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Courtney Meyers & Scott Burris
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AAAE 2024 National Conference Research Manuscript Presentation Schedule

Monday, May 20

Distinguished Research Session – Monday, May 20 – Opening Session – Ballroom 1
Facilitator: Scott Burris, Texas Tech University

Manuscript Title	Authors	Breakout Room & Discussant
Toward Globally Competent Teaching: A One-Year Retrospect on Agriscience Teachers' Changes in Perspective after an International Experience	Whitney L. Figland Cook, Jacob Englin, Richie Roberts, & Kristin S. Stair	Konza Prairie A Daniel Foster, Pennsylvania State University
A Call to Better Qual: A Philosophical and Methodological Examination to Advance Case Study Research	Rebecca Mott & Becky Haddad	Konza Prairie B Courtney Gibson, Texas Tech University
Retaining School-Based Agricultural Educators: A System Dynamics Approach	Tiffany Marzolino & Aaron J. McKim	Konza Prairie C Shannon Washburn, The Ohio State University
Black Doctoral Women "Walkin on Eggshells": Gendered Racial Microaggressions in Agricultural and Life Science Disciplines	Torrie Cropps	Kings B Summer Odom, Texas A&M University
Using ChatGPT with Novice Arduino Programmers: Effects on Performance, Interest, Self-Efficacy, and Programming Ability	Donald M. Johnson, Will Doss, & Christopher M. Estepp	Kings C Ben Swan, Cal Poly

Tuesday, May 21 – 9:15-10:45 a.m.

Session A – Tuesday, May 21 – 9:15-10:45 a.m. – Konza Prairie A
Discussant: Thomas H. Paulsen, Morningside University
Timekeeper: Rose Judd-Murray, Utah State University

Time	Manuscript Title	Authors
9:15	*Five-Year Analysis of Teacher Professional Development*	Dustin Perry, Scott Smalley, Michael Pate, & Becki Lawver
9:38	*A Twenty-Year Comparison of Traditionally and Alternatively Licensed SBAE Teacher Retention in Kansas*	KaCee James, Brandie Disberger, Gaea Hock, & Jonathan Ulmer
10:01	*Determining the Classroom Needs of School-Based Agricultural Education Teachers in Minnesota*	Lavyne Rada & Scott Smalley
10:24	*The Relationship Between Psychological Needs Satisfaction and Professional Commitment of Minnesota School-Based Agricultural Education Teachers*	Lavyne Rada, Amy R. Smith, & Bradley C. Greiman

Session B – Tuesday, May 21 – 9:15-10:45 a.m. – Konza Prairie B
Discussant: Aaron McKim, Michigan State University
Timekeeper: Sophia Jaramillo-Vasconez, University of Kentucky

Time	Manuscript Title	Authors
9:15	*Perspectives of African American School-Based Agricultural Education Teachers Toward Their Meaning of Work: A Q Methodology Study*	Courtney Brown, Angel Riggs, Lauren Cline, & M. Craig Edwards
9:38	*Exploring the Role of Positive Emotions in Leadership Learning*	Haley Traini, Katherine McKee, Dave Rosch, & Jennifer Smist
10:01	*Using Students' Chosen Pronouns in School-Based Agricultural Education (SBAE): An Exploratory, Longitudinal Study of Preservice Teachers' Perceived Knowledge and Preparedness*	Tyler Price & M. Craig Edwards
10:24	*H.O. Sargent: A Founding Father of the NFA*	Katlyn R. Foy, Wendy J. Warner, Joy E. Morgan, & Barbara M. Kirby

Session C – Tuesday, May 21 – 9:15-10:45 a.m. – Konza Prairie C
Discussant: OP McCubbins, Mississippi State University
Timekeeper: Catlin Goodwin, Michigan State University

Time	Manuscript Title	Authors
9:15	*Validation of the School-Based Agricultural Education Model of Support Instrument*	Kayla Marsh, Christopher J. Eck, & William Doss
9:38	*Tasks Associated with Teaching School-Based Agricultural Education: Advising an FFA Chapter*	Ryan Best, J. Shane Robinson, Robert Terry, Jr., M. Craig Edwards, & Ki L. Cole
10:01	*Tasks Associated with Teaching School-Based Agricultural Education: The Classroom and Laboratory Instruction Component*	Ryan Best, J. Shane Robinson, M. Craig Edwards, Robert Terry, Jr., & Ki L. Cole
10:24	*Identifying Relationships and Differences Related to Arkansas FFA Chapter Performance in Career Development Events*	Will Doss, Christopher M. Estepp, Donald M. Johnson, & Hiliary Rodgers

Session D – Tuesday, May 21 – 9:15-10:45 a.m. – Kings C
Discussant: Tracy Rutherford, Virginia Tech
Timekeeper: Kameron Rinehart, Texas Tech University

Time	Manuscript Title	Authors
9:15	*A Qualitative Analysis of the Development and Implementation of the "More to Meat" Campaign in Australia*	D'arcy Ryder, Courtney Meyers, Laura Fischer, Erica Irlbeck, & Courtney Gibson
9:38	*Determinants of Social Media Use by Government Agricultural Extension Workers in Nepal*	Sudarshan Adhikari, Emily Buck, & Narayan Raj Joshi
10:01	*Exploring Student Perceptions of an Interactive Virtual Tour of an Agricultural Facility*	Kylie Harlan, Courtney Meyers, Laura Fischer, & Lindsay Kennedy
10:24	*Electronic Field Trips and Inquiry-Based Learning: A Combination for Food and Agricultural Literacy*	Nicole Volk, Joy N. Rumble, & Sherifat Alabi

Wednesday, May 22 – 8:30-10 a.m.

Session E – Wednesday, May 22 – 8:30-10 a.m. – Konza Prairie A
Discussant: Joy Rumble, The Ohio State University
Timekeeper: Kelsey Hall, Utah State University

Time	Manuscript Title	Authors
8:30	*Framing Agricultural Labor Issues: An Analysis of News Coverage of the H-2A Program*	Erica Summerfield, Cara Lawson, Finn Garrison, & Lauren LaGrande
8:53	*Examining Consumers' Preferences for Beef Nutrition Social Media Influencer Messages*	Brooke Vyvlecka, Laura M. Fischer, Courtney Meyers, & Courtney Gibson
9:16	*Emerging Practices in Science Communication: A Scoping Review on the Design and Delivery of Professional Development Opportunities for Aspiring Agricultural Scientists*	Annabelle Lang & Richie Roberts
9:39	*What Do You Remember? An Analysis of Information Retention and Recall Through Data Visualization Use in Infographics*	Kristine Schechinger, Courtney Gibson, Laura Fischer, & Amber McCord

Session F – Wednesday, May 22 – 8:30-10 a.m. – Konza Prairie B
Discussant: Jon Ramsey, Oklahoma State University
Timekeeper: Mia Sullivan, Penn State University

Time	Manuscript Title	Authors
8:30	*Hispanic Student Motivation and Satisfaction after Participating in Organizations and Programs in the Gordon W. Davis College of Agricultural Sciences & Natural Resources*	Hannah Culak, Rudy Ritz, Courtney Gibson, & Amy Boren-Alpizar
8:53	*Does Sense of Belonging Predict Student Retention in a College of Agriculture?*	Christopher M. Estepp, Will Doss, Sarah James, & Donald Johnson
9:16	*Successful Programming for the Recruitment of Underrepresented Student Populations in Agriculture: A Case Study of a Diversity Initiative at an 1862 Land-Grant University*	Allison Spillman-Decell, Richie Roberts, Kristin S. Stair, & Michael F. Burnett
9:39	*SBAE Student Perceptions of Motivation through the Lens of Situated-Expectancy Value Theory*	Katrina Swinehart Held, Amanda Bowling, & Tracy Kitchel

Session G – Wednesday, May 22 – 8:30-10 a.m. – Konza Prairie C
Discussant: Laura Hasselquist, South Dakota State University
Timekeeper: Donavan Phoenix, University of Nebraska-Lincoln

Time	Manuscript Title	Authors
8:30	*Internal Dilemmas and External Burdens: Exploring Student Teacher Lesson Planning*	Amanda Bowling, Kellie Claflin, Mike Martin, Hannah Parker, Rachael Ramsier, & Javan Owiti
8:53	*Student Teacher Needs-Supporting and -Frustrating Experiences Through Guided Reflective Journaling: A Case Study of Triumphs and Tribulations*	Hannah C. Parker, Kellie Claflin, & Amanda M. Bowling
9:16	*Identifying Agricultural Mechanics Training Deficits for Preservice Agricultural Education Teachers: Perceptions of Teacher Educators*	Tyler Granberry, J. Joey Blackburn, Richie Roberts, & Blake Colclasure
9:39	*An Evaluation of Ohio Agricultural Education Students' Performance and User Experience in a Virtual Reality Machinery Safety Experience*	Justin Pulley, Dee Jepsen, Amanda Bowling, & Tracy Kitchel

Session H – Wednesday, May 22 – 8:30-10 a.m. – Kings C
Discussant: Amber Rice, University of Arizona
Timekeeper: Taylor Bird, University of Georgia

Time	Manuscript Title	Authors
8:30	*To Those Concerned with Teacher Retention: A Collective Thought Experiment*	Becky Haddad, Aaron J. McKim, Haley Q. Traini, Catlin M. Goodwin, & Brytany Gama-Romo
8:53	*Sowing Success: The Impact of Pedagogical Content Knowledge and Professional Development on the Turnover Intentions of SBAE Teachers*	Matthew Wood, Tyson Sorensen, Michelle Burrows, Rose Judd-Murray, & Lacee Boschetto
9:16	*Roots of Retention: Exploring Job Satisfaction, the Professional Identities, and Turnover Intentions of SBAE Teachers by Certification Type*	Matthew Wood, Tyson Sorensen, Michelle Burrows, Rose Judd-Murray, & Lacee Boschetto
9:39	*Investigating Teacher Margin and Creativity in Michigan*	Tiffany Marzolino & Aaron J. McKim

Wednesday, May 22 – 10:30 a.m.-Noon

Session I – Wednesday, May 22 – 10:30 a.m.-Noon – Konza Prairie A
Discussant: M'Randa Sandlin, University of Georgia
Timekeeper: Benjamin Fakunle, Purdue University

Time	Manuscript Title	Authors
10:30	*Sharing the Best Kept Secret: Describing Tennessee Residents' Familiarity with and Participation in Tennessee Extension Programs*	Victoria Jessie, Shelli Rampold, Jordan Richardson, & Tyler Granberry
10:53	*An Assessment of Clemson Cooperative Extension Agents' Perceptions of Work-Related Factors Leading to Burnout*	Erika Hwang, Christopher J. Eck, K. Dale Layfield, & Kristine Vernon
11:16	*Identifying Urban Extension Leadership and Personnel Development Priorities Through the Lens of Adaptive Leadership: A Nationwide Modified Delphi Study*	Joshua Campbell, Lauren Cline, & M. Craig Edwards
11:39	*Evaluating Land-Based Learning as a Pedagogical Approach*	Aaron J. McKim, Abbey L. Palmer, R. Bud McKendree, Phil Warsaw, & James DeDecker

Session J – Wednesday, May 22 – 10:30 a.m.-Noon – Konza Prairie B
Discussant: Mike Retallick, Iowa State University
Timekeeper: Krysti Kelley, Texas Tech University

Time	Manuscript Title	Authors
10:30	*Internationally Located Supervised Agricultural Experience Programs: An Exploration of Teaching Methods and Supervision*	Taylor D. Bird, Eric D. Rubenstein, & Amber M. Rice
10:53	*Exploring the Factors That Impact Positive Youth Development in Rural, Low SES High Schools*	Jason Hughes, Jonathan Ulmer, Brandie Disberger, Gaea Hock, & J. Spencer Clark
11:16	*Global Citizenship: Change in Agricultural Teacher Candidates from a High Impact Experience*	Mia Sullivan, Kasee Smith, Daniel Foster, Melanie Miller Foster, & Jeremy Falk
11:39	*Advancing Professional Development Among Secondary Agricultural Education Teachers in Uganda*	Dustin Perry, Brian Kibirige, & Michael Walach

Session K – Wednesday, May 22 – 10:30 a.m.-Noon – Konza Prairie C
Discussant: Kalynn Baldock, Eastern New Mexico State University
Timekeeper: Summer Odom, Texas A&M University

Time	Manuscript Title	Authors
10:30	*Middle School Agricultural Education Teachers' Implementation of Agriscience Fair*	Jillian C. Ford, Jason Dossett, Misty D. Lambert, & R. G. (Tre) Easterly III
10:53	*Incubating Education: The Lived Experiences of Middle School Science Teachers When Piloting a 4-H Science Enrichment Curriculum to Promote Agricultural Literacy*	Crystal Ahrens Rouillier & Richie Roberts
11:16	*Self-Regulated Learning in Middle School Agricultural Education: Teachers' Perspectives on Facilitating Quality Student Learning for Supervised Agricultural Experiences*	Jacob Englin, Richie Roberts, Kristin S. Stair, & Michael F. Burnett
11:39	*The Impact of a Weeklong STEM Immersion Curriculum Experience in School-Based Agricultural Education*	Christopher Eck, Kristopher Rankin III, Kayla Marsh, Emily Sewell, Ryan Best, Bradley Coleman, & J. Shane Robinson

Session L – Wednesday, May 22 – 10:30 a.m.-Noon – Kings C
Discussant: Kirby Schmidt
Timekeeper: Ruth Toole, University of Kentucky

Time	Manuscript Title	Authors
10:30	*Program Management and Planning Needs of Oklahoma School-Based Agricultural Education Teachers Based on Career Stage*	Ryan Best, Chris J. Eck, & Bradley M. Coleman
10:53	*A Critical Case Study of Secondary Students' Perceptions of Queerness, Social Positionalities, and School Culture in a Southern Rural High School*	Eric M. Moser, Stacy K. Vincent, Rebekah B. Epps, & J. B. Mayo
11:16	*Rising Above the Suffering: Assessing Agricultural Educators with Traumatic Situations Involvement in Supporting Students with Adverse Childhood Experiences*	William Norris, Shannon Norris-Parish, & Parker Greene
11:39	*More Than a Lesson: A Qualitative Analysis of Agricultural Educators' Impact on Students with Adverse Childhood Experiences*	William Norris & Shannon Norris-Parish

Wednesday, May 22 – 2:00-3:30 p.m.

Session M – Wednesday, May 22 – 2:00-3:30 p.m. – Konza Prairie A
Discussant: Eric Kaufman, Virginia Tech
Timekeeper: Cassandra Goff, University of Florida

Time	Manuscript Title	Authors
2:00	*Watch Your Language: A Systematic Review and Corpus Linguistics Analysis of Feedback in the Journal of Agricultural Education*	Kirby Schmidt, Josh Stewart, & Amy Smith
2:23	*Professional Rededication to SAE: Describing SAE Implementation in the United States*	William Norris, Roger Hanagriff, Don Edgar, & Kirk Swortzel
2:46	*A Fourteen Program Case Study of the Benefits and Challenges of 100% Work-Based Learning/SAE and Social-Emotional Learning/FFA Adoption*	Lavyne L. Rada, C. Zane Sheehan, Amy R. Smith, & Illana C. Livstrom
3:09	*Tasks Associated with Teaching School-Based Agricultural Education: The Supervised Agricultural Experience Component*	Ryan Best, J. Shane Robinson, M. Craig Edwards, Robert Terry, Jr., & Ki L. Cole

Session N – Wednesday, May 22 – 2:00-3:30 p.m. – Konza Prairie B
Discussant: Jessica Toombs, Chico State
Timekeeper: Emily Sewell, Oklahoma State University

Time	Manuscript Title	Authors
2:00	*"By God's Grace, Nothing Will Prevent Me": Exploring Intentions to Implement School-Based Agricultural Education in Liberia*	Haley Traini & Ehi Ogwiji
2:23	*Agricultural Education for All: Importance and Ability of Agricultural Educators to Integrate Special Education Competencies into Professional Practice*	William Norris, LaJoy Spears, & Steve Fraze
2:46	*Advocating for Agricultural Education: A Mixed Methods Examination on the Role of Opinion Leadership on Teachers' Advocacy Intentions*	Benita Komunjeru, Whitney L. Figland Cook, Richie Roberts, & Kristin S. Stair
3:09	*A Phenomenological Study of How Leaders Influenced the Career Choice of Pre-service Agricultural Education Teachers*	Cele Stone, Rudy Ritz, Jason Headrick, Erica Irlbeck, Steven Fraze, & Clarissa Darby

Session O – Wednesday, May 22 – 2:00-3:30 p.m. – Konza Prairie C
Discussant: Misty Lambert, North Carolina State University
Timekeeper: Mary Kate Lanier, North Carolina State University

Time	Manuscript Title	Authors
2:00	*"When I feel good, I'm almost pleasant to be around?" A Case Study of SBAE Teacher Wellness*	Colby Gregg & Amanda Bowling
2:23	*The Teacher's Noble Sacrifice: An Exploration of Agriculture Teacher Margin*	Tiffany A. Marzolino, Aaron J. McKim, Catlin M. Goodwin, & R. Bud McKendree
2:46	*The Examination of Skin Shades and Undertones Within Secondary Classroom Textbooks*	Stacy K. Vincent & Tara E. Rojas
3:09	*The Needs of Oklahoma School-Based Agricultural Education Teachers Related to Teaching Agriculture, Food and Natural Resources Topics*	Kristopher Rankin III, Christopher J. Eck, Kayla N. Marsh, Bradley M. Coleman, & Nathan A. Smith

Session P – Wednesday, May 22 – 2:00-3:30 p.m. – Kings C
Discussant: Justin Pulley, Tarleton State University
Timekeeper: Mikayla Daniels, North Carolina State University

Time	Manuscript Title	Authors
2:00	*The Intersection of Imposter Phenomenon and Multiracial Identity of Youth in Secondary Agricultural Education*	Juliana D. Markham, Stacy K. Vincent, & Sophia V. Jaramillo-Vasconez
2:23	*Teachers' Motivations and Barriers to Integrating Agricultural Content into Elementary School Curricula*	Kelly Gill, Madison Michels, & Amy Leman
2:46	*Parents' Value of their Children Learning about Agriculture in School*	Amelia Miller, Brian Warnick, Debra Spielmaker, Michael Pate, Ross Judd Murray, & Max Longhurst
3:09	*Implementing Agricultural Literacy in Pennsylvania Elementary and Middle Schools: Perceptions of Principals*	Madisen Plunkert & Kevin Curry

Toward Globally Competent Teaching: A One-Year Retrospect on Agriscience Teachers' Changes in Perspective after an International Experience

Authors

Whitney L. Figland Cook, *Louisiana State University*
Jacob Englin, *Louisiana State University*
Richie Roberts, *Louisiana State University*
Kristin S. Stair, *Louisiana State University*

Abstract

This study aimed to understand how agriscience teachers' lived experiences during an international experience influenced their perspective changes on globally competent teaching one year later. Using a phenomenological approach, four themes emerged – (1) personal growth, (2) intellectual growth, (3) professional growth, and (4) advocacy growth. By drawing on transformational learning theory, the themes demonstrated the phenomenon's essence – one year after an international experience in Costa Rica, the Louisiana agriscience teachers matured in their perspectives regarding globally competent teaching, which inspired a transformation in their personal and professional lives. Despite this, we concluded that the teachers' global competence, knowledge, and skills remained emergent and not fully formed. As such, we recommend that future research examine strategies that could be used to continue to support agriscience teachers' global competence and pedagogical development after returning from an international experience. Nevertheless, the growth experienced by the teachers should be further considered. Moving forward, we also recommend that future research obtain evidence regarding the extent to which the teachers have integrated global concepts into their curriculum to develop an understanding of the breadth and depth of their perspective changes.

Introduction and Review of Literature

A growing body of evidence has suggested that graduates must have adequate knowledge and skills to work in a globalized society (Marcos Fernandez et al., 2020). As such, the demand for a culturally competent workforce has been growing, and agriculturalists must understand domestic food production and consumption while also having the skills to navigate agricultural markets on a global scale (Marcos Fernandez et al., 2020). However, many agricultural graduates lack the global knowledge needed to flourish in today's competitive workforce (Goecker et al., 2015).

One strategy advanced to address these challenges has been global education – an approach designed to equip students with the competencies required to thrive in a world where national borders are becoming increasingly less distinct (Hall & Hite, 2022; Mardi, 2023; Parkhouse et al., 2015; Parmigiani et al., 2022). However, achieving such necessitates that teachers possess the competencies needed to teach from a global perspective (Pigg et al., 2021; Foster et al., 2014). Consequently, it has become crucial for students to enhance their global competence to be successful in their future careers (Roberts et al., 2023).

On this point, the Longview Foundation (2008) suggested that a globally competent teacher should exhibit (a) global knowledge of their subject, (b) a commitment to teaching students using multiple perspectives, and (c) the ability to help students become responsible global citizens (Longview Foundation, 2008). Equipping teachers with global competence is a somewhat new concept (Parkhouse et al., 2015). As a result, a paucity of evidence exists regarding how best to prepare teachers to achieve such competencies. For instance, Zong (2009) found that fewer than 10% of teacher preparation programs addressed global education in their preservice coursework. As such, the integration of global education concepts into teacher preparation has been insufficient due to a lack of preservice teachers' exposure to such concepts (Zong, 2009). In a similar study, Zhao (2010) reinforced this notion with evidence demonstrating a statistically significant and negative relationship between teachers' attitudes about global education and their intent to teach such concepts frequently.

Despite these deficiencies, Conner et al. (2017) called for agriscience teachers to integrate global concepts into their curriculum more profoundly. When exposed to a globalized agricultural curriculum, high school students have reported that the knowledge acquired from such an approach could positively influence their future careers (Heinert et al., 2020; Radhakrishna et al., 2003). Further, students have also suggested that experiencing instruction from an international perspective could help them develop an understanding of global agricultural practices (Heinert et al., 2020; Radhakrishna et al., 2003). However, many agriscience teachers have reported lacking the global knowledge and skills needed to teach such competencies to their students (Roberts et al., 2023). To complicate this issue further, there has been a dearth of empirical evidence examining teachers' global education needs (Mikulec, 2014). Such a paucity is concerning since teachers cannot instill global competence in their students without possessing such knowledge first (Tichnor-Wagner et al., 2019).

To help promote the acquisition of global knowledge in agriculture, some scholars (Brooks & Williams, 2001; Gorter et al., 2020) have called for more opportunities to allow agriscience teachers to engage in international learning experiences. However, agriscience teachers have reported that it has been difficult for them to participate in these endeavors because of limited time and financial constraints (Acker, 1999; Hurst et al., 2015). The inability to obtain global competence, therefore, has led to a narrow disciplinary approach from some teachers who can often only provide instructional content from a localized viewpoint, resulting in students having less understanding of the broader agricultural industry (Acker, 1999).

Granted, some progress has been made to promote the cultural competence of agriscience students. For example, Conner and Butcher (2016) reported that when agriscience students were exposed to a globalized curriculum, they attained greater employability skills. Further, a globalized agricultural curriculum has also been shown to enhance students' cultural competence and equip them with the 21st Century skills to be successful after graduation (Weeks et al., 2020). Conversely, some educators have indicated that they lack the confidence to teach concepts from a global perspective (Conner & Butcher, 2016). Therefore, the successful integration of this content into the agriscience curriculum has become a critical barrier to the cultural competence development of agriscience students (Roberts et al., 2023). To combat this issue, more evidence has been needed to understand whether international experiences could be used to expand agriscience teachers' knowledge and skills in ways that allow them to be better

prepared to create a pipeline of globally competent graduates for the agricultural industry. The dearth of evidence on this phenomenon served as the basis for this investigation.

Theoretical Framework

John Mezirow (1991, 2000) proposed transformational learning theory (TLT) after studying U.S. women returning to work – or higher education – after leaving their profession. TLT describes how individuals' perspectives change due to a profoundly impactful learning experience from an adult's frame of reference (Mezirow, 1997).

Frames of reference refer to the associations, concepts, values, feelings, and conditions that define a learner's lifeworld (Mezirow, 1997, 2000). Therefore, individuals' frames of reference shape how they process new information, ideas, and viewpoints, ultimately allowing them to reject or accept new information. Early in individuals' lives, their frames of reference result from the influence of their caregivers (Mezirow, 2000). However, frames of reference can evolve as individuals become exposed to new experiences and viewpoints that challenge their perspectives. Mezirow (1991) theorized that for adults to challenge their assumptions and engage in transformational learning, they must reflect on the experience and negotiate new meanings regarding a particular issue. This reflective process results in a transformation in an individual's frame of reference. The change in perspective often moves individuals toward a more inclusive, open-minded, and integrated perspective (Cranton, 1994; Mezirow, 1991).

Previous research on international experiences has recognized their potential to initiate transformative shifts in individuals' perspectives (Strange & Gibson, 2017). However, fostering such transformations necessitates that practitioners design and deliver such experiences purposefully to ensure that individuals are exposed to dissonance (Kiely, 2004). Dissonance represents the lack of agreement between an individual's previous frame of reference and what they observe during an international experience (Kiely, 2005). Kiely (2005) argued that the level of dissonance individuals encounter during international experiences also influences the transformative process they undergo by differentiating between low-intensity and high-intensity dissonance. Examples of low-intensity dissonance during an international experience are individuals noticing differences in the customs, traditions, and practices between their home and host country (Kiely, 2004). Meanwhile, high-intensity dissonance would likely occur when an individual experiences conflicts regarding class, race, social status, and human welfare. Therefore, high-intensity dissonance may initiate more reflective thought, believed to trigger more profound shifts in individuals' perspectives (Brewer & Cunningham, 2009).

In the current investigation, we examined an international experience's role in challenging agriscience teachers' previous assumptions and whether such led to them adopting globally competent teaching practices after one year. In particular, we sought to describe whether teachers' engagement in an international experience led them to challenge their previous assumptions and create a more diverse global perspective that they could impart to their students through curricular and pedagogical changes.

Background of the Study

In July 2021, eight agriscience teachers from Louisiana were selected to participate in a one-week international experience in Costa Rica – an opportunity funded by a USDA-NIFA grant. During their experience abroad, the participants interacted with academic and technical experts about issues that affected the country's agricultural industry. The intent of the international experience was to provide agriscience teachers with the knowledge needed to expand their pedagogical acumen to incorporate globally competent teaching in their classrooms. We achieved this by designing and delivering purposeful experiences across five programmatic focus areas: (1) coastal loss sessions with scientists in Costa Rica, (2) STEM-focused site visits, (3) cultural tours, (4) the development of instructional case studies, and (5) reflective sessions to that helped the teachers make connections to their experience and the agriscience curriculum in Louisiana.

Through these interactions, our goal was to ensure the agriscience teachers gained a more nuanced understanding of the issues and problems affecting Costa Rican agriculture. To help globalize their curriculum, we required the teachers to collect audio recordings of interviews with experts, documents, photographs, and videos. The teachers then used this information to create 24 instructional case studies, which were dispersed to agriscience teachers throughout Louisiana. Despite these efforts, little was known about how the agriscience teachers used their new knowledge and skills to promote globally competent teaching in their agriscience programs. Therefore, data for the current study were collected one year after the teachers returned from their international experience.

Purpose and Research Questions

This study aimed to understand how agriscience teachers' *lived experiences* in Costa Rica influenced their perspective changes on globally competent teaching. One research question guided this study: How have the agriscience teachers' lived experiences in Costa Rica inspired them to instill global competence in their students one year later?

Methodology

Moustakas' (1994) transcendental phenomenological approach guided this study. A phenomenological study describes "the common meaning of several individuals and their lived experiences of a phenomenon" (Creswell & Poth, 2018, p. 75). This approach allows the investigators to gain deeper insight into participants' shared experiences on a phenomenon. To achieve this, Moustakas (1994) advanced a four-step process to ensure qualitative quality: (a) epoché, (b) phenomenological reduction, (c) imaginative variation, and (d) synthesis of textual and structural descriptions. Each of Moustakas' (1994) recommendations was embedded in this investigation.

Participant Selection

The participants for this study were agriscience teachers who participated in an international experience in Costa Rica. In phenomenological research, low sample sizes (with as few as five individuals) are considered acceptable since the intent is to understand individuals' shared experiences in depth rather than seek to generalize the findings (Polkinghorne, 1989). In alignment with Polkinghorne's (1989) recommendations, five participants agreed to participate in this investigation. Multiple attempts were made through email and telephone correspondence

to reach the three unresponsive participants who also participated in the international experience; however, contact could not be established. Of those participants, all were agriscience teachers who taught from four to 25 years and had previously traveled internationally at least once. Four of the participants were female, and one was male. It should also be noted that three of the participants were traditionally certified, while two achieved certifications through alternative licensure. Therefore, the participants had a great diversity of personal and professional experiences.

Reflexivity

In the first stage of Moustakas' (1994) phenomenological approach, epoché, it was critical to be open about our potential biases and experiences. First, it was essential to acknowledge that each researcher had international experience and previously served as an agriscience teacher. Further, two researchers were faculty at Louisiana State University (LSU) and were responsible for designing and delivering the international experience. The other two researchers were graduate students at LSU and helped facilitate the collection of data. Then, collectively, we negotiated findings and advanced our interpretations as a team. We attempted to mitigate our biases during each phase by bracketing our views and experiences to ensure they did not cloud our interpretations – a process advanced by Moustakas (1994).

Data Collection and Analysis

To gain a deep understanding of the phenomenon, we spent six months collecting and synthesizing the data (Tracy, 2010). The primary source of data collected was multiple semi-structured interviews with each participant, which occurred either in person or through a virtual meeting platform, i.e., Zoom or Microsoft Teams. The interviews probed participants' experiences regarding their role as an educator, their experience in Costa Rica, and the impact the experience had on their personal and professional lives. The interviews were audio-recorded and transcribed verbatim by the researchers. We triangulated the data with observations of participants' classroom teaching, written reflective statements on their international experience, and other artifacts collected during the international experience. These artifacts included daily audio reflections ($f = 35$) recorded during the agriscience teachers' international experience and a two-hour focus group interview that occurred on their final day in Costa Rica. Each data source was mobilized for analysis in this investigation.

After collecting the data, we employed Moustakas's (1994) phenomenological reduction approach. This process began by analyzing each source of data line-by-line to identify significant statements (Moustakas, 1994). Then, we organized the significant statements into preliminary categories based on the research questions of this investigation. Next, we engaged in Moustakas' (1994) notion of imaginative variation by using versus coding to view the data from a different perspective. This process allowed us to question the competing goals, conflicts, or patterns in the data. During this process, we negotiated various discrepancies that emerged during our analysis.

Thereafter, we engaged in Moustakas' (1994) final step, a synthesis of textural and structural descriptions. Specifically, this phase aimed to understand *how* and *what* the participants experienced regarding the phenomenon (Moustakas, 1994). Therefore, we began constructing structural descriptions using divergent perspectives, theoretical frameworks, and opposing

explanations (Moustakas, 1994). We also began to make meaningful conceptual connections and identified how they were related, which emerged 22 categories. Then, we synthesized our emergent findings, which helped create unified statements of agriscience teachers' experiences regarding the phenomenon (Moustakas, 1994). In this phase, we negotiated and developed a complete synthesis of the structural and textual descriptions, presented through four themes, which were narrated in the findings section.

Qualitative Quality

To ensure we achieved the highest standards of qualitative quality, we embedded Tracy's (2010) recommendations throughout all phases of this study. Those standards included (a) worthy topic, (b) rigor, (c) sincerity, (d) credibility, (e) resonance, (f) significant contributions, (g) ethics, and (h) meaningful coherence. First, we selected a study that was worthy of investigation because it was relevant to Louisiana due to the need to develop culturally competent teachers who desired to teach content from a globalized perspective. We emphasized rich rigor and credibility by collecting multiple forms of data to triangulate our findings and provide rich insight into the context and experiences of participants while also achieving sufficient data saturation. Meanwhile, we promoted sincerity by including self-reflexive statements from the researchers to reveal our relevant biases and experiences. The richness of our data sources also helped us achieve resonance by ensuring that our findings could provide quality insight into the lived experiences of participants to encourage transferability to other contexts. Throughout all phases of the study, we emphasized ethics by first obtaining Institutional Review Board (IRB) approval and upholding cultural, procedural, and situational ethical decision-making throughout the life of the study. Because of the emphasis we placed on upholding standards of rigor and trustworthiness in this investigation, we perceive this it was able to make a significant contribution by meaningfully interconnecting theory, research, and practice to provide quality implications for the field of agricultural education.

Findings

Based on our analysis, four themes emerged – (1) personal growth, (2) intellectual growth, (3) professional growth, and (4) advocacy growth. By drawing on TLT, the themes demonstrated the phenomenon's essence – one year after an international experience in Costa Rica, the Louisiana agriscience teachers matured in their perspective regarding globally competent teaching, which inspired a transformation in their personal and professional lives.

Theme 1: Personal Growth

After the participants were immersed in Costa Rican culture and agriculture, it led them to reevaluate their personal assumptions and have a broadened understanding. In particular, the participants expressed how they were largely unaware of other countries' agricultural practices before their international experience. However, their interactions with professionals in Costa Rica exposed them to new customs and agricultural practices, i.e., low-intensity dissonance, that made them rethink their prior assumptions (Mezirow, 1991, 2000). For example, Participant #2 commented: "[This experience] makes you step back and think about things we are doing here and how I need to think of the bigger picture some." Meanwhile, Participant #1 shared: "[This

experience] had a big impact on [me] personally seeing different cultures and agriculture, specifically how they approach food production differently that we do [in the U.S.]."

Such changes in the participants' perspectives also appeared to lead them to consider alternative approaches to address global challenges and problems in agriculture by drawing on their collective knowledge as well as different perspectives to grow personally one year after returning from Costa Rica. Case in point, we observed that all participants in this investigation made noticeable changes to their classroom environments to promote sustainability by reusing and recycling materials. When probed about making such changes, Participant #3 stated, "The [international] experience has made me think about how I use things...I have now started to recycle more at home [rather] than buying new. This has also obviously made me start promoting these ideas to my students as well." Similarly, Participant # 5 shared:

> I would say a that a year after returning from Costa Rica, I have just continued to reflect and grow on a personal level. In Costa Rica, my eyes were opened to the importance of recycling and sustainable waste management. Since coming home, I've realized that I can make an impact on the environment by incorporating recycling practices into my daily life and teaching my students to do the same. The impact may be small, but at least I am doing my part now, while I really wasn't before I went to Costa Rica.

The experience abroad also led the participants to become more culturally aware. On this point, Participant #4 revealed that she "tries to stay mindful of what is going on in Central and South America." During our observations, we noted that such sentiments were expressed by all the participants, who talked about how they had begun to keep up with global news to understand how various issues affected the agricultural industry. When promoted about this, Participant #1 explained: "I've just started reading a lot more since returning from Costa Rica about agriculture in other countries. Because my personal interest in global ag news has grown, I also bring this into my classes through various examples and discussions with students."

Theme 2: Intellectual Growth

All of the teachers expressed intellectual dissonance, or an inconsistency with previously held beliefs, after their international experience regarding knowledge they believed to be universal (Mezirow, 1991, 2000). However, their experience abroad helped them understand that their knowledge was incomplete. For instance, many of the participants compared the cultural, environmental, and agricultural differences between Costa Rica and the U.S. Participant #1 explained: "[Costa Ricans] have a different mindset on utilization of resources…they are very land and water conscious… [the U.S.] just tries to maximize production and profitability while draining our resources." Because of this growth, Participant #1 explained "now that I better understand some differences in production practices among the different countries, I can also explain different agricultural systems to my students at a higher level since returning from Costa Rica." Meanwhile, Participant #3 revealed:

> The exposure we gained to different agricultural practices [in Costa Rica] was just mind-blowing. One year after witnessing their commitment to sustainable agricultural practices, I can say it has transformed the way I teach. Now, I am putting a lot more

> emphasis in my classes on conserving resources and adopting eco-friendly farming approaches. So, what I learned in Costa Rica is definitely being put into practice and impacting my students positively.

Some of the participants explained that the experience abroad made them realize that the U.S. could be doing more in terms of sustainable agriculture. For example, regarding land use, Participant #4 expressed: "[They] can have businesses right next to each other and grow bananas in the between them." He also explained: "We have the space, but the plants don't do anything other than make [the landscape] look pretty. This newfound knowledge has become a big part of my curriculum for horticulture now. It just made me rethink some things I've taught over the years." In a similar vein, Participant #2 shared: "Costa Rica's commitment to biodiversity preservation is inspiring. [Since my international experience], I've started integrating lessons on biodiversity conservation into my classes, which has helped my students understand the interconnectedness of agriculture and the environment."

Although Costa Rica is more food secure than most other Central American countries, the teachers still reported experiencing intellectual dissonance regarding food insecurity. For example, Participant # 4 explained: "As an ag teacher, I always teach about food insecurity, but I never really put a lot of thought into how we individually could contribute to this mission before I went to Costa Rica." She continued:

> Now, a year later, I preach to my students how food insecurity isn't just a local issue. It's a global concern. My experiences in Costa Rica just really emphasized the importance of teaching our students to grow nutritious food sustainably, which can ensure a brighter future for all people. I guess, I am just doing a lot more of that now.

Echoing this sentiment, Participant #2 recalled: "We were exposed to a lot of subsistence agriculture in Costa Rica. It taught me that even small spaces can yield enough food to support a family when managed effectively. I now encourage my urban students to explore different types of gardening approaches that can utilize every inch of available land." Participants also articulated the need to adopt some of Costa Rica's practices in terms of their eco-friendly mindset. Participant #5 explained: "We need to adopt some harvest methods Costa Rica uses…[and] better utilize our water structures. It is not just about growing crops; it's about creating a balanced ecosystem. This holistic approach now informs my teaching philosophy." Finally, Participant #3 argued:

> The lessons I learned from Costa Rica have shown me that agriculture shouldn't be this static, non-changing industry. Instead, we need to evolve with the times and new innovations, especially when teaching students about these types of practices. Since I got back from Costa Rica, I am definitely more committed to keeping my classroom curriculum up to date with the latest sustainable practices.

Theme 3: Professional Growth

The teachers were asked to process their experiences throughout their time in Costa Rica. To achieve this, they journaled as well as captured photographs and videos. The agriscience teachers

reported drawing on these sources to help them share their experiences with others. Case in point, Participant #1 explained: “[I] discussed and showed pictures of my international experience with my classes…. science department…and foreign language department.” This was echoed by Participant # 2, who stated: “[I] shared my written reflections with my principal” and “[I] also shared them with my classes.” On the other hand, Participant #4 revealed: "Costa Rica taught me the value of working with people from different backgrounds. For example, I started collaborating with science and environmental studies teachers to provide a more comprehensive lesson that incorporated different perspectives.” Meanwhile, Participant #5 explained:

> My international experience in Costa Rica helped me understand the power of storytelling in teaching agriculture. I have started weaving real-life anecdotes from my time there into my lessons. Now, I feel like I can make the subject matter more relatable and engaging for my students.

All the teachers in this investigation also reported implementing the knowledge they gained from their international experience in their classrooms. For example, Participant #1 revealed: “I am working on a hydroponics system [at school] and thinking about how to utilize space similar to what I saw in Costa Rica.” Meanwhile, Participant #2 echoed a similar sentiment: “Costa Rica’s sustainable farming practices inspired me to revamp my curriculum. I introduced modules on organic farming, agroforestry, and biodiversity conservation, giving my students a more holistic understanding of alternative approaches to agriculture.”

The participants also created new resources to teach their students from a global perspective. In particular, the teachers shared that they had created case studies, laboratories, and research assignments with a global agriculture focus – experiences they had not integrated into their classes before traveling to Costa Rica (Participants #1, #3, and #4). On this point, Participant #3 explained:

> One of the most impactful changes I have made to my teaching since Costa Rica was the creation of new teaching resources. I revamped some of my presentations with images and videos from my Costa Rican journey, making some of the concepts we discuss in horticulture, agricultural mechanics, and animal science more thought-provoking for my students.

Each participant also reported creating new resources to use when teaching their students about concepts from a global perspective. In particular, the participants shared how they have utilized pictures, discussions, and case studies to teach their students global concepts more frequently. For example, one of the participants stated: “[I] have shared pictures, videos, and stories” (Participant #3). Participants #5 and #2 shared that they had implemented the case studies they created in Costa Rica into their curriculum. Participant #2 explained the value of using this resource over the past year: “Incorporating the case studies we developed in Costa Rica into my classroom allowed me to showcase real-world examples of agricultural challenges and solutions. It helped my students connect theory to practice and encouraged critical thinking.” Finally, Participant #1 reported: “I started incorporating guest speakers [using video conferencing software] that I met in Costa Rica about their role in the agricultural industry. They were able to share experiences and insights that helped me add a missing global dimension to my classroom.”

Theme 4: Advocacy Growth

The final theme reflected a growth in the agriscience teachers' *advocacy* behaviors. As an illustration, all participants expressed that after returning home, they began to advocate for their students, themselves, and others to engage in international experiences. On this point, Participant #1 shared that engaging in globally competent teaching can be difficult unless you have already had an international experience; therefore, he encouraged other agriscience teachers to go abroad regularly after returning from Costa Rica. He continued: "Costa Rica helped me understand the immense potential of international experiences in agricultural education. Witnessing sustainable farming practices, diverse agricultural systems, and the importance of global perspectives ignited a passion within me to bring these insights back and share them with other ag teachers."

Similarly, Participant #5 explained: "Until you have been there and seen something like that, you can't really connect to those experiences." Multiple participants also reported discussing plans to organize an international trip for other agriscience teachers in Louisiana. Regarding this idea, Participant #3 reported: "By sharing about my experience in Costa Rica, I inspired some other ag teachers to consider joining me on similar experiences in the future. I think this could really broaden their horizons and deepen their appreciation for global agriculture as well." Participant #2 reiterated the importance of travel to experience new ideas, especially for teachers. She explained:

> Traveling is good…. it helps us to relate and reference how things are done in different places. After returning from Costa Rica, I felt a responsibility to advocate for international experiences to my fellow teachers. I firmly believe that exposing educators to different agricultural methods and cultures can enrich their teaching practices and ultimately benefit our students.

The impact of this international experience also made the participants feel a sense of responsibility to ensure their students were also becoming more globally aware. This notion was expressed by Participant #4, who stated: "Our job as teachers is to be able to share that global perspective, so I encourage all students to take the opportunity to travel abroad." Expanding on this notion, Participant #2 maintained: "involving our students in international agriculture can be really impactful. Through partnerships with organizations to promote international exchanges, I hope to expose my students to the world and try to create global agricultural leaders." Participant #5 maintained: "Over the past year, I have become more determined to equip my students with the skills and knowledge needed to become advocates for a more sustainable food system." Finally, Participant #1 revealed: "After my experience in Costa Rica, I firmly believe that by embracing international experiences and sharing my knowledge, I can help prepare the next generation of agriculturists to thrive in a globalized world."

Conclusions, Implications, and Recommendations

This study examined how agriscience teachers' *lived experiences* in Costa Rica influenced their perspective changes on globally competent teaching. To gain insight into this phenomenon, we grounded our study in Mezirow's (1991) TLT to gain an understanding of the participants' transformational learning. Consequently, we found that one year after the international experience, the agriscience teachers experienced vital growth. Despite this, we concluded that

the teachers' global competence, knowledge, and skills remained emergent and not fully formed. As such, we recommend that future research explore strategies that could be used to continue to support agriscience teachers' global competence and pedagogical development after returning from an international experience. Nevertheless, the growth – personal, intellectual, professional, and advocacy – experienced by the teachers should be further considered.

Personal growth referred to how the participants reevaluated their assumptions and gained a more holistic understanding of global agriculture, specifically regarding cultural awareness. For example, the teachers reported watching more global news and trying to stay updated on issues after returning home. This finding supported previous literature by Ibezim and McCracken (1994), which concluded that when preservice teachers actively participated in international experiences, they developed a heightened sense of cultural awareness and a broader worldview. Although the participants were actively teaching, this conclusion demonstrated the importance of teachers engaging in international experiences during multiple phases of their careers to become globally competent leaders. Moving forward, we suggest that teacher educators expand opportunities for preservice and in-service agriscience teachers to engage in international experiences to ensure they obtain key global competencies.

The agriscience teachers also reported *intellectual growth* after being exposed to concepts not supported by their previous knowledge. As an illustration, after returning home, the agriscience teachers began to challenge their assumptions and become more open-minded to alternative approaches to agricultural production. This conclusion was consistent with Mezirow (1991), who theorized that for adults to change their frames of reference, they must engage in reflective discourse to develop a broader perspective. Such a finding was also supported by evidence from O'Malley et al. (2019), who reported that international experiences focused on agriculture led to shifts in participants' intellectual growth and global competence development. When considering such through the lens of TLT, we recommend that practitioners seek to understand participants' assumptions and biases to determine the extent to which international experiences can help them mature in this regard.

In the third and fourth themes, *professional* and *advocacy growth*, the teachers began to draw on their international experience to inspire and champion the global competence development of others. In particular, the teachers began to share their experiences with their peers and their students. Further, the teachers reported using their experience abroad to discuss global issues while incorporating the curriculum materials they developed. Also, the teachers indicated an overwhelming desire to advocate for students and other teachers to engage in international experiences in the future. Such sentiments do not appear to have been previously reported in the literature on international experiences for agriscience teachers.

Our findings also suggested that the teachers were working to establish a globalized curriculum and held positive beliefs about incorporating these concepts into agriscience. This concept was supported by Mezirow's (1991) TLT, which postulated that perspective changes occur after individuals experience dissonance, i.e., the international experience in this investigation, which leads to actionable changes. In the current study, actionable changes were reported by the agriscience teachers one year after their international experience through their development and use of global curriculum resources, sharing their experiences abroad, and advocating for the

global competence development of others. These behavior changes warrant further examination. However, future research should also be conducted to obtain evidence regarding the extent to which the teachers have integrated global concepts into their curriculum to develop an understanding of the breadth and depth of their perspective changes.

A critical implication emerging from this investigation was that the dissonance reported by the agriscience teachers in this investigation was primarily low-intensity rather than high-intensity (Mezirow, 2000). Previous research (Kiely, 2004, 2005) has indicated that high-intensity dissonance can initiate deeper, more impactful perspective transformations. Perhaps this is because Costa Rica is considered to be more developed than other countries in Central and South America. Therefore, we recommend that future investigations examine whether international experiences in less developed nations and for longer durations of time may expose agriscience teachers to higher-intensity dissonance that leads to more transformative growth in globally competent teaching practices. It should be noted that a limitation of this study was that the international experience was only one week. Perhaps a longer experience could have been more impactful and led the participants to develop greater global competence. Therefore, we recommend that future investigations explore the effect of short-term versus long-term international experiences on agriscience teachers' global competence development.

Discussion

In school-based agricultural education, global learning is not a distant concept. Instead, it is at the heart of what teachers do every day. Despite this, agriscience teachers have reportedly struggled to connect global concepts to agricultural content (Acker, 1999; Hurst et al., 2015). Data from this investigation suggested that high-quality international experiences for agriscience teachers can serve as a transformational learning experience that can inspire them to adopt globally competent teaching practices. However, financial barriers often discourage teachers from engaging in such opportunities (Hall & Hite, 2022; Mardi, 2023). Therefore, it is critical for leaders in agricultural education to act as advocates for global learning in multiple ways.

Such support could take on various forms. For instance, leaders in agricultural education can begin to advocate for various global initiatives, such as seeking funding for international experiences for teachers or acquiring classroom materials with a global focus. Equally impactful, however, could be dispositional support for global education. This type of support could be manifested through statewide missions that emphasize global agriculture. Perhaps leaders could also formally and informally recognize teachers' successful contributions to their students' global competence growth through feedback sessions during formal evaluations, positive remarks to local school administrators, or more formal celebrations and recognition programs.

Going forward, teacher preparation programs for agricultural education should also establish a range of coordinated efforts to support preservice teachers' global competence development, extending beyond teaching abroad opportunities. For example, teacher educators could infuse global education throughout their curriculum, including applying theories of cross-cultural learning, communication, and pedagogy in multiple courses. Without such support, agriscience teachers will likely continue to struggle to prepare their students to shape the globally connected world they inhabit.

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A Call to Better Qual: A Philosophical and Methodological Examination to Advance Case Study Research

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Some set great value on method, while others pride themselves on dispensing with method. To be without method is deplorable, but to depend on method entirely is worse. You must first learn to observe the rules faithfully; afterwards, modify them according to your intelligence and capacity.
(Sze & Wang, 1701/1963, p. 17)

Abstract

Over the past 15 years, qualitative case study research has become more prominent in agricultural education. The first case study research appeared in the *Journal of Agricultural Education (JAE)* in 1997. To date, 33 qualitative case study research articles have been published in *JAE*. Additionally, case study research has become highly visible at regional and national conferences. However, planning, conducting, and reporting case study research is challenging due to the various approaches that exist. Furthermore, various philosophical assumptions underlie each unique approach. We offer this article as a roadmap to help novice researchers and reviewers make decisions about case study research. Additionally, we provide recommendations for writers, reviewers, and teachers of qualitative research who desire to strengthen their understanding of this methodology.

Introduction

In 2022, we wrote and presented a paper at the American Association for Agricultural Education national research conference focused on advancing qualitative rigor in phenomenological research. Throughout the research and writing process, we began to realize a similar resource was needed for those conducting, teaching, and reviewing case study research. Our inklings were reinforced at the national conference when numerous graduate students, trainers of qualitative researchers, and reviewers reached out to ask for similar work focused on other qualitative approaches. That need was reiterated as graduate students enrolled in our own courses requested guidance to support making decisions about case study methodology. Hence, the current philosophical paper came into existence.

We extend our call to rigorous qualitative research with an exploration of case studies, recognizing a felt need from those conducting, teaching, and reviewing case study research, and knowing case study is well situated as a pragmatic approach to challenging issues. Exploring, unpacking, and communicating the various approaches to case study research has been more difficult than we anticipated. This challenge is further complicated by the conflation of the terms *case study* and *case study research*. While *case studies* are commonly used as teaching tools, *case study research* follows different structures and styles that warrant exploring and embracing.

Additionally, with numerous approaches to case study research, undergirded by different philosophical underpinnings and processes for data collection and analysis, this methodology gets muddy very quickly. Without sound methods, clear communication about those methods,

and well-designed research questions, case study research does not offer the rigor or trustworthiness needed to make an impact on our profession. This article is intended as a practical resource promoting collaboration and conversation aimed at methodological improvement in agricultural education and leadership. Additionally, we hope it may serve as a useful tool for those teaching qualitative research courses or advising doctoral students.

This philosophical paper explores case study research published in agricultural education with a goal of advancing methodological rigor to yield higher-quality research. By providing an educational resource for writers, reviewers, and even teachers of qualitative research, our purpose is to clarify the similarities and differences among the various approaches to case study research. It is significant as it provides recommendations to de-mystify the writing and reviewing of case study research. Our positionality is framed both through our assistant professor roles at land grant universities, and our teaching and research using a variety of qualitative approaches to meet our research purposes. Readers will see evidence of pragmatic and interpretive lenses in this philosophical paper. We believe the most useful resources are easy to digest without extensive effort. We hope this paper will become a practical and familiar tool for researchers, reviewers, teachers, and students of case study research.

The greatest limitation of this paper is our inability to discuss case study research in greater detail due to space limitations. Additionally, our content analysis only included articles from the Journal of Agricultural Education (JAE). We have not explored the case study research our peers have published in other academic journals. We also regret space limitations have not allowed us to include an analysis of or discussion about data analysis techniques appropriate for case study research.

Situating Case Study Research

Although case studies themselves have probably existed since the beginning of recorded history (Flyberg, 2011), Frederic Le Play is credited for introducing the method during the 1800s in France in the field of finance. The origin of case study research in the United States can be traced to the Chicago School of Sociology (Tellis, 1997). The Chicago School's approach merged quantitative and qualitative methods and focused on researching people and culture. In addition to being used in the social science fields of sociology, medicine, and psychology (Kittenham et al., 1995), case study research is employed in management, anthropology, and others (Priya, 2021).

Researchers may find this approach helpful for describing, exploring, explaining, evaluating, and understanding processes or dynamics of an event, program, activity, or individual(s) (Creswell & Poth, 2018). Case study research is particularly useful when exploring an event or phenomenon in its real-life context (Yin, 2018). More specifically, this effort at exploration separates case study from other qualitative study designs. While a "phenomenon" may be explored, that does not make it a phenomenology. While a bound may be present, the study is not inherently a case. A helpful distinction lies in case study's use of "naturalistic design," meaning the researcher does not attempt to control or manipulate variables (Crowe et al., 2011). This "naturalistic design" helps separate case study from other qualitative methodologies; it implies an unobtrusiveness only available by collecting and analyzing myriad sources of data beyond interviews (i.e., manipulation).

Although case study research is typically categorized as qualitative (Creswell, 2014; Denzin & Lincoln, 2011; Merriam, 2009; Miles et al., 2014; Stake, 2006), it may also include quantitative data and is sometimes even used in quantitative and mixed methods research designs (Mills et al., 2010). Case study research typically incorporates a variety of data collection methods and sources, defines a case or cases within a bounded system (parameters), and is used to gain an in-depth understanding about that case or cases.

Differentiating Among Approaches

The use of case study design for qualitative research emerged along with the rise of grounded theory methodology (Glaser & Strauss, 1967). Since then, Robert Yin, Sharan Merriam, and Robert Stake are three prominent case study methodologists whose techniques are utilized and referenced frequently in agricultural education research. Additionally, Creswell et al., (2007) suggest that Yin, Merriam, and Stake are three researchers who provide procedures to follow when crafting case study research.

Robert Yin (1984) advanced case study research using a post-positivist approach to the methodology. Over time, Sharan Merriam and Robert Stake utilized adapted forms of case study methodology to evaluate programs and curriculum. Although Yin, Merriam, and Stake can all be classified as case study researchers their approaches vary both philosophically and methodologically, even to the extent of contradicting each other on occasion. We hope understanding Yin, Merriam, and Stake's approaches at a deeper level will help novice researchers make decisions about how to conduct, write, review, and/or teach case study research in alignment with their research purpose and philosophical assumptions. We have included a brief introduction about each of the three case study methodologists, along with a chart to quickly identify key terminology and characteristics associated with each. We intend for this resource to support consistency and alignment of case study research.

Yin's Positivist Approach to Case Study Research

Case study research depends on "prior development of theoretical propositions to guide data collection and analysis" (Yin, 2002, pp. 13-14).

Yin published the first edition of his well-known text *Case Study Research and Applications: Design and Methods* in 1984, at a time when researchers were utilizing case study, but the methodology was not well understood (Stake, 2017). Yin's primary emphasis is on process, and his use of words like "formal and explicit procedures" suggests his fondness for highly structured methods (Yin, 2018, p. 3). Yin's goal with case study research is the development of theory, believing case study design is the most useful in program evaluation. Yin advocates the use of case study methodology to help explain "how" and "why" questions. He also recommends case study design when the context is relevant to the phenomenon under investigation and when the lines between phenomenon and context are blurred (Yin, 2003).

Although Yin's case study approach is considered qualitative, his research paradigms are positivist. Terms like objectivity, validity, reliability, generalizability, and testing theory appear in his writing and reflect his assumptions. Additionally, Yin notes the case study may incorporate quantitative data into its design and, at times, categorizes qualitative data to create quantitative

data. Notably, Yin's 2018 revision of his original 1984 text suggests perhaps case study research should not be considered qualitative after all, but rather "a separate method that deserves much further explication" (Yin, 2018, xxiii).

Merriam's Constructivist Approach to Case Study Research

Case study research is "an intensive, holistic description and analysis of a bounded system such as a program, an institution, a person, a process, or a social unit" (Merriam, 1988, p. 21).

Sharan Merriam states what truly makes a case study a case study is the unit of analysis in a clearly bounded system (Merriam, 2009). She assumes reality is subjective and constructed through meanings and understandings of lived experiences and social interactions. A particular strength of Merriam's approach to case study research is her clear guidance for conducting literature reviews and selecting a theoretical framework. Suggesting theoretical frameworks may be drawn from literature or practice (Merriam, 1998), Merriam also makes clear recommendations for assigning titles to case study research.

Merriam prioritizes using practical processes to interpret and manage findings that are clear and applicable (Harrison et al.,2017) and recommends using multiple triangulation strategies to ensure rigor; data source triangulation, investigator triangulation, theory triangulation, and methodology triangulation. She emphasizes the holistic and ever-changing nature of qualitative research and insists the case study must provide enough details so the reader can see the author's conclusion is plausible (Merriam, 1998). While Merriam provides far less structure than Yin, she offers more concrete guidance than the third methodologist included in this article; Robert Stake.

Robert Stake's Constructivist Approach to Case Study Research

"Finishing a case study is the consummation of a work of art" (Stake, 1995, p. 15)

It is not an accident Robert Stake's book (which he refers to as a "Student Reader") is titled *The Art of Case Study Research*. He values the creativity that can occur within his flexible approach and explains: "Each researcher's style and curiosity will be unique in some way" (Stake, 1995, p. 13).

Stake describes his writing style for case study research as an "ample but non-technical description and narrative" (Stake, 1995, p. 134), recognizing the case report should include a "substantial body of uncontestable description" (Stake, 1995, p. 110). He also suggests including enough details about the physical context to provide ambiance while warning researchers not to overshadow findings with the description of the case. Stake asserts literature should be woven into discussion of a case study to ensure the findings are grounded in research. *Vignettes*-- "briefly described episodes to illustrate an aspect of the case" (Stake, 1995, p. 128) --are a hallmark of Stakian case study to introduce and conclude a report.

Stake prioritizes the use of case study research for people and programs and emphasizes the importance of selecting case(s) that help maximize what we can learn (Stake, 1995). He also explains case study research is not meant to be generalized, but others may indeed learn from reading about a particular case (Stake, 1995). Philosophically, Robert Stake aligns closely with

Sharan Merriam. However, Stake's approach to case study research differs from both Merriam and Yin in that he focuses on the case to be studied rather than processes and structures (Mishra, 2021).

Figure 1.

Characteristics of Prominent Approaches to Case Study Research Used in Agricultural Education

	Robert K. Yin	**Sharan Merriam**	**Robert E. Stake**
Philosophical Assumptions/ Interpretive Framework	Positivism/post-positivism	Constructivism/ Interpretivism	Constructivism/ Interpretivism
Research design	Tightly structured research design. Focus on the research process.	Presents a step-by-step process for research design	Flexible research design, focus on the case itself
Types of case studies	Single holistic, single embedded, multiple holistic, multiple embedded	Historic, observational, intrinsic, instrumental, multisite, descriptive, interpretive, evaluative, collective, cross-case, multi-case, comparative case	Instrumental intrinsic, collective
Data sources	Multiple sources, suggests use of both qualitative and quantitative data	Interviews, observations, document review, researcher-generated documents such as diaries or memos	Loosely structured interviews, observations, document review
Issues of Validation	Construct validity, internal validity, external validity, reliability	Data source triangulation, investigator triangulation, theory triangulation, methodological triangulation	Internal validity, reliability, external validity
Key terms	Objectivity, generalizability, unit of analysis, theoretical propositions, rival explanations	Theoretical framework, holistic description, particularistic, heuristic	Vignettes, assertions, issue questions, particularization

Note: Adapted from *Mishra, S. (2021 a) Mishra, S. (2021 b).* Yazan, B. (2015).

Situating Case Study Research in JAE

Recognizing the variety of approaches to case study allows us to turn our attention to the *Journal of Agricultural Education (JAE)* to review engagement with this method of qualitative inquiry. In 2022, we situated a call to advance qualitative research in JAE through an exploration

of Kim Dooley's (2007) recommendations for advancing qualitative research (Mott & Haddad, 2023). Following a similar format, we utilized a conceptual content analysis (Krippendorff, 2004; White and March,2006) to help provide a foundational understanding of how researchers and authors in the profession are conducting and communicating case study research. Throughout all phases of the research, we kept an audit trail that included detailed descriptions of our methods to promote trustworthiness. Additionally, we discussed results together and debriefed with other peers (Drisko & Maschi, 2015)

We searched JAE for articles using "case study," locating 42 articles with this search term from 1997 through June 2023. Two articles were removed from the frame as they analyzed "CASE Curriculum" (not using case study methodology), and one article was available by title only. We organized the remaining 39 articles by author, title, and publication year. Upon further analysis, three additional articles were removed as they analyzed the use of case studies as teaching tools rather than conducting case studies, and two outlined ethnographic or phenomenological rather than case study methods. Finally, three additional articles utilized the term "case study" in the title or abstract but did not include any component of case study methodology in their study. Instead, they were quantitative in nature, using descriptive statistics, content analysis, or general qualitative approaches. Noting the confusion this labeling contributes to engaging in case study methodology, these three studies remained in the frame for analysis, but encourage us return to Merriam's recommended naming conventions including phenomenon, theory, and "case study" when titling articles.

Using an Excel spreadsheet, we examined the articles to identify concepts, including case, concern, theoretical framework, philosophical assumptions, type of case study, data collection, number of participants, and identified themes. The remaining 33 articles were written by 97 authors, with an average of three authors per manuscript. The majority of authors (57, 59%) were only listed on one manuscript. Six authors were on two manuscripts, two were on three, and three were on four or more. Four authors were the first or solo authors of two or more manuscripts. Most commonly, authors used some form of collective (4), descriptive (4), instrumental (7), or multiple (3) case study approaches. Other identifiers included "qualitative case study," "mixed-methods case study," "exploratory case study," or simply cited Stake (1995, 2006, 2013), Merriam (1998, 2002, 2009), Yin (1989, 2003, 2009, 2014, 2017), or Creswell (1998, 2018).

Most authors named and described a theoretical framework or explained one was not utilized because of the desire for participant experiences or perspectives to frame the findings. However, far fewer authors positioned themselves as researchers and discussed philosophical assumptions impacting the research design. Data collection also varied. One-third of the studies used only one form of data collection, usually interviews or a survey. Another third used two forms of data collection, most often interviews accompanied by field notes or programmatic records. The remaining third either used multiple forms of data collection (27%) or did not outline the types of data utilized in their study (2, 6%).

Participant numbers ranged from one site to 290 survey responses accompanied by eight interviews. Case studies averaged 30 participants, recognizing a median of 10 participants.

Cases ranged and were variously bounded. Some examples of clear, bounded cases included: women's experience in a preservice teacher preparation program, science integration in a high school ag program, students at a particular high school preparing CDE (Career Development Event) teams, and a state's Farm Bureau Federation Young Farmers and Ranchers program. Other cases identified the concept to be studied or the general population without identifying what made the study sample a case. Themes and findings were equally varied, but commonly used only a single noun or the specific constructs of the theoretical framework to articulate findings. Knowing this, we are well-equipped to discuss opportunities to advance case study research in JAE.

A Call to Better Qual

"Many years ago, when I was pursuing an undergraduate music degree, my music theory professor was adamant about incoming students learning to write using basic chord structures and progressions before moving on to more advanced techniques. When we students strayed from these basic patterns, our assignments would swiftly be returned with bold red marks. Dr. McRoberts would gruffly scold us, "When you know what you are doing, you can go outside of these guidelines on purpose. But you are not going to do that simply because you do not know what you are doing."

The above *vignette,* a tool utilized by Robert Stake to illustrate an important aspect or issue of a case, introduces the next section of our article. We purport the same principle holds true for novice researchers learning to design sound qualitative research as it does for budding composers in any media. Experts go outside of norms intentionally, purposefully, and with good reason. Novices do so because they do not know better. Students of research should learn the norms and fundamentals initially and develop the habit of using these foundational patterns as building blocks to design and carry out sound research.

We present Figure 1 as a starting point for novice researchers, teachers of research, and reviewers to use when considering differences among common approaches to case study research. Selecting an approach in alignment with one's philosophical assumptions and the intended research purpose is an important first step. Considering data collection techniques and sources, the design of the case itself, and terminology aligning with the chosen approach are also important. For example, when reading an *intrinsic case study* manuscript citing Stake throughout the methods section, a reviewer might anticipate the findings section would contain *vignettes.*

Once researchers have a solid understanding of the characteristics associated with a methodological approach, they may choose to make decisions outside the expected norms *if* there is a good reason to do so. We encourage writers to be especially intentional about communicating *why* choices were made when straying from patterns associated with identified methodologists and methodical approaches.

The ABC(D)s of Writing & Reviewing Case Study Research

In 2015, Yazan openly acknowledged a key challenge facing research conducted via case study methodology: "[Case study] still does not have a legitimate status as a social science research strategy because it does not have well-defined structure and well-defined protocols" (p. 134). While case study research continues to advance in JAE and allows researchers to pragmatically explore issues facing populations across agricultural education, our discipline faces a similar challenge in articulating case study research. As such, we ask writers and teachers of case study research to consider the ABC(D)s of case study research: articulating analysis, building the bounds, constructing the case, and describing all data as they prepare case studies and the resulting manuscripts, and request reviewers to look for the same.

Articulating the Approach

As we have already outlined, there are significant differences in how Yin (2002), Merriam (1998), and Stake (1995) outline case study research. Each espouses a different paradigm for approaching the methodology, and as such the means of engaging in case study look different. It is imperative, then, for researchers to clearly articulate their approach to case study research. Beyond citation, researchers must address the philosophical assumptions underpinning their case study work. We exhort writers to align approach with purpose and worldview (Harrison et al., 2017); designing the exploration supported by case study researchers and aligned with philosophical assumptions.

Too often, outlining philosophical assumptions is dismissed as bias inducing to research. Yet, all research is influenced by philosophical assumptions; regardless of the authors' choice to acknowledge them. These assumptions about the nature of reality and truth influence the kind of questions explored and how we go about the exploration (Glesne, 2016). Critically, researchers must position themselves within the research, explaining how their own worldview and prior experiences have impacted the research question(s), methodology, data analysis, findings, and conclusions. Reviewers should ask of any manuscript: Is there evidence to support how the researcher's philosophical assumptions have influenced this study?

Cleary articulating the approach has significant implications for how the research will be conducted, analyzed, and interpreted. Regardless of alignment with seminal approaches, we challenge researchers to move beyond gathering information to deeply digging into issues (Stake, 1995). "Good research is not about good methods as much as it is about good thinking" (Stake, 1995). Themes should reflect meaningful issues, not simply identify key topics participants discussed. Merging aligned research with transparent writing to articulate the process is our central call. This manifests in approach and extends to the presentation of findings as themes. Deriving themes beyond convenient alignment with theoretical framing to explore the case under investigation truly and deeply is central to elevating this research methodology. Descriptively writing to articulate the same is also critical.

Building the Bounds

Given the variability in defining (or not defining) the case, we must take care in how our presentation and writing describe it. While each seminal case study methodologist defines "case" differently, on this they all agree: the limits of the case must be clearly defined. Writing research questions informed by literature, theory, and context are critical aspects of defining the case

(Stake, 1995). Cases are defined in terms of their relation to the world around them, including place and time as well as geography, organization, types of evidence, and even priorities for analysis (Yin, 2002). This makes it critical to include detailed descriptions, not only of the case itself but of the context surrounding the case. Key details must move beyond describing the sample under study to explore the economic, social, cultural, historic, and even environmental context surrounding the case (Leite & Marks, 2005). Merriam describes this as "fencing the case" (2008, p. 40), and we use this analogy to remind writers a fence keeps things in and out.

The bounds of the case have impacts on the remainder of the study design and the appropriateness of selected participants and data sources. Only a detailed description of the case context and its bounds can fully help a reader or reviewer interpret the appropriateness of the data sources. As such, reviewers should expect to see the number of participants, length and frequency of interviews, observations substantiated by the case's context, and the approach to case study undertaken. This is part and parcel with "understanding and openly acknowledging the strengths and limits of case study research" (Yin, 2002, p. 4). In bounding the case, we acknowledge the limit of what the case allows us to explore, explain, and apply beyond its bounds.

Constructing the Case

Constructing a case goes beyond a simple diagnosis. In case study research, we must look beyond "cases of" to include looking back to our approach and forward to our exploration. Remember, Yin (2002) defines case as a "contemporary phenomenon within its real-life context," Merriam (1998) focuses on the "delimitation of the case" (i.e., what the case is not), and Stake (1995) contends defining the case is not possible based on individual interaction with and interpretation of the case. While this may seem like contradictory footing from which to build a case, we remind writers and reviewers the goal is alignment rather than survey. Definition of the case is one area where readers likely will not see citations of all three seminal authors.

Describing a case, then, must go beyond simply citing the seminal case study methodologist with which a study aligns. The alignment in case extends from approach through description of the data and presentation of themes. It informs every emergent, convergent, and divergent detail to be uncovered. Across the case, there will also be associated structures helping to guide the researcher--and subsequently the reader—through the aligning approach as well as the data. For example, case studies aligning with Stake's (1995) approach will most likely use vignettes, Yin's (2002) will include a "chain of evidence," and Merriam's (1998) will emphasize triangulation. Furthermore, and certainly not as a secondary consideration, the type of case study will have ramifications for the complete design. Philosophical alignment again becomes imperative as the case study undertaken should serve the study's purpose while guiding data collection, use, and interpretation through the aligning structures.

Describing All Data

Finally, a hallmark of case study is the ability to draw on all necessary data forms to support the exploration of and understanding through the case. Researchers must capitalize on the encouragement to use an array of data, likely qualitative, recognizing quantitative may also

be appropriate, to explore their case and unearth what was previously hidden. Researchers' epistemological assumptions should influence the data sources. For example, a case study using Yin's (2002) approach would likely include both quantitative and qualitative data. Researchers citing Merriam (1998), or Stake (1995) would be more likely to only utilize qualitative data or at least most heavily emphasize the qualitative findings. All three, however, agree on case study as an in-depth method, implying the need for some kind of fieldwork, multiple sources of data, and deep and up-close interaction with the case being studied (Stake, 1995, Yin, 2018, Merriam, 1998). Recognizing the necessity for an array of data to embrace case study design fully calls for researchers to engage beyond interviews. Across qualitative research, we must engage deeply with the relevant and integral components of study design beyond collecting talk to include cultural and environmental knowledge, beliefs, and assumptions, and with case study specifically, artifacts and evidence-building context for the case.

The opportunity to vary significantly across types of data collected is both a benefit and a burden for the researcher. While maximizing the benefit of all sources of data the case can share, the burden of appropriateness of the data source falls on the writer. For each data source used, the writer must explain both the appropriateness of the source and incorporate references to that data in their analysis. Reviewers can expect to see writers articulating how each data source was analyzed differently based on the type of data it provided, with support from citations. This use of data moves beyond triangulation. The multiple data sources encouraged in case study design are where the discrepant details emerge. Beyond confirmation, authors should discuss how additional data show a difference in reflection and practice, provide opportunity for prolonged engagement, and delineate differences from what has been previously published as it pertains to the case.

Novice researchers often look for concrete, objective realities when naming themes instead of subjective processes and experiences. When this occurs, themes become superficial and have a limited ability to contribute to literature (Mishra et al., 2022). This starts with analyzing data to consider deep issues rather than key topics and carries through the reporting of findings. Describing data well also means identifying themes in descriptive and revelatory ways. Identifying themes is challenging, and naming those themes, even more so. First and foremost, themes should fit together. In case study research, when exploring a bounded unit, themes should align within the domain of the case. As an example, "feelings," "ponderings," and "challenges," may be ways to make sense of the data in coding, but those terms do not help the reader understand the relationship between them in terms of similarities or differences. In addition, themes should be named in a similar fashion, demonstrate balance in presentation, and clearly relate to the research question and theoretical framework. Noting a tendency to utilize constructs from a theoretical framework to identify themes, we offer this distinction for readers: themes should help your reader understand the data as it pertains to emergent findings, the question the data supports answering, and the frame grounding the study.

Applying the ABCDs: An Example

Let us assume a case study focused on student teacher's expectations of their cooperating teacher. Using the guidelines above, we should first *articulate the approach*. Knowing we (the writers) lean pragmatically constructivist, Yin is off the table. To better understand which approach to follow, we need to articulate our purpose and research questions. Our purpose is to

explore how student teachers engage in mentoring relationships with their cooperating teachers. Our questions then, may ask: What are student teachers' expectations of their cooperating teacher mentors? How are student teachers being mentored by their cooperating teachers? What cooperating teacher actions matter most to student teachers? What kind of mentor words, actions, and behaviors do not feel supportive to student teachers? While we may be interested in mentorship in a particular context (Stake, 1995), our questions, relative to our problem, are directing us to maximize learning (Merriam, 1998) about mentorship itself. Therefore, we might choose an *instrumental* approach to case study research, focusing more on describing mentorship than the particular program or setting in which it is occurring.

Second, we need to *build the bounds.* For the sake of example and space, we acknowledge the need to define the case geographically, historically, organizationally, economically, socially, culturally, historically, and even environmentally. This context may seem extensive but should not be assumed. For this example, we will build the bounds around all student teachers from one college participating in student teaching during the spring semester of 2024.

Recognizing alignment with Merriam (1998), our *construction of the case* should emphasize triangulation, and build credibility, consistency, and transferability into our study design. We should collect interviews, but could also collect student teacher assignments, notes from conversations with cooperating teachers and school administrators, and field notes from observing student teachers and cooperating teachers in action in the classroom, just to name a few. A hallmark of case study research is the use of multiple data sources; simply relying on interviews alone is not methodologically sound and does not align with this expectation. Also, case study research tends to emphasize prolonged engagement in the field, with observations occurring over an extended period.

Finally, we will need to *describe all data* included in the case study. This should extend far beyond mentioning we conducted, for example, "Five student teacher interviews, one hour of classroom observations, and analyzed three student teacher reflective assignments." In addition to including detailed information about each data source, the relevant data in each source contributing to the development of each theme needs to be explained. Describing the data is a function of the methods section, but perhaps even more necessary is outlining how the themes were gleaned from the data, particularly as it pertains to source. For example's sake, let us assume we named a theme "Desiring independence while seeking boundaries." Perhaps student teachers' interviews provided paradoxical evidence; while on one hand they wanted to be independent teachers, they also discussed regretting their cooperating teacher did not give them structure or guidance. We also may have found multiple reflective assignments written by participants providing similar evidence. Maybe the researcher even noted evidence of this in their classroom observations. In the discussion of this theme, it would be important to mention how individual interview data, reflective assignments, and field observations supported it. Participant quotes, text from reflective assignments, and comments taken from the researcher's field notes could all be used to describe this theme. Relying only on interview data and not explaining how other data sources were used within the case study does not provide the needed rigor.

Conclusion

"Perhaps the most difficult task of the researcher is to design good questions, research questions, that will direct the looking at the thinking enough and yet not too much" (Stake, 1995, p.15). We are not advocating a cookie-cutter approach to qualitative research, but instead providing tools and discussion to promote intentional decision-making. As we explore the challenges of conducting case studies and exhort writers to engage deeply in this research method, we begin with a challenge. Much of this call focuses on alignment, but technical and structural alignment alone will not produce good research. Beyond alignment, we ask writers to ask good questions, and we implore mentors and teachers of any research approach to teach good questioning toward solving wicked problems (Kolko, 2012). Improving qualitative work across our discipline is an intentional effort. Case study requires substantial alignment efforts to retain rigor and uncover revelatory findings. Revelatory findings move us from the "what" of the case to a detailed description providing insight into the "why" and "how" underneath the case. In a profession assessing impacts on learners of all ages, it is critical to try to understand what is going on behind the scenes; what is the story surrounding the statistics? Although case study research is not generalizable, it can certainly provide insight and perspective that may be useful in other contexts and situations.

Instead of simply identifying a case, rich and rigorous qualitative case studies ask good questions and yield complex answers. Furthermore, a case study should capitalize on multiple forms of data and rely on opportunities for prolonged research engagement. Conducting case study research is more challenging than it may appear at first glance. To that end, this manuscript is a starting point. We hope we have provided enough context that readers know where to explore individual methodologists via original sources to enhance their case study efforts. We must ask questions situating us in broader problems and grand challenges. In trying to answer these questions, we will extend our research from exploratory to revelatory. Only then will we be able to move from the basics of methodological application into contributions reflective of our "intelligence and capacity" (Sze & Wang, 1701/1963, p. 17).

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Retaining School-Based Agricultural Educators: A System Dynamics Approach

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Abstract

The teacher retention issue has been plaguing school-based agricultural education (SBAE) since the 1970's. This issue has been investigated from a multiplicity of angles by researchers throughout the discipline. A major gap in the literature, however, comes from the absence of a systems perspective which relates these various empirical studies to one another. This philosophical manuscript proposes a representation of one of the many systems teachers may navigate as they choose whether to remain in or leave the profession. Utilizing literature from the Journal of Agricultural Education, scholarship within the Theory of Margin, experiential knowing, and feedback from current and former teachers, a casual loop diagram (CLD) was constructed to represent one of the systems potentially present in SBAE. This model demonstrates how teachers navigate periods of margin deficit, where their workload is greater than their ability to achieve it. Analysis of the proposed CLD demonstrates there may be an overreliance on the noble sacrifice mindset and an underutilization (or prohibition) of boundary setting driving teachers' decision to leave the profession.

Introduction

The continual exodus of teachers from their jobs, 8.0% leaving teaching annually in general education and 6.8% in SBAE (Lawver et al., 2018), has led the profession to be deemed a "leaky bucket" (Sutcher et al., 2016, p. 2). In School-Based Agricultural Education (SBAE), teacher attrition has been identified as a significant challenge (Disberger et al., 2023; Smith & Smalley, 2018; Solomonson et al., 2019; The National FFA Organization, 2022). Research notes personal factors, working conditions, teacher development, and compensation as reasons for agriculture teacher attrition (Solomonson et al., 2018). Stated simply, the solution is to plug the holes in the leaky bucket by retaining teachers (Disberger et al., 2023; Kelsey, 2006; Sutcher et al., 2016); unfortunately, execution of this solution is much more complex. In fact, a growing clamor within the literature suggests systems perspectives are essential to exploring this complex issue (Haddad et al., 2023; Pauley et al., 2019). Within this philosophical manuscript, we employed a system dynamics approach to better understand the teacher attrition phenomena within SBAE.

Purpose

The purpose of this philosophical manuscript is to communicate the conceptualization of a systems model that explores what early career teachers may be experiencing in the profession. The creation of this model was facilitated by employing systems dynamics and the Theory of Margin. Understanding this system can help teachers and teacher educators in a variety of ways, including:

1. Locating areas in the system where small changes can make big shifts in system behavior, thus allowing individuals to take appropriate action(s).
2. Giving teachers, teacher educators, and any other interested parties vocabulary to associate with different feelings or experiences.
3. A preliminary understanding of one of the many systems teachers may navigate throughout their careers.

An Introduction to System Dynamics

System dynamics was employed to explore this topic. System dynamics is a specific facet of systems thinking and was originally created by Jay Forrester (1968) and further developed by himself and a team at the Massachusetts Institute of Technology. System dynamics has been utilized in a multiplicity of disciplines and contexts since its creation, from management to education. System dynamics also informs the work of Meadows (2008), who defines systems as "an interconnected set of elements that is coherently organized in a way that achieves something" (p. 11), requiring that systems have elements, interconnections, and a function (non-human systems) or purpose (human systems). System structure is thought to drive system function largely via feedback loops, which are interactions between varying factors that magnify a response in one or more variables (Duffy, 2008; Meadows, 2008). See Table 1 for an exploration of these concepts in an SBAE context.

Table 1

An Exploration of Systems Concepts in an SBAE Context

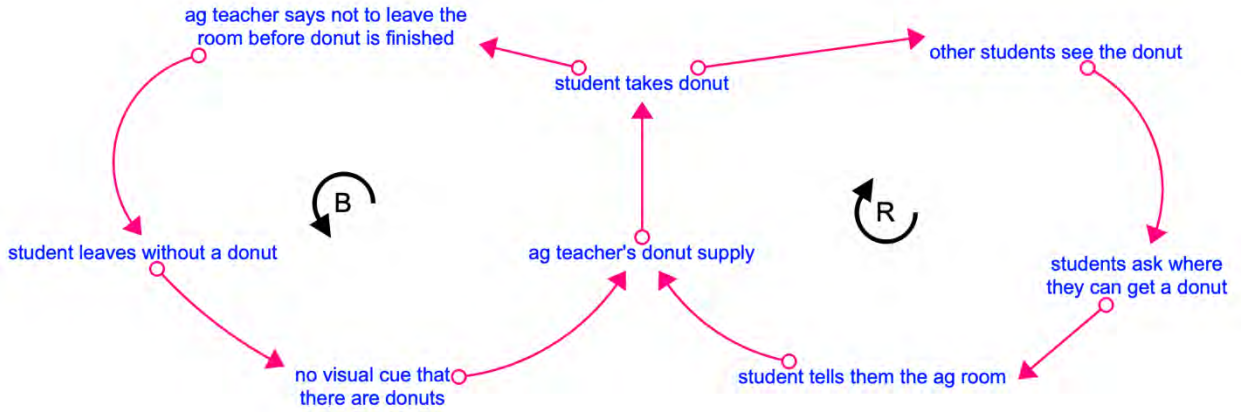
Item Type	Definition	SBAE Example
System elements	Different aspects within a system.	Teacher, students, and donuts.
Interconnections	Connections between system elements.	Teacher → donut → students.
System function	What a non-human system was designed to do.	The function of a float in a livestock watering tank is to ensure there is always water available; when the float is not atop the water, it will cue inflow to refill the tank.
System purpose	What a human system was designed to do (or is doing unintentionally).	The purpose of the SBAE system is to create agriculturally literate students who are good citizens.
Feedback loop (reinforcing)	When an interconnection creates a circle and comes back to its source, creating feedback; this type of feedback amplifies an effect.	One student leaves the ag room with a donut; other students see the donut and ask where that student got it; a slew of students arrive to the ag room for a donut; as more students see others with donuts, this cycle is amplified because many students would like a donut.

Feedback loop (balancing)	When an interconnection creates a circle and comes back to its source, creating feedback; this type of feedback tries to balance the impact of an effect.	To keep some donuts, the teacher tells the student to eat the donut in the ag room; other students do not see a donut; others do not know the ag teacher has donuts; the ag teacher's supply of donuts remains intact.

System dynamics approaches often involve the usage of models or causal loop diagrams (CLDs) to help visualize a system. In the case of the teacher and their donuts, these loops can be visualized for further clarity.

Figure 1

Example Causal Loop Diagram



Note. The *elements* of the system are represented in blue. The *interconnections* are represented by pink arrows. The R represents the *reinforcing loop* (i.e., cyclical system interaction that amplifies an effect) and the B represents the *balancing loop* (i.e., cyclical system interaction that balances the impact of an effect).

System dynamics approaches are appropriate to use when the problem at hand (i.e., teacher retention) is dynamic, has feedback cycles, and occurs over time (Duffy, 2008; Forrester, 1968; Kim, 2008; Meadows, 2008). Utilizing systems perspectives is recommended in education, especially when looking at the long-term effects of educational policy (Groff, 2013) and can help to make decisions from a variety of levels (i.e., individual, district, regional, state, national). These decisions are generally made at leverage points, defined as "places in the system where a small change could lead to a large shift in [system] behavior" (Meadows, 2008, p. 145). Leverage points outlined by Meadows (2008) include numbers, reinforcing feedback loops, information flows, solving delays, transcending paradigms, and more. See Table 2 for an exploration of these phenomena and examples within SBAE.

Table 2

Leverage Point Types and Examples in SBAE Context

Leverage Point Type	Definition	Example in SBAE
Numbers	The quantities of elements within a system.	Recruits in a teacher preparation program.
Reinforcing feedback loops	Altering the amplification of a reinforcing feedback loop.	A student who has not been turning in any work begins to turn in their work again, disrupting this feedback loop.
Information flows	Preventing or supplying information to other parts of the system.	Telling a parent about a student's poor performance in class.
Solving delays	Decreasing the amount of time a delay takes in a system.	Instead of allowing grading to pile up, grading things the day they are completed.
Transcending paradigms	Pushing people's minds to grow and think in a new way.	Taking disciplinary action against a student's poor choice, which does not repeat because the student learned there were consequences.

Theoretical Background

Our systems model of agriculture teacher attrition was framed using the Theory of Margin (McClusky, 1963). This theory is comprised of three key concepts. First, *load* is all the things an individual is tasked with that require energy, including both internal (e.g., personal goals) and external (e.g., work and family) components (Hiemstra, 1993; McClusky, 1963). Second, *power* is the energy an individual possesses to accomplish their load, which also includes internal (e.g., stamina) and external (e.g., support networks) components (Hiemstra, 1993; McClusky, 1963). Finally, *margin* is the difference between power and load (McClusky, 1963). An individual with margin, where their power exceeds load, has energy available to innovate, learn, and experiment with new ideas; alternatively, an individual without margin, where their load exceeds power, will be bogged down by obligations, precluding them from fully engaging in life (Merriam et al., 2006).

The Theory of Margin was developed to inform adult learning; however, it also has utility in our modeling of agriculture teacher attrition. Individuals are more resilient within, and committed to, systems that afford margin (Biney, 2021). Therefore, modeling the capacity for margin within SBAE is critical to understanding agriculture teacher retention. Furthermore, margin is a prerequisite to teachers bettering the system in which they operate (McKim & McKim, 2023), suggesting margin is critical to continual system adaptation, led by teachers, to be more aligned to their needs, goals, and values.

Methodology

The model developed takes the form of a causal loop diagram (CLD). The CLD was created using Stella Architect Version 3.4 (Stella Architect, 2023). The final diagram was informed by the researcher and a literature review of scholarship published in the *Journal of Agricultural Education* since 2000. Obtaining research for the literature review was facilitated by searching the following keywords: agrarianism, stress, attrition, system, teaching attitude, work-life balance, and job satisfaction. The initial collection of 57 articles was refined to 16 articles based on an analysis of the article titles and review of the abstracts. Salient conclusions within each of the 16 articles were incorporated into the model development process, as highlighted within the presentation of the CLD. Because SBAE teachers are operating within a multiplicity of interconnected systems, all operating on differing temporal and spatial scales, system boundaries must be set before modeling the system. This system is bounded within a school year and is based on an individual's decisions within their career as a teacher. Furthermore, the core of the system is a period of margin deficit; as such, aspects that may be unrelated to influencing this deficit are excluded, as they are not within the system's bounds.

The CLD was evaluated for face and structural validity by various system stakeholders (Burns & Musa, 2001), including two teacher educators, four current SBAE teachers in [State], and one former SBAE teacher who recently left the career. Adjustments to the model's structure and the narrative were made accordingly. There are many different symbols utilized to represent concepts within the CLD. These are outlined in Table 3.

Table 3

Symbols Used in Causal Loop Diagrams

Symbol	Meaning
+	Direct relationship between two variables (e.g., as one increases, the other increases).
-	Inverse relationship between two variables (e.g., as one increases, the other decreases).
=	Delay in information between two variables.
→	Relationship between two variables.
R	Reinforcing feedback loop.
B	Balancing feedback loop.

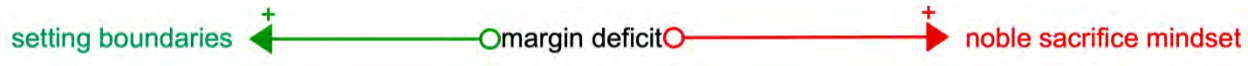
Findings

The model will be presented piece by piece and is color-coded to enhance readability. To enhance clarity, literature will be reviewed as the model is revealed. A narrative will be presented alongside the CLD as well to provide examples of how the concepts in the model may manifest.

This model begins with a teacher experiencing margin deficit, a key assumption of this model. When a teacher is experiencing margin deficit, they need to increase their margin to avoid breakdown. This can be done by increasing power or by decreasing load. In this conceptualization, teachers have a choice; they can choose to rely on the noble sacrifice mindset and take the red route or they can set boundaries and take the green route. Importantly, Traini et al. (2019) found early career teachers could find success or balance, but not both. The authors believe that this success or balance phenomena (Traini et al., 2019) is evidence that the decision in this model exists. See Figure 2.

Figure 2

Core Decision Point



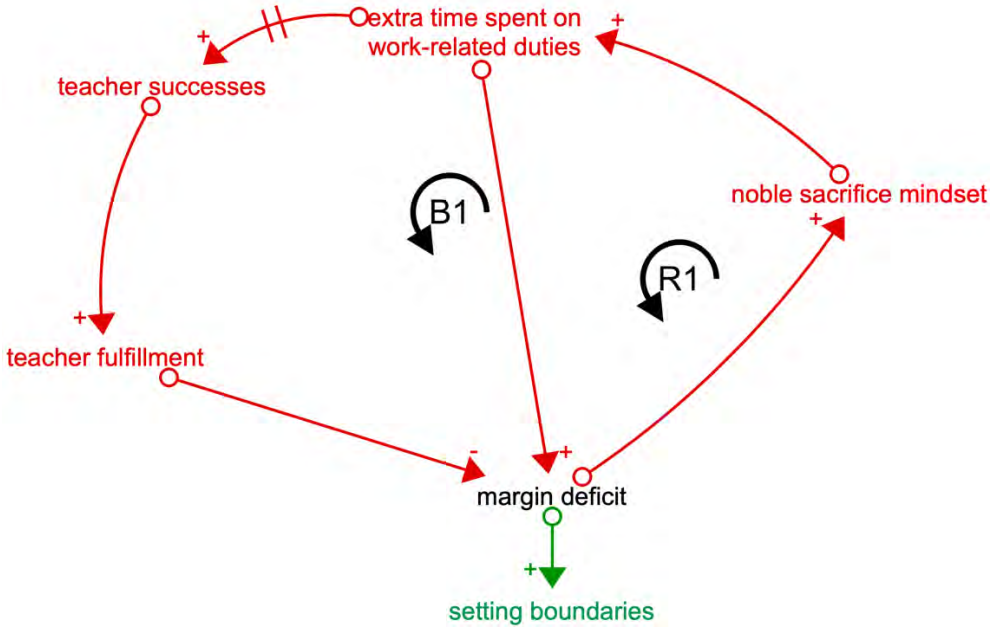
Let's say the teacher chooses to rely on the noble sacrifice mindset. To explore this mindset, one must unpack the phrase itself: *noble*, meaning possessing high moral character, principles, or ideals, and *sacrifice*, meaning an offering, giving something up for something or someone else (Merriam-Webster, n.d.). The noble sacrifice mindset is one in which the teacher is okay with sacrificing their time for something that feels like the right thing to do; as examples, spending more time with students to prepare them for leadership development events, working on the greenhouse roof over the weekend, or spending their evenings devising creative and innovative lesson plans. This mindset can also be invoked by asking teachers to remember their purpose in teaching, their 'why.' The existence of this mindset is thought to be tied to agrarianism and agrarian ideology which may exist in agriculture teachers (Martin et al., 2022; Martin & Enns, 2017; Martin & Kitchel, 2013).

Agrarianism is linked to FFA within SBAE literature. Agrarian views were held by several pre-service teachers enrolled in an SBAE program (Martin & Enns, 2017) and agrarianism can be found in the FFA and its tradition (Martin et al., 2022; Martin & Kitchel, 2013). In their work, Martin and Kitchel (2013) found two themes of agrarianism found in the FFA – dependence on self and loyalty to tradition. The noble sacrifice mindset relies on the teacher pushing themselves to dedicate extra time to seeing students succeed, which may be rooted in tradition. Communities where teachers find themselves may also have traditions teachers are expected to adopt. The teacher themselves may have expectations that stem from traditions valued personally. As such, when confronted with a margin deficit, the teacher operationalizing the noble sacrifice pathway may persuade themselves that they need to be content with this state and the status quo.

Noble sacrifice addresses margin deficit because of its other connections within the system. The entirety of the noble sacrifice route, the red route, is pictured in Figure 3. Our literature review revealed evidence of the noble sacrifice mindset; as an example, Clark et al. (2014) identified teachers extending their work hours by sacrificing family obligations.

Figure 3

Noble Sacrifice Pathway

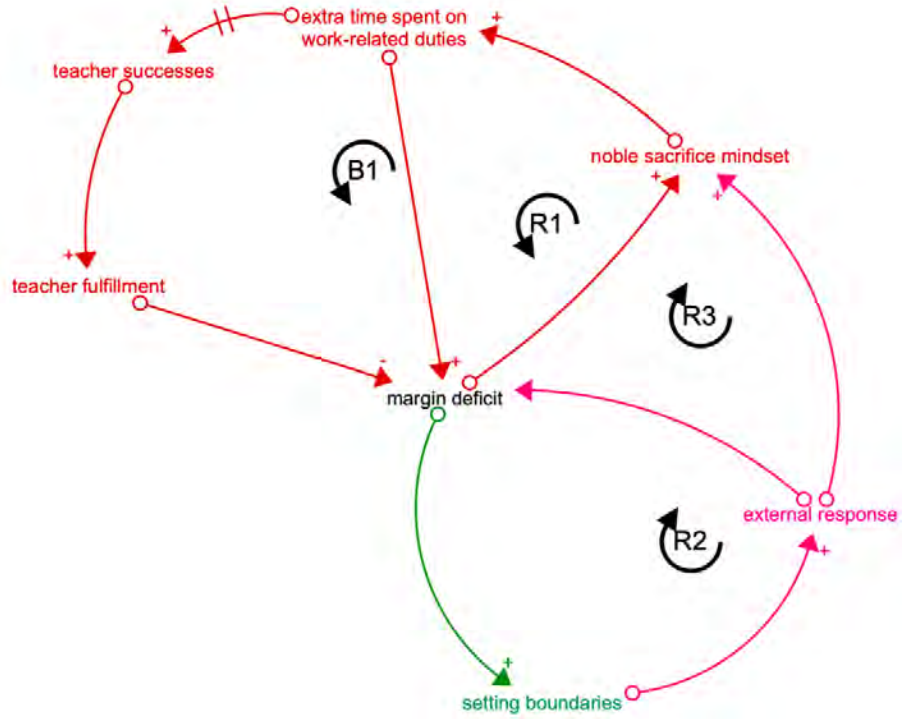


Once the teacher relies on their noble sacrifice mindset, they may choose to increase the amount of time spent with students or on work-related duties. This will increase their load, which creates our first reinforcing loop (R1) by increasing margin deficit. The relief comes once teachers see student success; there is a delay in the system, however, because success is often not an immediate outcome of additional time investment. Success can come in many forms, from teachers finding success in a leadership or career development event, to having a positive interaction with a student that felt highly impactful. As such, teachers may feel their hard work has paid off, which will increase their fulfillment. It is here the first balancing loop (B1) is realized; as teachers rely on the noble sacrifice mindset, they may see student successes increase, which will increase fulfillment and eventually increase teacher power. Once power increases, the margin deficit decreases.

Thus far, the noble sacrifice pathway assumes the teacher is *choosing* to employ the mindset. As noted by Torres et al. (2009), "[a]griculture teachers do have excessive roles and responsibilities, continue to place demands on themselves, and must meet demands placed on them by students, parents, administrators, and peers" (p. 108). This quote is emblematic of teachers choosing to push themselves (and perhaps employing the noble sacrifice mindset to do so) and points a finger to expectations from external others. There is a chance, as outlined in Haddad et al. (2023), that teachers wish to set boundaries but are prevented from doing so by some external response, be it from administrators, community members, alumni, parents, students, etc. Lambert et al. (2012) found teachers were having trouble setting boundaries (i.e., saying no), which may indicate an internal response to external requests. This relationship is captured in Figure 4 in pink, wherein teachers who try to take the green route and set boundaries are forced or expected to take the red route and rely on noble sacrifice instead.

Figure 4

Mandatory Noble Sacrifice



This creates a reinforcing loop between setting boundaries, an external response, the noble sacrifice mindset, and margin deficit (R3). As teachers are pushed to rely on the noble sacrifice mindset, they may build their margin deficit further via the loop labeled R1. The R3 loop demonstrates that a forced reliance on the noble sacrifice mindset via external response may compound the issue, as already stressed teachers experiencing a margin deficit may become more stressed; stress has been found to have a negative correlation with job satisfaction (Ryan et al., 2017).

Furthermore, we posit a potential connection from this external response directly to margin deficit (R2). As teachers try to set boundaries and those boundaries are rejected, their emotional load may rise. It is easy to imagine a scenario in which the teacher wishes to avoid adding another Career Development Event due to being at capacity, but interested students or their families push back. This leads to an undercutting of teacher autonomy and may be accompanied by other negative emotions, causing the teacher to feel less support, which decreases teacher power. This is a reinforcing loop that continues to increase margin deficit. It was suggested by Clark et al. (2014) that teacher autonomy is vital to remaining in the profession, along with support from (school) communities.

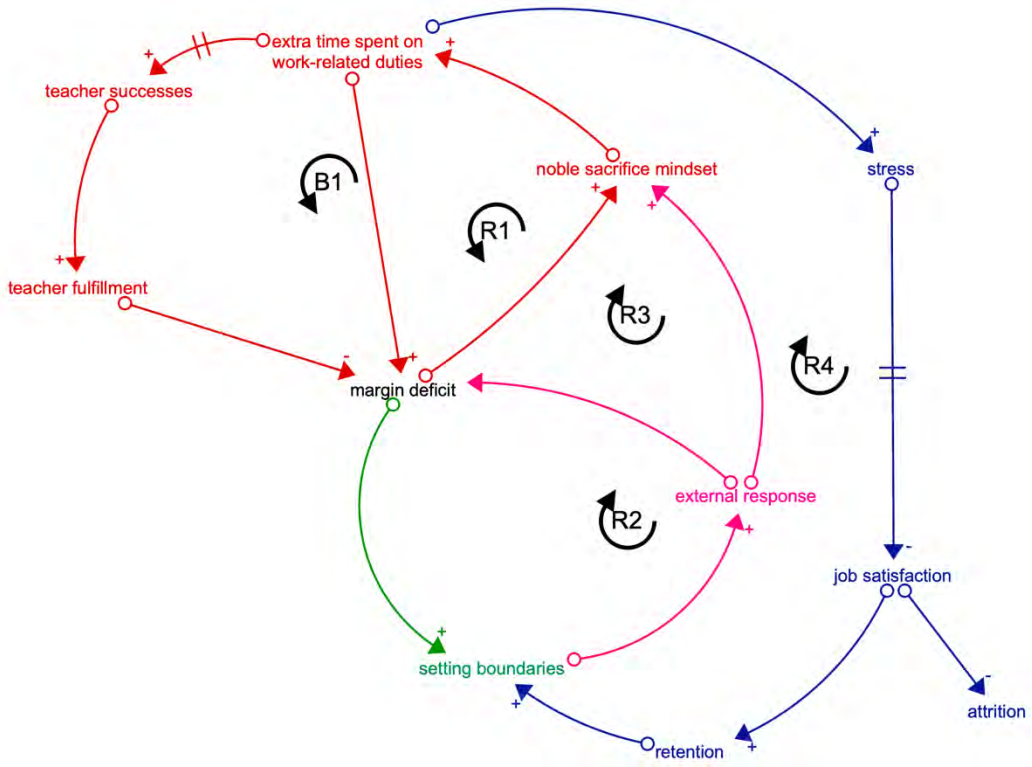
When setting boundaries is not an option allowed by external parties (or the teacher's own expectations of themselves), teachers may be forced to rely on the noble sacrifice mindset to try to power through. If they find enough success to balance their increased load, the noble sacrifice mindset can be a tool. This also circles back into agrarian ideology surrounding many actors in

communities or school districts that have an FFA program. Because there is a resistance to "urbanization" (Martin & Kitchel, 2013) and boundary work may be perceived as an "urban" concept, community members may look down on teachers who opt to set firm boundaries. New and early career teachers may be especially vulnerable to these pressures, as the career stage has them searching for relationships and acceptance (Disberger et al., 2023). Additionally, problems beginning teachers face may vary from those that mid to late career teachers face, as evidenced by research focusing specifically on early career teachers (Myers et al., 2005).

Regardless of the external response, when teachers adopt the noble sacrifice mindset, they will inevitably increase their stress. Classroom instruction, FFA and SAE components of education were revealed as primary drivers of stress in female SBAE teachers (King et al., 2013), ironically the entirety of the three-component model (Croom, 2008). Ritz et al. (2013) reported low to moderate stress levels in West Texas teachers. Kitchel et al. (2012) found teachers were experiencing moderate levels of emotional exhaustion, a symptom of burnout, which is driven by prolonged periods of stress. Kitchel et al. (2012) also posited job satisfaction may be a driver for teachers exiting the profession. Stress has been found to be a predictor of teacher attrition (Ryan et al., 2017). This stress may impact job satisfaction (Kyriacou, 2001), though it may be delayed. This is represented in the blue portion of the model, shown in Figure 4

Figure 4

Noble Sacrifice and Stress



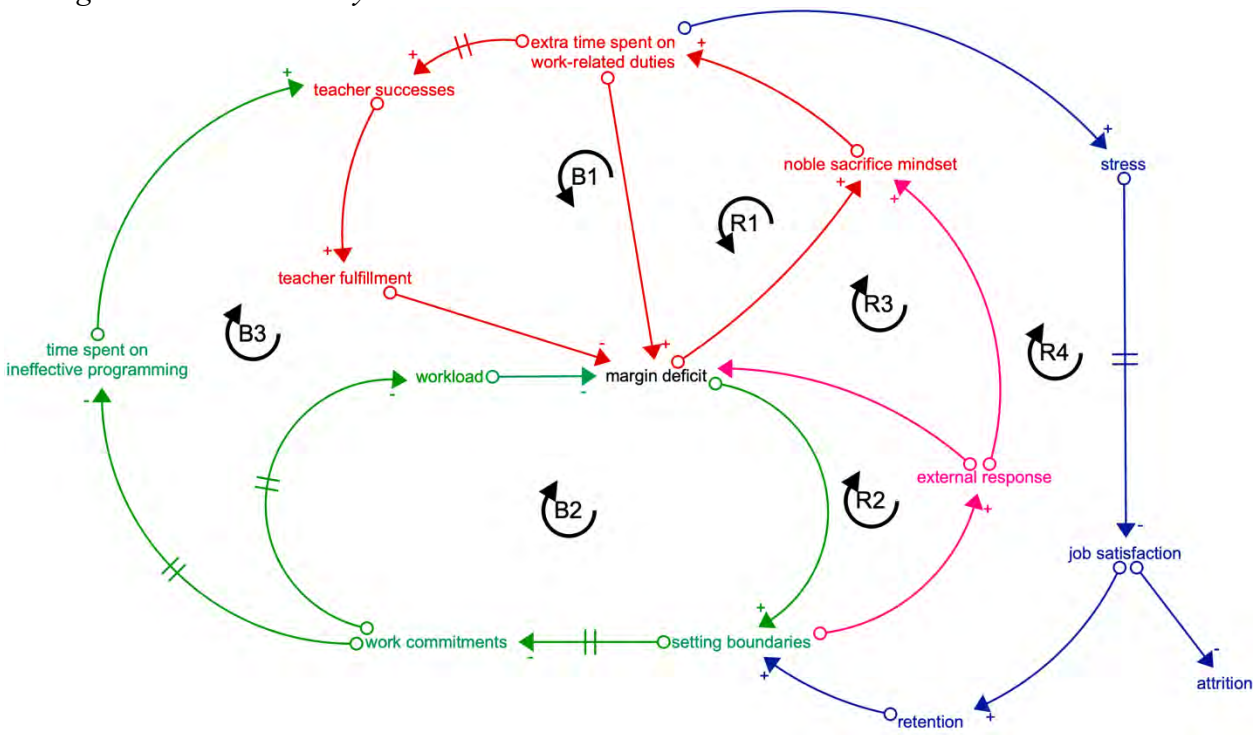
As teachers rely on the noble sacrifice mindset, they inadvertently increase their stress levels, which may lead to job dissatisfaction and questioning whether they ought to persist over time. Should they choose to stay, setting boundaries may be their best option to alleviate margin

deficit. This creates another reinforcing loop (R3) where margin deficit can be addressed via boundaries, provided other forces in the system do not prevent teachers from enacting boundaries. Sorensen et al. (2016) hint at a "dangerous spiral of increased work, inability to balance work and family, and job satisfaction," (p. 155) which is represented in this portion of the diagram.

Finally, this brings us to the boundary setting portion of the model, or the green route. This route is pictured in Figure 5.

Figure 5

Setting Boundaries Pathway



After teachers set boundaries, they will spend less time on work outside of school. There is a delay between setting boundaries and reduced work time, however, as there may be some reluctance from the teacher to make this change, or a delay from cutting an annual event from next year's program of activities. Over time, this modification decreases the teachers' load, which will alleviate the margin deficit. This creates another balancing loop (B2) which works via boundaries to decrease workload and keep the margin deficit in check.

The final portion of the green route happens after teachers make cuts to their time spent on work-related activities. Altering the amount of time spent on work commitments could manifest in a variety of ways. Some examples include mastering one contest, designing exciting classroom activities, or simply being more present with students. All these examples can result in success, which can be defined by individual teachers. Seeing student successes increases teacher power via fulfillment, which will reduce margin deficit. This creates another balancing loop (B3) which

decreases margin deficit via boundaries (decreasing load) and increasing student success and teacher fulfillment (increasing power).

Conclusions and Recommendations

The system modeled within our CLD resembles a system archetype: shifting the burden, or addiction. This archetype, discussed by Meadows (2008) and Kim (2008), is characterized by relying on something that treats the symptoms of an issue instead of its root. In this system, margin deficit is the root of the issue. Relying on the noble sacrifice mindset is a way to partially alleviate margin deficit, but it is not the "true solution," which is thought to be the freedom to set and maintain boundaries. To escape this systemic trap, Meadows (2008) presents two solutions: not getting into it in the first place or treating the true root of the issue without the employment of the addiction. In this system, the noble sacrifice mindset is the addiction. If we can prevent early career teachers from becoming fully dependent on the noble sacrifice mindset and, instead, empower them to establish and enact firm boundaries, long-term teacher retention and program success are likely outcomes. Of course, the external response provided by those surrounding the teacher and even the teacher's own definition of success can get in the way. To treat this symptom, we may need to encourage systemic change within SBAE and entreat administrators, community members, parents, and students to be okay with early career teachers (and even those in later career stages) doing what is best for them as opposed to upholding tradition.

As this model is framed around a period of margin deficit, teacher experiences with this system may vary. Nuance exists as teacher power or teacher load are impacted by experience. Teacher power could be bolstered by having established networks, proven classroom management strategies, established curriculum, and more. Teacher load may also fluctuate, with more established teachers able to better manage that load. As such, experience may alter the duration of a margin deficit. As teacher power, load, and margin can fluctuate and are largely dependent upon the individual, this model may not be relevant to all teachers across career stages. Though there may not be generalizability, this model may still be used as a heuristic tool to understand one of the many systems teachers may experience.

There are further limitations to this model. First, this is the mental map of one researcher and supplemented by current teachers and teacher educators; this model was not created by teachers themselves via participatory research methodology, which is generally the recommended route for creating a causal loop diagram. Second, this is a representation of a system that may exist; it is not perfect, nor is it applicable in every situation. We cannot know the true structure of systems, but we can put forth ideas about them and their structure to hone our models. Finally, this system may be influenced by individual or school district factors; there may be some elements that were left out of this model that impact teacher load, power, and margin.

Understanding this system teachers face could be helpful for teacher retention. Additionally, this model could give other stakeholders perspective on how SBAE teachers may be navigating their experiences. If utilized in teacher education, teachers may be aware of these potential pitfalls and be more prepared for what is to come. As such, we have recommendations for teacher educators and SBAE teachers that resulted from this model. First, early career teachers should strive for strong boundary setting, as this may stop them from falling into a prolonged period of margin

deficit. Having plentiful margin is important for effective learning and innovation. Second, building a program gradually may be more sustainable. As time is spent in a position, power and load will adjust, allowing for more opportunities to be added which positively impact students. Finally, if teachers find themselves employing the noble sacrifice mindset to cope with workload, defining success in an accessible way to may make this mindset more effective. As an example, if a teacher only defines success as placing first in the state in the Parliamentary Procedure contest, then success can only be achieved by one program; if, instead, success is defined as making meaningful relationships with students, that goal may be more readily achieved and, thus, more favorable for enhancing teacher margin.

The creation of this CLD also resulted in a variety of recommendations for researchers. First, we recommend further validation of this model not limited to a small subset of teachers and teacher educators in one state, affording a broader perspective of this system. Second, investigating other systems teachers may be navigating that impact teacher retention is important. These systems exist at a variety of levels, from the individual to the state, so the more we know, the more dynamics of those systems may reveal themselves so we can access leverage points for systems change. Finally, research exploring the composition of teacher load and power in relation to margin is recommended. The value of this research lies in identifying specific elements of teacher load (e.g., pedagogical innovation, relationship building, curriculum within topics of interest) and power (e.g., volunteer training, innovative professional development, access to financial resources) which uniquely elevate teacher margin, yielding salient recommendations for margin-supporting careers in agricultural education. Furthermore, this scholarship may also identify specific components of teacher load and power which consistently decrease teacher margin, leading to recommendations to rethink the necessity of these elements within agricultural education.

In closing, anyone interacting with SBAE teachers is shaping this system, knowingly or not. As teacher educators, our approach matters for how future educators will navigate a margin deficit. If we prepare teachers to operate within a system with little reverence for their boundary setting, then they may be more prepared to navigate that system. Alternatively, arming teachers with this model's language and ideation could help them change systems. The more teachers and their supporters resist and modify systems, the more the system will exemplify its adaptive capacity (Meadows, 2008) in a way that affords teacher margin and boundary setting. Either new feedback loops will arise which exacerbate margin deficit or others will arise which increase margin. We may be reaching a point where these systems are going to be altered; thus, we as teachers, teacher educators, and other teacher supporters must be ready to monitor this system at the local, state, and national levels, catalyzing and supporting changes which afford margin. This may require a paradigm shift which, while difficult, is one of the most effective leverage points for making systems change. If we decide, instead, we do not want change, we can stick to the agrarian ideals of tradition and hope we have enough recruits who make it to the proverbial *light at the end of the tunnel* to sustain SBAE and meet demand. Regardless, the choices teacher educators, teachers, and others affecting SBAE systems make will determine how this system does or does not evolve over time.

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Black Doctoral Women “Walkin on Eggshells”: Gendered Racial Microaggressions in Agricultural and Life Science Disciplines

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Abstract

This study examines Black doctoral women’s experiences with gendered racial microaggressions in agricultural science departments at Historically White Institutions. Gendered racial microaggressions are subtle everyday expressions of oppression due to one’s race and gender, and have been used to subordinate Black women in society. Further, they have been linked to increased psychological distress, increased depressive symptoms, and lowered self-esteem. This study uses Critical Race Theory and Critical Race Feminism as theoretical lenses and critical narrative inquiry as methodology. Findings show that Black women experienced assumptions in communication style and beauty, the angry Black woman stereotype, and silencing and marginalization to avoid gendered racial microaggressions. Participants’ coping strategies, study implications, and future research are discussed.

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Introduction

Black women have been and continue to be severely underrepresented in graduate programs. Black women have experienced decades of socio-historical challenges that have impeded their success in graduate programs, such as isolation and exclusion from white peers. As Black women experience these challenges, they are presumed incompetent by white faculty and peers (Grant & Cleaver Simmons, 2008). Further, Black women are “routinely underestimated” and must be considered extraordinarily qualified to receive the same treatment and/or opportunities as their white peers (Essed, 1994). The overrepresentation of whiteness, along with the underrepresentation of Blackness, reinforces the norm that Black women do not belong (Anderson, 2015). As a result, Black women have reported the lack of Black women graduate students and Black women faculty as a deterrent from enrolling in a graduate program (Croom & Patton, 2011), continuing in a graduate program, or pursuing a career in academia.

There is a need to address the dearth of exploration of experiences of Black women in agricultural doctoral programs. Given our troubled history with agriculture, it is important to encourage policies and practice that contribute to Black women’s sense of belonging, persistence to graduation, and inclusion in our discipline. By openly discussing and addressing how white supremacy has influenced and continue to shape agricultural curriculum, policy, and practice, we can move towards solutions that contribute to Black women’s success in agricultural doctoral programs. Therefore, the purpose of this study is to examine Black doctoral women’s experiences of gendered racial microaggressions in agricultural sciences at a Historically White Institution (HWI).

Literature Review

Microaggressions & Gendered Racism

Microaggressions are the brief, commonplace verbal, behavioral, and environmental messages, whether intentional or intentional, that communicate "hostile, derogatory, or negative racial, gender, sexual orientation, and religions slights and insults" to a specific person or group (Sue, 2010, p. 5). The term "racial microaggression" was defined by Black psychiatrist Chester Pierce and colleagues (1977) as subtle and stunning racial slights aimed at Black Americans. That definition was later expanded by Sue et al. (2007) as the "commonplace daily verbal, behavioral, and environmental indignities that communicate hostile, derogatory, or negative racial slights and insults to the target person or group (p. 273). Similarly, gendered microaggressions have been defined as the commonplace daily verbal and behavioral interactions that communicate sexist messages towards women (Nadal, 2010).

Originally coined by Essed (1991), gendered racism describes the everyday, concurrent experience of both racism and sexism experienced by Black women based on racist perceptions and perceptions of gender roles. Essed asserted that Black women's experiences of gendered and classed forms of racism are based on stereotypes of Black women. Adapted from Sue and colleagues' definition of racial microaggressions (Sue et al., 2007), gendered microaggressions (Sue & Capodilupo, 2008), and gendered racism (Essed, 1991), Capodilupo et al. (2010) and Lewis et al. (2010) extended scholarship on microaggressions to address the intersection of racial and gendered microaggressions.

Gendered Racial Microaggressions

Lewis et al. (2013) defined gendered racial microaggressions as the "subtle and everyday nonverbal, verbal, behavioral, and environmental expressions of oppression due to one's race and gender" (p. 51). Gendered racial microaggressions have been used to other and subordinate Black women in society; and therefore, higher education. They manifest in four major themes: 1) assumptions of beauty and sexual objectification, 2) silenced and marginalized, 3) strong Black woman stereotype, and 4) angry Black woman stereotype (Lewis & Neville, 2015). Lewis et al.'s (2013) focus group study revealed Black women in higher education are at risk of experiencing gendered racial microaggressions in their social and collegiate relationships, the academic environment, and in the classroom. Gendered racial microaggressions have been linked to increased psychological distress, increased depressive symptoms, and lowered self-esteem (Szymanski & Lewis, 2016), and cause difficulty in forging relationships with faculty, staff, and potential mentors. Similarly, Essed (1991) found that Black women's everyday experiences with gendered racism manifest and maintained in three major ways: 1) marginalization of Black women's experiences, 2) suppression of internal reactions to oppression, and 3) problematization and legitimization of oppression. She goes on to assert that Black women's experiences of gendered and classed forms of racism are based on stereotypes of Black women. Her research is supported by later research from Lewis and colleagues (Lewis et al., 2013; Lewis et al., 2016; Lewis & Neville, 2015; Moody & Lewis, 2019) on gendered racial microaggressions, a collection of research from Jones (2021; 2022; 2023) on Black collegiate women and

microaggressions, and scholars examining gendered racial microaggressions in other contexts (Erving et al., 2022; Kilgore et al., 2020; Newton, 2023; Ofoegbu, 2023).

Research (Lewis et al., 2013; Lewis & Neville, 2015) suggests that Black women in higher education experience gendered racial microaggressions in their social and collegiate relationships, the academic environment, and in the classroom. Further, gendered racial microaggressions have a cumulative effect on their psychological distress (Lewis & Neville, 2015), greater depressive symptoms (Carr et al., 2014), increase in post-traumatic stress symptoms (Woods et al., 2009), and lower self-esteem (King, 2003). These symptoms are stressors that can potentially influence the psychological stress response, which can impact health outcomes (Clark et al., 1999). The lack of research exploring the effects of gendered racial microaggressions has resulted in in a lack of effective strategies and resources to help Black women navigate gendered racial microaggressions such as mentors, which could lead to avoidance and negative coping strategies (Charles, 2010). In fact, Lewis et al. (2013) found that Black women who experience gendered racial microaggressions engaged in four types of coping strategies: 1) active engagements coping are strategies that use cognitive and behavioral efforts to deal with a situation, 2) social support and interconnectedness coping are strategies that seek support from friends and family, 3) religion and spirituality coping include prayer and/or ritual-centered strategies, and 4) disengagement and avoidance coping are strategies that include not doing anything to address the situation and denial (Everett, et al., 2010; Shorter-Gooden, 2004).

An important area in which gendered racial microaggressions have proven to be prevalent is within higher education. Previous research on microaggressions found that racially minoritized students experience microaggressions in the classroom, university housing, and the general campus environment (Harwood et al., 2012; Mills, 2020; Morales, 2014; Solórzano et al., 2000). Microaggressions contribute to feelings of isolation, inferiority, imposter syndrome, poor classroom performance, and mental health issues. In addition to the inherent stresses of doctoral education, microaggressions in doctoral education are detrimental to minoritized students' success. However, few studies have specifically focused on Black doctoral women, microaggressions in AgLS disciplines, or Black women and microaggressions in AgLS disciplines. Furthermore, very few studies have utilized critical race theory/critical race feminism to examine the experiences of Black women in AgLS disciplines. Through the lens of critical race theory and critical race feminism, this study will further research on Black women in doctoral studies, AgLS, and gendered racial microaggressions.

Postsecondary Agriculture & Life Sciences

The microaggressive "white space" of many AgLS departments creates and perpetuates a vicious cycle of whiteness: Black students view their lack of representation as a deterrent to enrolling or staying enrolled in an AgLS discipline. Simply, Black students do not and cannot see themselves as a part of the college of agriculture; as a result, many students do not continue in their AgLS program. Many of these students do not go on to pursue graduate AgLS programs, contributing to the lack of Black faculty representation. For Black women who do pursue doctoral programs in AgLS, we find ourselves desperately in search of community and other Black people or people with similar backgrounds who we can lean on for support outside of the classroom and/or department.

The busted pipeline of Black doctoral women to the professoriate in AgLS contributes to the lack of Black faculty representation. A department of majority white faculty does not serve well in developing or showcasing a culture of inclusivity. Further, many white faculty are ill-equipped to work well with diverse populations (Talbert & Edwin, 2007). Swortzel (1998) found that a faculty dominated by white males significantly decreases the likelihood of future Black faculty representation due to accounting for less than 10% of doctoral students.

Black Americans have a complicated history with agriculture. Our troubled history, coupled with the white male-centered culture of AgLS, serves as a barrier to Black students' engagement in AgLS disciplines. Many Black Americans' beginnings in the U.S. were rooted in slavery and continued in sharecropping (Moon, 2007). Though less than 1% of AgLS involves farming, the perception of agriculture remains as such (Environmental Protection Agency, 2013). Consequently, the perception of agriculture is that of unwelcome, oppression, low wages (Beck & Swanson, 2003), and farm and production related occupations (Brown, 1993).

Purpose of the Study

This study is from a larger narrative study which examined how intersecting oppressed identities shape the experiences of Black doctoral women doctoral candidates in Agricultural and Life Science disciplines at Historically White Institutions (HWIs) and how those experiences shape their journey into or away from the academy. The current study will focus specifically on the participants' experiences with gendered racial microaggressions. The purpose of this study is to examine Black doctoral women's experiences of gendered racial microaggressions in agricultural sciences at a Historically White Institution (HWI). The research questions that guided this study were:

1. What were Black doctoral women's experiences of gendered racial microaggressions in agricultural sciences at an HWI?
2. What coping strategies did they use to deal with gendered racial microaggressions?

Theoretical Frameworks

I used Critical Race Theory (CRT) and Critical Race Feminism (CRF) to inform this study. CRT is an explanatory framework and tool used to acknowledge and examine the impacts of race and racism (Perez-Huber & Solórzano, 2015). Ladson-Billings (2000) described it as a way to acknowledge that race is socially constructed, embedded within all of society, and as central to everyday life. The tenets of CRT used in this study are: 1) racism is permanent in society, 2) experiential knowledge and storytelling, 3) interdisciplinary analysis, 4) critique of liberalism, and 5) commitment to social justice (McCoy & Rodricks, 2015; Yosso et al., 2009). First, racism is permanent to and embedded in all institutions of society. It is so ingrained within society that it is often unrecognizable to many (Ladson-Billings, 2013). The invisibility of everyday racism can lead people to believe that a) it no longer exists or occurs only in isolated events (Bell, 1992) or b) it is to be expected (Jones, 2021). Second, the centrality of experiential knowledge and storytelling recognizes the voices of people of color (in this study, Black women) as valuable, legitimate, and crucial in understanding race and racism (DeCuir & Dixson, 2004; Solórzano & Yosso, 2001). Third, an interdisciplinary lens of analysis is needed to examine

Black women's experiences. I consider the sociological, psychological, and political factors that play a role on Black women's experiences (Jones, 2021). Agricultural frameworks that have only been used with majority white student populations are inappropriate for this study and others like it. Fourth, the critique of liberalism (myth of meritocracy) challenges the ideas of individualism, objectivity, meritocracy, incremental change, and color evasiveness (Delgado & Stefancic, 2001). Byars Winston (2014) suggests that the myth of meritocracy is prevalent in STEM disciplines. However, there is evidence demonstrating that educational opportunities in STEM are "socially constructed and unevenly distributed" (Byars Winston, 2014, p. 345). Last is CRT's commitment to social justice. It is my goal that this research is used to enact positive change in agricultural and STEM departments that contributes to the academic success and well-being of Black women.

CRF was also used to inform this study. Stemming from CRT, CRF is a framework and movement that helps elucidate the impacts of gender, race, class, and sexuality on the experiences of Black women (Floyd, 2010). Wing (2003) explained the concept of "multiplicative identity," which suggest that when multiplied together, the multiple marginalized identities of women of color become a holistic one. To explain these experiences, Crenshaw (1989; 1991) coined the term intersectionality. Intersectionality emerged as a critique from women of color recognizing how most gendered studies examined the experiences of middle-class white women (Crenshaw, 1989). The tenets that guide intersectionality are 1) social identities are not additive, but intertwined, 2) no social identity is a monolith, 3) individuals can simultaneously possess oppressed and privileged identities, 4) social identities are historically and contextually situated, and 5) social identities are influenced by power structures (Crenshaw, 1989).

Methodology

Critical Narrative Inquiry

Critical narrative inquiry was the methodology for this study. Critical research methodologies encompass the ideas of unmasking beliefs and practices that contribute to limiting human freedom, justice, and democracy, while simultaneously having a commitment to social change (Usher, 1996). Critical narrative inquiry questions how narratives intersect with power, and their positionality (Allen & Hardin, 2001). Ladson-Billings (1999) asserts that critical narrative research confronts the dominant theories and concepts that govern our disciplines and restrict our thinking in an effort to reveal the ongoing inequities that shape our society. Further, critical narrative inquiry resists colonial traditions of inquiry and are concerned with uncovering the subtleties, complexities, and biases that come with representing culture (Clair, 2003). Connecting narrative inquiry with a critical approach strengthens the ability of the researcher to identify and critique the social and cultural character of personal narratives (Squire, 2008; Usher, 1996).

Narrative inquiry is the study of descriptive experiences (Clandinin & Connelly, 2000), which allows the researcher to determine the nature and extent of social change (Connelly & Clandinin, 2006). Narrative experiences are used as a way to understand one's and others' actions, connecting the consequences of actions and events over time (Chase, 2011). The goal of

narrative inquiry is to make sense of the participants' personal experiences in relation to the researcher's research question(s) which are derived from the researcher's theoretical framework. Clandinin & Connelly (2000) state that narrative inquiry is a way to understand and inquire about experience through a collaboration between the researcher and their participants over time, in a place (or places), and in interaction with their environment. Narrative inquiry in identity research "makes audible the voices and stories marginalized or silenced in more conventional modes of inquiry" (Bowman, 2006, p.14).

Research Setting & Participants

The findings of this study are derived from qualitative data collected as part of a larger study. The present study represents findings specific to gendered racial microaggressions. All study participants were enrolled at Very High Research Activity (also known as R1s), Historically White 1862 Land-grant Universities. At the time of data collection, there were no more than 40 Black women doctoral students in AgLS programs at any of the institutions. At all the institutions, white students comprised the largest category of students, and international students comprised the second largest category of students.

Participants were full-time, domestic students; reached candidacy status; and self-identified as a Black woman. I used purposeful and snowball sampling were used to identify participants (Gilchrist & Williams, 1999; Patton, 2015). Following IRB approval, I contacted each student to explain the purpose of the study and invited her to participate. Due to the significantly small numbers of Black doctoral women AgLS disciplines, anonymity was important. I gave each participant a pseudonym and did not disclose the discipline of the women, or any other identifying information. I would like to note that though participants were of different generations of college students, they were all first-generation doctoral students.

Data Collection & Analysis

Data points for the study were interviews and personal narratives. I conducted three 60-90-minute semi-structured interviews with each participant on Zoom. Each interview was audio and video recorded and transcribed via a third-party transcription service. After interview transcription, I checked for accuracy and then sent the transcripts to the participant to check for accuracy. I conducted two cycles of coding. Initial, simultaneous, and narrative coding were used during the first cycle. During initial coding, I read interview transcripts line by line for familiarity with the data. Simultaneous coding allowed me to assign multiple codes to content that may have more than one meaning (Saldaña, 2013). Narrative coding allowed me to explore intra- and interpersonal participant experiences and actions to better understand their lived experiences. During the second cycle of coding, I used focused coding to organize the data around the most salient categories (Saldaña, 2013), then used those categories and codes to develop themes for a written narrative about the participants. The written narratives were reviewed and compared to other narratives (Ollerenshaw & Creswell, 2002) to create a co-narration of meanings, themes, and descriptions with the participants. To meet the criteria for trustworthiness, I used member checking to check for accuracy, engaged in prolonged engagement with my participants, established an audit trail, and obtained rich descriptions from

participants to allow for second decision span generalizing (Patton, 2015; Creswell, 2007; Kennedy, 1979).

As a Black woman scholar, I bring with me and acknowledge the privilege of my past experiences of growing up in a diverse city; having many Black women teachers/instructors in K-20 education, undergraduate, and graduate education; attending a Historically Black College/University (HBCU); and having a good relationship with my doctoral advisor at my HWI. I also acknowledge the privilege I have experienced in having mentors to help me through the doctoral process and working in a student-driven, majority-minoritized research group. However, I also recognize the challenges I have experienced, like my participants, that were rooted in white supremacy. By understanding our shared but different experiences forced me to make careful decisions regarding the research process including building rapport with participants, how I analyzed and interpreted the data, and how I presented this research to the public. Consequently, I continue to interrogate my own research decisions regarding theory, methods, and analysis to make sure I am not (re)producing oppression in my research.

Findings

I organized this section by first presenting a cross-case theme analysis of the participants' narratives. I organized each theme according to the stereotype experienced. Then, in keeping with critical race methods, I further centered my participants voices by creating a composite counterstory called *If.* in the form of poetry. I will not be presenting the poetry in this document due to page limit constraints. As a note, Errica and Ebony experience gendered racial microaggressions at a much higher rate than their peers in this study. Therefore, there will be more data representation from them in the cross-case analysis.

Cross-Case Analysis

Following data analysis, I identified three ways gendered racial microaggressions manifest for my participants: Angry Black Woman, Assumptions of Communication Style and Beauty, and Silenced and Marginalized. These stereotypes were projected upon my participants, gendered racial microaggressions occurred, and subsequently, my participants were silenced and marginalized. Further, participants felt like they could not speak up for themselves or underwent mental gymnastics to determine whether they should speak up or not. The perpetrator has the privilege of either not being aware or not caring they committed a microaggression, and the victim is put in a position of rocking the boat by speaking up, which leaves room for the perpetrator to offend again.

Assumptions of Style and Beauty

Assumptions about Black women's communication styles can often cause feelings of isolation and inferiority. Perpetuated by the media, assumptions about communication style include speaking loudly, neck and eye rolling, and hand waving (Lewis et al., 2016). When Errica described how a white student in her department, mimicked her "in a neck-rolling kind of way," she experienced an assumption of communication style. Further, when Ebony described how a white student told her that Black people don't speak English, the white student assumed a

certain communication style. Errica and Ebony's experiences are problematic for a couple reasons. First, their experiences communicate to Black women that their style of communication is inappropriate and needs to change to make white people feel more comfortable or to be considered educated. Second, though both Errica and Ebony spoke up, many Black women are not in a position where they feel they can express their concerns without repercussions. It is one thing to express to another student that they have offended you, but the situation escalates when tasked with the decision to inform a supervisor or instructor of their offense.

Assumptions of aesthetics include comments made about Black women's hair styles, body size, and facial features. At one of the agricultural conferences, Ebony was microaggressed by a white woman: "This [white] lady walks up to me – I had faux locs in at the time – she walks up to me, picks up my hair, and goes, 'Oh my God; it's so clean!'." Errica, in discussing her relationships with departmental faculty, described how though she did not have any negative experiences with white women in the department, an Asian faculty member commonly and inappropriately discussed and commented on Black women's hair. Whether consciously, subconsciously, or a combination thereof, an Asian American faculty member that frequently commented on Black women's hair adopted the racist dominant culture as the beauty standard:

> …she identifies with white agricultural culture. She has many times made just comments about to Black girls' hair…it was raining one day, and this faculty member said, "You don't even have to worry about not having an umbrella, you got your wig on." Just stuff like that. It just happened way too frequently. It's always with Black girls though, it's always with Black girls and it's about hair.

Acceptance and assimilation of white beauty standards gives those who feel they have honorary whiteness the false entitlement to comment on Black women's bodies, hair, and beauty choices. These occurrences may seem small at first glance but serve as an example of everyday life and ongoing oppressive experiences for these Black women. Further, Errica's experience calls for discussion on how anti-Blackness, internalized racism, and white supremacy extends beyond the Black/white binary.

Expectation of the Angry Black Woman

The expectation of the Angry Black Woman worked to silence and marginalize Errica and Ebony. Black women find themselves "shifting," or changing their posture, voice, or attitudes in order to avoid the Angry Black Woman stereotype. Black women are often accused of being aggressive, angry, and complaining when expressing dissent. Conversely, if a white person were to express dissent, they may be seen as standing up for themselves (Davis & Brown, 2017). Davis (2018) explained, "Even though code-switching and role flexing are vital in the workplace, both strategies can signify that the perceived essence of Black womanhood is antithetical to 'professionalism.'" (p. 308). Being portrayed as the Angry Black Woman is something that all participants were very conscious of. Ebony described a situation where her advisor left the university abruptly and told her he was leaving over the phone. She felt that because of her speaking out against injustices in the past, he presumed she would be angry and was afraid to confront her in person. Karla described a situation in which she received poor marks on her assistantship evaluation:

> So when they did my evaluation, they pretty much gave me like 1's and 0's in some places and they told me they felt like I was always on edge and all this stuff and I was like, "Where is this coming from?...I've been very open with what has happened in my life and my [parent] passing and you all say things like, 'Well, we just felt like you were really being short in the email or you're on edge". It's almost like they were trying to make me the angry Black woman. I went to my department head I said, "I Can't work for them anymore."

Jayei discussed in our interviews that she tried to "stay under the radar" and seem "non-threatening" when interacting with departmental faculty. Errica, Ebony, Karla, and Jayei all reported feeling like they were constantly walking on eggshells within their department and that they needed to minimize themselves. Utilizing non-threatening assimilation techniques to fit in (e.g., smiling when they do not feel like it), being overly friendly in emails, fading into the background, and avoiding negative reactions feeds into stereotypes that uphold white supremacy and oppression. Conversely, not conforming to white patriarchal standards can cause Black women to be the victim of microaggressions, negatively impacting sense of belonging and perceived departmental climate.

Silenced and Marginalized

Errica and Ebony discussed how they would avoid addressing offenses; essentially silencing themselves, which contributes to the vicious cycle of microaggressive behavior. The perpetrator has the privilege of either being unaware or not caring they committed a microaggression, and the victim is put in a position of "rocking the boat" by speaking up for themselves or staying silent, which leaves room for the perpetrator to offend again. Essed (1991) found that some of black women's everyday experiences of racism manifested in the suppression of internal reactions to oppression. For example, Ebony mentioned how she has to be careful of what she says to not upset white women. Similarly, Errica discussed being "very conscious" of being portrayed as the angry Black woman:

> I have been trying to be very conscious about not being portrayed as the angry Black woman. That is complicated because it's like, in my mind I'm kind of like, well, so am I?...when I'm upset about something, or aggravated or annoyed or just not happy about something I had to just check myself first and make sure I'm not coming across as angry…it seems like if you don't have like a smile on your face or you are not acting all chipper and happy, then it's like people will automatically assume that you're upset about something or not doing well. That's very annoying because it's just like you have to act like it's like this performative thing that you have to do to make other people feel comfortable.

Mathias (2016) argues that any attempt to suppress one's emotions is an example of how whiteness maintains power. Having to constantly exist where one cannot be themselves, cannot speak up without risk of repercussions, or have to worry about being microaggressed can negatively impact mental health. Increased psychological stress responses negatively impact mental health outcomes and have been found to be associated with experiencing

microaggressions (Lewis et al., 2013). For example, Ebony shared her experience of going to the doctor's office to seek assistance for a family member. The support dog trained to seek out those who have experienced post-traumatic stress disorder walked past her family member and went to her, indicating she was the one in psychological need.

Coping Strategies

Earlier I outlined Black women's coping strategies used to combat gendered racial microaggressions, which include: (a) active engagements coping are strategies that use cognitive and behavioral efforts to deal with a situation, (b) social support and interconnectedness coping are strategies that seek support from friends and family, (c) religion and spirituality coping include prayer and/or ritual-centered strategies, and (d) disengagement and avoidance coping are strategies that include not doing anything to address the situation and denial (Everett et al., 2010; Lewis et al., 2013; Shorter-Gooden, 2004). Errica, Ebony, and Karla expressed utilizing all of these coping techniques. However, though they attempted to engage in their departments, they experienced marginal success due to microaggressive behavior from their departments. These negative experiences caused them to disengage from the department and seek out other support systems, such as their institution's Black graduate organization and church. Jayei described seeking social support from her family and close friends and disengaging and avoidance with faculty in the department.

Discussion

The purpose of this study was to examine Black doctoral women's experiences of gendered racial microaggressions in agricultural sciences at a Historically White Institution (HWI) using CRT/CRF as an analytic lens. Gendered racial microaggressions manifest for study participants in three major ways: 1) Assumptions of Style and Beauty, 2) the Angry Black Woman, and 3) Silenced and Marginalized. These findings highlight the forms of gendered racial microaggressions that Black women experience in agricultural departments.

First, the theme Assumptions of Communication Style and Beauty describes a challenge Black women doctoral students face in higher education from students and faculty. Participants reported negative messaging from white peers regarding their communication style, with one participant reporting being mimicked by a faculty member. This finding supports previous research on gendered racial microaggressions (Lewis et al., 2016), which found that Black women were being reduced to their communication style. The projection of negative stereotypes and views from the majority regarding Black culture and ways of communication as a racial microaggression has been reported in previous literature (Sue, 2010; Sue et al., 2007). Lewis et al. (2016) used the example that Black people are often assumed as loud and/or speaking using Ebonics. My findings extend this research and build on previous research, highlighting the nuances of the assumption of communication style at the intersection of race and gender.

Additionally, Errica described a situation in which a faculty member in her department made a comment about her wig. She also noted that this faculty often made comments about Black women's hair. This finding on the assumption of beauty regarding hair and physical

appearance is also supported by previous research (Domingue, 2015; Lewis et al., 2016; Newton, 2023). Assumptions of communication style and beauty have been reported as stressful with a negative impact on Black women's well-being (Lewis et al. 2013). Moreover, Errica mentioned feeling the need to "shift," or code switch/role flex and change her clothes, the way she talked, and the way she wore her hair. Code switching/role flexing occurs out of a need or desire to fit in with whiteness often to survive an inhospitable climate (Davis, 2018). The assumption of communication style and beauty communicates to Black women that our hair, bodies, and dialect are not acceptable or professional (Davis, 2018).

Next, all women discussed being described as or the perception of being the Angry Black Woman. Attempting to avoid the Angry Black Woman stereotype resulted in the minimization of self and the feeling of "walking on eggshells." These findings are supported by previous literature on gendered racial microaggressions and stereotypes (Collins, 1990; Lewis et al., 2017; Lewis & Neville, 2015; Newton, 2023). Utilizing non-threatening assimilation techniques in order to fit in serve to uphold white supremacy and oppression. Further, participants mentioned they would sometimes not speak up for themselves, contributing to the vicious cycle of microaggressive behavior. The perpetrator has the privilege of either not being aware or not caring they committed a microaggression, and the victim is put in a position of "rocking the boat" by speaking up for themselves or staying silent, which leaves room for the perpetrator to offend again. These findings align with research (Essed, 1991; Jones, 2021; Lewis et al., 2013; Newton, 2023; Sue and Capodilupo, 2008) on the silencing of Black women as a result of gendered racial microaggressions.

This study supports research on Black women in doctoral programs and departmental climate. Research (Cropps, 2023; Loyola & Grebing, 2022) has shown that microaggressions are linked to negative departmental climate. Interactions with other students, faculty, and staff contribute to students' perceived departmental climate. Participants in this study reported poor interactions with faculty and students, which can lead to feelings of frustration and isolation. Isolation in the doctoral program has been cited as one of the biggest challenges for students (Gardner, 2009). As such, Black women may experience structural isolation as the only Black person or Black woman in the department, isolation from struggling to find community outside of the department/university, the isolation of conducting independent research, and potential isolation from being the only or one of the few conducting DEI research (Cropps, 2023). Departmental climate contributes to students' sense of belonging within a department and relatedly, their discipline (Archibeque-Engle, 2015; Perez et al., 2019). To that point, these findings support work from Loyola and Grebing (2022), who found that women of color graduate students reported lower career commitment than other groups when asked if their graduate program had solidified their career choice. Errica and Karla decided not to pursue faculty positions post-graduation largely due to their experiences.

This study used CRT/CRF as a lens of understanding participants' experiences. CRT and CRF help to center and highlight the identity-based experiences Black women experience in graduate education and in AgLS departments. While graduate women in AgLS departments may have similar gendered experiences, their experiences at intersection of race demonstrate that these are not raceless experiences (Ofoegbu, 2023). This supports Delgado's (2003) explanation that the woman of color's experience "is unique; it is not a combination of the two worlds of

Black men and white women, A plus B equals C" (p. xiv). The use of CRT/CRF and counterstorytelling presented these women's stories in a way that allows others to better understand the unique experiences of Black women through deliberate, conscious listening (Bernal, 2002; Jones, 2023). A CRT/CRF analysis of policies and practices at the departmental level would force consideration of race and gender and the role they may play in (re)producing inequitable policies and practices.

Recommendations include cultural training on microaggressions for students and faculty, intentionality from faculty, increase structural diversity at all levels. Understanding what a microaggression is and how it affects Black women would hopefully keep faculty from committing them, whether intentionally or unintentionally, and would give Black women the ability to recognize and name what is happening to them. Next, education would hopefully lead faculty to be more intentional about creating educational spaces where Black women feel safe physically, mentally, and emotionally (Jones, 2021). Finally, increasing the numbers of Black faculty and students would further help Black women to see what they can be and what is possible for them.

Future research should continue to amplify Black women's voices in colleges of agriculture by using critical social theories to examine marginalized experiences and challenge white supremacy. I also recommend examining the experiences of Black women faculty in colleges of agriculture, as there are very few studies exploring Black faculty experiences in agriculture. Future research should also consider mixed methods research, using critical quantitative methodologies, including quantitative measures (e.g., Gendered Racial Microaggression Scale (Lewis & Neville, 2015)), and qualitative methods to gain a more holistic view of the gendered racism Black women experience.

Conclusion

This study examined Black doctoral women's experiences with gendered racial microaggressions in AgLS departments at HWIs. Using CRF/CRT and counterstorytelling I centered four Black women's experiences and found that they were microaggressed regarding their communication styles, the way they aesthetically presented themselves, the projection of the angry Black woman stereotype, and consequently, were silenced and marginalized. These stories need to be told. Black women have the right to be joyful. Black women have the right to be angry. Black women have the right to be human.

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Using ChatGPT with Novice Arduino Programmers: Effects on Performance, Interest, Self-Efficacy, and Programming Ability

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Abstract

A posttest-only control group experimental design compared novice Arduino programmers who developed their own programs (self-programming group, n =17) with novice Arduino programmers who used ChatGPT 3.5 to write their programs (ChatGPT-programming group, n = 16) on the dependent variables of programming scores, interest in Arduino programming, Arduino programming self-efficacy, and Arduino programming posttest scores. Students were undergraduates in an introductory agricultural systems technology course in Fall 2023. The results indicated no significant ($p \leq .10$) differences between groups for programming rubric scores ($z = 0.74$, $p = .46$) or interest in Arduino programming, $t(31) = 0.69$, $p = .50$). There were significant differences for Arduino programming self-efficacy, $t(31) = 2.14$, $p = .03$, Cohen's $d = 0.77$, and Arduino posttest scores, $t(31) = 2.17$, $p = .03$, Cohen's $d = 0.76$; students in the self-programming group scored significantly higher on both measures. Analysis of students' errors indicated the ChatGPT group made significantly ($z = 3.11$, $p < .01$) more program punctuation errors. These results indicate novice students writing their own programs develop greater Arduino programming self-efficacy and programming ability than novice students using ChatGPT. Nevertheless, ChatGPT may still play an important role in assisting novices to write microcontroller programs.

This manuscript is based on data presented at the AI in Agriculture Conference, Johnson et al., (2024).

Introduction

ChatGPT (OpenAI, 2022), the first widely available generative artificial intelligence (AI) technology, was introduced in November 2022 and had over 100 million registered users within two months (Ebert & Louridas, 2023). Generative AI is a term used to describe "machine learning solutions trained on massive amounts of data in order to produce output based on user prompts" (Saetra, 2023, para. 2). Generative AI has been predicted to be a disruptive technology, potentially revolutionizing education, the workplace, and careers (Chow, Sanders, & Kay, 2023; Saetra, 2023).

The use of generative AI to assist students with their assignments has become a growing concern for those in education with implications for teaching and learning, ethics, and workforce preparedness (Alasadi & Baiz, 2023; Baidoo-Anu & Ansah, 2023; Chiu, 2023; Su & Yang, 2023). According to Rasul et al. (2023), ChatGPT (Open AI, 2022), one of many generative AI platforms, has several potential benefits for teaching and learning including the ability to facilitate adaptative learning experiences; provide individualized feedback; support for research, writing, and data analytics; provide automated administrative support; and developing innovative assessment activities. On the other hand, the use of ChatGPT in education can create challenges

in the areas of ethics, equity, academic integrity, the potential for generating biased or falsified information, increased difficulty in evaluating skills sets of graduates, and assessing student learning outcomes (Rasul et al., 2023). While many benefits and challenges have been identified for using this relatively new technology in educational settings, much is still unknown about how using generative AI affects education. Therefore, several authors and educators have suggested further research is needed in this area (Chiu, 2023; Sheehan, 2023; Su & Yang, 2023).

While the use of generative AI in education is still relatively novel, research has emerged investigating the effects of this technology on student learning. Studies have shown that using ChatGPT had positive impacts on student learning (Hakiki et al., 2023; Li, 2023) including, improved self-efficacy, attitudes, intrinsic motivation, and creative thinking (Li, 2023). In the field of computer education, research revealed that ChatGPT can provide an adaptive learning experience for students to enhance their learning resulting in improved performance, self-efficacy, and motivation in the context of computer programming (Yilmaz & Yilmaz, 2023).

Computer programming has not extensively been taught in agricultural education; however, the inclusion of microcontrollers as components of agricultural equipment and systems requiring basic programming is becoming more common (Garling, 2013). The future workforce of the agricultural industry is expected to possess a basic knowledge of programming related to microcontrollers (Titoskaya et al., 2019). A microcontroller is a small, integrated circuit device consisting of a microprocessor, memory, and peripherals used for receiving inputs and controlling other parts of an electronic or mechanical system (Keim, 2019). Microcontrollers have an increasingly wide range of agricultural uses including robotics and drone applications in precision agriculture, greenhouse climate and irrigation controls, tractors, and variable rate applicators (Goering et al., 2003; Jude et al., 2022; Kurkute et al., 2018; Liu, 2022; Negrete, 2023, Schumann, 2010).

The function and applications of microcontrollers in agriculture is an emerging topic that can be taught at both the high school and college levels (Global Teach Ag Network, 2024; Johnson et al., 2022). At the high school level, basic DC electrical system concepts are evaluated with programmable controllers at the National FFA Agricultural Technology and Mechanical Systems Career Development Event (National FFA Organization, 2023). A common tool used to teach both novice and advanced students how to use and program microcontrollers is the Arduino UNO (Al-Abad, 2017; Herger & Bodarky, 2015). This technology has been adopted by educators because of its potential for positive educational impacts (Lee, 2020). Studies have shown that students using Arduino reported positive attitudes toward learning about and programming microcontrollers (Arslan & Tanel, 2021; Johnson et al., 2022; Johnson et al., 2023). Results regarding students' confidence, however, have been mixed, as Johnson et al. (2022; 2023) found increased programming self-efficacy among students, but no significant increase in self-efficacy was found by Arslan and Tanel (2021). While Arduino software is considered relatively user-friendly, novice users may encounter difficulties due to their unfamiliarity with computer programming (Thomas et al., 2011).

According to the literature, the use of ChatGPT has the potential to improve students' performance, self-efficacy, and motivation in computer programming (Yilmaz & Yilmaz, 2023). In the specific context of agricultural education, would using ChatGPT influence student performance when using Arduinos to teach microcontroller programming? How might it affect

student interest and self-efficacy in the subject? The gap in research connecting these two topics and the lack of generative AI research within the context of agricultural education necessitates research comparing students who use ChatGPT to help them write an Arduino program to students who write their own program without assistance from AI. Results from this study can help determine the feasibility of using generative AI to enhance interdisciplinary teaching within agricultural education.

Theoretical Framework

To determine the effects ChatGPT could have on performance, interest, and self-efficacy, we must examine how experiences theoretically impact these variables. The intersection of social cognitive theory (Bandura, 1986), self-efficacy theory (Bandura, 1977), and Roberts' (2006) model of experiential learning served as the theoretical frameworks for this study and provided insight for how experiences impact learning. Social cognitive theory seeks to explain cognitive learning through the reciprocal interactions of personal, behavioral, and environmental factors (Bandura, 1986). Personal factors can include characteristics such as self-efficacy, values, and outcome expectations. Behavioral factors have been characterized as choice of activities, effort, persistence, and achievement. Lastly, environmental factors include feedback, instruction, opportunities for self-evaluation, and rewards (Schunk & DiBenedetto, 2020).

Self-efficacy has been defined as a person's confidence in their ability to perform a specific task or behavior (Bandura, 1977). Because self-efficacy is contextual (Smith et al., 2006), individuals with high self-efficacy would be confident in their ability to complete a specific task while individuals with low self-efficacy would be less confident in the same task. Self-efficacy theory suggests mastery, vicarious, and social persuasion experiences each influence a person's self-efficacy toward a task or behavior. Mastery experiences occur when an individual successfully accomplishes a behavior or task and tend to have the greatest influence on an individual's self-efficacy. Accordingly, Smith et al. (2006) suggested that repeated failure of a task can have negative impacts on task-specific self-efficacy. Vicarious experiences occur when an individual witnesses someone similar to themselves complete a behavior or task successfully (Bandura, 1977). Social persuasion experiences occur when another person, such as a teacher, expresses confidence in the individual's ability to successfully complete a behavior or task. Social persuasion experiences tend to have the least impact on self-efficacy (Bandura, 1977).

Experiential learning theory also lends insight into how experiences affect the learning process. According to Roberts (2006), the process of experiential learning is "cyclical in nature and requires an initial focus of the learner, followed by interaction with the phenomenon being studied, reflecting on the experience, developing generalizations, and then testing those generalizations" (p. 27). Roberts posited that learning begins with an experience, which must then be reflected upon in order for students to make generalizations. Learners then use their new knowledge in subsequent experiences leading to further experimentation in an on-going pattern.

This study applied social cognitive, self-efficacy, and experiential learning theories to test the learning impacts of using ChatGPT in the context of a college level agricultural systems technology course where students participated in a three-day lesson on microcontrollers and

Arduino programming. Half the students used ChatGPT to program an Arduino UNO microcontroller to operate light-emitting diodes (LEDs) on a breadboard, while the rest programmed Arduino UNO to perform the same task without the use of ChatGPT. The programming activity served as a mastery experience where all students in the study were allowed to program their Arduino until it executed the correct blinking LED sequence on their breadboard. A breadboard operating with the correct blinking LED sequence constituted a successful mastery experience within Bandura's (1977) self-efficacy theory, theoretically improving students' programming self-efficacy.

Since the programming experience allowed students to continually make corrections to their program until it executed the correct LED sequence, the mastery experience included a reflective experiential learning component. Students could interact with the programming software and the Arduino microcontroller to determine if they could obtain the desired results on their breadboard. They could reflect on the results, develop a generalization, and try again by testing their generalization. This process could be continued until success was achieved, as recommended by Robert's (2006) experiential learning model. Students who used ChatGPT to assist them in writing their program had the opportunity to alter their prompt in ChatGPT to give them different results and allow them to keep trying for a successful experience. The interaction with ChatGPT served as a social component (environmental factor) within Bandura's (1986) social cognitive theory, influencing persistence (behavioral factor) to create a successful program, and ultimately impacting self-efficacy (personal factor).

Purpose and Objectives

The purpose of this study was to compare novice Arduino programmers who wrote their own programs (self-programming group) with those using ChatGPT version 3.5 to write their programs (ChatGPT programming group) on (a) interest in Arduino programming, (b) Arduino programming self-efficacy, and (c) Arduino programming ability. The specific objectives were to:

1. Determine if there was a significant ($p \leq .10$) difference in laboratory programming task rubric scores between students who wrote their own Arduino programs (self-programming group) and students who used ChatGPT (ChatGPT-programming group).
2. Determine if there was a significant ($p \leq .10$) difference in (a) interest in Arduino programming, (b) Arduino programming self-efficacy, and (c) Arduino programming posttest scores between students who wrote their own Arduino programs (self-programming group) and those who used ChatGPT (ChatGPT-programming group).
3. Determine if there was a significant ($p \leq .10$) difference between groups (self-programming or ChatGPT-programming) on the categories of errors on the Arduino programming posttest.

Methods

The population for this study was novice Arduino programmers enrolled in introductory agricultural systems technology courses in U.S. universities. The accessible sample consisted of students ($N = 44$) enrolled in one introductory agricultural systems technology course at the

University of [STATE] during the fall 2023 semester. After IRB approval, 43 students consented to participate in the study. These students were randomly assigned to the self-programming (n = 21) and ChatGPT-programming (n = 22) groups using the RANDBETWEEN function in Excel. After removing students who did not complete all research activities (n = 6) and those who reported previous Arduino programming experience (n = 4), data from 33 students were used in analysis, with approximately equal numbers in the self-programming (n = 17) and ChatGPT-programming (n = 16) groups.

A potential limitation of experimental research in college classrooms is small samples and the resultant lack of statistical power (McGrath, 2016). Spatz (2019) defined statistical power as the probability of rejecting the null hypothesis when it is false in the population, and Cohen (1998) recommended a minimum statistical power of .80. One method of increasing statistical power, often recommended for small sample exploratory studies such as this is to increase the alpha level (Baguley, 2004). With 33 subjects and an alpha level of .10, our statistical power at the large effect was .73, .86, and .71 for the Mann-Whitney U tests, the overall MANOVA, and the *post-hoc* Bonferroni t-tests, respectively. Thus, we recognize low statistical power as a potential limitation of our study; readers should consider this limitation in interpreting the results.

Research Design

This study employed a posttest-only control group experimental design as described by Campbell and Stanley (1963). This design controls all threats to internal validity (Campbell & Stanley).

Experimental Procedures

During the 12th week of the fall 2023 semester, students were randomly assigned to two groups (1 and 2) and membership in each group was shared with students via class announcements and two email notifications. However, students were not informed of the specific tasks or conditions for either group. Student access to free ChatGPT 3.5 accounts was also confirmed prior to the study.

The study was conducted during the Monday, Wednesday, and Friday class meetings (50-minutes) during the 13th week of the fall 2023 semester. On Monday pairs of students were provided with a package containing an Arduino UNO microcontroller and breadboard, one 240-ohm resistor, one light emitting diode (LED), pin connector wires, and a paper mock-up of the Arduino programming environment. Students then participated in an illustrated lecture introducing Arduino UNO microcontrollers, their uses in agriculture, simple resistor and LED circuits, and basic Arduino programming. The lecture incorporated the same four hands-on practice tasks described by Johnson et al. (2022; 2023): (a) point to the primary components of the Arduino UNO, (b) identify resistors and LEDs and identify the anode (+) and cathode (-) terminals of the LED, (c) breadboard a simple resistor and LED circuit between a specific digital pin and a ground pin on the Arduino UNO, and (d) write an Arduino program (in pencil on the paper mock-up of the Arduino programming environment) to cause the LED to blink repeatedly with a 1-second delay. The programming component of the lecture emphasized the two primary sections of an Arduino program (void setup and void loop), and the three basic Arduino statements (pinMode, digitalWrite, and delay) and syntax (wording, capitalization, and

punctuation) necessary to accomplish the hands-on practice task. The lecture concluded with a brief demonstration of how ChatGPT could be used to write the Arduino program. Johnson et al. (2022; 2023) found that successful completion of simple hands-on practice tasks provided students with positive mastery and vicarious experiences and increased self-efficacy.

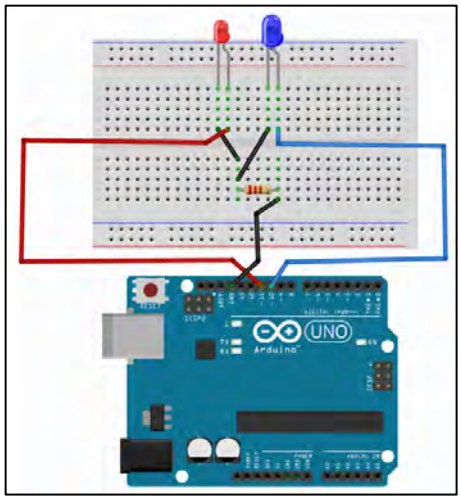
On Wednesday students reported to a college computer laboratory to complete the Arduino programming task. Each student was provided with an Arduino UNO connected to a desktop computer running the Arduino programming environment, an identical pre-breadboarded circuit (Figure 1), and a single-page reference sheet showing a pictorial drawing and the program developed in class on Monday. A slide was projected showing the two groups (1 and 2) and the students in each group. Students were instructed to open the online course management system and then to open the assignment for their group (1 or 2). The programming assignment was the same for both groups and required students to develop Arduino programs that would cause the LEDs to blink in the following sequence. The program could be written using the three basic Arduino statements (pinMode, digitalWrite, and delay) introduced in the lecture.

- Blue LED turns “ON” for 1.0 second
- Blue LED turns “OFF” for 1.0 second
- Blue LED turns “ON” for 1.0 second
- Blue LED turns “OFF” for 1.0 second
- Red LED turns "ON” for 1.0 second
- Red LED turns “OFF” for 1.0 second
- Repeat the sequence

Students assigned to Group 1 (self-programming) were instructed to use their knowledge of Arduino programming to write a program to cause the LEDs to blink in the indicated sequence. Students assigned to Group 2 (ChatGPT-programming) were instructed to query ChatGPT to write a program to accomplish the same task by adding to the stem provided: *“Write the most simple and basic Arduino program so that an Arduino UNO will [in your own words complete the prompt so that ChatGPT will write a program that causes the LEDs to blink as described].*” The ChatGPT group was instructed to formulate their own queries, not to simply copy the desired sequence into the ChatGPT message window; students were required to copy their final ChatGPT query into the online assignment form. Both groups were instructed to paste their final Arduino programs into the online assignment form for grading.

Figure 1

Arduino UNO and Breadboarded Laboratory Circuit



On Friday students received their graded rubric for their Arduino programs and were debriefed on the laboratory activity. A PowerPoint slide showing a pictorial drawing of the Arduino laboratory circuit and a correctly written Arduino program was displayed and discussed. The debriefing concluded with a brief (10 minute) mini lesson on applications of microcontrollers in agriculture and on additional coursework offered for interested students. After the debriefing, students completed the survey instrument measuring Arduino interest and Arduino programming self-efficacy, then completed the Arduino programming posttest.

Instrumentation

Data were collected using a survey instrument and scoring rubrics. The survey instrument, adapted from Johnson et al. (2022), contained three sections. The first section assessed students' interest in learning about Arduino programming using a 13-item, five-point summated Likert scale (1 = strongly disagree and 5 = strongly agree) with a coefficient alpha reliability of .91. The second section measured Arduino programming self-efficacy using an 8-item, five-point summated Likert scale (1 = very unconfident and 5 = very confident) with a coefficient alpha reliability of .71. The third section contained three items about academic classification, gender identity, and previous Arduino programming experience.

The Arduino programming posttest was similar to the laboratory activity. A drawing presented an Arduino UNO and a breadboard with one orange and one red LED circuit connected. The desired operation of each LED was described, and students were provided with a paper mock-up of the Arduino programming environment. Students were instructed to write an Arduino program to achieve the desired circuit operation using correct commands and syntax as if they were typing directly into the Arduino programming environment.

The course instructor used two rubrics, based on those used by Johnson et al. (2022), to evaluate the student Arduino programs developed during the hands-on laboratory activity and the programming posttest. Both rubrics contained dichotomously scored (incorrect = 0 and correct = 1) items; the laboratory activity rubric consisted of 17 items and the programming posttest rubric contained 52 items. Scores for both rubrics were converted to a percentage correct basis.

Data Analysis

Data were analyzed using SAS 9.4. For objective one, a nonparametric Mann-Whitney *U* test was used to determine if there was a significant difference in group (self-programming vs. ChatGPT-programming) means for scores on the laboratory programming task. For objective two, a one-way multivariate analysis of variance (MANOVA) was used to determine if significant ($p \leq .10$) differences existed in group means for the posttest measures of (a) interest in learning about Arduino, (b) Arduino programming self-efficacy, and (c) Arduino programming test scores. Bonferroni *t*-tests were used *post hoc* to identify dependent variables on which the groups differed significantly while maintaining the overall experiment-wise error rate at the .10 level. Finally, for objective three, independent samples Bonferroni *t* tests were used to identify significant differences in error rates for the two groups. The alpha level for all statistical tests was set at .10 *a priori*.

For objective one, the nonparametric Mann Whitney *U* test was used because the data did not meet the assumption of homogeneity of group variances required for parametric tests (Field & Miles, 2010). Before MANOVA testing (objective two), the data were examined to identify outliers and tested for violation of the assumption of homogeneity of covariance matrices. Two outliers (both in the control group with low scores on the Test) were identified. Following suggestions by Field and Miles (2010), the MANOVA analysis was conducted both with and without the outliers included. These analyses resulted in consistent results for both the MANOVAs and the *post hoc* Bonferroni *t*- tests; therefore, the two outliers were retained and reported in the analysis. The Box test results, $\chi^2(6) = 2.15$, $p = .91$, indicated the MANOVA assumption of homogeneity of variances was met. For objective three, the assumption of homogeneity of variances was met allowing the use of Bonferroni *t* tests with an experiment-wise error rate of .10.

Results

After removing subjects with previous Arduino programming experience ($f = 4$) and those who did not complete all research activities ($f = 6$), 33 undergraduate students were included for data analysis with 17 in the self-programming group and 16 in the ChatGPT-programming group. The self-programming group had fewer females ($f = 3$, 17.7%) compared to the ChatGPT-programming group ($f = 6$, 37.5%). A slight majority of students in both groups were freshmen or sophomores (self-programming group = 52.9%; ChatGPT group = 56.3%).

Objective One

The mean rubric scores for the Arduino laboratory programming activity were 94.8% (*SD* = 6.5%) for the self-programming group and 90.4% (*SD* = 17.2) for the ChatGPT-programming group. The sample mean for the self-programming group was 4.4% higher than the sample mean for the ChatGPT-programming group. However, a higher percentage (68.8%) of the ChatGPT-programming group made a perfect score on the programming activity compared to the self-programming group (41.2%).

All students in the self-programming group wrote programs using only the three statements taught and practiced in the lecture. For the ChatGPT-programming group, despite the prompt to write the 'most simple and basic Arduino program,' all programs included one additional statement, the 'cont int' statement, to assign descriptive names (such as LED1 and

LED2) to the digital pins controlling the LEDs. The most common errors made by the self-programming group were relatively minor and included failure to include comments to document the program ($f = 5$) and omitting one or more delay statements ($f = 4$) from the program. The most common errors for the ChatGPT-programming group were omitted or incorrect delay statements ($f = 4$) and, more seriously, omitted sections of code required to control one of the LEDs ($f = 4$). Evaluation of the ChatGPT queries indicated these programming errors resulted primarily from incomplete or incorrectly worded ChatGPT queries. For example, one student query, "Write the most simple and basic Arduino program so that an Arduino UNO will activate a blue LED for 2 seconds, turn off the LED for 2 seconds, and repeat the pattern," omitted mention of the red LED and specified the wrong delay period, resulting in a rubric score of 47.1%.

Because the group variances were significantly different $F(15, 16) = 6.89$, $p < .001$, a nonparametric Mann-Whitney U test was conducted to test for differences between group means. The results, $z = 0.74$, $p = .46$, indicated no significant difference between groups for the laboratory programming rubric scores.

Considering the small sample used in this study, a Cohen's d for laboratory programming activity rubric scores was calculated even though the difference between groups for this variable was not statistically significant ($p > .10$). The resulting η^2 of .017 indicated that if larger sample studies find a significant difference in the population for Arduino programming rubric scores between groups for this task, the magnitude of this difference is likely to be negligible to small (Cohen, 1988).

Objective 2

Observed means for interest, self-efficacy, and posttest scores were higher for the self-programming group than for the ChatGPT-programming group (Table 1). Scores for the self-programming group were 3.8% higher for interest, 11.7% higher for self-efficacy, and 20.5% higher for posttest scores.

Table 1

Descriptive Statistics for Interest, Self-efficacy and Test Scores, by Group

		Dependent Variable					
		Interest [a]		Self-efficacy [b]		Posttest [c]	
Group	n	*M*	*SD*	*M*	*SD*	*M*	*SD*
Self-programming	17	3.86	0.58	3.63	0.53	86.9%	20.6%
ChatGPT-programming	16	3.72	0.61	3.25	0.50	72.1%	15.2%

[a] Measured on a summated 13-item scale where 1 = strongly disagree and 5 = strongly agree.
[b] Measured on a summated 8-item scale where 1 = very unconfident and 5 = very confident.
[c] Percent correct on a 52-item scoring rubric.

The results of a one-way MANOVA indicated a significant multivariate effect for group on one or more dependent variables, $F(3, 29) = 4.21$, $p = .01$. *Post hoc* Bonferroni t-tests indicated significant differences between groups for self-efficacy, $t(31) = 2.14$, $p = .03$), and

posttest scores, $t(31) = 2.17$, $p = .03$. There was no significant difference between groups for interest, $t(31) = 0.69$, $p = .50$).

Cohen's *d* effect sizes (Cohen, 1988) were calculated to quantify the magnitude of the group differences for the two significant dependent variables self-efficacy and posttest scores. With Cohen's *d*s of 0.75 and 0.76, group membership had a medium effect on both self-efficacy and posttest scores, respectively, for novice Arduino programmers. According to Cohen (1988), a medium effect size represents "an effect likely to be visible to the naked eye of the careful observer" (p. 156) and is the typical effect observed in most fields of social science research.

Again, considering the small sample size used in this study, the Cohen's *d* for interest was calculated even though the difference between groups for this variable was not statistically significant ($p > .10$). The resulting Cohen's *d* of 0.24 indicated that if larger sample studies find a significant difference exists in the population for Arduino programming interest in similar studies comparing novice students who self-program and those who program using ChatGPT, the magnitude of this difference is likely to be negligible to small (Cohen, 1988).

Objective 3

The final objective was to describe errors on the Arduino programming posttest and to determine if there were a significant ($p \leq .10$) differences between group (self-programming or ChatGPT-programming) for any category of error. Table 2 shows the seven categories of programming errors evaluated by the rubric, the number of opportunities to make each error in writing the program, descriptive statistics for the number of errors made by group, and the ratio of the mean errors made comparing the ChatGPT-programming group to the self-programming group (ChatGPT: Self) for each category of error.

Table 2

Summary of Posttest Programming Errors by Group

		Group				
		Self-programming		ChatGPT-programming		
Error	Error opportunities	*M*	*SD*	*M*	*SD*	Ratio (ChatGPT: Self)
Required statement is absent or incorrect	10	0.35	1.03	0.25	.066	0.71
Wording of required statement is incorrect	10	2.24	3.20	3.00	3.39	1.34
Incorrect digital pin specified in setup	2	0.35	0.76	0.23	0.66	0.66
Incorrect digital pin specified in loop	2	0.24	0.64	0.25	0.66	1.04
Incorrect capitalization of statements	10	1.52	2.68	2.81	3.03	1.85

Incorrect punctuation of statements	10	2.12	3.05	7.27	3.86	3.43
Incorrect delay duration specified	6	0.12	0.47	0.00	0.99	--

The mean number of errors by group was similar for six of the seven categories; however, the mean punctuation errors for the ChatGPT programming group was 3.43 times higher than for the self-programming group. The primary punctuation error was omitting the required semicolon at the end of each program statement. The results of an independent *t* test confirmed the mean number of punctuation errors committed by the ChatGPT-programming group was significantly higher than for the self-programming group, $t(31) = 4.12$, $p < .001$. There were no other significant ($p \leq .10$) differences between groups for mean errors by category.

Conclusions, Recommendations, and Implications

Caution should be used in interpreting the results of this study due to the small sample size. However, the results do suggest several tentative conclusions and recommendations for both research and teaching practice in colleges of agriculture. Results from objective one indicated, the mean rubric scores for the self-programming and the ChatGPT-programming groups were above 90% on the laboratory programming activity and there was no statistically significant difference in mean scores. Further, the ChatGPT-programming group had a higher percentage of perfect rubric scores (68.8%) than did the self-programming group (41.2%), and errors by the ChatGPT-programming group were primarily the result of incorrect or incomplete queries. This finding raises an important question for teaching Arduino (and similar) programming languages in colleges of agriculture. For agriculture students who may need to use Arduinos and similar microcontrollers only occasionally in their academic and professional careers, would it be more effective to focus on basic programming skills, or how to write complete and correct ChatGPT (and similar AI chatbots) queries and evaluate the resultant programs? Or is some combination of instruction in basic programming and effective use of ChatGPT more warranted? This is an area that calls for further discussion and research.

Data from objective two revealed that both groups were somewhat interested in learning more about Arduino programming with no significant difference between the two groups. This indicates that either method (self-programming or ChatGPT-programming) can be used to teach Arduino programming to novices without sacrificing student interest.

The self-programming group had a significantly higher mean score for Arduino programming self-efficacy than the ChatGPT-programming group (medium effect sizes). This seems to suggest that self-programming should be the preferred method of instruction if the desired outcome is self-efficacy. However, programming self-efficacy was measured with statements concerning students' ability to *write* Arduino programs, and according to Smith et al. (2006), self-efficacy is task specific. Thus, had we used statements concerning students' ability to *use ChatGPT* to write Arduino programs our results might have been different. Studies from the literature review found the use of ChatGPT improved self-efficacy (Li, 2023; Yilmaz & Yilmaz, 2023). While our study did not assess changes in self-efficacy over time, it is plausible gains in self-efficacy resulting from ChatGPT use still may not be as strong as self-efficacy gains from

self-programming; however, further experimental research is needed to test this speculation. According to Bandura's (1977) self-efficacy theory, a mastery experience impacts self-efficacy. Students in both the self-programming and ChatGPT programming groups engaged in a mastery experience by successfully executing the correct blinking LED sequence, so why might their self-efficacy levels differ? Consistent with Social Cognitive Theory (Bandura, 1986), ChatGPT use could possibly be an environmental factor reciprocally interacting with self-efficacy. Additionally, due to students' potential lack of familiarity with ChatGPT, the addition of ChatGPT may have added complexity to the task, which was not experienced by the self-programming group. Increased difficulty of a task has been shown to affect self-efficacy (Smith et al., 2006) and is another area in which empirical testing is warranted in the context of generative AI use.

The self-programming group scored significantly higher on the Arduino programming posttest compared to the ChatGPT-programming group (medium effect size). This finding was somewhat intuitive in that students who had written a program (self-programming group) scored higher than students who had not written a program (ChatGPT-group). While Yilmaz and Yilmaz (2023) suggested ChatGPT can enhance learning resulting in improved performance over time, our study would indicate its use does not necessarily equate with better performance. Perhaps this is an area worthy of continued investigation and over longer periods of time. Examination of students' errors indicated the only significant difference between groups was punctuation errors, primarily the mistake of omitting the semicolon at the end of statements. Likely future ChatGPT-programming assignments should require students to deliberately examine and reflect on syntax and other nuances of the ChatGPT generated program. This finding also illuminates the concern of assessing student learning outcomes highlighted by Rasul et al. (2023). Accordingly, what should be the intended learning outcome: have students use ChatGPT to effectively write Arduino programs and be able to diagnose and catch errors or write Arduino programs from memory?

Overall, posttest rubric scores for the ChatGPT-programming group (72.1%) provided evidence of learning; however, it was unclear whether this learning was a product of classroom instruction or from developing the ChatGPT-written program, or a combination of the two. Further research should explore the exact source of this learning and how it can be enhanced. According to experiential learning theory (Roberts, 2006), reflection should occur for learning to take place. Therefore, intentional reflection activities (Roberts, 2006) should be incorporated into the ChatGPT programming experience to increase learning and to aid students in more productively using the results of generative AI to perform common programming tasks.

This study provided consistent and intriguing insights for both additional research and for teaching Arduino microcontroller programming to novice college of agriculture students. However, the most important questions are curricular and focus on the purpose and desired outcomes of teaching Arduino programming as artificial intelligence applications become even more prevalent and powerful. Should colleges of agriculture focus on developing students' programming skills or developing students' ability to productively and efficiently us artificial intelligence applications like ChatGPT in completing microcontroller programming tasks, or perhaps some combination of the two? Research such as the present study can inform this important discussion.

Generative AI technologies such as ChatGPT will continue to impact education and careers in all areas including agriculture (Chow, Sanders, & Kay, 2023; Saetra, 2023). This will present an ongoing challenge and opportunity for faculty members in universities and colleges of agriculture. Educators and researchers must be proactive in developing strategies to positively incorporate this potentially disruptive technology into the student experience so graduates will be able to productively combine their expertise with generative AI to produce outcomes superior to what either personal expertise or AI alone can accomplish.

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Five-Year Analysis of Teacher Professional Development

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Abstract

Recognizing the agriculture industry's persistently high worker fatality rate, a multi-year teacher professional development was conducted to enhance teachers' tractor and machinery safety knowledge. This study aimed to scrutinize changes in participant knowledge throughout the professional development, shedding light on the role of continued engagement. A total of 97 teachers participated in year five of the five-year training program, with a near-equal gender distribution. Over 80% of participants were either beginning (1-5 years of experience) or mid-career (6-15 years of experience) educators, many of whom engaged in the training program for multiple years. The program employed the National Safe Tractor and Machinery Operations Program (NSTMOP) curriculum. The average post-test score was 39 out of 50. Second-year attendees recorded the lowest test score average, while fifth-year attendees recorded the highest. On the post-test, participants were asked what prompted them to return to the training experience. Almost one-third cited curriculum obtainment as the primary motivator. These findings have significant implications for professional development coordinators seeking to implement safety education programs. Future research should focus on evaluating the integration of safe tractor and machinery operations in participating teachers' classrooms.

Introduction

Professional development, defined in various ways, is essential for all teachers in their pursuit to continue to grow and improve their classroom teaching quality. Darling-Hammond et al. (2017) defined professional development as improving teacher practices and students' learning outcomes. Scher and O'Reilly (2009) defined professional development as outcomes about teachers' knowledge, which can be immediate, outcomes that lead to changes in a teacher's instruction, and outcomes that lead to improvements in student achievement. Even with some variation in defining professional development, we can look at the development of teachers as a continuum from the time they are pre-service until they are considered veteran teachers.

As we consider a pre-service teacher's formal preparation program, they begin transitioning to their first year of teaching through induction (Moir & Glass, 2001). This initial stage involves continuous, ongoing training designed to help new teachers improve their teaching. A transition then occurs from the induction to the development phase, wherein a majority of a teacher's professional and skill development will continue to occur. Teachers often then transition into the final state of renewal, which focuses on revitalizing one's practice, often accomplished through professional development. Over the last several years, literature has identified a need for agriculture teachers' professional development (Burris et al., 2005; Smalley et al., 2019). More specifically, the topic of content-specific professional development in

agricultural mechanization, including agricultural safety (Burris et al., 2005; Byrd et al., 2015; McCubbins et al., 2017), has been well documented.

A need for safety education has been further identified as the agricultural industry continues to have a higher worker fatality rate than any other industry (U. S. Bureau of Labor Statistics [BLS], 2022). This number becomes more alarming as the National Children's Center (2022) fact sheet reported the highest number of occupational fatalities for youth ages 17 and younger. Educational areas within career and technical education, such as agricultural education, can have a direct impact on providing education to youth and can further prepare students for employment related to the agricultural industry. Within agricultural education programming, students participate in supervised agricultural experiences (SAEs), where they can participate in work-based learning opportunities (FFA, 2023). These opportunities can provide the foundation for ensuring safe behaviors in future applications.

It is crucial to acknowledge that teachers' safety knowledge has been shown to increase as they accumulate more teaching experience (Pate et al., 2019). Moreover, professional development has the potential to significantly impact teachers' knowledge, which, in turn, can transform practice and enhance student learning of safety (Kennedy, 2016). School-based agricultural education (SBAE) teachers, in particular, are uniquely positioned to address the issue of escalating fatality rates in agriculture. To underscore the importance of continued engagement in effective safety education professional development, additional research must examine the knowledge gained by participants in multi-year professional development events.

Conceptual Framework

Our study sought to analyze changes in participant knowledge throughout a multi-year professional development to better understand the role of continued engagement. To ensure the quality of this training, a framework that details effectiveness strategies and a theory for implementing action was selected. As displayed in Table 1, Darling-Hammond et al. (2017) determined that effective professional development includes seven elements and focuses on a rigorous learning experience for teachers. The content centers on what will be taught in the classroom and the content elements focus on active learning by teachers. This learning can involve collaboration among other educators, using models and coaching, an element that combines reflection and feedback. Professional development over a sustained duration is critical for the content skills to be practiced and retained (Darling-Hammond et al., 2017).

Table 1

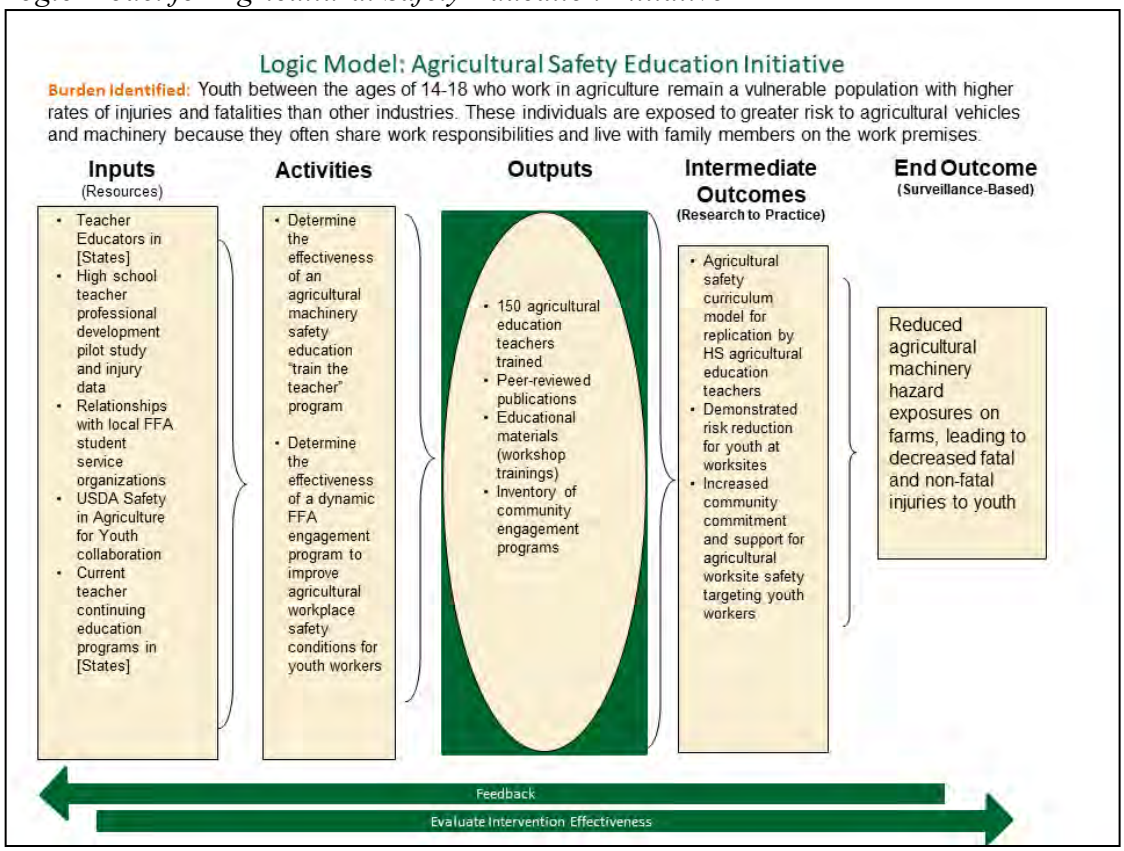
Elements of Effective Professional Development adapted from Darling-Hammond et al. (2017)

Elements	Description
Content Focus	Effective professional development focuses on the content that teachers teach.
Active Learning	Professional development must address both the what and the how of teaching.
Collaboration	Professional development should provide opportunities for teachers to work together.
Use of Models and Modeling	Professional development should provide clear examples or models of effective instruction.
Coaching and Expert Support	Professional development should provide for coaching teachers in the acquisition of new skills.
Feedback and Reflection	Professional development should promote, encourage, and provide teachers feedback on their performance.
Sustained Duration	Professional development should be of the duration necessary to allow for the six elements listed here.

Considering the effective teaching elements, a logic model was designed to guide our program, as displayed in Figure 1. The developed model links theories and assumptions with inputs, activities, outputs, and outcomes (W.K. Kellogg Foundation, 2004). The agricultural safety professional development explored in our study connects the program's resources to its stakeholders. Stakeholders are an essential component of agricultural education programs, and having a strong interaction with students will assist in promoting safety within the local community. Through educator training and behavior modeling (Schwebel & Pickett, 2012), students can develop safe behaviors and sound decision-making skills in a workplace setting, including those found in SAEs. SAEs allow students to facilitate experiential learning, which can help students further develop career development skills (Barrick et al., 1992; Burke et al., 2006). More specific to the purpose of this study, Sanderson et al. (2010) concluded that farm safety can be learned through observation and modeling.

Figure 1

Logic Model for Agricultural Safety Education Initiative



Tractor and Machinery Safety Professional Development Model

According to Kennedy (2016) and building on effective professional development and modeling, a teacher's professional development should be guided by a theory of action comprised of a central problem. For this multi-year professional development program, the guiding theory of action was informed by a central problem of practice. This focused on SAE safety using a hands-on pedagogy to facilitate student instruction. Workshop development and teaching strategies followed Desimone's (2009) core features of professional development. The workshop focused on addressing the teaching problem (coherence) of how to improve student comprehension of tractor and machinery safety (content) using hands-on table-top demonstrations (active learning) and tractor operations walk-through examples (collective participation) of student activities during a 10-hour session (duration).

The enactment component of our program theory of action was guided by a prescriptive approach for integrating agricultural safety curriculum within school-based SAEs (Kennedy, 2016b) using the National Safety Tractor Machinery Operations Program (NSTMOP) and the SAE Risk Assessment Protocol. This approach provided teachers with pre-established lesson plans that utilized closed-ended prompts for teachers and expected responses by students. The prescriptive curriculum allows teachers to implement without modifications as it provides what ought to happen, thus reducing the judgment teachers need to implement the teaching strategy

(Kennedy, 2016). Kennedy (2016) noted that as a teacher, various requirements create conflicting curriculum priorities. Having a teacher sustain the implementation efforts can be challenging as teachers maintain district and state curriculum requirements for their students. This framework was used to guide teacher professional development analysis and help formulate recommendations for developing new professional development.

Purpose and Objectives

To better understand the role of continued engagement in professional development, this study aimed to analyze participant knowledge throughout a multi-year safe tractor and machinery operations professional development. The research objectives guiding the study were:

1. Describe the teachers who participated in the SBAE multi-year professional development training.
2. Determine if knowledge attainment differences existed according to the quantity of multi-year professional development events attended.
3. Determine if motivational factors existed among teachers attending a multi-year professional development focused on safety operations training.

Methods

A convenience sample of secondary agricultural educators who had participated in hands-on agricultural safety trainings from Montana, South Dakota, and Utah were recruited to participate in this study over the five-year professional development. Each state's training seminar was hosted separately, but the content and delivery were uniform in learning activities and experiences. Teacher educators in each state provided professional development to SBAE teachers in June of each year from 2018 to 2023, with a one-year pause for COVID-19. The 10-hour professional development sessions focused on improving student comprehension of tractor and machinery safety through hands-on tabletop demonstrations. This was also completed by utilizing tractor operations walk-through examples of student activities. Resource materials, which involved safety materials and workshop curriculum, were provided to all participants. New lesson materials were developed yearly, including large group activities and rotations between small group, hands-on stations. Active engagement occurred with teachers throughout the training. This study examined data collected in the final year, 2023, of the five-year professional development.

Instrument and Data Collection

Following each professional development training, participants completed a paper-based test constructed of 50 NSTMOP knowledge items. This test had reliability established previously with youth. In addition, the test collected demographic questions and questions on motivation for returning to the training seminar. Test questions were focused on safe tractor operation, machinery safety, and general health and safety. The internal consistency reliability for dichotomous choices was measured by a KR-20 alpha, which measured dichotomous answer scoring (0 = incorrect, 1 = correct). The KR-20 alpha for the instrument was .89 when tested on 1,400 youth ages 14-18 (Smalley et al., 2022). For post-hoc reliability with the current sample of teachers, the KR-20 alpha was .54. For teacher-made tests, acceptable score reliability averages a

KR-20 value of .50 (Frisbie, 1988). Factors that have been noted to affect reliability estimates include test content, group heterogeneity, item difficulty, and item discrimination (Frisbie, 1988). A low reliability score may have been attributed to the multidimensional content assessed by the items pulled from each seminar's safety lessons (i.e., Tractor Stability, ATV/UTV, and Safe Operation of Equipment). Tests that measure multiple content areas tend to yield lower reliability scores (Frisbie, 1988). An item analysis was conducted to identify specific test items of concern regarding item discrimination using point-biserial correlations and the item difficulty index, which are provided in Table 2. We concluded that the instrument was reliable based on the literature and prior reliability scores.

Table 2

Safety Test Item Discrimination and Difficulty Index

Item	Point Biserial Correlation	Item Difficulty Index
In order to prevent falls when mounting the tractor, you should have at least body part(s) in contact with the tractor at one time.	.177	.88
What is the purpose of personal protective equipment?	.120	.99
The "point of no return" for a rear tractor overturn is reached in how many seconds?	.122	.76
If a ditch is 6 feet deep, how far away should you keep the tractor from the embankment?	.052	.87
Heavy draft loads (i.e., tillage equipment) should be attached to which of the following?	.453**	.62
When working on a skid steer loader with the bucket in the raised position, the following safety practice is expected of all workers:	.329**	.85
According to the North American Guidelines for Children's Agricultural Tasks (NAGCAT), what is the recommended minimum age for operating a PTO-powered implement?	.369**	.48
How would you describe work on the farm?	.476**	.74
What percent of tractor-related fatalities are a result of tractor overturns?	.104	.82
Start a tractor engine with the:	.200	.93
When releasing a two-pedal direction and speed control, what position should you return it?	.173	.82
Before starting your tractor, you should:	.210	.96
To stop a diesel engine:	.302**	.75
The rear tires of older tractors may contain a commonly used corrosive liquid in the inner tube to add weight to the tractor to improve its traction. What is the liquid?	.207	.88
If a mechanical push-pull fuel switch is used, where should this switch be located?	.233*	.82

Table 2

Safety Test Item Discrimination and Difficulty Index

Item	Point Biserial Correlation	Item Difficulty Index
To prevent runaways when parked with heavy tractor loads, you should:	.207	.88
What may happen if you crank the tractor's starter motor too long?	.019	.84
To prevent heat-related illness, you should:	.275*	.95
What information about your tractor engine is shown in this picture? (RPM)	.237*	.87
Throttle controls next to the tractor seat increase engine speed when moved:	.324**	.75
The letters "ROPS" stand for:	.309**	.88
Which of the following increases the chance of a run-over?	.228*	.87
Which of the following scenarios is NOT a designed use of a farm tractor?	.120	.87
When using wheel-type tractors on silage surfaces, do NOT use with slopes greater than:	.348**	.85
When operating a high-lift bucket, where should you keep the bucket while the tractor is in motion?	.110	.93
To prevent untrained operators, children, and visitors from accidentally starting the tractor you should:	.186	.89
Working as a non-family member farm employee, youth who are younger than 16 or older can fell trees with a butt diameter up to:	.319**	.84
Nationally, what fraction of all farm work fatalities are tractor-related?	.104	.56
According to the North American Guidelines for Children's Agricultural Tasks (NAGCAT), which age group should not operate a medium/large tractor (more than 70hp)	.370**	.71
The ROPS on a tractor:	.305**	.92
A safe work site should include which of the following:	.182	.95
Rather than an occupation, farming is commonly viewed as:	.227*	.78
A factor(s) that affect(s) your reaction time is/are:	-.154	.98
What has to exist for OSHA to apply to a business or operation?	.353**	.78
You should avoid driving an ATV on:	.352**	.80
This pictorial warns you about which of the following potential hazards: (run over)	.059	.93
If you raise your arm vertically overhead (palm to the front) and rotate it in large horizontal circles, what hand signal are you using? (come to me)	.261*	.60
What personal protective equipment is recommended for ATV driving?	-.003	.96

Table 2

Safety Test Item Discrimination and Difficulty Index

Item	Point Biserial Correlation	Item Difficulty Index
Identify this public road hand signal. (stop)	.123	.93
Farm shops need adequate:	-.004	.94
What unit is used to measure sound?	.012	.95
Identify this public road hand signal. (left turn)	.015	.96
If someone draws his/her right-hand palm down across his/her neck in a throat-cutting motion from left to right, what should you do? (stop engine)	.079	.94
What does an arm extended horizontally sideward with palm down, waving a downward signal? (slow down)	.010	.94
Identify this public road hand signal. (left turn)	.038	.94
What does this symbol indicate? (alert)	.042	.87
Which of the following are ground-motion controls and should be orange color-coded?	.140	.78
Lifting heavy loads with the skid steer bucket can result in the center of gravity:	.347**	.75
PTO controls are designed to move rearward or downward to:	.341**	.60
Engine speed controls are operated with which of the following?	.074	.75

** p < .05; ** p < .01*

Data Analysis

For objective one, descriptive statistics were used to report teacher performance and demographics, including frequencies, percentages, means, and standard deviations. Data was assessed for and met the assumption of normality. Once Levene's Test for equal variance was run to examine assumptions of homogeneity of variance, objective two was accomplished by utilizing a One-Way ANOVA to determine if there was a significant difference in knowledge and machinery operations between teachers participating in multiple years of professional development. Objective three used open-ended items to assess participants' motivation for returning to the training seminar. Open responses were coded based on priori established themes using the conceptual framework for teacher professional development (Desimone, 2009; Kennedy, 2016). Responses were coded by researchers as 1 = knowledge, 2 = curriculum, 3 = scheduling, 4 = yes. 5 = incentives, 6 = other, and 7= delivery. Data were compiled in Microsoft Excel and then analyzed in SPSS version 21.

Findings

As this was a multi-state project that included teachers from varying backgrounds, the purpose of objective one was to describe program participants. A total of 98 teachers participated in year five of the training program. Table 3 provides the distribution of teachers from each state.

Participants were nearly split in gender identification, with 45 (46.39%) identifying as female and 50 (51.55%) as male. Teaching experience was collapsed as an ordinal variable and renamed "Teacher Life Cycle Stage," with 1-5 years of teaching experience classified as a beginning teacher, 6-15 years as a mid-career, and 16 or more years as a veteran (National Association of Agricultural Educators, 2016). Beginning and mid-career educators accounted for over 80% (f = 77, 81.05%) of participants. The chi-square test of association was used to determine if there was a significant association between first-year attendees and multi-year attendees. There was no significant association between years of attendance and gender (χ^2 (4) = 6.42, p = .169). The average participant was 35.0 years of age (SD = 11.85). For years of teaching experience, six participants had 30 or more years, with the highest having 41 years of experience. Only 9 (9.28%) participants had less than or equal to one year of experience. The median teaching experience in years was eight.

Table 3

Demographics of Professional Development Participants

Distribution of teachers by State	f	%
Montana	44	44.90
South Dakota	23	23.47
Utah	31	31.63
Total Responses	98	100.00
Gender		
Female	45	46.39
Male	50	51.55
Missing/Other	2	2.06
Total Responses	97	100.00
Years of Experience		
Beginning (1-5)	39	41.05
Mid-Career (6-15)	38	40.00
Veteran (16 plus)	18	18.95
Total Responses	95	100.00
Age		
Young Adult (21-29)	41	43.62
Middle Aged Adult 30-39)	25	26.60
Older Adult	28	29.78
Total Responses	94	100.00

Objective two sought to determine if knowledge attainment differences existed according to the quantity of multi-year professional development events attended. Participants were asked how many times, including the current year, they had participated in the training program. This was the first time attending the training program for over one-third (f = 35, 36.08%) of participants, with Utah experiencing the highest number of first-year attendees (f = 17, 54.84%). Most participants (f = 62, 63.92.5%) had participated in the training at least twice, and Montana

had 7 (15.91%) participants who had participated in all five years of training. Table 4 provides the distribution of teachers' participation experience.

Table 4

Distribution of Teacher Attendee Category by State

Attendance Category	Montana		South Dakota		Utah		Combined	
	f	%	*f*	%	*f*	%	*f*	%
First time	12	27.27	6	26.09	17	54.84	35	36.08
Second time	5	11.36	4	17.39	8	25.81	17	17.53
Third time	11	25.00	6	26.09	1	3.23	17	17.53
Fourth time	9	20.45	7	30.43	4	12.90	20	20.62
Fifth time	7	15.91	0	0.00	1	3.23	8	8.25

When combining the attendee category with participant demographics, the average first-year attendee age was 34.34 years (*SD* = 11.53), and they had an average of 10.02 years of teaching experience (*SD* = 9.67). Second-year attendees' average age was 31.47 years (*SD* = 8.97), with an average of 7.65 years of teaching experience (*SD* = 8.62). Third-year attendees' average age was 33.18 (*SD* = 10.14), with an average of 10.5 years of teaching experience (*SD* = 9.81). The average fourth-year attendee age was 42.71 (*SD* = 12.35), and they had an average of 16.26 years of teaching experience (*SD* = 9.55). Fifth-year attendees' average age was 37.38 (*SD* = 10.13), with an average of 10.63 years of teaching experience (*SD* = 5.71).

The average test score was 39.0 (*SD* = 3.69) out of 50. Table 5 provides mean scores by attendee category and state. Second-year attendees recorded the lowest test score average (*M* = 37.82, *SD* = 3.66), while fifth-year attendees recorded the highest (*M* = 41.25, *SD* = 2.60). A passing test performance was considered 70%, or correctly answering at least 35 questions. Only ten individuals (10.3%) failed the test. An ANOVA was used to compare the means according to attendance category to determine the effect of sustained teacher participation on teachers' knowledge of safe tractor and machinery operation. Levene's Test of Equal Variance showed that the assumption of homogeneity of variance for ANOVA was met (F,(4,92) = 1.08, p = .37). The resulting difference was not statistically significant.

Table 5

Test Score Averages by Teacher Attendance Category

Attendance Category	Montana Test Score		South Dakota Test Score		Utah Test Score		Combined Test Score	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
First time	38.67	2.71	40.50	4.23	37.35	2.50	38.34	3.05
Second time	38.40	3.58	41.75	0.96	35.50	2.78	37.82	3.66
Third time	37.40	4.03	43.50	2.07	33.00	-	39.16	3.67
Fourth time	40.00	4.64	41.43	2.37	37.50	3.42	40.00	3.84
Fifth time	42.00	1.63	-	-	36.00	-	41.25	2.60

Objective three explored the motivational factors among teachers attending a multi-year professional development focused on safety operations training. On the post-experience NSTMOP test, participants were asked what attracted them to attend the training experience. Almost one-third (f = 30, 30.93%) reported *Curriculum Obtainment* as the primary attractor. Although accounting for only 12.37% (f = 12) of total responses, *Delivery Method* represented 29.41% of second-year attendees' reasons to return. Other responses included incentives such as PD credit, gift cards, or food (f = 6, 6.19%). Also of note, 23 (23.71%) participants responded with an affirmative but did not indicate factors that would bring them back to the training, and 18 (18.56%) answered *Other*. Table 6 provides frequencies and percentages of attendees' justification for returning to the training.

Table 6

Frequencies and Percentages of Attendees' Justification for Returning to the Training

Attendance	Knowledge Acquisition		Curriculum Obtainment		Scheduling		Incentives		Delivery	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
First time	2	5.71	9	25.71	1	2.86	2	5.71	3	8.57
Second Time	0	0.00	5	29.41	0	0.00	2	11.76	5	29.41
Third time	1	5.88	7	41.18	0	0.00	1	5.88	1	5.88
Fourth time	2	10.00	7	35.00	1	5.00	1	5.00	1	5.00
Fifth time	1	12.50	2	25.00	0	0.00	0	0.00	2	25.00
Total	6	6.19	30	30.93	2	2.06	6	6.19	12	12.37

Conclusions and Recommendations

This study aimed to analyze changes in participant knowledge throughout a multi-year professional development to better understand the role of continued engagement in safety training. A limitation of this study should note that the generalizability of these results should not go beyond the participants of this study. However, valuable information on the multi-year professional development has been acquired and helped form a series of implications for practice and recommendations for research.

Findings from objective one showed strong participation from each of the teacher life cycle stages, with many participants representing beginning and mid-career teachers. Moir and Glass (2001) would suggest this group is focused on ongoing training designed to help new teachers gain effectiveness in their teaching and begin the transition to skill development. As such, future professional development should include attention to effective teaching strategies that complement specific skill development. Even though most participants were categorized as beginning and mid-career teachers, almost twenty percent were considered veterans. During this cycle stage, teachers often focus on revitalizing their practice (Moir & Glass, 2001). Ideally, professional development events that include teachers from multiple life cycle stages would capitalize on the veteran experience and offer specific environments for coaching and expert support, as outlined by Darling-Hammond et al. (2017).

Objective two sought to determine if knowledge attainment differences existed according to the quantity of multi-year professional development events attended. Despite a significant association between participants attending for the first time versus multiple years, participants did well on the safe tractor and machinery operations knowledge test. Most participants received passing scores above 70% and had been part of the professional development for more than two years. Recommendations for practice are grounded in Darling-Hammond et al.'s (2017) Elements of Effective Professional Development, guided by Desimone's (2009) core features of professional development, and supported by this study's findings. As suggested by Darling-Hammond et al. (2017) and observed throughout our multi-year professional development, effective safety education professional development should include activities with classroom relevance, be delivered through an active learning approach, and allow for collaboration among participants. The long-term goal of this approach would be the attainment of outcomes that lead to improvements in student achievement (Scher & O'Reilly, 2009).

Objective three explored participants' motivational factors by asking what attracted them to attend and return to the training experience. Reinforcing Moir and Glass's (2001) conclusions, almost one-third of participants reported *curriculum obtainment* as the primary attractor. Also noteworthy was the participants' recognition of the role of delivery methods in attending and returning to professional development events. This would seem to align with Darling-Hammond et al.'s (2017) suggestions for effective professional development, especially concerning active learning that addresses the what and the how of teaching. Incentives such as PD credit, gift cards, or food did not factor into participant motivation as strongly as anticipated, implying that professional development facilitators could reallocate resources to other aspects of the training that factored more strongly into participants' willingness to engage in continued professional development.

Ultimately, with the seven elements of effective professional development (Darling-Hammond et al., 2017) being incorporated throughout the planning and implementation process, it was promising to see growth and commitment over several years. Future research should focus on evaluating the implementation of safe tractor and machinery operations in participating teachers' classrooms, as this is where authentic student behavioral changes will begin to address the issue of rising agricultural accidents. This study has implications for professional development coordinators looking to implement safety education programs and enhance safety within existing curriculum.

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A Twenty-Year Comparison of Traditionally and Alternatively Licensed SBAE Teacher Retention in Kansas

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Abstract

Given the state and nationwide shortage of school-based agricultural education (SBAE) teachers, the researchers in this study conducted a document analysis to compare the attrition and retention rates of Kansas SBAE teachers who are traditionally and alternatively certified. Utilizing Ingersoll's "Revolving Door" framework and Schlossberg's Transition Model, the study examined the attrition patterns of SBAE teachers over 20-years (2003-2022) in Kansas. The findings were consistent with nationwide trends, with an overall retention rate of 44% and many SBAE teachers leaving within their first five years of being in the classroom. Additionally, researchers compared the years SBAE teachers left by certification type. They found that overall attrition rates and longevity in the classroom of traditionally certified teachers were similar to those who were alternatively certified. Acknowledging that alternatively certified teachers may be critical in solving teacher shortages, the study highlights the need for tailored induction programs and mentorship for teachers of both certification types.

Author Note

This manuscript is based on data published in the Proceedings of the North Central Region Conference of the American Association for Agricultural Education, James et al., (2023).

Introduction and Need for Study

Teacher shortages nationwide continue to be a concern. Nguyen et al. (2022) estimated 36,500 vacant teaching positions across all grades and disciplines in the United States and more than 1,200 in Kansas in 2022. Furthermore, there were 163,650 positions filled by underqualified teachers (Nguyen et al., 2022). Like other disciplines, school-based agricultural education (SBAE) struggles to find qualified teachers (Smith et al., 2021).

Forty-eight new SBAE programs and 63 new SBAE teaching positions have been established in Kansas since 2015 (Smith et al., 2022). The growth of SBAE coupled with high teacher turnover, has contributed to schools struggling to find qualified teachers (Smith et al., 2021). The attrition rate of SBAE teachers reached a record high in 2022 with 12.23% of agricultural educators leaving the classroom in Kansas (Foster et al., 2022).

Recent studies have examined SBAE teacher turnover. Work-life balance was cited as a leading reason for attrition, with Solomonson et al. (2018) reporting teachers enjoy their teaching experiences at the expense of their personal lives. Other research found SBAE teachers leave the classroom due to a lack of self-confidence and low self-efficacy (Solomonson et al., 2018). Some exited the profession because of school culture. Researchers found teachers left because of

negative attitudes towards administration or lack of support, contributing to stress (Barry et al., 2022; Solomonson et al., 2018).

Policymakers have looked to solve teacher shortages by increasing the supply through alternative certification programs that postpone formal education training (Ingersoll & Smith, 2003). Researchers have investigated the merit of alternatively certified teachers in SBAE and found that they have a wealth of technical and content knowledge but lack pedagogical and student management skills (Bowling & Ball, 2018). Although alternatively certified teachers may lack educational skills, their existence is necessary for the future of SBAE (Bowling & Ball, 2018).

Literature Review

Teacher Certification

As recently as 2021, the United States had a demand for 1,011 SBAE teachers, but agricultural teacher preparation programs had only 789 completers (Foster et al., 2023). Given the shortfall of educators, states rely on alternative certificates, emergency certificates, or waivers to increase the supply of teachers (Suell & Piotrowski, 2007). Many alternatively certified teachers entered the profession claiming they had no plan to teach, but the opportunity arose (Cannon et al., 2022).

Between 20 and 30 percent of aspiring teachers enter the profession through one of approximately 130 alternative routes nationwide (National Research Council, 2010). Each state has unique requirements for alternative teaching certificates. Thus, the substantial number of avenues for individuals to obtain teacher certification creates confusion in tracking and supporting alternatively certified teachers (Claflin, 2020).

Much like novice traditionally certified teachers, alternatively certified teachers need daily contact with a mentor to provide technical and emotional support (Suell & Piotrowski, 2007). It is suggested that alternative certification pathways fail to prepare applicants as they may be teaching in areas in which they have no experience, have little or no pedagogical knowledge, or are not required to pass competency examinations for licensure (Bowling & Ball, 2018). Teachers with alternative certifications have demonstrated a lack of basic literacy skills and challenges in using lesson plans (Bowling & Ball, 2018).

Studies that compared the retention and attrition of teachers prepared traditionally versus alternatively have conflicting results. Suell and Piotrowski (2007) found that traditionally certified teachers had higher attrition rates than alternatively certified teachers. However, another study found no difference between the two groups (Suell & Piotrowski, 2007). Instead, Zetchner and Schulte (2001) credit subject area, level of teaching, and age as determining attrition factors. Claflin et al. (2020) found no link between teachers' backgrounds and certification when examining turnover intentions.

Attrition and Retention

The dynamics of teacher attrition and retention in SBAE are influenced by various factors such as regional disparities, subject area, and school characteristics. According to Carver-Thomas & Darling-Hammond (2019), the annual national attrition rate of all teachers across all disciplines is 8%. In a broader context, Ingersoll et al. (2018) reported that 44% of public and private school teachers leave the profession within their first five years of teaching.

There are 13,349 school-based agricultural education teachers nationwide employed in 8,367 programs as of September 2021 (Smith et al., 2022). In 2021, 382 new positions and 220 programs were added (Smith et al., 2022). Despite increasing positions and programs, the profession faces rising attrition rates. In 2020-2021, 674 SBAE teachers did not return to the classroom for the following school year (Smith et al., 2022). Research reveals that work-life balance primarily contributes to educators exiting the profession (Solomonson & Retallick, 2018; Solomonson et al., 2018; Solomonson et al., 2022; Sorenson, 2016). Teachers also left the classroom due to school culture, primarily negative attitudes towards or lack of support from school administration (Barry, 2022; Lemons et al., 2015; Solomonson et al., 2018).

Demand for Teachers

Between 2015 and 2021, 48 new school-based agricultural education programs were established in Kansas (Smith et al., 2022). The state has increased student enrollment and FFA membership in conjunction with the program additions. In fact, there was a 30% increase in FFA membership in the last decade (Kansas FFA Association, n.d.). While the growth in SBAE programs, student enrollment, and FFA membership is a positive trend, it has increased demand for qualified agricultural educators. Unfortunately, the surge in demand for SBAE teachers coincides with rising attrition rates due to retirement, employment in other fields, contract nonrenewal, and more (Smith et al., 2022).

The demand for SBAE teachers in Kansas surpasses the available supply of graduates in the field. Two institutions in Kansas provide degrees in agricultural education (Smith et al., 2022). In 2022, 30 individuals graduated with degrees in agricultural education between the two institutions (Smith et al., 2022). Of these graduates, 19 secured teaching positions as SBAE teachers within Kansas (Smith et al., 2022). However, during the same year, the state recorded 62 open SBAE teaching positions (Kansas Agricultural Education Vacancies, n.d.). Two of those 62 positions were new programs, and five were new positions in multi-teacher programs (Kansas Agricultural Education Vacancies, n.d.). Four of the 62 open positions went unfilled for the 2022-2023 school year (Kansas Agricultural Education Vacancies, n.d.). The discrepancy between the number of graduates and the existing job openings underscores a significant gap in the state's supply and demand dynamics for SBAE teachers.

Conceptual Framework

This study was anchored on the conceptual frameworks of Ingersoll's (2003) "The Revolving Door" and Schlossberg's (2011) Transition Model. Ingersoll (2003) found many teachers leave the profession for personal reasons other than retirement, which results in school staffing problems. Supply and demand data demonstrates a leaky bucket that is losing highly qualified teachers early in their careers (Ingersoll, 2003). This study investigated the "revolving

door" of teachers in SBAE programs based on their type of licensure in Kansas. Further, Ingersoll's (2003) framework was used to investigate attrition patterns among traditionally and alternatively certified SBAE teachers. The framework suggests that addressing attrition is crucial to resolving staffing issues.

The Transition Model (Schlossberg, 2011) was used to understand how alternatively certified SBAE teachers navigate the challenges and adjustments upon entering the profession. The Transition Model is based on the assumption that interactions with others influence an individual's response to a transition (Schlossberg, 2011). The model seeks to understand transitions, explain coping mechanisms, and provide guidance during transitions (Schlossberg, 2011). Transitions can alter a person's roles, responsibilities, and assumptions (Schlossberg, 2011). Schlossberg (2011) explains three types of transitions: anticipated (expected or voluntary), unanticipated (unexpected or involuntary), and nonevent (expected event that failed to occur). Teachers who entered the profession through alternate certification may have experienced an anticipated transition in which they sought a new experience or an unanticipated transition in which taking a position as an SBAE teacher was convenient.

Undeniably, both traditional and alternatively certified teachers experience significant challenges (Myers et al., 2005) upon entering the profession. Schlossberg's (2011) system for coping with transitions was applied to this study as it allowed the researchers to consider the complexities of entering the SBAE profession. Schlossberg (2011) outlines four categories (4 Ss) that can be applied to helping an individual cope with the potential resources or deficits they may experience during a transition (Schlossberg, 2011). The 4 Ss include situation, self, support, and strategies (Schlossberg, 2011). The 4Ss are further described in Figure 1.

Figure 1

The 4 Ss System for Coping with Transitions (Schlossberg, 2011).

4S Categories	Explanation of Category
Situation	Refers to a person's situation at the time of the transition, i.e. other stressors in the person's life.
Self	Refers to a person's inner strength and ability to cope with a situation
Supports	The support available to an individual at the time of a transition
Strategies	The coping strategies that change a situation reframe the situation and help reduce stress

By adopting the frameworks of Ingersoll (2003) and Schlossberg (2011), this study examined the years of attrition and overall retention rates by Kansas SBAE teachers. Through an examination of coping factors, the research seeks to contribute insight into the ongoing SBAE teacher shortage in Kansas and nationwide.

Research Purpose and Questions

This study aimed to analyze the retention and attrition rates of Kansas SBAE teachers over a twenty-year span from 2003-2022 with a focus on certification type. The research questions were:

1. At which year(s) of teaching were agricultural educators most likely to leave the profession in Kansas?
2. Did certification type impact agriculture teacher retention?
3. On average, how long do traditionally and alternatively certified teachers remain in the classroom?

Limitations

We recognize the limitations of our study. Although we found that the overall teacher retention and attrition rates aligned with national averages, we were unable to compare the trends at the regional or national level. Because the study was bound to Kansas, we were unable to track the teachers who left Kansas but continued teaching SBAE in other states due to the inaccessibility of data and difficulty following teachers once they left the state.

Moreover, the relatively small population of alternatively certified teachers required us to aggregate the various certification types in our data analysis. We acknowledge that separating the certification types could have revealed differences in the retention and attrition of each cohort.

Methods and Procedures

Bowen's (2009) principles of document analysis research methods were used in this study. The process of document analysis involved superficial examination, thorough examination, and interpretation (Bowen, 2009). Analyzing documents poses questions to be asked and provides supplementary research data and a means of tracking change and development (Bowen, 2009). A database of Kansas agriculture teacher information kept for 20 years (2003-2022) was analyzed (Disberger, 2023).

The data was obtained from the state's novice teacher coordinator who served from 2004-2016 and 2020-present, along with information provided by Kansas Team Ag Ed. The data was collected for each cohort of teachers based on the year they entered the SBAE profession in Kansas. The information included the teacher's name, initial school, number of years taught, and current teaching status. The researchers compared the teacher data to the Kansas vacancy bulletins to verify new teacher hires. Contact was made directly with teachers or veteran teachers in the FFA district to verify missing data.

To investigate the second and third research questions, the researchers contacted the Kansas State Department of Education to verify the types of teacher licenses from 2003 to 2022. The license types were classified as "traditional" or "alternative." Traditional teaching licenses were classified as those who graduated with a degree in agricultural education while alternative licenses included transition-to-teach with a restricted teaching license, Career and Technical Education specialized certificates, and restricted technical certificates. The study did not include SBAE teachers with standard and emergency substitute licenses.

The researchers entered the name of each teacher on the public Kansas Educator License Lookup website to determine their initial type of licensure. The data was then entered into the database of Kansas agriculture teachers. Spreadsheets were created for both traditionally certified and alternatively certified teachers. Additionally, a spreadsheet was created that included data for all certification types.

The data of 383 teachers across 20 years (2003-2022) was included in the study. Formulas in Microsoft Excel were used to determine retention and attrition rates within each year of experience for teachers of each certification type. Attrition from teaching was calculated based on leaving the profession in Kansas. Teachers who left teaching, but returned were considered retained. Due to the inability to track those teaching out of state, teachers who left Kansas were not considered retained.

Findings and Results

The first research question, "At which year(s) of teaching were agricultural educators most likely to leave the profession in Kansas?" focused on the departure of Kansas SBAE teachers from the profession. Table 1 provides an overview of retention and attrition data across all certifications by years of experience from 2003 to 2022. The data includes the total years of teaching, the number of returning teachers per year of experience, and the number of first-year teachers per year of experience in Kansas. Our findings indicated that attrition rates of teachers of all certifications were high in the first three years, with year one having a notably high attrition rate of 15.67% of teachers leaving the classroom. Attrition declined after the fourth year (9.19% attrition) and fifth year (4.79%). However, there was an upturn in attrition after the sixth year (16.67%). Notably, attrition experienced a decrease in years eight through 10 but rose to 10.42% after the 11th year. Conversely, the overall retention of Kansas SBAE teachers was 46.80%.

Table 1

Percentage of Traditionally Certified SBAE Teachers Retained in Years 1-10

Initial Year	*N*	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
2003-2004	10	90.00	70.00	50.00	50.00	50.00	30.00	30.00	30.00	30.00	30.00
2004-2005	9	100.00	88.89	55.56	55.56	55.56	44.44	33.33	33.33	33.33	33.33
2005-2006	12	91.67	75.00	59.53	58.53	50.00	33.33	25.00	25.00	25.00	25.00
2006-2007	14	85.71	57.14	50.00	42.86	42.86	21.43	21.43	7.14	7.14	7.14
2007-2008	11	81.82	72.73	63.64	45.45	45.45	45.45	45.45	45.45	45.45	45.45
2008-2009	12	91.67	75.00	58.33	58.33	58.33	58.33	50.00	50.00	41.67	41.67
2009-2010	10	60.00	60.00	60.00	60.00	60.00	60.00	50.00	50.00	50.00	40.00
2010-2011	12	91.67	58.33	58.33	50.00	41.67	41.67	41.67	41.67	33.33	33.33
2011-2012	16	87.50	68.75	50.00	43.75	43.75	31.25	31.25	31.25	31.25	31.25
2012-2013	17	88.24	82.35	76.47	70.59	64.71	58.82	58.82	58.82	58.82	52.94
2013-2014	20	90.00	80.00	55.00	50.00	50.00	35.00	35.00	35.00	35.00	30.00
2014-2015	12	83.33	83.33	75.00	75.00	75.00	66.67	58.33	33.33	33.33	
2015-2016	13	100.00	100.00	76.92	61.54	61.54	46.15	38.46	38.46		
2016-2017	14	85.71	71.43	64.29	57.14	57.14	50.00	50.00			
2017-2018	17	76.47	70.59	70.59	64.71	52.94	41.18				
2018-2019	20	95.00	90.00	70.00	50.00	50.00					
2019-2020	17	94.12	88.24	76.47	76.47						
2020-2021	18	100.00	100.00	94.44							
2021-2022	23	91.30	82.61								
2022-2023	20	90.00									
Avg. Retention		89.23	78.70	65.75	57.20	53.42	43.72	40.66	36.90	35.48	33.57
Avg. Attrition		10.77	11.74	16.08	10.00	4.10	18.69	7.50	7.46	3.51	5.88

Table 2 highlights the findings of the second research question which focused on the retention and attrition data for SBAE teachers who were traditionally certified in Kansas in the same timeframe of 2003-2022. The data indicated that most teachers left the classroom after the third year (16.08% attrition). Attrition declined in years four and five but increased after year six (18.69% attrition) before waning through year 20. The overall retention rate of traditionally certified SBAE teachers in Kansas between 2003-2022 was 46.80%.

Table 2

Percentage of Traditionally Certified SBAE Teachers Retained in Years 11-20

Initial Year	*N*	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
2003-2004	10	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
2004-2005	9	22.22	22.22	22.22	22.22	22.22	22.22	22.22	22.22	22.22	
2005-2006	12	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00		
2006-2007	14	7.14	7.14	7.14	7.14	7.14	7.14	7.14			
2007-2008	11	36.36	27.27	27.27	27.27	27.27	27.27				
2008-2009	12	41.67	41.67	41.67	33.33	33.33					
2009-2010	10	40.00	30.00	10.00	10.00						
2010-2011	12	33.33	33.33	33.33							
2011-2012	16	18.75	18.75								
2012-2013	17	52.94									
Avg. Retention		30.89	25.47	24.44	21.79	25.53	21.43	20.00	25.81	26.32	30.00
Avg. Attrition		9.52	6.90	8.33	5.56	0.00	0.00	0.00	0.00	0.00	
Overall Retention		46.80									

Alternatively certified teachers were found to have initially higher attrition rates than traditionally certified teachers. As seen in Table 3, the attrition rate of alternatively certified teachers after year one was 19.28%. Attrition increased in year two (22.81%) but declined in years three (13.95%), four (6.25%) and five (8.70%). The attrition rate of alternatively certified teachers increased in years six (16.67%) through 11 (20.00%). The overall retention rate of Kansas alternatively certified SBAE teachers was 43.37%.

Table 3

Percentage of Alternatively Certified SBAE Teachers Retained in Years 1-10

Initial Year	*N*	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
2003-2004	0	-	-	-	-	-	-	-	-	-	-
2004-2005	0	-	-	-	-	-	-	-	-	-	-
2005-2006	2	100.00	100.00	100.00	50.00	50.00	50.00	0.00	0.00	0.00	0.00
2006-2007	6	100.00	83.33	66.67	66.67	66.67	50.00	50.00	50.00	50.00	50.00
2007-2008	0	-	-	-	-	-	-	-	-	-	-
2008-2009	3	66.67	66.67	33.33	33.33	33.33	33.33	33.33	0.00	0.00	0.00
2009-2010	1	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2010-2011	0	-	-	-	-	-	-	-	-	-	-
2011-2012	1	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2012-2013	1	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2013-2014	3	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	66.67
2014-2015	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2015-2016	5	100.00	100.00	60.00	60.00	40.00	40.00	20.00	20.00		
2016-2017	4	25.00	25.00	25.00	25.00	25.00	25.00	25.00			
2017-2018	7	85.71	71.43	71.43	71.43	57.14	28.57				
2018-2019	9	77.78	33.33	33.33	33.33	33.33					
2019-2020	12	91.67	83.33	66.67	58.33						
2020-2021	9	66.67	55.56	55.56							
2021-2022	5	100.00	20.00								
2022-2023	14	71.43									
Avg. Retention		80.72	63.77	57.81	54.55	48.84	44.12	40.74	39.13	44.44	41.18
Avg. Attrition		19.28	22.81	13.95	6.25	8.70	16.67	15.38	10.00	0.00	12.50

Table 4

Percentage of Alternatively Certified SBAE Teachers Retained in Years 11-20

Initial Year	*N*	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th
2003-2004	0	-	-	-	-	-	-	-	-	-	-
2004-2005	0	-	-	-	-	-	-	-	-	-	
2005-2006	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-		
2006-2007	6	33.33	33.33	33.33	33.33	33.33	33.33	33.33			
2007-2008	0	-	-	-	-	-	-				
2008-2009	3	0.00	0.00	0.00	0.00	0.00					
2009-2010	1	0.00	0.00	0.00	0.00						
2010-2011	0	-	-	-							
2011-2012	1	100.00	100.00								
2012-2013	1	100.00									
Avg. Retention		28.57	23.08	16.67	16.67	18.18	25.00	25.00	0.00	0.00	0.00
Avg. Attrition		20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Overall Retention		43.37									

The third research question, “On average, how long do traditionally and alternatively certified teachers remain in the classroom?” sought to determine teachers' longevity by certification type. On average, traditionally certified teachers taught for 3.9 years, whereas alternatively certified teachers were in the classroom for 3.3 years.

Conclusions, Implications, and Recommendations

This study found retention and attrition trends of SBAE teachers in Kansas align with all teachers nationwide, albeit with a slight increase in comparison (Carver-Thomas & Darling-Hammond, 2019). Not only are educators exiting the profession before retirement, 44% are leaving within their first five years (Ingersoll, 2003; Ingersoll et al., 2018). Low retention rates of SBAE teachers in the first five years between traditionally and alternatively certified teachers created SBAE teacher staffing problems, as described by Ingersoll et al. (2018) and Nguyen et al. (2022). The "revolving door" (Ingersoll et al., 2018) of teachers increased the need for alternative certification which placed pressure on schools and groups who worked to support and provide pedagogical resources to early career teachers.

The attrition rate of SBAE teachers of all certification types was initially high after the first three years in the classroom. The subsequent decline in attrition after the fourth and fifth year, followed by an upturn in year six, suggests a series of factors influencing teachers' decision to stay or leave. The overall retention of SBAE teachers of all certification types at 46.80% highlights the challenge of retaining a substantial portion of SBAE teachers from 2003-2022.

The patterns of traditionally certified teachers follow those of the overall SBAE teacher data. Traditionally certified teachers' retention and attrition trends show that they were retained after the first year, but almost half left the classroom by year five. Attrition rates decline in the fourth and fifth years before sharply rising following the sixth year. Retention of alternatively certified teachers was similar to overall trends and traditionally certified teachers although they experienced initially higher attrition rates after the first two years. While the retention of alternatively certified teachers was highest after the first two years, it sharply declined in the third, fourth, and fifth years. Like traditionally certified teachers, attrition of alternatively certified teachers rises after the sixth year in the classroom. Furthermore, almost half of all alternatively certified teachers left the profession by their fourth year of teaching.

The data shows little difference between the overall retention rate of traditionally and alternatively certified teachers. The similarities in retention of SBAE teachers of both traditional and alternative certifications can be seen in the overall longevity in the classroom, with traditionally certified teachers staying in the classroom for an average of 3.9 years while alternatively certified teachers taught for an average of 3.3 years. Because the two rates of each certification type are similar, we believe it is important to emphasize mentorship programs equally for both. As reported by Bowling & Ball (2018), alternatively certified teachers may be vital to solving the teacher shortage problem, and thus, universities certifying agriculture teachers should consider programs that support alternatively certified teachers.

Initially high attrition rates of novice traditional and alternatively certified teachers could be explained by Schlossberg's Transition Model (2011). Both novice and alternatively certified teachers undergo significant transitions when they enter the profession. Novice teachers may experience a shift from student to teacher, while alternatively certified teachers face novel challenges with lesson planning, classroom management, and advising an FFA chapter. This underscores the need for targeted support during their formative years in the profession.

We recommend conducting additional research to compare retention among the different types of alternative licenses. In addition to investigating the nuances of each alternative licensure, it is recommended that traditional and alternatively certified teachers receive separate beginning teacher induction training programs given their unique needs.

Qualitative studies should be conducted to better understand the transitions of alternatively certified teachers, focusing on studies that investigate the experiences and practices of successful, alternatively certified teachers. Specifically, research should determine if their maturity and/or phase in life (married, with children, etc.), ties to the local school and community, or appreciation of teaching and nonfinancial benefits contributed to their desire to teach and continue in the profession. Successful alternatively certified teachers could be instrumental in creating professional development for other alternatively certified teachers to help increase retention.

Qualitative studies should also be conducted to understand the experiences of the traditionally certified teacher. Questions are specific to whether they have ties to the community they teach, appreciate the nonfinancial benefits of teaching, and feel appreciated. Qualitative studies about teachers' experiences who left the profession would provide insight into how we can support early career teachers. There may be factors out of our control, but we need to know how to support them in areas we can help.

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Determining the Classroom Needs of School-Based Agricultural Education Teachers in Minnesota

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Abstract

A desire is to retain quality SBAE teachers is key to the success and growth of the agricultural industry. Given the connection between SBAE teacher perceived competence and professional commitment (Palmer, 2020; Rada, 2023), it is vital to explore the perceptions of competence of teachers concerning their classroom. The purpose of this study was to evaluate the perception of Minnesota SBAE teachers in the areas of teaching and classroom management and technical agriculture. The SBAE teachers utilized various sources of professional development to enhance their competence as educators. The agriculture teachers' association workshops and school in-service workshops were the main sources of professional development that the teachers in this study most frequently attended. Most respondents (69.2%) had also participated in the Teacher Induction Program (TIP) as an early-career teacher. Managing student behaviors, motivating students to learn, proper implementation of IEPs for students with disabilities, integrating current advances in agricultural technology into the curriculum, teaching in an agricultural mechanics laboratory, and teaching knowledge and skills in biotechnology were identified as the top six professional development needs.

Introduction

A shortage of teachers has been found in numerous disciplines and has impacted education negatively. Career and technical education (CTE) provides students with an opportunity to be prepared for college and careers (CTE, n.d.). With a shortage of school-based agricultural education (SBAE) teachers, reaching and preparing students can be challenging. A shortage of SBAE teachers has been identified since the 1970's and has continued for decades (Camp, 2000). Ingersoll et al. (2018) indicated 44% of classroom teachers leave the profession within five years. Though attrition in Minnesota is lower than the national average, more than one-third (34.1%) had departed the SBAE profession within the first five years, and SBAE remains a teacher shortage area (Minnesota Professional Educator Licensing and Standards Board (PELSB), 2021). In addition, this teacher turnover is costly and can exceed $20,000 for some school districts to replace with a quality educator (Carver-Thomas & Darling-Hammond, 2017).

With having a continuous trend of teachers leaving the profession and the cost and challenge to replace teachers, an effort has been placed on retaining teachers. A desire is to retain quality SBAE teachers is key to the success and growth of the agricultural industry. The retention piece looks at areas to focus on such as teacher work life balance, new teacher workshop series, engagement, mentoring, and professional development. Psychological needs satisfaction of autonomy, competence, and relatedness (independently and collectively) have a significant and negative impact on turnover intention on Minnesota SBAE teachers (Rada, 2023). Specifically, perception of competence is one of the primary predictors of SBAE educator

professional commitment (Palmer, 2020; Rada, 2023). However, development and support are required for these human tendencies to be strong (Ryan & Deci, 2020).

The connection between SBAE teacher perceived competence and professional commitment identify a vital need to explore the teacher perceptions of competence concerning their classroom. According to the Minnesota Department of Education (DOE), the annual enrollment of SBAE students in the 2022-2023 school year had 24.7% of SBAE students in power, structural, and technical systems courses (n = 10,617), 19.1% of students in animal systems courses (n = 8,207), and 17.0% in plant systems (n = 7,317) (2023*;* see Table 1). When considering the courses taught by Minnesota SBAE teachers with program approval, 30.0% were power, structural, and technical systems courses (n = 800), 16.3% were animal systems courses (n = 434), and 14.8% were plant systems courses (n = 394) (DOE, 2023; see Table 1). It is crucial to evaluate of SBAE teacher perceptions of competence to identify strategies for supporting and enhancing competence, with the intention of improving teacher retention.

Table 1
SBAE Program Enrollment and Approved Courses by Pathway

	Student Enrollment		Approved Courses	
Item	*n*	%	*n*	%
Agribusiness Systems	1,919	4.5	145	5.4
Animal Systems	8,207	19.1	434	16.3
Biotechnology Systems	415	1.0	20	0.8
Food Products and Processing Systems	3,536	8.2	152	5.7
Natural Resources, Energy, and Environmental Service Systems	5,481	12.8	282	10.6
Plant Systems	7,317	17.0	394	14.8
Power, Structural, and Technical Systems	10,617	24.7	800	30.0
Multiple Pathways	5,478	12.7	439	16.5
Total	42,970		2,666	

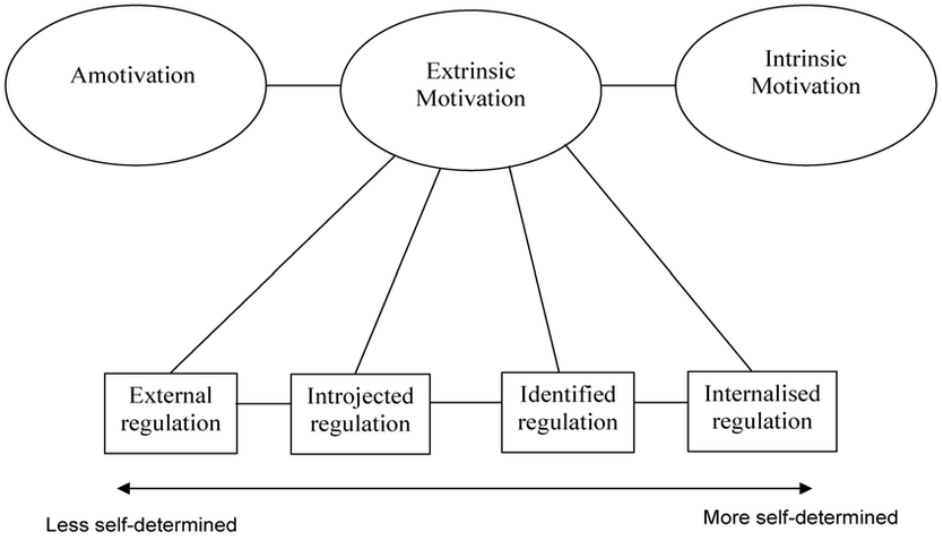
Framework

Self-determination theory (SDT) (Deci & Ryan, 1985, 2000) focuses on how human motivation and personality are shaped with intrinsic and extrinsic factors (Figure 1). This theory explores how human motivation and personality addresses the three universal psychological needs of competence, autonomy, and relatedness. It clarifies how people perceive their surroundings and contends that human motivational processes are supported by psychological needs satisfaction (Deci & Ryan, 2000). Based on the SDT (Ryan & Deci, 2002), individuals possess a natural propensity towards psychological growth and development. This predisposition leads to increased capacity in learning, acquiring skills, and forming interpersonal relationships.

It distinguishes between autonomous motivation which is driven by interest and values and the controlled motivation. Controlled motivations are driven by rewards and pressures. If the universal needs are met, the theory argues the people will grow and function optimally. SDT will apply to a variety of domains in life, work, and relationships. In addition, it examines how social contexts will support people's needs and motivations, including work motivations.

The three psychological needs of autonomy, competence, and relatedness are essential to human development and motivation (Ryan & Deci, 2002, 2020). Autonomy refers to the ability to take initiative and ownership of one's activities. It is fostered by experiences that a person finds interesting and valuable (Deci & Ryan, 2012; Ryan & Deci, 2020). Competence refers to a sense of mastery and the belief that one can succeed and develop. This feeling is fulfilled by facing appropriate challenges, receiving positive feedback, and having possibilities for personal progress (Ryan & Deci, 2020). Relatedness refers to a feeling of "belonging and connection" (Ryan & Deci, 2020, p. 1) that is established via the presence of mutual respect, dependence, and concern with other individuals and collectives. According to SDT, if these three conditions are fulfilled, well-being is maintained and improved; otherwise, individuals would suffer significant psychological setbacks (Deci & Ryan, 2012; Ryan & Deci, 2020). The absence of any of these three fundamental needs is perceived to damage motivation and professional commitment.

Figure 1
Self-Determination Theory

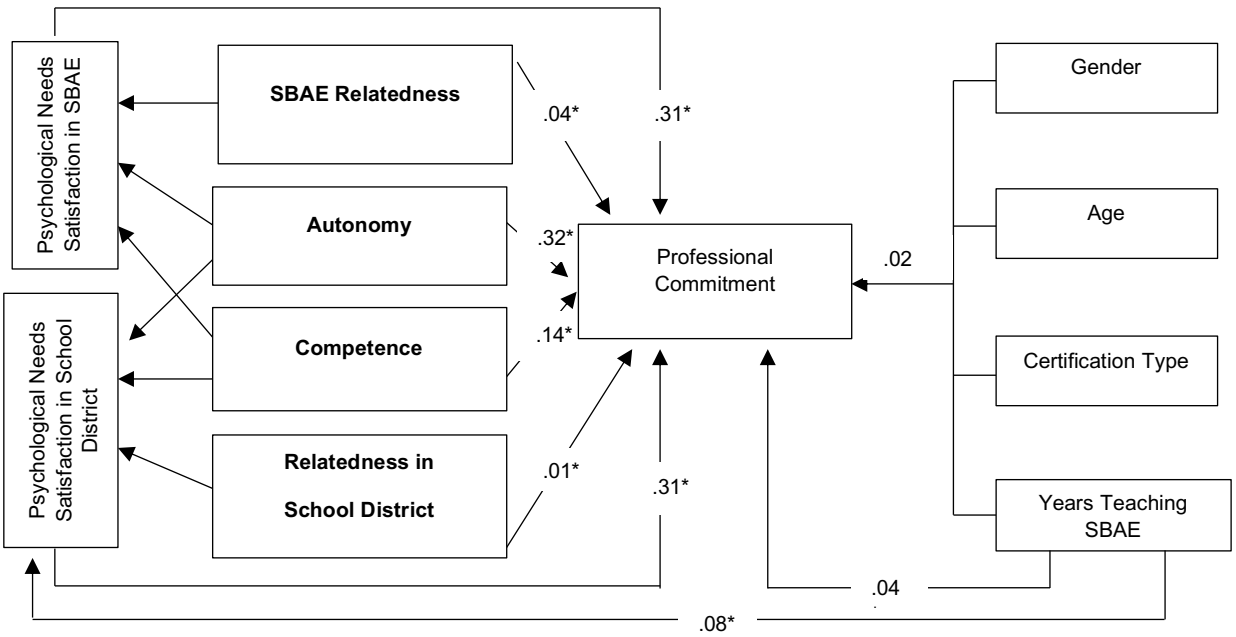


This framework has a distinction between the motivational regulation of behavior which focuses on intrinsic and extrinsic motivation. Intrinsic motivation behavior is autonomous and self-determined. While extrinsic motivation refers to performing an activity because of the instrumental value. The various types of extrinsic motivation can be placed on a continuum ranging from non-self-determined to self-determined behavior (Deci & Ryan, 2000). The two extrinsic motivations are external and introjected regulation, and the externally regulated behaviors are motivated external contingencies involving threats of punishment. Externally regulated behaviors are regulated by forces in the social environment and are considered non-self-determined. The introjected regulation is an internalization process where external standards of self-worth are adopted (Deci & Ryan, 2000). Behaviors which are introjectedly regulated are motivated by acquiring a positive feeling and avoiding negative feelings. When individuals do not identify with adopted external standards, they experience conflict with external standards and what they find important. Introjected behavior can be non-self-determined.

Competence is the psychological need for effectiveness and influences a person's psychological well-being. Psychological frustration occurs in the workplace when there is a disparity between what people must do and can do. When duties exceed capabilities, anxiety results, but boredom results when responsibilities fall short of abilities (Pink, 2009). When developing competence or mastery, an individual must work to learn and grow (Pink, 2009). When studying the context of teaching, perceived competence may influence a teacher's belief in their ability to be effective. This perception of competence is a critical component to evaluate when exploring teacher retention. A teacher's psychological needs fulfillment at work is influenced by perceived competence (Palmer, 2020). Collie et al. (2016) attested that competence was the best predictor of overall well-being and provided insight into understanding teachers' psychological functioning at work. A statistically significant relationship between teachers' perceived competence satisfaction and years of service has been documented (Hobson & Maxwell, 2017; Palmer, 2020) and confirmed with Minnesota SBAE teachers (Rada, 2023; see Figure 2). Understanding SBAE instructors' views of their competence at work is crucial to retention due to the link between perceived competence and professional commitment.

Figure 2

Relationship Among Psychological Needs Satisfaction, Professional Commitment, and Teacher Demographic Variables as Determined by Regression Analysis (Rada, 2023)



Note: *$p < .01$

The capabilities and deficiencies of SBAE teachers have been assessed through needs assessments, considering the competencies required to manage the discipline-specific expectations of an SBAE teacher (Clemons et al., 2018; Coleman et al., 2020; Smalley et al., 2019; Smalley & Smith, 2017; Sorensen et al., 2014), but these perceptions had not been assessed in Minnesota. Discipline-specific teacher expectations encompassed in SBAE research

include pedagogy, program management, technical knowledge, professional growth, and personal qualities (McKim et al., 2017; Roberts & Dyer, 2004). SBAE teachers who perceive higher competence within the discipline-specific teacher competence areas also reported a higher perceived commitment to teaching (McKim et al., 2017). Additional research assessed SBAE teachers' perceived competence regarding specific content, including agricultural mechanics (Byrd et al., 2015; Wells et al., 2021). Competence was a primary predictor of professional commitment for Minnesota SBAE teachers (Rada, 2023). Given that competence has been discovered to be a strong predictor of psychological functioning at work (Collie et al., 2016) and professional commitment (Rada, 2023), a needs assessment of the perceived competence of Minnesota's SBAE teachers was warranted.

Purpose and Objectives

The purpose of this study was to evaluate the perception of Minnesota SBAE teachers in the areas of teaching and classroom management and technical agriculture. The following three research objectives served as a guide for this needs assessment study:

1. Determine the background characteristics (i.e., education and training in agricultural education, completion of CASE certification, participation in professional development) of Minnesota SBAE teachers.
2. Determine the perceptions of competence of Minnesota SBAE teachers related to teaching and classroom management and technical agriculture.
3. Assess Minnesota SBAE teachers' professional development needs related to teaching and classroom management and technical agriculture.

Methods

Population

A census was attempted of all Minnesota SBAE teachers ($N = 326$). Of the 143 teachers with complete responses to this instrument, the majority of Minnesota SBAE teachers were female ($n = 79$, 55.2%). Their average age was 38.06 ($SD = 12.51$). With regard to the level of education of the teachers, 140 (97.9%) SBAE teachers indicated that they have obtained a bachelor's degree, while 68 (47.6%) SBAE teachers completed a master's degree. Of those with a bachelor's degree, 18.1% ($n = 31$) did not have a bachelor's degree in agricultural education.

Instrumentation

Researchers utilized a modified Borich Needs Assessment Model to assess the current professional development needs of active SBAE teachers in Minnesota. The model is used to quantify the discrepancy between what is and what should be by identifying the "behaviors, skills, and competencies" versus what should be to identify the goals of needed training (Borich, 1980, p. 39). The needs assessment instrument was developed and validated by Smalley et al. (2019) and evaluated the perception of Minnesota SBAE teachers in the areas of teaching and classroom management and technical agriculture.

The items of the online instrument were organized so that each topic was allocated to a distinct page, improving the readability (Dillman et al., 2014; Revilla & Ochoa, 2017). The area of teaching and classroom management had 18 items and technical agriculture had nine items. Each needs assessment item was paired with two Likert-type scales. One scale assessed the teachers' perceived importance associated with the different topics (1 = *No Importance*, 2 = *Below Average*, 3 = *Average*, 4 = *Above Average*, 5 = *Essential*). Importance within this statement refers to the perceived importance of all SBAE teachers understanding the topic within their classrooms. The other scale evaluated their perceived ability to perform the skill within their classroom (1 = *No Ability*, 2 = *Below Average*, 3 = *Average*, 4 = *Above Average*, 5 = *Exceptional*). The instrument also contained items to determine the demographic and personal history of the participants.

Data Collection

Teachers teaching in the SBAE profession in Minnesota as of October 2022 were the participants of this research. The contact information of the SBAE teachers teaching in the fall of 2022 was obtained using the Minnesota Agricultural Education teacher directory developed by one of the researchers. Each contact to respondents was personalized, with at most three contacts made to encourage participation, and included information regarding the study, instruction for participation, and the link to the needs assessment instrument in Qualtrics. The message, time, and day of the week in which the messages were delivered varied for each contact (Dillman et al., 2014). Each teacher was assigned a randomized code, and teacher completion was tracked. Qualtrics collected quantitative data using an online questionnaire, stored the data on web servers which were accessible only by password, and provided a downloadable file for data analysis. This allowed for the tracking of respondents, ensured the integrity and security of survey data, and prevented duplicated submissions (Dillman et al., 2014).

Data Analysis

The data were analyzed using descriptive statistics in IBM's Statistical Package for Social Sciences (SPSS©) to establish the background characteristics related to objective one. Objectives two and three indicated the professional development needs for Minnesota SBAE teachers in the areas of teaching and classroom management and technical agriculture. The data were examined using mean weighted discrepancy scores (MWDS) for each assertion.

Calculating discrepancy scores provides valuable information into an individual participant's perceptions. Additionally, the Borich model incorporates the collective assessment of the participant group to mitigate any potential flaws in individual assessment (Borich, 1980). The calculation of a MWDS is performed. Responses missing one of the two scores for each item were unusable and removed. It is necessary to first calculate the discrepancy score for each competency, which represents the gap between the perceived significance and level of accomplishment. Next, a weighted discrepancy score is calculated for each participant by multiplying the participant's discrepancy score by the average perceived importance for that ability among all participants, as suggested by Borich (1980). Ultimately, the MWDS can be determined by adding all the weighted discrepancy scores for the competency and then dividing by the total number of responses. A comparison of the MWDS for the perceptions is used

identify the specific ones that call for professional development. Higher MWDS imply larger disparities between the perceived importance and the level of ability among the participants, suggesting a stronger demand for development (Borich, 1980). Competencies having the largest MWDS should be regarded as the utmost objectives for training. The researchers used McKim & Saucier's (2011) Excel-Based Mean Weighted Discrepancy Score Calculator.

According to Smalley et al. (2019), the instrument has a good internal consistency, with a Cronbach alpha coefficient reported for importance (α = .97) and knowledge (α = .97). In this study reliability Cronbach's alpha coefficients for the importance (α = .96) and ability (α = .96) were calculated and met the tolerable threshold level (Hair et al., 2014; Johnson & Christensen, 2014). These findings are consistent with the psychometric properties in prior research (Hainline & Smalley, 2023; Smalley et al., 2019). Response options were limited to five balanced categories to improve reliability, validity, and provide meaningful distinctions for analysis (Dillman et al., 2014). The external validity of the findings was not assessed due to constraints associated to the attempted census of SBAE teachers in Minnesota. Therefore, it is important to use caution when trying to generalize these findings to any other population.

Findings

The first objective sought to determine the background characteristics (i.e., education and training in agricultural education, completion of CASE certification, participation in professional development) of Minnesota SBAE teachers. Minnesota SBAE teachers indicated participation in Minnesota's teacher retention programs. Of the 143 participants, 24 (16.8%) had participated in the state's Future AgriScience Teacher Symposium as a pre-service teacher, 99 (69.2%) had participated in the Teacher Induction Program (TIP) as an early-career teacher, and 34 (23.8%) in the Resources for Professional Learning retention program for teachers with 3-7 years of experience. The primary sources of professional development identified by SBAE teachers were agricultural teachers' association workshops (88.1%, n = 126), school in-service events (76.2%, n = 109), university workshops (14.0%, n = 20), professional organization workshops (46.2%, n = 66), and graduate coursework (22.4%, n = 32; see Table 2). Additionally, 66 (46.2%) had attended at least one Curriculum for Agricultural Science Education (CASE) Institute.

State provided professional development was a key source for professional development. Teachers found additional professional development in their school districts and from additional professional organizations. Though CASE was identified as a professional development sources for 46.2% of participants (n = 66), only 25.9% of participants (n = 37) claimed it as a primary source of professional development.

Table 2

Primary Sources of Professional Development for Minnesota SBAE Teachers

Primary Source(s) of Professional Development (n = 143)	f	%
Agricultural teachers' association workshops	126	88.1
School in-service events	109	76.2
University workshops	20	14.0
Professional organization	66	46.2
Graduate coursework	32	22.4
CASE institutes	37	25.9

The second objective was to determine the perceptions of competence of Minnesota SBAE teachers related to teaching and classroom management and technical agriculture. The perception of ability and importance were necessary in determining the professional development needs of Minnesota teachers. Table 3 provides a summary of the perceived importance and average ability of each item associated with teaching and classroom management. The three competencies with the highest perceived importance were (a) managing student behavior problems; (b) motivating students to learn; and (c) teaching students problem-solving skills. The three competencies with the lowest perceived importance were (a) developing articulation agreements with local community colleges; (b) conducting parent/teacher conferences; and (c) teaching in land laboratory. The three competencies in which teachers had the highest mean ability in teaching and classroom management were (a) providing career exploration activities in the agricultural education; (b) providing guidance to students interested in post-secondary education; and (c) teaching students problem-solving skills. The three competencies in which teachers identified the lowest mean ability were (a) teaching in land laboratory; (b) developing articulation agreements with local community colleges; and (c) teaching in an agricultural mechanics laboratory.

Table 3

SBAE Teachers' Perceived Ability Related to Teaching and Classroom Management

	Importance			*Ability*		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
Managing student behavior problems.	143	4.57	.60	142	3.67	.70
Determining the content that should be taught in specific courses.	142	4.25	.74	142	3.61	.69
Motivating students to learn.	142	4.42	.66	141	3.60	.71
Providing guidance to students interested in post-secondary education.	142	3.94	.68	142	3.77	.73
Developing articulation agreements with local community colleges.	141	3.16	.83	140	2.87	.97
Assessing and evaluating student performance.	142	4.18	.71	142	3.63	.73
Providing career exploration activities in the agricultural education.	142	4.23	.71	142	3.78	.79
Locating and selecting student references and materials.	142	3.71	.80	142	3.46	.81
Teaching students problem-solving skills.	142	4.38	.72	142	3.70	.74
Teaching students decision-making skills.	142	4.35	.73	142	3.69	.71
Conducting parent/teacher conferences.	141	3.40	.86	141	3.51	.80
Proper implementation of IEPs for students with disabilities.	142	4.26	.79	142	3.41	.77
Developing performance-based assessment instruments.	141	3.88	.78	142	3.42	.79
Organizing and supervising a teaching laboratory.	142	4.12	.75	141	3.73	.76
Teaching in an agricultural mechanics laboratory.	140	3.82	.97	141	3.01	1.1
Teaching in horticulture/greenhouse facility.	142	3.82	.80	142	3.18	.96
Teaching in land laboratory.	142	3.43	.86	142	2.89	.93
Using technology in teaching.	142	4.13	.77	142	3.63	.79

Note: Participants Perceived Importance Likert Scale: 1 = No Importance, 2 = Below Average, 3 = Average, 4 = Above Average, 5 = Essential. Participants Perceived Ability to Perform the Skill 1 = No Ability, 2 = Below Average, 3 = Average, 4 = Above Average, 5 = Exceptional.

Table 4 provides a summary of the average proficiency and significance of each competency associated with technical agriculture knowledge. The three items with the highest perceived importance were (a) integrating current advances in agriculture technology into the curriculum; (b) teaching about public issues regarding agriculture; and (c) teaching knowledge and skills in animal sciences. The three competencies with the lowest perceived importance were (a) teaching knowledge and skills in biotechnology; (b) teaching knowledge and skills in agronomy; and (c) teaching knowledge and skills in natural resources. The three competencies in which teachers had the highest mean ability in technical agriculture knowledge were (a) teaching knowledge and skills in animal sciences; (b) teaching knowledge and skills in horticulture; and (c) teaching knowledge and skills in natural resources. The three competencies with the lowest mean ability were (a) teaching knowledge and skills in biotechnology; (b) teaching knowledge and skills in agricultural mechanics; and (c) teaching knowledge and skills in agronomy.

Table 4

SBAE Teachers' Perceived Ability Related to Technical Agriculture Knowledge

	Importance			*Ability*		
Item	*n*	*M*	*SD*	*n*	*M*	*SD*
Integrating current advances in agriculture technology into the curriculum.	139	3.98	.74	140	3.11	.79
Teaching knowledge and skills in agribusiness.	140	3.69	.76	139	3.01	.86
Teaching knowledge and skills in agronomy.	140	3.55	.77	140	2.99	.89
Teaching knowledge and skills in natural resources.	140	3.65	.76	140	3.41	.82
Teaching knowledge and skills in agricultural mechanics.	139	3.68	.83	140	2.93	1.0
Teaching knowledge and skills in animal sciences.	140	3.78	.72	139	3.71	.83
Teaching knowledge and skills in horticulture.	140	3.74	.71	140	3.51	.83
Teaching knowledge and skills in biotechnology.	140	3.52	.77	140	2.64	.91
Teaching about public issues regarding agriculture.	140	3.95	.78	140	3.39	.82

Note: Participants Perceived Importance Likert Scale: 1 = No Importance, 2 = Below Average, 3 = Average, 4 = Above Average, 5 = Essential. Participants Perceived Ability to Perform the Skill 1 = No Ability, 2 = Below Average, 3 = Average, 4 = Above Average, 5 = Exceptional.

The third objective was to assess Minnesota SBAE teachers' professional development needs related to teaching and classroom management and technical agriculture. The MWDS for each teaching and classroom competency and the rank in order of professional development priority are summarized in Table 5. The top three professional development priorities related to teaching and classroom management were (a) managing student behavior problems; (b) motivating students to learn; and (c) proper implementation of IEPs for students with disabilities. In comparison, the three competencies with the least need for professional development include (a) conducting parent/teacher conferences; (b) providing guidance to students interested in post-secondary education; and (c) developing articulation agreements with local community colleges.

Table 5

SBAE Teachers' Perceived Professional Development Needs Related to Teaching and Classroom Management, Using the Borich Needs Assessment Model

Item	*n*	MWDS	Rank
Managing student behavior problems.	141	4.04	1
Motivating students to learn.	140	3.67	2
Proper implementation of IEPs for students with disabilities.	141	3.63	3
Teaching in an agricultural mechanics laboratory.	139	3.11	4
Teaching students problem-solving skills.	141	2.98	5
Teaching students decision-making skills.	141	2.87	6
Determining the content that should be taught in specific courses.	141	2.71	7
Teaching in horticulture/greenhouse facility.	141	2.50	8
Assessing and evaluating student performance.	141	2.29	9
Using technology in teaching.	141	2.02	10
Providing career exploration activities in the agricultural education.	141	1.86	11
Teaching in land laboratory.	141	1.85	12
Developing performance-based assessment instruments.	140	1.77	13
Organizing and supervising a teaching laboratory.	140	1.56	14
Locating and selecting student references and materials.	141	0.95	15
Developing articulation agreements with local community colleges.	139	0.91	16
Providing guidance to students interested in post-secondary	141	0.64	17
Conducting parent/teacher conferences.	140	-0.34	18

The MWDS for each technical agriculture knowledge competency and the rank in order of professional development priority are summarized in Table 6. The top three professional development priorities related to technical agriculture knowledge were (a) integrating current advances in agriculture technology into the curriculum; (b) teaching knowledge and skills in biotechnology; and (c) teaching knowledge and skills in agricultural mechanics. In comparison, the three competencies with the least need for professional development include (a) teaching knowledge and skills in animal sciences; (b) teaching knowledge and skills in horticulture; and (c) teaching knowledge and skills in natural resources.

Overall when combining all the competencies, the top six identified needs for professional development were: (a) managing student behaviors (*MWDS* = 4.04); (b) motivating students to learn (*MWDS* = 3.67); (c) proper implementation of IEPs for students with disabilities (*MWDS* = 3.63); (d) integrating current advances in agricultural technology into the curriculum (*MWDS* = 3.46); (e) teaching in an agricultural mechanics laboratory (*MWDS* = 3.11); and (f) teaching knowledge and skills in biotechnology (*MWDS* = 3.09).

Table 6

SBAE Teachers' Perceived Professional Development Needs Related to Technical Agriculture Knowledge, Using the Borich Needs Assessment Model

Item	*n*	MWDS	Rank
Integrating current advances in agriculture technology into the curriculum.	139	3.46	1
Teaching knowledge and skills in biotechnology.	140	3.09	2
Teaching knowledge and skills in agricultural mechanics.	139	2.67	3
Teaching knowledge and skills in agribusiness.	139	2.46	4
Teaching about public issues regarding agriculture.	139	2.24	5
Teaching knowledge and skills in agronomy.	140	1.98	6
Teaching knowledge and skills in natural resources.	140	0.86	7
Teaching knowledge and skills in horticulture.	140	0.85	8
Teaching knowledge and skills in animal sciences.	139	0.27	9

Conclusions, Implications, and Recommendations

The purpose of this study was to evaluate the perceptions of Minnesota SBAE teachers in the areas of teaching and classroom management and technical agriculture. The SBAE teachers utilized various sources of professional development to enhance their competence as educators. The agriculture teachers' association workshops and school in-service workshops were the main sources of professional development that the teachers in this study most frequently attended. Most respondents (69.2%) had also participated in the Teacher Induction Program (TIP) as an early-career teacher. The chosen methods of professional development shed light on the teachers' self-perceived needs. The SBAE teachers' assessment of their professional development needs takes into consideration the self-directed nature of these adult learners. This study offers a comprehensive overview of the professional development activities that instructors opted to participate in. However, it did not investigate the factors that influenced engagement in these professional development events.

The SBAE teachers' engagement in professional development might imply that they are motivated to develop their knowledge or mastery of a topic to fulfill their psychological need for competence. The satisfaction of a teacher's psychological needs at work is determined by their perceived competence (Palmer, 2020). According to McKim et al. (2017) and Rada (2023), SBAE teachers who perceive higher competence within the discipline-specific teacher competence areas also reported a higher perceived commitment to teaching. The professional development events need to make sure the time, length, and topics are correct for the audience and there is active participation (Birman, et. al., 2000). Though this study did not investigate factors that influence professional commitment or retention, in future studies, factors influencing engagement in professional development and the long-term impact of professional development in relationship to retention should be explored.

Teachers perceived ability related to teaching and classroom management identified as being important including areas which were related to intrinsic motivation within the SDT (Deci & Ryan 2000). Specifically, teachers identified managing student behavior, motivating students to learn, teaching students problem-solving and decision-making skills and proper implementation

of IEPs for students with disabilities as important. Within the theory, a need for autonomy focused on the ability to take ownership. Teachers are certainly doing this by identifying pedagogical needs focused on engaging all students as being important, yet further they have identified it as an area of need as they do not feel as confident in their ability to deliver these areas. A recommendation to the professional development planning committee would be to create professional development which would include pedagogical focus areas. These areas would assist in helping the teachers to enhance their ability to grow in the areas which they do not feel as confident in.

Areas which were identified as being important for technical agricultural knowledge aligned with the areas which have the largest enrollment within the state includes power, structural and technical systems, animal, plant and natural resources systems (DOE, 2023). Areas which were identified as not having the knowledge and skill included biotechnology and agronomy. In both of these areas, the teachers did not feel as strong in their ability to instruct. Even though the areas of power, structural and technical systems were being taught in largest number of programs within the state, this area was near the lowest of areas in their perceived ability to teach. Periodic professional development events should be offered by professional development entities (e.g., agricultural teachers association, postsecondary partners, teacher educators, industry representatives) to assist teachers in building their competence in agricultural mechanics, biotechnology, and agronomy to help strengthen their skills and perceived competence.

It is important to consider the professional pathways to licensure and life cycles of teachers when developing and delivering professional development events. The means of certification within the state should be considered as teachers who are alternatively certified may have different needs than teachers who were traditionally prepared. Additionally, future needs assessment studies should focus on determining potential differences in the professional development needs of the SBAE educators based on their current career cycle. The proposed inquiry would assist professional development entities (e.g., administrators, conference coordinators, etc.) in providing appropriate training events for teachers who identify with varying stages of the professional life cycle. By being able to tailor the professional development needs of the teacher based on their unique pathway to the classroom and professional life cycle can certainly assist in working with the targeted needs of the specific teachers.

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The Relationship Between Psychological Needs Satisfaction and Professional Commitment of Minnesota School-Based Agricultural Education Teachers

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Abstract

To address the increasing demand for school-based agriculture education (SBAE) teachers throughout the United States, it is imperative for teachers to remain in the profession. Although the literature has identified several factors influencing SBAE teacher retention, previous research has not examined psychological needs satisfaction. This study viewed psychological needs through the lens of self-determination theory (Ryan & Deci, 2002), recognizing that the psychological needs of autonomy, competence, and relatedness are universal and innate needs essential for psychological functioning (Ryan & Deci, 2020). This study aimed to examine if and to what extent psychological needs satisfaction was related to SBAE teachers' professional commitment. Our results support earlier research (Collie et al., 2016; Lee & Nie, 2014; Mabekoje et al., 2016) that found people are drawn to needs-satisfying environments. Our most important finding was that psychological needs satisfaction affects SBAE teacher retention as results revealed psychological needs satisfaction of autonomy, competence, and relatedness (independently and collectively) had a significant and negative impact on turnover intention. Our study adds to the evidence that suggests psychological needs satisfaction affects teachers' career choices and provides insight into this relationship in SBAE.

Introduction

Teachers must remain in the profession to meet the growing need for school-based agriculture education (SBAE) teachers across the United States. Around 8% of teachers leave the profession each year, with more than two-thirds leaving before retirement age (National Center for Education Statistics, 2018; Sutcher et al., 2016). Reduced teacher attrition would reduce shortages more than any other factor (Sutcher et al., 2016). Teachers must be physically, psychologically, and emotionally engaged to remain in their roles. Examining teachers' professional commitment is important because it affects both teacher attrition and teacher quality and is essential to deliver high-quality education.

The annual attrition rate of Minnesota SBAE teachers is noteworthy. Of the 381 teachers who started their careers in Minnesota over a 22-year span, 54.5% were still teaching SBAE (Rada & Haddad, 2021). Studies suggest that Minnesota has supported new teachers through induction for decades (Greiman, 2010; Joerger, 2002; Joerger & Boettcher, 2000; Rada, 2022). Minnesota SBAE teachers have a lower annual attrition rate (2.4%; Rada & Haddad, 2021) than the national average (4.5%; Foster et al., 2020) due to this support. Although annual turnover is below the national average, 40% of teachers with less than 10 years of experience left the profession, which is problematic (Rada & Haddad, 2021). More than 33% of Minnesota SBAE teachers with 22 years or less of experience had fewer than four years of SBAE experience (Rada & Haddad, 2021). However, Rada and Haddad (2021) did not investigate the traits of the

teachers who continue to work in the field. Because many Minnesota SBAE instructors have five or fewer years of experience and leave at higher rates (Darling-Hammond & Sykes, 2003; Gray et al., 2015; Rada & Haddad, 2021), it was critical to analyze the factors that contribute to SBAE teachers' professional commitment.

The satisfaction of the basic psychological requirements of autonomy, competence, and relatedness has been proven to be a reliable indicator of teachers' perceptions, particularly their professional commitment (Baard et al., 2004; Collie et al., 2016; Deci et al., 2001; Gagné & Deci, 2005; Lee & Nie, 2014). Humans have an inherent inclination towards psychological growth and development, which results in an increased ability to learn, acquire skills, and build interpersonal relationships (Ryan & Deci, 2002). When examining work environments, the behaviors and outcomes of people are connected to the fulfillment of their psychological needs at work (Deci & Ryan, 2000; Van den Broeck et al., 2010, 2016). In addition, there is a correlation between high attrition rates and inadequate fulfillment of psychological needs (Albrecht & Marty, 2017). Fulfilling teachers' basic psychological needs is crucial for job satisfaction and professional dedication (Lee & Nie, 2014). It is essential to enhance and reinforce these inherent human tendencies. The human mind naturally seeks out environments, such as work environments, that meet its psychological needs and is drawn towards them (Deci & Ryan, 2000, 2002; Van den Broeck et al., 2010, 2016).

Professional commitment predicts teacher turnover, performance, and burnout (Chapman, 1983; Day et al., 2005; Louis, 1998; Raju & Srivastava, 1994; Singh & Billingsley, 1996; Tsui & Cheng, 1999). The professional commitment of SBAE teachers refers to the degree to which individuals identify with their work and acknowledges their dedication to remaining in the SBAE profession (Crutchfield et al., 2013; Gorter, 2018; McKim & Velez, 2015; Moser & McKim, 2020; Sorensen & McKim, 2014). Indicators for strong professional commitment were a favorable work-life balance, dependable contracts with competitive wages, sufficient training for the role, and positive relationships with students, schools, and the community (Igo & Perry, 2019; Moser & McKim). Overall, SBAE teachers who are confident in their work, have connections, and are appropriately compensated are more likely to stay in the profession.

Framework

Self-determination theory (SDT), developed by Deci and Ryan (1985), is a human motivation theory that posits the existence of inherent and instinctive drives for psychological growth and development in every individual. These drives ultimately contribute to the formation of a more intricate and cohesive sense of self (Ryan & Deci, 2002). SDT theorizes that individuals are active organisms in their environment who actively seek personal growth and the integration of their experiences to form a cohesive sense of self (Deci & Ryan, 2000). Human beings' inherent developmental inclinations and psychological requirements necessitate continuous nourishment and assistance to operate optimally. The essence of SDT lies in recognizing the conflicting influences of an individual's innate disposition and the surrounding environment, which can either facilitate or impede personal growth (Ryan & Deci, 2002). "SDT is concerned not only with the specific nature of positive developmental tendencies, but it also examines social environments that are antagonistic toward these tendencies" (Ryan & Deci,

2000, p. 69). Hence, the relationship between the person and their social environment served as the foundation for insights regarding behavior, experience, and development guided by SDT.

The theoretical framework of SDT promotes psychological needs satisfaction by assessing the factors that drive, enhance, and diminish performance (Deci & Ryan, 1985; Ryan & Deci, 2000). The Basic Psychological Needs Theory (BPNT), a sub-theory of SDT, places emphasis on three fundamental psychological needs—autonomy, competence, and relatedness—which are crucial for human development and motivation (Ryan & Deci, 2002, 2020). *Autonomy* refers to the feeling of taking initiative and responsibility for one's actions. It is fostered by engaging in activities that are personally interesting and meaningful. *Competence* is a sense of mastery and the belief that one can succeed and develop and is fulfilled through facing appropriate challenges, receiving positive feedback, and having possibilities for personal improvement (Ryan & Deci, 2020). *Relatedness* is a feeling of "belonging and connection" (Ryan & Deci, 2020, p. 1) that is established by the mutual presence of respect, dependence, and concern with individuals and groups. If these three conditions are fulfilled, well-being is maintained and improved; otherwise, individuals suffer psychological setbacks (Chirkov et al., 2003; Deci & Ryan, 2012; Ryan & Deci, 2020). Conditions that facilitate the fulfillment of psychological demands for autonomy, competence, and relatedness positively impact motivation, performance, and perseverance (Deci & Ryan, 1995, 2002, 2012; Ryan & Deci, 2002, 2020; Ryan et al., 2019). Lack of any of these three requirements undermines motivation and dedication.

People evaluate environments based on basic psychological needs support and fulfillment using BPNT. Three basic psychological needs determine whether an environment supports or hinders psychological functioning (Ryan & Deci, 2002). Psychological needs dissatisfaction and poor human functioning arise from environments that fail to meet the fundamental needs (Ryan & Deci, 2002; Vansteenkiste et al., 2020). Psychologically healthy individuals actively pursue the fulfillment of their psychological needs and deliberately select surroundings that fulfill those requirements (Ryan & Deci, 2002). Psychological well-being is enhanced by a social setting that fosters autonomy, competence, and relatedness. This study examined teachers' views to evaluate if psychological needs (i.e., the satisfaction of autonomy, competence, and relatedness) affected career drive and persistence (i.e., professional commitment).

Purpose and Objectives

The purpose of this study was to examine if and to what extent psychological needs satisfaction of autonomy, competence, and relatedness were related to SBAE teachers' professional commitment. The following research questions guided the study:

1. What is the perceived basic psychological need satisfaction (including autonomy, competence, and relatedness collectively and independently) of Minnesota SBAE teachers?
2. What is the perceived professional commitment of Minnesota SBAE teachers?
3. What is the relationship between psychological needs satisfaction (autonomy, competence, and relatedness collectively and independently) and teacher professional commitment?

Methods

This study applied a quantitative, cross-sectional non-experimental design (Creswell & Creswell, 2018; Jackson, 2015). A census study examined the complete population of Minnesota SBAE instructors actively working in the profession (Johnson & Christensen, 2014). This study was part of a larger study which aimed to ascertain the predictive power of each independent variable on each dependent variable The most effective approach to explore this link was through a quantitative design. Each participant assessed their need satisfaction and professional dedication using an online questionnaire. A questionnaire collected data from the participants who were SBAE teachers in May 2022 (Creswell & Creswell, 2018; Stockemer, 2019).

Population

This study's population was Minnesota SBAE teachers actively teaching as of May 2022 (N = 316). We selected Minnesota SBAE teachers for this census study for three primary reasons: the state's focus on retention, lower-than-average attrition rate, and significant program growth. All teachers listed on the 2021-2022 Minnesota SBAE teacher directory and actively teaching received an invitation to participate. The directory was available from the Minnesota FFA Association. A potential benefit to this study was that all Minnesota SBAE teachers knew and had worked with the primary researcher because of their state staff role and may have been more willing to participate, resulting in a higher response rate. However, due to their position with Minnesota FFA and the state's teacher induction and retention programming, there was a potential for response bias.

Demographic data provide an overview of the participants. A total of 181 SBAE teachers participated (57.3%). Among them, 72 were male (39.8%), while 108 were female (59.7%). The average age of participants was 38 years (*SD* = 12.72), ranging from 22 to 76 years. Two-fifths (39.2%) of respondents had fewer than five years of teaching experience, and more than half (56.3%) had less than 10 years of experience. Participants had an average of 12.36 years (*SD* = 11.08) of teaching experience. Of the 181 respondents, more than 65% reported having an agricultural education undergraduate degree (*n* = 118), 8% (*n* = 15) have an agricultural education graduate degree, and an additional 27 respondents (14.9%) have both an undergraduate and graduate agricultural education degree. Most participants (*n* = 160, 88.4%) have an agricultural education undergraduate and/or graduate degree, which led to licensure. The remaining SBAE teacher participants (*n* = 21, 11.6%) have obtained licensure through alternative means. Table 1 provides an analysis of participant gender and licensure pathway, based on years of teaching experience. The data indicates an upward trend toward a greater proportion of alternatively licensed teachers and early-career female teachers in Minnesota.

Table 1

Demographics Summarized by Years of Teaching Experience

Years of Experience	*f*	*Male*	*%*	*Female*	*%*	*Traditionally Licensed*	*%*	*Alternatively Licensed*	*%*
1 – 5 years	70	17	22.9	53	77.1	54	77.1	16	22.9
6 – 10 years	32	10	31.3	21	65.6	28	87.5	4	12.5
11 – 20 years	40	19	47.5	21	52.5	44	97.5	1	2.5
21 – 40 years	36	23	63.9	13	36.1	36	100	0	
More than 41	3	3	100	0		3	100	0	

Instrumentation

We created an online questionnaire in Qualtrics to gather quantitative data to assess participants' psychological needs satisfaction and professional commitment using matrix table questions, numerical continuous questions, and multiple-choice questions. The matrix table questions employed Likert scales comprising numerous items featuring identical response possibilities (Stockemer, 2019). The questionnaire contained 27 items, which were derived from two established instruments: the Work-related Basic Need Satisfaction Scale (Van den Broeck et al., 2010), used to measure psychological needs satisfaction, and the Michigan Organizational Assessment Questionnaire (MOAQ) Job Satisfaction Subscale (Cammann et al., 1983), used to measure the professional commitment of SBAE teachers. The study utilized the Work-related Basic Need Satisfaction Scale (W-BNS) and the MOAQ Job Satisfaction Subscale (MOAQ-JSS) to assess the correlation between the fulfillment of psychological needs and teachers' professional commitment.

The W-BNS (Van den Broeck et al., 2010) instrument contained 24 items with three subscales: autonomy satisfaction, competence satisfaction, and relatedness satisfaction. The items were assessed using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The Autonomy Satisfaction subscale, Competence Satisfaction subscale, and Relatedness Subscale each consisted of six items (Van den Broeck et al., 2010). We duplicated the Relatedness subscale to consider relatedness in both the school district and within the SBAE profession. The subscale typically examines the teacher's role within their present school district, considering the fulfillment of relatedness. The additional duplication in the questionnaire requested participants indicate the degree to which their experiences in the SBAE profession fulfilled their need for relatedness. We assessed the satisfaction of relatedness in the SBAE context by using statements specific to SBAE, such as "Some colleagues in the SBAE profession are close friends of mine." The scores were obtained by summing all the questions and calculating the average score. We determined subscale scores in the same manner.

In the final section, the questionnaire asked participants to indicate their level of commitment to the SBAE profession. The variable being studied, professional commitment, is a continuous variable that was measured using an instrument called MOAQ-JSS (Cammann et al., 1983). MOAQ-JSS includes a subscale that specifically evaluates turnover intention. We assessed professional commitment by measuring the intention to turnover, which is a reliable predictor of actual turnover (Blau, 1985, 1988; Blau & Boal, 1987). The MOAQ-JSS consists of three items that assess an individual's inclination to persist in their present employment (Cammann et al., 1983) using a seven-point Likert scale.

An expert panel of SBAE professors, instrument authors, and scholars examined the 27-item online questionnaire for face and content validity. For a pilot group, we recruited 177 teachers from states with similar SBAE structure and geographic locations as Minnesota. We aimed for a minimum of 20 participants (DeVellis, 2017). With 50 SBAE teachers completing the pilot questionnaire administered online through Qualtrics via an email invitation, the pilot test screened items for appropriateness, validity, and internal consistency (Hair et al., 2014).

Data Collection

The Dillman Tailored Design Method (Dillman et al., 2014) guided data collection. In May 2022, we sent a personalized letter and an online Qualtrics questionnaire to the target demographic for the census. Every interaction with the respondents was personalized, with a maximum of four contacts made. Each teacher received messages at different times and on different days of the week (Dillman et al., 2014). We chose a non-experimental survey to gather perceptions from a large population at a specific moment in time (Creswell & Creswell, 2018).

To reduce participant fatigue, we grouped items to minimize the number of pages required for navigation. The questionnaire included 27 validated items derived from two instruments and 22 demographic items. We estimated it would take around 10 minutes to complete the questionnaire based on the pilot test (Revilla & Ochoa, 2017). The response options were constrained to five or seven balanced categories to enhance the reliability and validity of the data and facilitate significant distinctions for analysis (Dillman et al., 2014). We tested the questionnaire on both a computer and a smartphone to confirm its compatibility with mobile devices (Dillman et al., 2014). We opened the survey for four weeks, during which time we sent weekly email reminders to individuals to increase the response rate (Dillman et al., 2014).

Data Analysis

We screened and uploaded our data from Qualtrics to SPSS Version 27 to analyze our data. Before calculating total scores, we inspected the frequencies of each variable, and any inaccuracies or deviated values were rectified (Pallant, 2020). We also looked for "extreme or outlier cases, significant predictors, significant results relating variables, insignificant predictors, or even demographics" (Creswell & Creswell, 2018, p. 222).

We analyzed the instrument's reliability and the reliability of each summated scale to determine its suitability for the study. We used post-hoc analysis to examine the summated scale and subscales to evaluate the consistency or stability level over numerous variable measurements (Hair et al., 2014; Johnson & Christensen, 2014). The Cronbach alpha coefficients obtained for autonomy satisfaction (.77), competence satisfaction (.80), relatedness satisfaction in their school district (.87), and relatedness satisfaction within SBAE (.89) indicated satisfactory levels of reliability. The results align with the psychometric properties identified by Van den Broeck et al. (2010). The Cronbach alpha provides evidence that each of the W-BNS subscales is unidimensional when assessing autonomy, competence, and relatedness satisfaction. Furthermore, the entire instrument is unidimensional in measuring the overall satisfaction of psychological needs. The Cronbach alpha also exhibited satisfactory reliability in measuring overall satisfaction of psychological demands. The MOAQ-JSS (Cammann et al., 1983) scale demonstrated acceptable internal consistency reliability with a coefficient of .89. Konovsky and Cropanzano (1991) and Shore et al. (1990) also reported high reliability (.84).

We used independent samples t-tests on early and late responders to examine the presence of nonresponse bias. The results are in Table 2. The study compared early respondents (n = 135), who responded before the third email, with late respondents (n = 46), who responded after the third email, in terms of the independent and dependent variables. To safeguard the external validity and generalizability of the findings, we conducted a two-tailed independent t-

test at the .05 alpha level to address the potential impact of nonresponse. In general, the test's power ranged from .0 to 0.20, showing a negligible to small influence for each variable, suggesting the findings can be applied to the population (Cohen, 1988). We found no notable disparities between early- and late-respondents in evaluating the independent and dependent variables. As a result, the conclusions drawn from the study can be applied to the entire population (Johnson & Shoulders, 2017; Lindner et al., 2001; Miller & Smith, 1983).

Table 2

Independent Samples t-Test of Early and Late Respondents to Test for Nonresponse Bias

Variable	Early Respondents			Late Respondents			95% CI	*t*	*p*	Cohen's *d*
	f	*M*	*SD*	*f*	*M*	*SD*				
Autonomy[a]	135	3.46	.68	46	3.55	.64	-.31, .14	-.75	.45	-.13
Competence[b]	135	4.10	.63	46	4.21	.48	-.32, .08	-1.18	.24	-.20
Relatedness[c]	135	3.70	.92	46	3.78	.78	-.38, .22	-.55	.59	-.09
SBAE Relatedness[d]	135	3.95	.84	46	3.89	.85	-.23, .34	.38	.71	.07
Psychological Needs Satisfaction[e]	135	3.75	.55	46	3.85	.49	-.28, .08	-1.06	.30	-.18
Turnover Intention[f]	135	3.13	1.74	46	2.97	1.67	-.43, .74	.53	.60	.09

[a b c d e] 5-point scale (1 = strongly disagree, 5 = strongly agree)

[f] 7-point scale (1 = strongly disagree, 4 = neither agree nor disagree, 7 = strongly agree)

*$p < .05$. **$p < .01$

We examined data for normality by evaluating skewness and kurtosis values. Our kurtosis values (ranging from -.66 to .43) and skewness values (ranging from -.78 to .99) fell within acceptable ranges, indicating that the variables (i.e., autonomy satisfaction, competence satisfaction, relatedness satisfaction in their school district and within the SBAE profession, psychological need satisfaction, professional commitment measured by turnover intention, years teaching SBAE) were normally distributed (see Table 3) and classified as approximately normal.

Table 3

Descriptive Statistics for the Variables of Interest

Variable	*f*	*M*	*SD*	Skewness	Std. Error	Kurtosis	Std. Error
Autonomy	181	3.48	.67	-.05	.18	-.59	.36
Competence	181	4.13	.59	-.78	.18	.43	.36
Relatedness	181	3.72	.89	-.45	.18	-.64	.36
Relatedness in SBAE	181	3.94	.84	-.48	.18	-.56	.36
Psychological Needs Satisfaction	181	3.76	.53	-.10	.18	-.60	.36
Turnover Intention	181	3.09	1.72	.54	.18	-.66	.36
Years Teaching	181	12.36	11.08	.99	.18	.32	.36

Findings

Research Question One: Perceived Basic Psychological Need Satisfaction

To answer research question one, the descriptive statistics of the independent and dependent variables are shown in Table 4. We interpreted the W-BNS scale analysis using mean scores of *strongly disagree* (1 – 1.49), *somewhat disagree* (1.5 – 2.49), *neither agree nor disagree* (2.5 – 3.49), *somewhat agree* (3.5 – 4.49), and *strongly agree* (4.5 – 5).

The results illustrate that respondents tended to slightly agree that their basic psychological needs (collectively and individually) were being met. Participants indicated the highest mean score for competence satisfaction and the lowest for autonomy satisfaction. The responses exhibited the greatest variation in terms of relatedness in the school district and relatedness in the SBAE profession. In addition, none of the respondents had a mean score of 1.00, indicating that each respondent experienced some level of psychological needs satisfaction. However, certain respondents did have a mean score of 5.00, indicating a strong agreement with every statement regarding their satisfaction of psychological needs.

Table 4

Frequency Counts of Independent Variables by Mean Score

Mean Score	Psychological Needs Satisfaction		Autonomy		Competence		Relatedness		SBAE Relatedness	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
1.00-1.99	0	-	0	-	0	-	6	3.3	1	.6
2.00-2.99	13	7.2	42	23.2	10	5.5	35	19.3	24	13.3
3.00-3.99	98	54.1	89	49.2	47	26.0	53	29.3	58	32.0
4.00-4.99	69	38.1	49	27.1	110	60.8	75	41.4	67	37.0
5.00	1	.6	1	.6	14	7.7	12	6.6	31	17.1

Note. The W-BNS scale anchors are strongly disagree (1), somewhat disagree (2), neither agree nor disagree (3), somewhat agree (4), and strongly agree (5).

Basic Psychological Needs Satisfaction

Of the 181 respondents, basic psychological need satisfaction mean scores of respondents ranged from 2.44 to 5.00, with an overall mean of 3.78 (SD = .53). This suggests that respondents somewhat agree that SBAE teachers' basic psychological needs are being fulfilled in the workplace. Thirteen of the 181 respondents (7.2%) somewhat or strongly disagree that their basic psychological needs are fulfilled in their workplace (see Table 4).

Perceived Need Satisfaction of Autonomy

Of the 181 respondents, autonomy need satisfaction scores ranged from 2.00 and 5.00, with a mean score of 3.48 (SD = .67; see Table 5). Of the 181 respondents, 23.2% (n = 42) somewhat disagreed and 27.1% (n = 49) somewhat agreed that their need for autonomy was fulfilled in their workplace (see Table 4).

Perceived Need Satisfaction of Competence

The lowest mean score for competence satisfaction was 2.17, while the maximum score was 5.00. The mean score for the subscale of 4.13 (*SD* = .59) indicates that respondents somewhat agree that their workplace fulfills their competence need (see Table 5). Also, 68.5% of the respondents somewhat agree or strongly agree with a score of 4.0 or higher (see Table 4).

Table 5

Descriptive Statistics of Independent and Dependent Variables

Variable	*f*	Mean	Min	Max	*SD*
Psychological Needs Satisfaction	181	3.78	2.44	5.00	.53
Autonomy	181	3.48	2.00	5.00	.67
Competence	181	4.13	2.17	5.00	.59
Relatedness	181	3.72	1.33	5.00	.89
SBAE Relatedness	181	3.94	1.50	5.00	.84
Turnover Intention	181	3.09	1.00	7.00	1.72

Note. The W-BNS scale scores are strongly disagree (1), somewhat disagree (2), neither agree nor disagree (3), somewhat agree (4), and strongly agree (5). MOAQ-JSS is a 7-point Likert scale consisting of the following responses: strongly disagree (1), disagree (2), slightly disagree (3), neither agree nor disagree (4), slightly agree (5), agree (6), and strongly agree (7).

Perceived Need Satisfaction of Relatedness

We evaluated the relatedness need satisfaction variable in the context of both the district and the SBAE profession. District relatedness need satisfaction ranged from 1.33 to 5.00, with a mean score of 3.72 (*SD* = .89) for the sub-scale (see Table 5), which we interpreted as the respondents somewhat agreeing that relatedness satisfaction is being fulfilled in their district.

When evaluating relatedness in the context of the SBAE profession, the lowest mean score was 1.5, the highest was 5.00, and the mean score was 3.94 (*SD* = .84; see Table 5), which indicates the respondents somewhat agree that relatedness satisfaction is being fulfilled in the SBAE profession. Unlike other variables, 31 respondents had a 5.0 score (17.1%) of strongly agree when evaluating relatedness within the SBAE profession (see Table 4).

Research Question Two: Perceived Professional Commitment

To address research question two, we measured professional commitment using a MOAQ-JSS turnover intention subscale. Professional commitment, indicated by turnover intention, ranged from 1.00 to 7.00, with a mean score of 3.09 (*SD* = 1.72; see Table 5). Of the 181 respondents, 92 had low turnover intentions (50.8%), 76 were neutral (42.0%), and 13 had high intentions (7.2%). Most (50.8%) had turnover intentions below 3.0, indicating high commitment.

Research Question Three: Relationship Between Psychological Needs Satisfaction and Teacher Professional Commitment

We examined the relationship between basic psychological needs satisfaction and professional commitment using correlation, linear regression, independent-sample t-tests, and one-way ANOVA to answer research question three. We used the Pearson product-moment correlation coefficient to analyze the relationship between basic psychological needs satisfaction (W-BNS) and professional commitment (MOAQ JSS turnover intention). We found a medium, negative correlation [r = -.49, n = 181, p<.01], with high psychological needs satisfaction levels associated with lower levels of turnover intention (see Table 6).

There was a negative correlation between each psychological need and professional commitment measured by turnover intention. There was a strong, negative correlation between the two variables [r = -.57, n = 181, p<.01], with high autonomy satisfaction levels associated with lower levels of turnover intention (see Table 6). There was a medium, negative correlation between the two variables [r = -.38, n = 181, p<.01], with high competence satisfaction levels associated with lower levels of turnover intention (see Table 6). There was a small, negative correlation between relatedness within the school district and turnover intention [r = -.20, n = 181, p<.01], with high relatedness satisfaction levels associated with lower levels of turnover intention (see Table 6). There was also a small, negative correlation between relatedness within SBAE and turnover intention [r = -.19, n = 181, p<.05], with high relatedness satisfaction levels associated with lower levels of turnover intention (see Table 6).

Table 6

Means, Standard Deviations, and Correlations Among Variables

Variable	*M*	*SD*	1	2	3	4	5	6
1. Autonomy Satisfaction	3.48	.67	-					
2. Competence Satisfaction	4.13	.59	.40**	-				
3. Relatedness Satisfaction	3.72	.89	.40**	.17*	-			
4. Relatedness Satisfaction in SBAE Profession	3.94	.84	.22**	.27**	.36**	-		
5. Psychological Needs Satisfaction	3.78	.53	.79**	.63**	.79**	.39**	-	
6. Years of Experience	12.36	11.08	.24**	.45**	.01	.11	.28**	
7. Turnover Intention	3.09	1.72	-.57**	-.38**	-.20**	-.19*	-.49**	-.21**

*p < .05. **p < .01

Conclusions and Discussion

According to SDT (Ryan & Deci, 2002), the psychological demands of autonomy, competence, and relatedness are universal, innate, and required for psychological functioning (Ryan & Deci, 2020). People are drawn to surroundings that create needs fulfillment, which influences attitudes and behaviors (Collie et al., 2016; Lee & Nie, 2014; Mabekoje et al., 2016). Basic psychological needs are crucial for teachers' job satisfaction and professional commitment (Collie et al., 2016; Lee & Nie, 2014). The relationship between psychological needs satisfaction and teacher professional commitment (Lee & Nie, 2014; Mabekoje et al., 2016) and the need to identify factors affecting Minnesota SBAE teacher retention necessitated an investigation.

Psychological needs satisfaction may differ individually; however, each research question revealed important information about the professional commitment characteristics of Minnesota

SBAE teachers. Our results support earlier research (Collie et al., 2016; Lee & Nie, 2014; Mabekoje et al., 2016) that found people are drawn to needs-satisfying environments, needs satisfaction influences beliefs and behaviors, and psychological needs fulfillment influences teachers' intentions to stay in the profession. With a mean score of 3.78 (*SD* = .53), Minnesota SBAE teachers somewhat agreed that workplace psychological needs were addressed. Competence had the highest mean score of 4.13 (*SD* = .59) of the three psychological needs, indicating participants somewhat agree that their competence psychological need is met. Respondents somewhat agreed that their need for relatedness in the SBAE profession is met with a mean of 3.94 (*SD* = .84) and in the school district at 3.72 (*SD* = .89). Respondents neither agreed nor disagreed if their psychological demand for autonomy was met at work, with a mean score of 3.48 (*SD* = .67). We measured professional commitment by turnover intention, which averaged 3.09 (*SD* = 1.72), suggesting neutral turnover intention. Our most important finding was that psychological needs satisfaction affects SBAE teacher retention as results revealed psychological needs satisfaction of autonomy, competence, and relatedness (independently and collectively) had a significant and negative impact on turnover intention. Our study adds to the evidence that psychological needs satisfaction affects teachers' career choices and provides insight into this relationship in SBAE.

Recommendations

Minnesota SBAE teacher retention depends, in part, on meeting teachers' psychological needs. Our findings indicate that psychological need fulfillment at work is correlated with professional commitment, which impacts SBAE teacher professional development leaders, SBAE teacher leaders, school administrators, and teachers. Our findings reflect previous studies indicating a need-satisfying work environment for teachers increases psychological health and commitment (Collie et al., 2016; Lee & Nie, 2014; Mabekoje et al., 2016). Professional commitment is strongly influenced by instructors' psychological needs at work.

This research shows that Minnesota's SBAE teacher demographics are changing considering gender, years teaching SBAE, and pathway to licensure. SBAE literature has investigated the shift in the profession to having more female SBAE teachers under the age of 40, which aligned with the findings of this study, and the stress and job satisfaction levels concerning work-life balance (Hainline et al., 2015; Solomonson & Retallick, 2018; Sorensen & McKim, 2014). These data also show an increasing number of teachers without an agricultural education degree. The psychological needs satisfaction of SBAE teachers exploring the influence of gender, age, years of teaching experience, and licensure pathway warrants further research and discussion. Further research is needed to explore how each factor influences psychological need satisfaction and what supports need fulfillment. Due to varying teacher characteristics, findings beyond this study warrant further study to see the implications explicitly related to teacher characteristics.

Autonomy satisfaction significantly impacted SBAE teacher turnover intention. Previous studies found that autonomy satisfaction predicted teachers' psychological well-being (Collie et al., 2016; Deci et al., 2001; Nie et al., 2015; Taylor & Ntoumanis, 2007). Education leaders in Minnesota may foster an autonomy-supportive climate to retain SBAE teachers. Research could explore what SBAE teachers desire in terms of autonomy. Additionally, given Minnesota's focus

on induction and retention programming, do specific SBAE professional development programs (e.g., Teacher Induction Program; Resources for Professional Learning) influence autonomy satisfaction? Furthermore, given the increase in the number of alternatively certified teachers, is there a difference in autonomy expectations based on certification type (e.g., do alternatively certified teachers prefer a complete, packaged curriculum and less autonomy?)?

The Minnesota Association of Agriculture Educators, Minnesota Department of Education, and the Minnesota FFA Association have collaborated to support SBAE disciple-specific skill professional development. Teachers are encouraged to participate in chances to build competence fulfillment and knowledge due to the strong association between competence fulfillment and SBAE teachers' professional commitment. Administrators can also encourage and support SBAE instructors' participation in professional development to increase competency and reduce turnover. Finally, SBAE leaders should continue offering competence-based professional development. Given teacher differences and the significance of competence need satisfaction, it is advised that Minnesota SBAE leadership assess teacher needs to evaluate perceived competence and research the impact of professional development, considering certification type and years teaching SBAE.

District relatedness was a strong predictor of professional commitment (Moser & McKim, 2020), but we found it was not the most crucial factor. SBAE teachers often highlighted the *"*Ag Ed family" as a reason they continue teaching (Moser & McKim, 2020). However, we found a substantial but negligible negative correlation between SBAE profession relatedness and turnover intention. When the Ag Ed family is mentioned, it is often in the context of providing reasons to engage in the profession, join the professional organization, and participate in SBAE-relevant professional development. Organization membership and participation in professional development is often a foundational step to professional engagement in SBAE. Therefore, it is logical that those participating in SBAE-relevant professional development are simultaneously improving relatedness fulfillment in the SBAE profession while also improving their competence. SBAE leaders should acknowledge that they can meet psychological needs for relatedness and competence. We encourage SBAE leaders to intentionally provide options to develop the knowledge and skills of SBAE teachers while also supporting relationship development.

This study laid the groundwork for examining how psychological needs satisfaction impacts turnover intention and professional commitment. Further research is needed to determine SBAE factors that affect autonomy, competence, and relatedness satisfaction in the school district and profession. This study was a snapshot, but replication would provide more information on the relationship. Since 39.2% of the study's participants had five or fewer years teaching SBAE and 17.1% had six to ten years, a replication of this study could shed light on the factors that affect turnover intention and actual attrition during a critical career phase.

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Perspectives of African American School-Based Agricultural Education Teachers Toward Their Meaning of Work: A Q Methodology Study

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Abstract

The most prominent group of leaders in the African American community historically have been educators, including public school teachers of agriculture. The importance of African American educators became apparent when the representation of African American teachers declined precipitously during the 1960s era of school integration. This trend of limited African American teachers in School-Based Agricultural Education (SBAE) continues today. This Q methodology study explores the voices of African American SBAE teachers. The following research question guided this study: "What are the perspectives of African American SBAE teachers toward the meaning of their work?" The concourse for this study was developed using a combination of naturalistic and theoretical methods resulting in a hybrid approach representing a multitude of attitudes, values, or opinions of African American SBAE teachers. Twenty-three African American SBAE teachers nationwide sorted 45 statements according to the condition of instruction, "What does being an African American agricultural education teacher mean to you?" The Q methodology data analysis software program, PQ Method was used to analyze the data for this study revealing three perspectives: Anchored in Service, Anchored in Resilience and Anchored in Assurance. The depth of insight from their perspectives can improve African American SBAE teacher recruitment and retention.

Introduction / Conceptual Framework

Enhancing racial and ethnic relationships across cultures is important as the United States (U.S.) becomes a more culturally interdependent nation. Although the population of U.S. teachers has gradually become more diverse over time, the elementary and secondary teacher workforce does not reflect the racial diversity of public-school students or the nation's general population (U.S. Department of Education, 2016). The U.S education system must ensure its environment is a space that welcomes culturally inclusive interactions among students and educators, especially those from marginalized populations (Howard, 2007). However, the history of education in the U.S. indicates African American teachers were historically and are currently underrepresented (King, 1993; Madkins, 2011). [The use of the terms Black and African American will be used interchangeably within this paper.]

School-Based Agricultural Education (SBAE) has a century-old presence in the U.S. and has evolved in considerable ways (Phipps et al., 2007). However, when considering the evolution of agricultural education, it is important to note the presence of the New Farmers of America (NFA) organization and its impact on African American agricultural educators. This organization, created in the 1920s, is the strongest to have ever promoted agriculture within the African American community. NFA reached a peak membership of more than 58,000 members in over 1,000 chapters by 1965 (Alston et al., 2022). However, during the merger in 1965, NFA lost its identity when the organization was required to relinquish its constitution, name, money, and ultimately 52,000 members to FFA (Wakefield & Talbert, 2000). Many Black students involved

in vocational agriculture were not integrated into the program (Wakefield & Talbert, 2000), creating more opportunity for discontinuation among potential future Black agriculturalists. Today, African American representation in The National FFA Organization is not half of what membership was during the peak of NFA's operation in the 1960s, with approximately 25,000 (slightly more than 3%) of active members identifying as African American (National FFA Organization, 2022). The damage to the human capital infrastructure created by the loss of NFA advisors, who were the schools' agricultural teachers, during the merger continues to have longstanding consequences. It also has been suggested, the decline of African American students participating in SBAE programs was because too few students were interested in or were accepted into such programs along with the decline in hiring minority teachers (Lawrence et al., 2013; Wakefield & Talbert, 2000).

With African Americans accounting for 13.4% of the U.S. population (U.S. Census Bureau QuickFacts, 2019), their disproportionate size of representation in the teaching workforce attracts interest considering the significant role education plays in the lives of all students and their communities (King, 1993). Education and its connection to the advancement of social and economic progress in the U.S. has long been a fundamental value for many African Americans (King, 1993). The most prominent group of leaders in the African American community historically have been educators (King, 1993), and this included public school teachers of agriculture (Wakefield & Talbert, 2000). The importance of educators in the African American community became critically apparent, including agricultural education, when the representation of African American teachers declined precipitously during the era of school integration in the 1960s, as many of these teachers were significant community leaders (Wakefield & Talbert, 2000). SBAE programs never recouped the loss of African American teachers, subsequently failing to attract a sizeable number of African American students (Wakefield & Talbert, 2000).

A declining trend of African American educators continues to stretch across most subject areas (Collier, 2002). More specifically, SBAE, grades 6 to 12, has experienced a noticeably reduced number of African Americans joining its teaching ranks (Doerfert, 2011). It is estimated less than 5% of students enrolled in SBAE are African American, and only about 1.5% of the teaching corps are African American (National Association of Agricultural Educators, 2020). According to National Supply and Demand Study Comparison Report, data representing the number of SBAE African American teachers in the U.S. is at an estimated number of 176 (National Association of Agricultural Educators, 2020). Recent advances and increases in recognizing culturally inclusive and diversity priorities in SBAE (Vincent & Hains, 2015) galvanized the needed exploration to understand the perspectives and motivators of minority educators (Roberts et al., 2016), particularly African Americans pursuing a rarely chosen career path to become agricultural education teachers in U.S. public schools. Despite interest toward increasing representation of African Americans in agricultural education (Roberts et al., 2016), the experiences and attitudes of current African American SBAE teachers remains unclear.

The academic literature available about African Americans and agriculture in contemporary times is scant at best (Tyler & Moore, 2013). Limited research in this area has created a dilemma in truly knowing who African American SBAE teachers are and how they experience their careers in the agricultural education sector. The trend of limited African American teachers in agricultural education continues to present a challenge. The need exists for all students to

develop a greater and more appreciative understanding of multiculturalism. Students should also be introduced to more opportunities for diverse cultural experiences in SBAE, and, if unmet, the imbalance between minority teachers and their students will likely continue to grow (Vincent & Hains, 2015).

Historically, the idea of work was greatly influenced by an individual's fundamental desire to fulfill basic survival needs, but this perspective has changed over time (Friedmann & Havighurst, 1954). Preliminary work focused primarily on the general description of meaningful work, but Rosso et al. (2010) took previous literature a step further by developing a theoretical integration of mechanisms effecting the perceived or acquired meaning of work. Through the evolvement of this theoretical integration, categories were constructed around several questions of how work becomes meaningful, the meaning of work, and how that meaning differs between individuals (Rosso et al., 2010). These emergent categories were utilized in this study as a conceptual framework that aided in the development of the concourse, or collection of opinionated statements. These statements reflected various opinions toward the meaning of work for African American SBAE teachers and were organized according to the following categories identified by Rosso et al. (2010): self-esteem, cultural and interpersonal sense making, authenticity, purpose, self-efficacy, transcendence, and belongingness.

The utility of conceptual and theoretical frameworks in Q methodology supports the development of the concourse, which includes a multitude of statements reflecting the thoughts and opinions held within a specific population toward a phenomenon (Stephenson, 1986). Researchers apply consideration to the theoretical relevance when cultivating the statements within the concourse and the final Q sets, but during analysis of the Q sorts the data remains independent of the assigned theoretical value researchers initially placed on the selected statements (Brown, 1980; Wolf, 2004). Therefore, Brown (1980) asserted the interest is not, "in the logical properties of the Q sample, but in learning how the subject, not the observer, understands and reacts to the items" (p. 191). Additionally, applying the framework further as a source of validity for the researcher during analysis is not appropriate in interpreting viewpoints (Brown, 1980).

Purpose and Research Question

This study addresses a critical knowledge gap by providing an opportunity to understand and interpret this phenomenon of the limited number of African American SBAE teachers versus the much larger number of White SBAE teachers, more specifically as it pertains to their fulfillment in their work. Gaining deeper insight from African American agricultural educators' perspectives of work provides direction in recruiting, understanding the lived experiences of, and retaining future African American SBAE teachers. This study could also illuminate the unique needs of African American SBAE teachers, further improving our comprehension of potential career decision influences. Moreover, improvement in this area could presumably attract an increased African American youth enrollment in agricultural programs and ultimately yield a more diverse and nationally representative pool of talent for the U.S. agriculture sector. The following research question guided this study: "What are the perspectives of African American SBAE teachers toward the meaning of their work?"

Methods

Q methodology blends the strengths of quantitative and qualitative research traditions (Brown, 1996), which, in this study allows for a more profound understanding of the lived experiences of African American SBAE teachers. The holistic nature of this methodology offers a platform to elevate marginalized voices (Brown, 1980). Brown (2006) describes the marginalized community as individuals who are not considered or ignored, which effects their ability to reach their potential within the individual or society at large. Bashatah, (2016) emphasized an additional advantage of Q methodology in allowing the researcher to raise diverse voices, which is ideal when exploring sensitive topic areas.

The number of participants within a Q study, called a P set, are characteristically small in nature (Brown, 1980; McKeown & Thomas, 2013). It is critical to include diversity within the demographic being studied to ensure opportunity for a variety of perspectives to be revealed (McKeown & Thomas, 2013). However, when constructing a P set it is not guaranteed that the all population variables are accounted for (McKeown & Thomas, 2013). Q methodology is not generalizable to a population of people but allows for the identification of particular viewpoints (Watts & Stenner, 2012). As large numbers of participants are not necessary for a Q study (Watts & Stenner, 2012), this methodology is ideal for the purpose of this study.

Q methodology begins with the development of a concourse. The concourse begins as a large list of items that represent a multitude of attitudes, values, or opinions a group holds toward a specific phenomenon (Stephenson, 1986). After in-depth immersion in relevant literature and materials related to this topic over several months, the concourse totaled nearly 200 statements. Each statement was then categorized using Rosso's (2010) meaning of work conceptual model. After the entire list of statements within the concourse were categorized according to Rosso's (2010) theory, through the process of homogeneity as recommended by Brown (1980), each category was then reviewed for heterogeneity, or ensuring the statements were not similar in nature (Brown, 1980). The resulting list of 45 statements, known as a Q set, was sorted by participants according to those most like and most unlike their thoughts with condition of instruction, "What does being an African American agriculture education teacher mean to you?"

University IRB approval was obtained in December 2021. Participants who met the criteria of being an African American SBAE teacher in the U.S. were recruited through a combination of purposive and snowball procedures. Participants received an incentive, a $10 digital gift card, for agreeing to participate in this study. Twenty-three African American SBAE teachers participated in this study. Ten identified as male and 13 as female. The teachers were from 10 states, including the southwest, southeast, and northeast regions. Each participant taught agricultural courses spanning a variety of disciplines, including horticulture, agriscience, animal science, agricultural education, and plant science. Their reported years of experience teaching agriculture ranged from one to 18 years. When describing the community of the school in which they taught, five reported they taught in an urban community, 10 taught in in a rural community, and eight taught in a suburban community.

Findings

The Q methodology data analysis software program, PQ Method (Schmolck, 2014) was used to analyze the data for this study. The 23 Q sorts were correlated with one another resulting in a correlation matrix. Using principal components analysis and varimax rotation, a three-factor solution was chosen due to the exploratory lens of pursuing a revelation of deeper or more distinct viewpoints of a seldom studied group of educators. Seventeen sorts achieved significance on one of the three resulting factors with the other six either significant on more than one factor (confounded) or nonsignificant. Three exemplar sorters were identified, one from each factor, and contacted for a follow-up interview. Of the 23 participants in this study, eight defined Factor 1; four defined Factor 2; and five defined Factor 3. Statements within the three factors were arranged by *z*-score calculation, which resulted in a composite array for each factor. The composite array is representative of the statements' placement within each factor, and along with field notes, demographic information, and post-sort interviews was used to interpret the meaning of each perspective. The three perspectives identified in this study were interpreted as *Anchored in Service, Anchored in Resilience* and *Anchored in Assurance.*

Anchored in Service

The *Anchored in Service* perspective was defined by eight sorters, or participants. Of those sorters, four identified as male and four identified as female. Each sorter in this perspective taught in the southern region of the U.S. All sorters who defined this perspective indicated a family background in agriculture. Sorters within the *Anchored in Service* perspective reported teaching in the following areas: rural (n=3) suburban (n=4), and urban (n=1). The depth of the *Anchored in Service* array can be further explained by three conceptual themes: Student Focused, Faith and Community, and Diligent Effort. The most like and most unlike statements for *Anchored in Service* are listed in Table 1, with the distinguishing statements in bold.

Table 1

Anchored in Service Most Like and Most Unlike Statements

No.	Statement	Array Position	Z-Score
	Most Like Statements		
37	**The love I feel from my students when I walk into my classroom each day makes it all worth it.**	+5	**1.500**
45	My faith allows me to see that the impact I make as an agriculture teacher is bigger than myself.	+4	1.457
43	**Prayer gives me the strength to pursue my dreams as an agriculture teacher.**	**+3**	**1.466**
39	**I was called to improve the community through my service.**	**+3**	**1.318**
7	**Working hard is more important than the color of my skin when pursuing a career in agriculture.**	**+3**	**1.343**
	Most Unlike Statements		
12	Teaching in rural, predominantly white communities scares me.	-2	-1.044
33	How can I fit in when no one else is like me?	-4	-1.431
8	**My level of competence is always questioned.**	**-4**	**-1.209**

24	**The microaggressions I hear seriously make me question why I teach.**	**-4**	**-1.334**
2	The tokenization that I feel as an African American agriculture teacher is sickening.	-5	-1.462

Note. Distinguishing statements are bolded.

Student Focused

The element of service embodied by *Anchored in Service* teachers is emboldened by the love they receive from their students (statement 37, array position +5, *z*-score 1.500). Sorter 5 described in a post-sort interview the fuel he gets from students saying, "They give you a reason to go to work every day, and seeing student success is my greatest reward." *Anchored in Service* teachers actively seek to serve African American students through mentorship, including those students who are not enrolled in their agricultural education programs (statement 20, array position +1, *z*-score 0.414). Additionally, the notion that African American students relate more to African American teachers is not only seen from the perspective of the African American teachers (statement 16, array position +4, *z*-score 1.410) but from their White colleagues as well. While understanding the need to go outside of their classroom to support African American students, they also communicated their desire to encourage more African American students to join their program (statement 16, array position +4, *z*-score 1.410), as well as the challenges associated with successfully doing this.

Faith & Community

The role of community in the lives of *Anchored in Service* teachers is monumental. *Anchored in Service* teachers have a strong desire to serve community and feel it is their calling (statement 39, array position -3, *z*-score 1.318). Sorter 5 illustrated the tie between agriculture and community work during a post-sort interview saying, "I think teaching agriculture is a community thing. In a rural community agriculture is important." Serving the community is personal for *Anchored in Service* educators. The community of support these teachers have around them also plays a pivotal role in their ability to stay in agriculture (statement 36, array position +2, *z*-score 0.939). *Anchored in Service* teachers have a strong aspiration to serve even when faced with challenges, and their faith helps them to stay grounded (statement 45, array position +4, *z*-score 1.457; statement 39, array position +3, *z*-score 1.318).

Diligent Effort

Anchored in Service teachers understand the challenges of being an African American SBAE teacher, but view hard work as a means to surpass any negative stereotype placed on them due to their race (statement 7, array position +3, *z*-score 1.343). Sorter 6 pointed out the negative stereotype associated with his race during a post-sort interview, saying "a lot of White people have a negative image in their head that Black people are lazy, when we're the people who did the whole agriculture thing in the beginning." The *Anchored in Service* teachers manage to overcome the questioning of their competency through a focus on their work ethic, experience and demonstrated commitment to agriculture (statement 8, array position -4, *z*-score -1.209).

Anchored in Resilience

The *Anchored in Resilience* perspective was defined by four sorts. Two sorters identified as male and two identified as female. The sorters in this perspective teach in the southeastern and southwestern region of the U.S. Three sorters in this perspective indicated a family background in agriculture. The *Anchored in Resilience* perspective included teachers in the following communities: rural (n=2), suburban (n=1), and urban (n=1). Four conceptual themes provide depth of the *Anchored in Resilience* perspective: Pride and Legacy, Weight of Race, Racial Focus and Needed Presence. The most like and most unlike statements for *Anchored in Resilience* are listed in Table 2, with the distinguishing statements bolded.

Table 2

Anchored in Resilience Most Like and Most Unlike Statements

No.	Statement	Array Position	Z-Score
	Most Like Statements		
27	I am proud to be one of the few African American agriculture teachers.	+5	1.688
41	**I stay in this position because students need to see more people who look like me in teacher roles.**	**+4**	**1.523**
35	**The tokenization that I feel as an African American agriculture teacher is sickening.**	**+4**	**1.207**
16	African American students can relate easier to African American teachers.	+4	1.422
15	FFA hasn't acknowledged NFA's footprint for decades, neglecting the role of race in its history.	+3	0.818
	Most Unlike Statements		
29	If we expect agriculture to become more diverse, we cannot spend all day talking about race.	-4	-1.449
6	**My needs and wants are the same as white teachers in agricultural education.**	**-4**	**-1.787**
17	**My cultural values are pretty much the same as the values of the greater agriculture education sector.**	**-4**	**-2.025**
22	The best way to move forward is to forget and forgive the past.	-5	-2.207
13	**I'm not comfortable talking about race, my primary focus is to prepare my students for their future careers.**	**-5**	**-2.104**

Note. Distinguishing statements are bolded.

Pride and Legacy

The *Anchored in Resilience* teachers have a deep connection and pride in their history and existence as an African American in agriculture (statement 27, array position +5, *z*-score 1.688). They feel it is important and take it upon themselves to share many of the untold stories of African American agriculture. In a post-sort interview, Sorter 14 shared his effort to do this in saying, "Like with slavery, people are tired of hearing about it and students are tired, but you

need to know what actually happened. It would be better to know the growth if you know the past." These teachers see the importance of telling a broader story within the agricultural space. *Anchored in Resilience* teachers value the acknowledgment of NFA in agricultural education (statement 15, array position +3, *z*-score 0.818). Sorter 14 reaffirmed the disappointment in the lack of discussion of NFA by stating, "We don't know much about NFA, it's like they're sweeping it under the rug." *Anchored in Resilience* teachers are bothered that parts of their history are not shared at large with the discipline, which leads them to take the initiative teach it on their own.

Weight of Race

Anchored in Resilience teachers acknowledge the difficulties related to combating negative stereotypes possibly held against their race (statement 3, array position +2, *z*-score 0.497). During a post-sort interview, Sorter 14 shared some of the experiences he had with teachers stressing the need for him to connect with other African American students by making assumptions on what his life experiences may have been like: "They tell me that I have to connect with my students, and now, analyzing it, do they think if this child came from a broken home, just because I'm Black I may have come from a broken home, too?" He expanded on his frustration with the assumptions made due to his race by stating, "You don't even know me to know that's my experience, just because I'm Black, telling me to share my struggles. I'm not saying just because you're White you need to share that you grew up in a trailer park."

The *Anchored in Resilience* teachers illuminated the experience of tokenism as an African American SBAE teacher (statement 35, array position +4, *z*-score 1.207). Sorter 15 shared, during her post-sort interview, her divisive feelings toward being put on display as an African American SBAE teacher, saying, "Some days I just feel like I don't know if I can play this game much longer. They couldn't wait to introduce me or want to take pictures of me and put me big on posters." On the contrary, she saw a value of serving as representation if it could possibly encourage more African Americans to pursue agriculture.

Racial Focus

Anchored in Resilience teachers recognize purposeful support they have to provide for their African American students as they enter predominantly White spaces of agriculture (statement 21, array position +2, *z*-score 0.694). Sorter 15 expressed during a post-sort interview the encouragement she has to give her African American students when preparing to go to FFA competitions. She said, "I have to give my Black kids a pep talk . . . we're about to step into something that you may not have seen at your house or [not somewhere you] have been. It's a big culture shock." The variance between this perception's cultural views and agricultural education was clear (statement 17, array position -4, *z*-score -2.025). Sorter 14 expressed during a post-sort interview that he is very aware of the cultural values of his students. He further commented on this difference when discussing how he approaches working with his students: "My cultural values are different from AGED. I'm trying to help students find their place in AG. I'm not trying to help them find careers in AG."

Needed Presence

Teachers in the *Anchored in Resilience* perspective feel it is important for others to see African Americans as SBAE teachers (statement 41, array position +5, *z*-score 1.523). During a post-sort interview, Sorter 14 shared how their White colleagues expressed the importance of others seeing him in that role: "The guidance counselor said to me, 'I am so happy that you're here; our Black students need to see more Black people in teacher roles.'" He continued with conveying the comparison of the subservient roles most African Americans hold in his school versus his role as a teacher and the unfortunate lack of respect they receive. Sorter 14 said, "They don't need to only see Black people in cafeteria, as custodians, bus drivers. Not to disapprove their roles, but they don't get the respect I do from the students." Teachers also expressed the unique ability they must connect to all students, no matter their race. During her post-sort interview Sorter 15 stated, "White teachers struggle to connect with Black students. Black teachers have that gift of connecting to White and Black students all the same. We have to live in two worlds, so it's easier to navigate between groups."

Anchored in Assurance

The *Anchored in Assurance,* with assurance alluding to them being certain and acting to inspire confidence in others (Merriam-Webster, 2024), perspective was defined by five sorts. Of those sorters, one identified as male and four identified as female. The teachers within this perspective teach in the southwestern and southeastern region of the U.S. Out of the five sorters *Anchored in Assurance,* three specified a family background in agriculture. The *Anchored in Assurance* perspective includes teachers in the following communities: rural (n=3), suburban (n=1), and urban (n=1). Three conceptual themes were identified to delve into the *Anchored in Assurance* perspective: Undervalued, The Responsibility is Mine and Victimized but Not a Victim. Table 3 lists the most like and most unlike statements for *Anchored in Assurance* with the distinguishing statements bolded.

Table 3

Anchored in Assurance Most Like and Most Unlike Statements

No.	Statement	Array Position	Z-Score
	Most Like Statements		
8	My level of competence is always questioned.	+5	1.317
14	It doesn't matter how many diversity trainings they create, my experience is still a struggle as an African American teacher in agriculture education.	+4	1.550
20	**I am responsible for mentoring African American students.**	**+4**	**1.300**
16	African American students can relate easier to African American teachers.	+4	1.296
28	**I have a responsibility to reach out to new African American teachers to help them build their confidence as agriculture teachers.**	**+3**	**1.003**
	Most Unlike Statements		

32	**It is important for my colleagues to empathize with my experiences without feeling sorry for me.**	**-3**	**-1.002**
33	How can I fit in when no one else is like me?	-3	-1.366
29	If we expect agriculture to become more diverse, we cannot spend all day talking about race.	-4	-1.729
22	The best way to move forward is to forget and forgive the past.	-5	-2.331
2	Society's assumption that I am a victim as an African American, affects the way I view myself at work.	-5	-1.853

Note. Distinguishing statements are bolded.

Undervalued

The *Anchored in Assurance* teachers believe in an ideal world diversity trainings should help improve things, but are not sure where the value of diversity lies because improvement is not always the outcome due to the structure of SBAE programs (statement 14, array position +5, *z*-score 1.550). There is little faith in the effectiveness of these workshops because the assumed loyalty to founding groups who may not value diversity runs deep. During a post-sort interview, Sorter 1 said, "I've sat on think tanks on what we have to do to increase diversity and nothing really changes. They are still going to cater to the groups that it was predominantly founded for." Teachers within this perspective also expressed how their competency is always in question (statement 8, array position +5, *z*-score 1.550).

Within this perspective, Sorter 1 specifically communicated how her expertise in specific content area is not recognized. She stated: "I have been asked to put on these workshops about diversity, but never a workshop about [content specialty area]." She continued, "It's like 'We know you're here and knowledgeable, but were not going to ask for your input unless we need some token information . . . We use you for what we want to use you for.'" *Anchored in Assurance* teachers acknowledged the disparities in treatment due to their race (statement 9, array position +2, *z*-score 0.774). Sorter 1 also shared how African Americans can do the same thing as their White colleagues, but should not expect the same opportunities. This stance builds upon the question of hard work being more significant than skin color (statement 5, array position -2, *z*-score -0.719).

The Responsibility is Mine

Teachers in *Anchored in Assurance* feel an obligation to support other African American SBAE teachers (statement 20, array position +5, *z*-score 1.688). Sorter 4 expressed during a post-sort interview the challenges she faces when attempting to get African American students involved in agriculture, compared to her time teaching at a predominantly White school: "When I was at a majority White school, the White kids were excited [about agriculture]. It's more work to get the Black kids excited about the Ag part." For the teachers in this perspective, it is equally important to support other African American SBAE teachers as well (statement 20, array position +4, *z*-score 1.300). Sorter 18 expressed during a post-sort interview the importance of ensuring African American SBAE teachers feel valued: "I would be trying to connect with them [African American SBAE teachers] and make sure they felt comfortable . . . make sure they feel welcomed. I would want them to feel supported and that they mattered." The desire to serve their African American colleagues runs deep for *Anchored in Assurance*.

Victimized but Not a Victim

Teachers in the *Anchored in Assurance* perspective, although they understand others see the multitude of hardships they may encounter as a large burden, they do not allow themselves to be labeled as victims (statement 2, array position -5, *z*-score -1.853). Sorter 1 explained this perspective during a post-sort interview: "It is true, I have experienced discrimination during the hiring practice . . . I'm not the victim but I am victimized. I try not to take it personal." Teachers admit their race places them in the position to face unjust treatment but do not allow it to alter the way they perceive themselves. *Anchored in Assurance* teachers do not pursue the need to feel empathy from their colleagues when encountering a troubling situation (statement 32, array position -3, *z*-score -1.002). People in this conceptual theme gain assurance from the community they have built around them (statement 34, array position 3, *z*-score 1.162). Sorter 1 shared the value of community when describing her teacher support community of other African American agriculturalists and how it helped her stay in teaching ranks longer.

Conclusions and Implications

This study identified three perspectives within African American SBAE teachers toward their meaning of work: *Anchored in Service, Anchored in Resilience* and *Anchored in Assurance*. This study provides an introductory step toward understanding African American SBAE teachers. Although these findings are not generalizable to all SBAE African American teachers, they provide insight into a rarely explored group in SBAE. The experience of African Americans is not monolithic in nature (Dagbovie, 2006) and the nuances of those differences were revealed within each of the three perspectives. Collectively, African American SBAE teachers have a strong desire to stay in the classroom and find value in their work. The heartened expression of confidently remaining in the classroom despite adversity conveyed within the perspectives revealed supports of Griffin & Tackie's (2017) conclusion of the immense value African American teachers have in their role. The distinction in value for these SBAE teachers lies in where they find their source of strength, motivation, and enjoyment.

When considering the few African American students within SBAE programs, which are often located in predominantly White school programs (National Research Council, 1988), some teachers feel disheartened with the lack of African American student representation. They have a strong aspiration of seeing more involvement from their African American students in their SBAE programs and work to get them interested. Furthermore, not only do African American SBAE teachers carry the obligation to support African American students within their SBAE programs, but many may also feel compelled to provide support for African American students outside of their programs.

The *Anchored in Resilience* viewpoint shows the contrast of the expectations placed on them to interact and connect with African American students. Though invested in working with African American students, they do not appreciate the assumptions placed on them to reach every African American student or the application of negative stereotypes on them. *Anchored in Resilience* teachers take it upon themselves to create a space in their classrooms where they can discuss race and the impact of racial challenges. This perspective also sees a misalignment with

the values they held as an African American SBAE teacher versus that of a White SBAE teacher when working with Black students. *Anchored in Resilience* and *Anchored in Assurance* felt their ability to connect with and support African American students came from a place of care and reassurance rather than viewing those students as a challenge they would prefer to avoid.

African American SBAE teachers know they are more than a stereotype and strive for excellence. Some reject the negative notion of tokenism and rely on their work ethic as an opportunity to shift the narrative; while others are frustrated with being tokenized but see it as a means to an end towards the greater good in blazing a trail for future African American agriculturalists. *Anchored in Service, Anchored in Resilience,* and *Anchored in Assurance* each have a deep-rooted pride in being one of the few African American SBAE teachers in the U.S. Confidence in self, as well as their ability within the world of agriculture, was expressed and appeared to be a familiar motivator for African American SBAE teachers toward staying in this industry. These teachers also feel it is of tremendous importance to educate their students on the historical layers of agriculture, including slavery and NFA. They take the initiative to incorporate those elements into their curriculum which is an important approach to integrate as diversity grows across classrooms. The efforts of these African American SBAE teachers emphasize the call of Lavergne et al. (2012) to encourage SBAE teachers to incorporate more layers of multiculturalism into their curriculum.

In this study some African American SBAE teachers question the effectiveness of diversity efforts within the discipline. *Anchored in Resilience* teachers had many questions about the true intent FFA and agricultural education has to improve areas of diversity, equity and inclusion. Some African American SBAE teachers realize diversity trainings are happening but see it more as a short-term "check in the box" toward demonstrating symbolic action to improve diversity strategies rather than a conscientious effort to make strides with real, long-term follow through.

Recommendations for Practice and Research

The findings in this study lead to several recommendations for agricultural education professionals and SBAE programs to consider. The location of SBAE programs are still primarily in rural, White communities (Martin & Kitchel, 2015; National Research Council, 1988), which can pose a challenge. If the desire is to attract more African American SBAE teachers, then where new programs are established should be heavily considered. Additionally, more opportunities for African American SBAE teachers to network would be beneficial. The creation and expansion of supportive networks for African American SBAE teachers may also enhance the value of African American SBAE teachers'expertise outside of their ability to provide a glimpse into the experience of an ethnic minority. Lastly, evaluating equitable hiring practices within agricultural education is cruicial to ensure fair treatment of African Americans through every stage, which is important in attracting and retaining them as SBAE teachers.

Conducting additional studies investigating the thoughts, experiences, and opinions held within this population could help overcome that challenge. To add nuance to these experience, there is also a need to explore why African Americans choose to leave the SBAE teaching profession. Furthermore, SBAE should integrate more curriculum in classrooms that speak to the various contributions and experiences of African American in agriculture.

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Exploring the Role of Positive Emotions in Leadership Learning

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Abstract

Experiencing positive emotions can significantly impact the learning process, yet the literature on leadership learning, up to this point, has neglected the role of these emotions. This project aimed to address this gap by delving into the ways in which students link positive emotional experiences with learning leadership. Conducted as a qualitative exploration, our focus was on understanding the connection between undergraduate students' encounters with positive emotions and their ability to lead effectively. In this study, we undertook a qualitative analysis of survey comments provided by students in post-course assessments spanning three academic years. The objective was to unveil how the experience of positive emotions connected with self-reported leadership learning. Our findings reveal a nuanced interplay between emotions and specific pathways for leadership development. Although this study is preliminary, it holds the potential to unveil the fundamental mechanisms through which young individuals acquire leadership skills.

Introduction and Literature Review

Research regarding the influence of emotions on learning demonstrates a strong relationship between positive emotions and learning (Fredrickson, 1998; Pekrun, et al., 2002; Rowe, et al., 2015; Schmidt, 2020; Trigwell, et at., 2012; Vail, 1994; White, 2013; Wolfe, 2006). However, previous studies have yet to explore how students connect emotions to their experience and learning process within the context of a postsecondary leadership course. As Simpson and Marshall (2010) state, "emotion and learning may be reconceptualized as two social processes that are interdependent constituents of all human experience" (p. 351-352). Considering the social constructs inherent within leadership, the connection between emotion and learning provides a beneficial framework to study learning within formal leadership courses. In this paper, we address the gap in leadership education literature regarding how leadership courses unlock students' learning and development by exploring the role of emotions in fostering leadership learning.

Emotions can both enrich and inhibit learning. Negative emotions can weaken or interrupt learning, while positive emotions can enhance or ignite learning (Schmidt, 2020; Trigwell et al., 2012; Vail, 1994). Specifically, positive emotions of joy and interest have shown to enhance students' memory and concentration and supported students' interpersonal communication (Rowe et al., 2015). Researchers have also found correlations between positive emotions and academic task performance and achievement (Pekrun et al., 2002; Trigwell et al., 2012; White, 2013).

Classroom instruction and social environments influence students' academic emotions related to their perceptions of control and value in a classroom environment (Pekrun et al., 2002).

Pekrun et al. (2002) recommend giving students autonomy to self-direct their learning, using a growth mindset approach to providing feedback, and creating cooperative and supportive interactions in class as instructional design strategies. Furthermore, Rowe et al. (2015) found positive emotions associated with three learning conditions: (1) concepts relevant to them and passionate delivery by faculty, (2) positive classroom climate and student/faculty relationships, and (3) student attributes grounded in achievement, certainty, and control over their learning.

To generate positive emotions and deep learning among students, Schmidt (2020) recommend course instructors employ teaching and learning practices that stimulate students' interest and their motivation to learn. Students who use deep approaches to learning experience higher positive emotions and greater levels of intrinsic motivation, whereas those who use surface approaches experience more negative emotions towards the course content and motivation based in fear (Schmidt, 2020; Trigwell et al., 2012). While stressors in a classroom where students do not feel safe to take risks can create barriers to learning and retention, active learning through simulations, role plays, problem-based learning, and other experiential learning activities, along with psychologically safe classrooms, positively contribute to learning and retention (Wolfe, 2006). Leadership educators frequently employ these collaborative learning strategies and experiential learning along with creating supportive and psychologically safe learning communities in leadership courses (Guthrie & Jenkins, 2018; Jenkins, 2020).

Theoretical Framework

In this study, we utilized Fredrickson's (1998) broaden-and-build theory of positive emotions as a lens to explore how students in a postsecondary leadership class connect the emotions they felt during class to their leadership learning. In this framework, positive emotions are described as "brief, multisystem responses to some change in the way people interpret-or appraise-their current circumstance." (Fredrickson, 2013, p. 3). Emotions arise from the cognitive evaluation of specific events—how we think about something that happens—which may occur consciously or unconsciously. This appraisal initiates a chain of response tendencies that manifest across multiple systems, including subjective experiences, facial expressions, and physiological changes (Fredrickson, 2004).

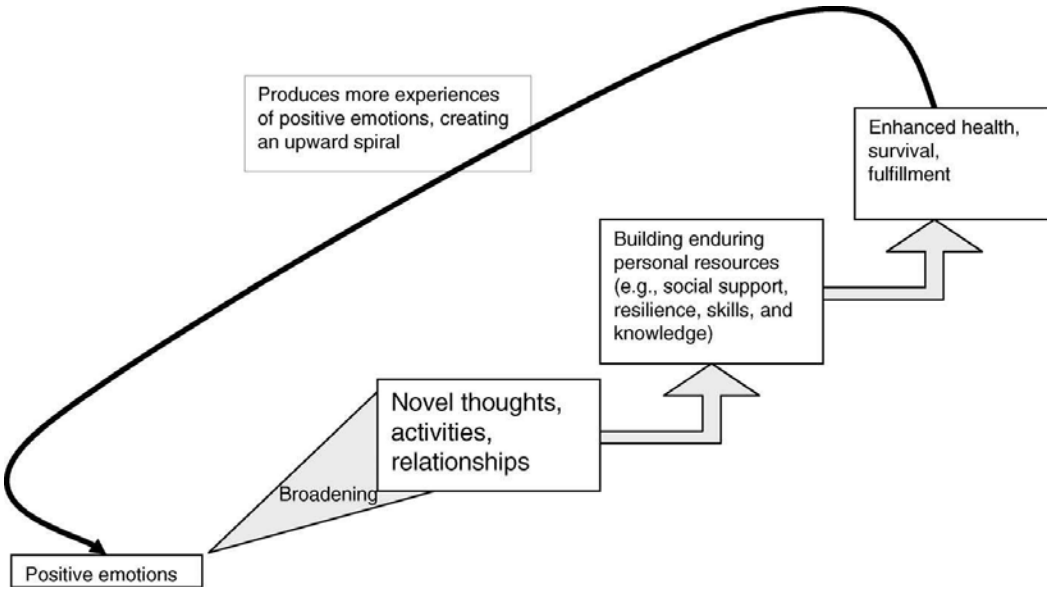
When a person recognizes that situations are negative for oneself, it triggers negative emotions; conversely, when it perceives positive prospects or good fortune, it triggers positive emotions. The purpose of positive emotions, which have evolved through natural selection over thousands of years, was to enhance an individual's ability to survive. This was accomplished by temporarily expanding their awareness, leading to a type of consciousness that encompassed a broader range of thoughts, behaviors, and perceptions (Fredrickson, 2013). Unlike negative emotions, which prompt immediate survival responses like fighting or fleeing, positive emotions impact survival over a longer duration. They briefly expand our mindset, enabling discovery, the creation of new knowledge, the formation of social connections, and the development of new skills. These resources, built because of experiencing positive emotions, propel individuals forward and prepare them for encountering more positive emotions in the future. This sets off an upward spiral that enhances the chances of survival, as well as overall health and well-being (see Figure 1).

The broaden-and-build theory is built on two hypotheses, the *broaden hypothesis* and the *build hypothesis*. The *broaden hypothesis* postulates that positive emotions broaden or widen one's thought-action repertoire in the moment which ignite novel ideas, boost creative thinking, and spark generosity, among other reactions. The broadening effect is a result of a "cognitive shift, one in which boundaries of awareness stretch open a bit further during positive emotional experiences, enabling people to connect the dots between disparate ideas and thereby act creatively, flexibly, and with greater sensitivity to future time horizons" (Fredrickson, 2013, p. 18). Multiple experiments have offered evidence bolstering the broaden effect. Studies have shown that experiencing positive emotions broaden peoples action urges (i.e., they feel more inclined to do and experience more) (Fredrickson & Branigan, 2005), increase their holistic processing (i.e., looking at the big picture, higher-order thinking, seeing overall patterns), expand their attention flexibility (i.e., the ability to shift attention between objects or levels of focus) (Johnson et al., 2002), broaden their scope of people's visual attention (Wadlinger & Isaacowitz, 2006), and expand their circle of trust (Dunn & Schweitzer, 2005), to name a few.

The *build hypothesis* postulates that positive emotions build durable social, emotional, intellectual, and psychological resources that can be drawn upon in the future (Fredrickson, 2013) and place people on "positive trajectories of growth" (Fredrickson, 2013, p. 24). Fredrickson and Cohn (2008) state that "through experiencing positive emotions, people transform themselves-becoming more creative, knowledgeable, resilient, socially integrated, and healthy individuals" (p. 783). Ample evidence supports this claim (Fredrickson, 1998, 2001, 2005; Fredrickson et al., 2003, Fredrickson & Losada, 2005, Lyumbomirsky et al., 2005, Mauss et al., 2012).

Figure 1

The Broaden-and-Build Theory of Positive Emotions (Source: Fredrickson & Cohn, 2008)



Fredrickson's (2013) work focuses on the top ten positive emotions, which are those that occur most frequently in people's daily lives. In order of frequency, they are love, joy, gratitude, serenity/contentment, interest, hope, pride, amusement, inspiration, and awe. Each discrete emotion can be triggered by specific appraisal patterns. Appraisals are swift evaluations of situations concerning an individual's well-being. These evaluations often occur almost instantaneously, allowing individuals to gauge whether a situation is beneficial or harmful to their overall welfare (Frijda, 1986; Lazarus, 1991). When activated or triggered, certain emotions prompt specific patterns of thought and action (called thought-action repertoires), leading to a range of perceived actions that individuals then choose to take. These emotions also help build durable physical, intellectual, social, or psychological resources. For instance, the emotion of interest emerges when situations are perceived as both secure and intriguing. People experience interest when they come across something that is mysterious or challenging, yet not too daunting (appraisal). Interest fuels the desire to investigate, to acquire knowledge, and to fully engage with new experiences, thereby enriching oneself (through-action repertoire). The information and knowledge gained in this process becomes lasting assets (durable resource). Table 1 offers a glimpse of the ten key positive emotions, along with the appraisals that trigger each, the broadened thought-action repertoire each spark and the durable resources that each helps to build.

Table 1

Description of ten positive emotions, revised from Fredrickson, 2013

Emotion	Appraisal theme that triggers it	Thought-action repertoire it sparks	The durable resources that it helps build
Joy	Feeling safe, familiar, unexpectedly good. When one's current circumstances present unexpected good fortune.	Creates the urge to play or get involved	Skills gained via experiential learning
Gratitude	Receives a gift or benefit. When someone acknowledges another person as the source of unexpected good fortune.	Creative urge to be prosocial, be kind, and generous oneself	New skills for showing care, kindness, loyalty, social bonds
Serenity / Contentment	Safe, familiar, low effort. When people interpret their circumstances as right, cherished, at ease, at one with their situation, or satisfying.	Save and integrate into new priorities	New priorities, new views of self, more refined sense of sense.
Interest	Arises in circumstances appraised as safe but offering novelty, mysterious or challenging but not overwhelming.	Creates the urge to explore, learn, expand self, and immerse oneself in the novelty.	Knowledge gained

Hope	Hopeful, optimistic, or encouraged. Arises in circumstances in which people fear the worst yet yearn for better.	Plan for a better future	Resilience to adversity, optimism
Pride	Arises when people take credit from socially valued good outcome or accomplish an important goal.	Creates urge to dream big	Achievement motivation
Amusement	Amused, fun-loving, or silly When people identify their circumstances as involving non-serious incongruity.	Creates urge to laugh and be jovial.	Social bonds and formed and endured
Inspiration	Inspired, uplifted, or elevated. Emerges when people witness human excellence	Creates urge to excel or reach personal best	Motivation for personal growth
Awe	Awe, wonder, amazement. Emerges when people encounter goodness on a grand scale.	Compels people to absorb and accommodate vastness they've encountered	New worldviews
Love	Love, closeness, or trust. Arises when other positive emotions are felt in the context of a safe interpersonal connection or relationship.	Any/all of the above, with mutual care	Any/all of the above, especially social bonds and community

Research Objectives

Given extant research that positions positive emotions as playing a key role in the learning process, and the absence of this conversation in the leadership education literature, our goal was to explore the ways in which students connect experiences of positive emotions to learning leadership. Two research questions guided our inquiry:

1) Do students experience positive emotions throughout their engagement in a postsecondary leadership course?

2) In what ways do students attribute positive emotions to their experience in a leadership course?

Methods

Sample, Population, and Data Collection

All data was collected at a large, research-extensive university located in the Midwestern United States from the Fall 2020 semester to the Spring 2022 semester. Students who provided

data were enrolled in academic courses that focused on leadership development, such as "foundations of leadership," "leadership in group and teams," "leadership communications," etc. All courses were open to students of all academic disciplines. Enrolled students were invited to complete a survey at the end of each academic semester within each course that included items such as, "Think about how you FELT when you participated in this leadership course. What emotions come to mind?" and "How did these emotions affect your learning about leadership?" We collected a total of 308 survey responses from students during this time, some of which were multiple responses from students taking multiple courses over the period.

Data Analysis Procedures

Two members of the research team began by using Fredrickson's (2013) ten representative positive emotions (joy, gratitude, serenity, interest, hope, pride, amusement, inspiration, awe, love) as provisional codes to analyze the 308 student responses to the two open-response survey items listed above. Provisional codes are predetermined codes, or a "start list" of codes researchers use for first-cycle coding methods (Miles & Huberman, 1994; Saldaña, 2009). Provisional codes are derived from literature reviews, researcher experiences, previous research findings, or, as in our case, conceptual frameworks, and are useful for studies that build on existing work or focus variables of interest (Saldaña, 2009). The use of provisional codes as a first round of coding allowed for a process where each survey response could be sorted into sets of positive emotions and be ready for additional analysis. Specifically, we coded the responses from the open-ended question, "Think about how you FELT when you participated in this leadership course. What emotions come to mind?". The provisional coding process was highly iterative between the two researcher who led this coding process. Each provided a "reality check" for the other and, after several rounds of back and forth, the provisional codes were sent to a third member of the research team to verify the codes and ensure the codes were in alignment with the theoretical descriptions of each positive emotion. Of the 308 responses, 244 were coded into the provisional codebook.

We then engaged in a series of second cycle focused coding to build an understanding of how reported positive emotions contributed to student leadership learning (Saldaña, 2009; Strauss & Corbin, 1998). Each student response that was coded into the provisional codebook was analyzed in conjunction with their response to the second open-ended survey question, "How did these emotions affect your learning about leadership?". We first attempted to determine if patterns emerged *within* the provisional codes (i.e., if students connected discrete emotions to particular learning outcomes). However, we quickly determined that the amount and type of data we had would not allow for this depth of analysis. Therefore, we opted for a more broad, focused coding approach that involved looking for the most prominent categories and themes from the data more broadly (Saldaña, 2009). This process was accompanied by analytical memos and personal debriefings between the two authors who led the analysis with the purpose of revealing our thinking about the codes, categories, and themes we developed. After several iterations of analysis, the most salient initial codes developed into the themes that we discuss below (Charmaz, 2006).

Author Positionality Statement

We are four leadership education faculty at three distinct research-extensive universities in the United States. Two of us work at the institution in which this study's data originated. While the data we analyzed were anonymized, two of us have likely served as instructors for students who provided data within this study. To enhance objectivity throughout the data analysis process, the two researchers who did not teach the student participants in this study lead the data analysis process. Each of us feel a commitment to better understand the mechanisms and processes within formal leadership-focused courses that contribute to student growth and development, leading us to the topics from which this project was founded.

Findings

Through iterative cycles of coding, our findings congregated to describe the emotions students felt during a postsecondary leadership course and how they attributed those emotions to their learning experience. Of the 308 participants, 244 were coded into Fredrickson's (2013) ten representative positive emotions. The most salient emotions were interest, joy, serenity, and pride. The frequency of each emotion and examples of statements coded under these emotions are found in Table 2.

Table 2

Positive emotions felt by students in a leadership course

Emotion	*f*	Example of statements coded
Joy	49	I felt joy from speaking my mind and feeling accomplished
Gratitude	5	Appreciation and gratefulness because this is the most enriching class and teaching I've experienced
Serenity/ Contentment	48	I really felt very content, never stressed like most of my other classes. It felt very comfortable as all people were welcoming
Interest	75	Interested. Wanting to know more
Hope	9	Optimistic- I enjoyed coming up with solutions
Pride	35	Powerful, capable: we were able to take on an issue we were passionate about
Amusement	5	I had a lot of fun in this class. Although there were times I was late, I am always excited coming to this class.
Inspiration	11	Inspired. After this class I felt like I could be an effective leader
Awe	5	My mind opened up

Love	2	Empathy- feeling for others and their experiences

Participants attributed the positive emotions to their leadership learning in multiple and unique ways. However, three salient ideas consistently appeared, which resulted in the construction of three respective themes: 1) *Gateway to Engagement*, 2) *Deepening Desire to Learn* and 3) *Motivation for Application*. Below we briefly describe each theme with accompanying illustrative quotes. Quotes with a "…" between segments indicate the combination of participant responses to the two open-ended survey questions, *think about how you felt when you participated in this leadership course. What emotions come to mind? why?* and *how did these emotions affect your learning about leadership?* Following each quote is the respective emotion code in parentheses.

Theme One: Gateway to Engagement

Students attributed positive emotions to motivation to attend class, pay attention, and engage in the learning process. Feeling interested, happy, calm, hopeful, and amused created a desire to show up every day, eager for a new, joyful, and interesting learning experience. Many students attributed the feelings they experienced to sharing that they "love the class", often stating their leadership course was their favorite class and the one they prioritized when it came to completing coursework. Others attributed a welcoming collaborative atmosphere to the prospect that there will be "something fun to do" (amusement) as their reasons for attending class. One student shared they felt "engaged, excited, interested" (interest) and this made them "more invested and excited to come to class and learn" (interest). Experiences of joy, serenity, and hope created an environment where students were comfortable participating. Many students specifically associated feelings of joy to the desire to be involved and engaged in class activities. Students also connected feelings of serenity to an increased willingness and ability to express their thoughts freely during class discussions. This was attributed to a comfortable and positive atmosphere, feeling cared for and seen, and feeling like peers and instructors valued their opinions. For example, two students shared, "It felt very comfortable as all people were welcoming…It helped me open up more and express freely" (serenity) and "I felt welcomed...made it easy to participate" (serenity).

Theme Two: Deepening Desire to Learn

Experiencing emotions of joy, interest, inspiration, serenity and pride instilled a desire and drive to learn leadership concepts. Students used words like "curious", "intrigued", "confident", and "happy", among others, to capture how these emotions motivated them to understand the material taught in class, work harder on coursework, and become "eager to learn more" (interest). For example, one student shared, "Curious, positive. This class was engaging and interesting...These emotions made me want to learn more and kept me motivated to succeed throughout the semester" (interest). Several other students connected the emotion of interest to a deepening desire to learn or engage more fully in the learning process. This was expressed through comments such as, "new concepts I didn't know were part of leading... It made me want to learn as much as I can so that I can lead and follow to the best of my ability" (interest), "It

made me interested and eager to learn more" (interest) and, "Visualized, intrigued, curious.. I wanted to learn more" (interest).

Other students connected joyful feelings to their contributions in their group, which made them "want to learn more about leadership" (joy). Two students shared, "Happy and Joy. I think this class really focuses on becoming the best person you can be and that creates a great environment...They really help my learning because I want to learn more about the topics" (joy) and "Happy, it genuinely made me happy to contribute to a group...They made me want to learn more about leadership" (joy). Emotions of pride, serenity, and inspiration encouraged learning through connections to the teacher's passion and the empowering classroom environment. For example, one student shared, "I felt more confident in my leadership abilities... They helped me want to understand leadership more" (pride). Another wrote, "Creativity and empowering. It made me want to become a better leader...It helped and always made me want to learn more" (inspiration).

Theme Three: Motivation for Application

Emotions of awe, interest, joy, pride, and inspiration allowed students think beyond their engagement in their leadership course and begin to consider how they can use their new learning in their own lives. These emotions motivated students to change their behavior, consider future leadership opportunities, and apply their learning in numerous and diverse ways. Students felt excited, invigorated, open-minded, confident, and contemplative and these emotions sparked a desire to apply the content outside the course, make changes in their lives, and become the best leader they can be. Two students captured this with the following statements, "Empowered...I felt empowered that I can make good changes as a leader" (pride), and "My mind opened up...I took everything I learned into my personal life" (awe). Other students directly connected their emotions to motivation for application. This was shared through comments such as, "I felt excited to be able to share my voice so easily, openly...I felt excited in a way that moved me to further engage with leadership content within and outside of this course" (joy), "It [the emotions] made me feel contemplative and reflective...It made me really think about how to actually apply these principles" (interest), "Empowered because it makes me want to be the best leader I can...It made me want to pay attention more and apply it to other aspects of my life" (pride) and, "Open mindedness, confidence, and optimism because I feel stronger and sharper to lead…I was able to confidently learn material and put it into my everyday actions" (awe).

Discussion and Implications

This study provides insight into how positive emotions might impact the learning experience of students in a leadership course. We saw how multiple emotions motivate students to show up, pay attention, participate, engage, and feel agentic in expressing their thoughts and opinions with their peers and instructors. While this finding may not be surprising to the experienced instructor, it does offer new insights into existing conversations about best pedagogical practices in leadership education.

Previous studies have asserted that students' emotions are connected to control, value, and agency in the classroom and a positive and supportive classroom environment (Perkun et al.,

2002; Rowe et al., 2015). In this study, we found that the positive emotions connected to a welcoming atmosphere and feeling valued – amusement, interest, serenity, joy and hope – created a *Gateway to Engagement* such that students felt motivated to attend class and engage in the learning. Further, supporting Schmidt's (2020) findings that instructors must stimulate student interest to generate deep learning, our participants connected joy, interest, inspiration, serenity, and pride to a *Deepening Desire to Learn* with one student writing "these emotions made me want to learn more." Finally, our findings can clarify Fredrickson's (2013) assertion that positive emotions also build durable resources that can be drawn upon in the future for the context of leadership education. Students in our study attributed their *Motivation for Application* to awe, interest, joy, pride, and inspiration.

While certain emotions emerged more frequently in certain themes, our data did not suggest definitive distinctions between discrete emotions and their distinct effects on learning. While extant research does posit discrete positive emotions have unique effects (see Table 1), it also implies that positive emotions are less cognitively distinct than negative ones, and therefore can often covary, are more diffuse, and more difficult to observe in isolation (Fredrickson & Cohn, 2008). Perhaps another reason explicit distinctions did not emerge is that we only assessed emotions cumulatively and at the end of the semester, which is a limitation of this study. To gain a more clear and more descriptive understanding of student emotions, we recommend future studies measure student emotions multiple times throughout the learning experience, perhaps after every class. To do this, scholars could utilize the modified Differential Emotions Scale (mDES) (Fredrickson et al., 2003) or the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988), which are widely used instruments to measure emotion. Finally, this study did not seek to connect thought-action repertoires to pedagogical strategies in a leadership education classroom. Future work that assesses pedagogical or other course-related phenomena (e.g., interactions with peers, faculty, the curriculum, etc.) and the more long-term durable resources it helps build will offer a more nuanced understanding of the role positive emotions play in learning leadership. However, this study opens the door for future work that acknowledge the power and importance of positive emotions in the leadership learning experience.

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Using Students' Chosen Pronouns in School-Based Agricultural Education (SBAE): An Exploratory, Longitudinal Study of Preservice Teachers' Perceived Knowledge and Preparedness

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Abstract

The growing diversity of American society requires that U.S. teachers be prepared to effectively teach students of a variety of backgrounds. However, many teachers are ill-prepared by teacher preparation programs to instruct and mentor lesbian, gay, bisexual, transgender, and queer (LGBTQ+) youth. Using students' chosen pronouns is a way to show respect for an individual's identity and make gender minority youth feel welcome and included. This study spanned three consecutive courses in a SBAE teacher preparation program. Its purpose was to explore the attitudes of preservice teachers toward pronouns during their teacher preparation program, emphasizing the importance of creating more inclusive environments for LGBTQ+ students. Findings revealed the participants' views over multiple observations. While they somewhat agreed on the importance of gender pronoun knowledge, a decline was noted after their student teaching experiences. The findings suggest a need for improved teacher preparation efforts, stressing the role of curriculum and experiences to foster understanding. Recommendations include enhancing teacher preparation programs with content on pronouns and increasing awareness of the benefits of inclusivity that could serve all stakeholders. Further research should explore the long-term impact of teacher preparation on SBAE teachers and the influence of cooperating teachers' attitudes regarding students' chosen pronouns.

This manuscript is based on data presented at the Southern Region Conference of the American Association for Agricultural Education (Price & Edwards, 2024).

Introduction

While educators have the ability to take steps to foster welcoming and affirming environments for all students regardless of their gender identity (Cross & Hillier, 2021), a notable challenge persists as many U.S. teachers graduate from teacher education programs without adequate preparation to guide and mentor LGBTQ+ individuals (Clark, 2010). As a consequence, this contributes to unsupportive classroom environments, which have been linked to adverse truancy rates, grades, and postsecondary aspirations among LGBTQ+ youth (Aragon et al., 2014; Kosciw et al., 2022). Recognizing this, Hall (2021) emphasized the need for schools to develop strategies likely to foment inclusive and welcoming learning spaces for LGBTQ+ students.

Studies have indicated that when classrooms actively support students of diverse sexual orientations and gender identities, educational outcome disparities diminish (Aragon et al., 2014). Teachers using gender-neutral language and acknowledging chosen pronouns in educational settings are straightforward methods to create an inclusive atmosphere for transgender and gender minority students (GLSEN, 2023; Matsuno, 2019). The use of chosen gender pronouns is particularly significant as it represents the initial step in demonstrating

respect for an individual's identity and agency, allowing them to share their gender identity and avoiding assumptions based on physical appearance (GLSEN, 2023).

In the context of career and technical education (CTE), Hall (2021) identified strategies for educators to enhance inclusivity, including responding to anti-LGBTQ+ language, learning LGBTQ+ terminology, incorporating inclusive language, and employing gender pronouns. Teacher preparation, if focused on cultivating professionals through experiential courses to enhance their pedagogical and content knowledge (Franklin & Molina, 2012), requires an intensified emphasis on diversity across all dimensions (Mayo, 2014). The American Association for Agricultural Education (AAAE) addressed this need through its *Standards for School-Based Agricultural Education Teacher Preparation Programs*, setting a framework for universities preparing SBAE teachers (Myers et al., 2017). Of note, Standard Four emphasizes the preparation of SBAE teachers to embrace and celebrate diversity (Myers et al., 2017), albeit this standard was somewhat less prescriptive compared to others, providing additional rationale for the need for this study. Further, AAAE (2023) identified "Ensuring Diversity, Equity, Inclusion, and Belonging" (p.10) as a *research value* that seeks to expand diversity through agricultural education and related evaluation efforts.

Purpose and Objectives

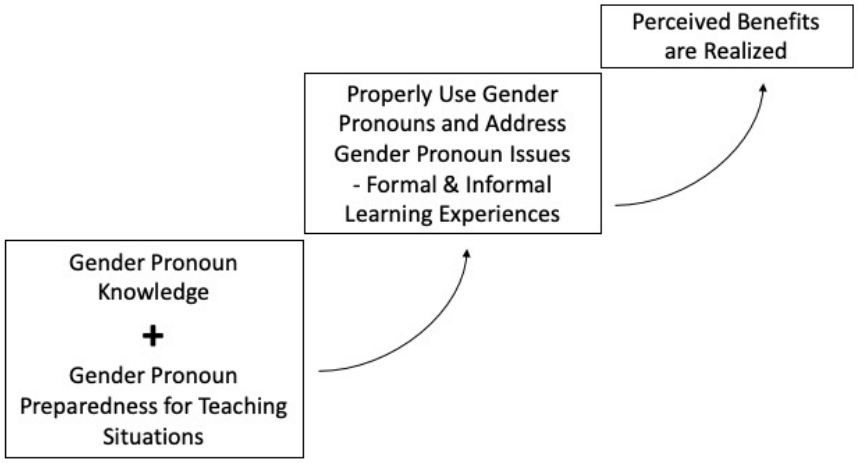
This manuscript presents the results of an exploratory and longitudinal study. The overall goal of the study was to assess preservice teachers' knowledge and preparedness regarding the use of students' chosen pronouns in SBAE as they matriculated through the teacher preparation program at Oklahoma State University (OSU). For the purpose of this study, the teacher preparation program included three consecutive, sequential, and required courses of agricultural education. As such, this study's purpose was to describe the changes in attitudes of preservice teachers regarding chosen gender pronoun usage in SBAE from a baseline observation at the end of their first agricultural education course to the conclusion of their student teaching internship experiences. Two research objectives guided this exploratory study: 1. Describe the knowledge of SBAE preservice teachers regarding chosen gender pronouns; and 2. Determine the preparedness of SBAE preservice teachers to properly use chosen gender pronouns.

Conceptual Framework

This study was guided by a three-part conceptual framework rooted in Bandura's social cognitive theory (SCT), which asserts that individuals are more inclined to adopt a particular action or object if they perceive associated benefits are accrued by doing so (Vasta, 1989). The framework is comprised of (1) gender pronoun knowledge and preparedness, (2) the proper use of gender pronouns, and (3) the realization of perceived benefits. A pressing need exists for teacher preparation programs to emphasize the advantages of using students' chosen pronouns and establishing inclusive learning environments. Other than their formal coursework, preservice teachers may also participate in campus and community events addressing LGBTQ+ inclusivity, potentially contributing to their understanding of gender pronouns and readiness for real-world scenarios during student teaching or as inservice teachers. The precise impact of these learning experiences – formal and informal – on preparing preservice teachers to effectively use gender pronouns remains unclear. Figure 1 displays the conceptual framework guiding the study.

Figure 1

The Study's Conceptual Framework



Methods

The Institutional Review Board at OSU approved this study. Phase I and Phase II data were reported through research poster presentations at AAAE conferences (Price & Edwards, 2022, 2023), and the findings from Phase III and the trend in perceptions of preservice teachers over time was presented at a regional AAAE conference (Price & Edwards, 2024). This paper presents the intact investigation. The overall study included the collection of data at three points during the matriculation of a cohort of OSU preservice SBAE teachers. Data were collected at or near the end of three courses completed sequentially in the preservice teachers' preparation program. Participation in the study was voluntary, and students' final course grades were not impacted based on their involvement.

Description of the Participants

A convenience sample (Ary et al., 2014) of intact groups consisting of agricultural education undergraduate students in the SBAE teacher preparation program at OSU provided the study's data. A variety of personal characteristics were identified at each observation of this study. A majority of the 25 participants in the initial observation identified as women (18, 72.00%), and seven (28.00%) as men. The participants ranged from 20 to 24 years of age. Most participants (19, 76.00%) selected their race/ethnicity as White, while four (16.00%) identified as American Indian or Alaska Native, and 2 (8.00%) selected other. When asked to identify their sexual orientation, nearly all (23, 92.00%) selected straight, one (4.00%) selected gay, and one (4.00%) chose other. Students from four states were represented in this study, with a majority (20, 80.00%) selecting Oklahoma as their home state. Other home states included Louisiana, Illinois, and California with one (4.00%), one (4.00%), and three participants (12.00%), respectively. They were also asked to identify the size of the community in which they grew up. Nearly two-thirds (16, 64.00%) reported rural (1-2,500), seven (28.00%) selected suburban (2,501-49,999), and two (8.00%) chose urban (50,000+). In addition, participants were asked to identify the community size in which they hoped to student teach with 11 (44.00%) selecting rural, 12 (48.00%) choosing suburban, and two (8.00%) preferring an urban SBAE program. When asked

where they preferred to begin their teaching careers, 13 (57.00%) chose a rural community, 11 (44.00%) preferred a suburban community, and one (4.00%) wanted an urban setting. Further, participants were asked to identify whether they started their college careers at OSU or if they were transfer students. Fourteen (56.00%) reported starting at OSU, and 11 (44.00%) identified as transfer students.

Slight attrition occurred between the first (n = 26) and second observation (n = 23), however, the cohort of participants remained very similar. Female-identifying participants remained a majority (f = 14, 60.87%). A slight increase in age was found with participants ranging from 21 to 25 years. Most (f = 17, 73.91%) still identified as White while sexual orientation remained predominantly straight (f = 22, 95.65%). Oklahoma was again the primary home state (f = 14, 60.87%). Similar to the initial observation, a majority (f = 16, 72.73%) of participants had been enrolled in SBAE programs in rural communities. Participants' student teaching placements mostly aligned with their desires from the initial observation, with 15 (65.22%) placed to student teach in rural communities, five (21.74%) in suburban communities, two (8.70%) in urban settings, and one (4.35%) was unconfirmed at the time of data collection. At the observation immediately prior to student teaching, nearly 70.00% of participants still desired to begin their teaching career in rural communities. Fifteen (65.22%) identified as starting their college career at OSU, and eight (34.78%) were transfer students.

Twenty-four participants completed the instrument after student teaching. Seven (29.17%) participants in the third observation indicated having had experiences during student teaching that influenced their beliefs about students' chosen pronouns in SBAE. Women (f = 17, 70.83%) remained a majority of students in the cohort, and the age range was still 21 to 25 years old. Eighteen (75.00%) identified as White, and all participants (n = 24) identified as straight in the third observation. A majority (f = 16, 69.57%) were still residents of Oklahoma, and 15 (62.50%) had grown up in rural communities. Most (f = 16, 66.67%) participants completed student teaching in rural communities, and 14 (58.33%) desired to begin their teaching careers in similar settings. Further, 15 (62.50%) participants began their college career at OSU and nine (37.50%) identified as transfer students. As this data indicated, although the cohorts were not exactly the same at each observation, they were very similar regarding the participants' personal characteristics.

Instrumentation

A web-based *Qualtrics* questionnaire was developed to collect the study's data. The instrument asked participants to rate six statements describing their knowledge and understanding of gender pronouns and perceptions regarding use of such in SBAE. Each statement was rated using a 7-point, Likert-type scale ranging from 1 = *Strongly disagree* to 7 = *Strongly agree*. In addition, participants provided personal characteristics as reported above at each observation. The questionnaire also included various open-ended questions depending on the observation. For the first observation, it included a question that asked participants to describe their attitudes regarding the use of gender pronouns in SBAE. The questionnaire at observation two had an additional question that asked participants to provide any experiences they may have undergone that influenced their views of gender pronoun usage in SBAE since the initial observation. The third observation included two additional open-ended questions that asked participants to describe any experiences they may have had during their student teaching internship that

possibly influenced their views on the topic and whether they followed the media coverage of anti-LGBTQ+ legislation progression during their student teaching semester. After data collection at each observation, post-hoc analysis revealed Cronbach's alphas ranging from 0.755 to 0.890 for the six Likert-type items as a single construct, of which all were acceptable (Field, 2013).

Data Collection

For the first observation, 45 preservice teachers enrolled in *AGED 3103: Foundations and Philosophies of Teaching Agricultural Education* during the Fall semester of 2021 were invited to participate through an anonymous link to the instrument via an electronic mail message. More than one-half (n = 26) completed the instrument. A QR code linked to the instrument was made available to 29 students enrolled in *AGED 4103: Methods of Teaching Agricultural Education* at the end of the Fall semester of 2022 for the study's second observation. Most preservice teachers (n = 23) completed the instrument at the end of that course prior to their student teaching semester. The third observation was also collected through a QR code for the 25 preservice teachers enrolled in *AGED 4200: Student Teaching in Agricultural Education* during the Spring semester of 2023. All but one student (n = 24) completed the third instrument during their semester-ending seminar after their return to campus from student teaching.

Data Analysis

Descriptive statistics (Ary et al., 2014) were used to describe the participants' perceptions. Frequencies (*f*) and percentages (%) were calculated for each response choice of the six Likert-type items. Mean scores (*M*) and standard deviations (*SD*) were also computed for the items at each observation so that the mean differences (*MD*) between the first and third observations could be determined. The open-ended questions were analyzed for content and meaning to expand on the quantitative findings (Creswell & Plano Clark, 2011). For interpretation and reporting, the real limits of the Likert-type scales were 1.00 to 1.49 = *Strongly disagree*, 1.50 to 2.49 = *Disagree*, 2.50 to 3.49 = *Somewhat disagree*, 3.50 to 4.49 = *Neither agree nor disagree,* 4.50 to 5.49 = *Somewhat agree,* 5.50 to 6.49 = *Agree*, and 6.50 to 7.00 = *Strongly agree*.

Limitations of this Study

The first limitation is the use of convenience sampling regarding one cohort of preservice SBAE teachers at one university who all completed their student teaching internship in the same state. As such, the findings of this study should not be generalized to all preservice SBAE teachers in preparation programs nationwide. Another limitation of this study is the slight attrition and small participant variation regarding whom provided responses throughout the three observations as the sample size became marginally smaller and its composition deviated slightly over time. Further, the third observation occurred during a time that anti-LGBTQ+ legislation was proposed, amended, and enacted in state legislatures throughout the United States. Much of the progression of the legislation was covered by various media outlets. This coverage could have influenced the participants' perceptions of the topic outside of their interactions and experiences during agricultural education, teacher education courses.

Results

The instrument's first item sought to measure the participants' perceptions of the importance of gender pronoun knowledge and preparedness for SBAE teachers (see Table 1). Less than one-half (*f* = 11, 42.31%) *agreed* it was important during the first observation and none *strongly disagreed*. In the second observation, 10 (43.48%) *agreed* and no participants *strongly disagreed* or *disagreed* (see Table 1). However, in the third observation, nine (37.50%) *agreed* and three (12.51%) either *strongly disagreed, disagreed, or somewhat disagreed.* The item mean score for each observation (5.27, *SD* = 1.09; 5.48, *SD* = 1.06; 5.13, *SD* = 1.56) was in the range of *somewhat agree* (see Table 1). The second item measured whether participants understood gender pronouns. In Observation 1, four (15.39%) participants either *strongly disagreed*, *disagreed*, or *somewhat disagreed* that they understood gender pronouns. In Observation 2, only two (8.70%) participants either *strongly disagreed* or *somewhat disagreed*. However, in Observation 3, no participants *strongly disagreed* or *disagreed*. The item mean score for the initial observation (5.12, *SD* = 1.60) was in the range of *somewhat agree*. Further, the item mean score for the second and third observations (5.52, *SD* = 1.35; 5.58, *SD* = 1.22) were in the range of *agree*. The third item sought to describe whether participants felt prepared to address situations regarding students' chosen gender pronouns in SBAE. Ten (38.47%) either *strongly disagreed, disagreed,* or *somewhat disagreed* in the initial observation. Fewer (*f* = 6, 26.10%) *strongly disagreed, disagreed,* or *somewhat disagreed* in Observation 2 and five (20.83%) in Observation 3. The item mean scores for this item at the first and second observations (4.38, *SD* = 1.67; 4.22, *SD* = 1.59) were in the *neither agree nor disagree* range, and the item mean score for Observation 3 (4.83, *SD* = 1.62) was in the range of *somewhat agree* (see Table 1).

The fourth item measured participants' perceptions of how well their teacher preparation program had prepared them to understand and use gender pronouns. In the first observation, only one (3.85%) participant *strongly agreed* that their teacher preparation program had adequately prepared them (see Table 1). No participants *strongly agreed* regarding this item in the second and third observations. The item mean scores for each observation (3.81, *SD* = 1.54; 3.61, *SD* = 1.58; 3.71, *SD* = 1.49) were in the range of *neither agree nor disagree*. The fifth item sought to measure if the participants perceived that SBAE teachers should use their students' chosen pronouns. Each observation saw an increase in those who *strongly disagreed, disagreed,* or *somewhat disagreed* with this statement. Two (7.70%) either *disagreed* or *somewhat disagreed* in the initial observation. Three (13.04%) *disagreed* in the second observation, and five (20.80%) either *strongly disagreed, disagreed,* or *somewhat disagreed* in Observation 3. The item mean score for Observation 1 (5.77, *SD* = 1.28) was in the range of *agree*. The second and third observations' item mean scores (5.48, *SD* = 1.56; 4.92, *SD* = 1.87) were in the range of *somewhat agree*. The final item sought to measure if participants perceived that SBAE teachers should inquire about their students' chosen pronouns. Eighteen (69.23%) participants either *somewhat agreed*, *agreed*, or *strongly agreed* during the initial observation. In the second observation 16 (69.57%) either *somewhat agreed*, *agreed*, or *strongly agreed*, and nine (37.49%) either *somewhat agreed*, *agreed*, or *strongly agreed* in Observation 3. The item mean scores for the first and second observations (5.00, *SD* = 1.80; 4.83, *SD* = 1.49) were in the range of *somewhat agree*. The item mean score for Observation 3 (4.29, *SD* = 1.62) was in the range of *neither agree nor disagree* (see Table 1).

Table 1

Participants' Perceptions of the Use of Students' Chosen Pronouns in SBAE over Three Teacher Preparation Observations

Items	Observation 1 (n = 26)				Observation 2 (n = 23)				Observation 3 (n = 24)			
	f	%	*M*	*SD*	*f*	%	*M*	*SD*	*f*	%	*M*	*SD*
Gender pronoun knowledge and preparedness are important as a SBAE teacher.												
Strongly disagree	0	0.00	-	-	0	0.00	-	-	1	4.17	-	-
Disagree	1	3.85	-	-	0	0.00	-	-	1	4.17	-	-
Somewhat disagree	0	0.00	-	-	2	8.70	-	-	1	4.17	-	-
Neither agree nor disagree	5	19.23	-	-	1	4.35	-	-	5	20.83	-	-
Somewhat agree	7	26.92	-	-	7	30.43	-	-	3	12.50	-	-
Agree	11	42.31	-	-	10	43.48	-	-	9	37.50	-	-
Strongly agree	2	7.69	-	-	3	13.04	-	-	4	16.67	-	-
Item Total	26	100.00	5.27	1.09	23	100.00	5.48	1.06	24	100.00	5.13	1.56
I understand the meaning of gender pronouns he/him, she/her, they/them.												
Strongly disagree	1	3.85	-	-	1	4.35	-	-	0	0.00	-	-
Disagree	2	7.69	-	-	0	0.00	-	-	0	0.00	-	-
Somewhat disagree	1	3.85	-	-	1	4.35	-	-	3	12.50	-	-
Neither agree nor disagree	2	7.69	-	-	1	4.35	-	-	1	4.17	-	-
Somewhat agree	8	30.77	-	-	5	21.74	-	-	4	16.67	-	-
Agree	7	26.92	-	-	11	47.83	-	-	11	45.83	-	-
Strongly agree	5	19.23	-	-	4	17.39	-	-	5	20.83	-	-
Item Total	26	100.00	5.12	1.60	23	100.00	5.52	1.35	24	100.00	5.58	1.22

I am prepared to address situations regarding students and their gender pronoun preferences in SBAE.												
Strongly disagree	1	3.85	-	-	2	8.70	-	-	1	4.17	-	-
Disagree	3	11.54	-	-	2	8.70	-	-	2	8.33	-	-
Somewhat disagree	6	23.08	-	-	2	8.70	-	-	2	8.33	-	-
Neither agree nor disagree	1	3.85	-	-	6	26.09	-	-	3	12.50	-	-
Somewhat agree	7	26.92	-	-	6	26.09	-	-	6	25.00	-	-
Agree	6	23.08	-	-	4	17.39	-	-	7	29.17	-	-
Strongly agree	2	7.69	-	-	1	4.35	-	-	3	12.50	-	-
Item Total	26	100.00	4.38	1 .67	23	100.00	4.22	1.59	24	100.00	4.83	1.62
My teacher preparation program prepared me to understand and use gender pronouns in SBAE.												
Strongly disagree	2	7.69	-	-	3	13.04	-	-	2	8.33	-	-
Disagree	3	11.54	-	-	5	21.74	-	-	4	16.67	-	-
Somewhat disagree	6	23.08	-	-	1	4.35	-	-	4	16.67	-	-
Neither agree nor disagree	8	30.77	-	-	4	17.39	-	-	6	25.00	-	-
Somewhat agree	2	7.69	-	-	9	39.13	-	-	5	20.83	-	-
Agree	4	15.38	-	-	1	4.35	-	-	3	12.50	-	-
Strongly agree	1	3.85	-	-	0	0.00	-	-	0	0.00	-	-
Item Total	26	100.00	3.81	1.54	23	100.00	3.61	1.58	24	100.00	3.71	1.49
SBAE teachers should use gender pronouns aligned with their students' choices.												
Strongly disagree	0	0.00	-	-	0	0.00	-	-	2	8.33	-	-
Disagree	1	3.85	-	-	3	13.04	-	-	2	8.33	-	-
Somewhat disagree	1	3.85	-	-	0	0.00	-	-	1	4.17	-	-
Neither agree nor disagree	2	7.69	-	-	1	4.35	-	-	3	12.50	-	-
Somewhat agree	3	11.54	-	-	4	17.39	-	-	4	16.67	-	-
Agree	11	42.31	-	-	9	39.13	-	-	7	29.17	-	-
Strongly agree	8	30.77	-	-	6	26.09	-	-	5	20.83	-	-

Item Total	26	100.00	5.77	1.28	23	100.00	5.48	1.56	24	100.00	4.92	1.87
SBAE teachers should ask students to identify their chosen gender pronouns.			-	-								
Strongly disagree	1	3.85	-	-	1	4.35	-	-	2	8.33	-	-
Disagree	2	7.69	-	-	2	8.70	-	-	1	4.17	-	-
Somewhat disagree	4	15.38	-	-	0	0.00	-	-	3	12.50	-	-
Neither agree nor disagree	1	3.85	-	-	4	17.39	-	-	9	37.50	-	-
Somewhat agree	6	23.08	-	-	8	34.78	-	-	2	8.33	-	-
Agree	5	19.23	-	-	6	26.09	-	-	5	20.83	-	-
Strongly agree	7	26.92	-	-	2	8.70	-	-	2	8.33	-	-
Item Total	26	100.00	5.00	1.80	23	100.00	4.83	1.49	24	100.00	4.29	1.62

Note. Scale: 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Somewhat disagree*, 4 = *Neither agree nor disagree*, 5 = *Somewhat agree*, 6 = *Agree*, and 7 = *Strongly agree*.

The item mean scores were compared across the observations. To assess the change in participants' perceptions of using students' chosen gender pronouns in SBAE while matriculating through a teacher preparation program, *mean differences* (*MD*) were calculated by subtracting the item mean scores in Observation 1 from the corresponding scores in Observation 3 (see Table 2). In the third observation, participants indicated that they *somewhat agreed* on the importance of SBAE teachers possessing gender pronoun knowledge and preparedness (M = 5.13, SD = 1.56), but not as strongly as they had during Observation 1 (*MD* = -0.14) [see Table 2]. In addition, at the third observation, participants affirmed an enhanced understanding of gender pronouns compared to the initial observation (M = 5.58, SD = 1.22). Their overall perception shifted (*MD* = 0.46) [see Table 2] from *somewhat agreed* to *agreed*. Moreover, at Observation 3, participants *somewhat agreed* (M = 4.83, SD = 1.62) that they felt prepared to address situations related to gender pronouns, which was also an increase over the first observation (*MD* = 0.45) [see Table 2]. Participants *neither agreed nor disagreed* on whether their teacher preparation program adequately equipped them to comprehend and use gender pronouns (M = 3.71, SD = 1.49), as evidenced by the third observation's finding (see Table 2), which was slightly lower than the first (*MD* = -0.10) [see Table 2]. Following their student teaching experience, participants *somewhat agreed* (M = 4.92, SD = 1.87) that using the chosen pronouns chosen of students was a responsibility of SBAE teachers, despite a decline in agreement, as noted in the second and third observations. The rating slipped from *agreed* to *somewhat agreed* between observations 1 and 3 (*MD* = -0.85) [see Table 2]. Further, participants considered it less important for SBAE teachers to inquire about students' chosen gender pronouns after completing their student teaching internships (M = 4.29, SD = 1.62). The perception declined (*MD* = -0.71) from *somewhat agreed* to *neither agreed nor disagreed* (see Table 2).

Table 2

Mean Differences in SBAE Preservice Teachers' Perceptions of Gender Pronoun Knowledge and Preparedness at the End of Their First Agricultural Education, Teacher Education Course (Observation 1) and After Completing Student Teaching (Observation 3)

Items	*MD*
Gender pronoun knowledge and preparedness are important as a SBAE teacher.	-0.14
I understand the meaning of gender pronouns.	0.46
I am prepared to address situations regarding students and their gender pronoun preferences in SBAE.	0.45
My teacher preparation program is preparing me to understand and use gender pronouns.	-0.10
SBAE teachers should use gender pronouns aligned with their students' choices.	-0.85
SBAE teachers should ask students to identify their chosen gender pronouns.	-0.71

Note. *Mean differences* (*MD*) were calculated by subtracting the item mean scores in Observation 1 from the corresponding item mean scores in Observation 3.

Following the study's second observation and prior to their student teaching internships, more than three-fourths of participants reported no experiences, formal or informal, influencing their beliefs regarding pronoun preparedness and usage. Five participants reported that they did participate in experiences influencing their beliefs. Two of those highlighted the impact of a lab instructor in their agricultural education courses and the instructor's passion for the topic. In response to an open-ended question about SBAE teachers' use of gender pronouns in the third observation, one participant advocated for comprehensive support and stated: "I think as educators, we should all support our students in all parts of their life." Another participant emphasized adherence to students' assigned genders as designated by parents or guardians. A third student, however, expressed that using students' chosen gender pronouns is a sensitive topic in need of more study and understanding before they would be comfortable implementing associated behaviors as a SBAE teacher.

Although a majority (n = 17) of participants did not report having episodes during student teaching that influenced their beliefs about gender pronoun usage, those who did shared impactful experiences. One participant revealed that their cooperating teacher did not use students' chosen pronouns, which they perceived as negatively impacting the engagement of some students and their FFA participation. Another described a situation where the cooperating teacher consistently disregarded a student's pronoun choice. In addition, a participant stated that some students were comfortable sharing their chosen pronouns with them, leading the preservice teacher to pay heightened attention to the use of pronouns while interacting with students. Despite these experiences, participants generally expressed an understanding of the meaning of students' chosen gender pronouns. Acknowledging the extensive media coverage of anti-LGBTQ+ legislation during the participants' student teaching internships, both in Oklahoma and other states, it is recognized that this coverage may have influenced participants' perceptions of the phenomenon. However, only three (12.50%) students confirmed following the media coverage, with one noting that it "helped inform me of what some of my students may be experiencing."

Conclusions, Implications, and Recommendations

Following their student teaching experience, participants *somewhat agreed* on the importance of gender pronoun knowledge and preparedness for SBAE teachers. However, this perception decreased from the second to the third observation and was also lower than the initial observation. Despite perceiving increased readiness to address SBAE situations involving gender pronouns at the third observation compared to the first two, participants only expressed partial agreement regarding their level of preparedness associated with their teacher preparation program. This aligns with the findings of Clark (2010), who found that U.S. teachers were ill-prepared to serve LGBTQ+ youth. Although participants felt less prepared regarding gender pronouns by their teacher preparation program over time, it was found that their understanding of the meaning of gender pronouns did increase. As such, other experiences or interactions may have occurred outside of the formal learning setting that assisted them in understanding the use of gender pronouns and the application of such in SBAE. Another noteworthy trend pertained to participants' perceptions of their increased preparedness to address situations involving gender pronoun usage after their student teaching experiences. This suggests that the participants may have engaged in relevant situations during their student teaching internships. However, after student teaching, participants also reported a decrease in their agreement that gender pronoun

knowledge and preparedness are crucial to the performance of SBAE teachers. This decline in agreement on whether SBAE teachers should use students' chosen pronouns and inquire about their pronoun identification suggests that participants may not have fully grasped the potential benefits associated with these behaviors (Vasta, 1989), particularly after their student teaching experiences. These contradictory findings warrant further exploration and study.

Analyzing our data across multiple observations following three interventions (courses) over time revealed several discernible trends. For instance, it is worth exploring whether and how cooperating teachers influence student teachers' acquiring less positive views regarding this issue. As such, we recommend that teacher educators exercise intentional selectivity when assigning preservice teachers to cooperating teachers and schools. Purposeful placements could align future teachers with educators more supportive of using students' chosen pronouns, thereby fostering the adoption of such practices by their student teachers. Regarding course content and experiences within teacher preparation, participants expressed a need for additional training in using gender pronouns. To this point, our findings underscored the importance of dedicating more attention to the goals outlined in *AAAE's Standards for School-Based Agricultural Education Teacher Preparation Programs,* specifically Standard Four which currently does not include any subtopics outlining how preservice teachers should be prepared to create inclusive learning environments and how to celebrate diversity (Myers et al., 2017). Such could emphasize the creation of more inclusive programs that establish positive relationships and thereby increase the likelihood of greater fairness and equity among students, teachers, parents, community members, and other SBAE stakeholders (Murray et al., 2020; Price, 2023).

We recommend that additional investigations be conducted with a larger population of preservice teachers to better understand the knowledge and preparedness of future SBAE teachers regarding gender pronouns. We further recommend that other teacher preparation programs replicate this study to determine their effectiveness in preparing preservice SBAE teachers to address situations regarding gender pronoun usage in SBAE. These studies could also help to identify those cooperating schools and teachers that may hinder or promote the use of gender pronouns in SBAE. We also suggest expanding this study by incorporating an additional observation after the participants have gained inservice teaching experience. This longitudinal extension would aim to evaluate the practical application of their preparation in educational programs and ascertain if any shifts in attitudes and behaviors had manifested due to the accrual of more benefits over time, as suggested by Bandura's SCT (Vasta, 1989). Further, a complementary study should be conducted involving SBAE inservice teachers, both in Oklahoma and other states. We also recommend that teacher educators at OSU enhance efforts to prepare SBAE teachers to understand and use their future students' chosen pronouns (Cross & Hillier, 2021; Murray et al., 2020). This could involve an instructional unit delivering pertinent content on gender pronouns and strategies for fostering inclusive SBAE programs for gender minority students, promoting a sense of welcomeness and support (Price, 2023). Given that experiences influencing participants' views on pronoun usage in SBAE occurred during their teacher preparation coursework, this period offers an opportune time to introduce preservice teachers to the concept and its impact by providing examples of potential situations and appropriate responses. Such scenarios may also encompass rooming assignments for overnight trips and implementation of the National FFA Organization's (2023) non-gendered official dress standards for students with chosen gender pronouns differing from their assigned sex.

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H.O. Sargent: A Founding Father of the NFA

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Abstract

H.O. Sargent was essential in improving vocational agriculture and education for African American students in the United States. Through his continuous efforts and role as the regional supervisor of Negro schools in the South, H.O. Sargent, along with G.W. Owens, was able to establish the New Farmers of America organization. The New Farmers of America encouraged and guided African American boys to choose a career in agriculture and become established in an occupation that many African Americans were not a part of during that time. The New Farmers of America organization also aided students in learning skills and knowledge in leadership, citizenship, cooperation, and scholarship (Alston, 2021). Over time, the New Farmers of America quickly gained popularity, and groups were established in North Carolina, South Carolina, New Jersey, Alabama, and many other states throughout the South (Moore, 2019c). Due to the efforts of H.O. Sargent and G.W. Owens, the National New Farmers of America organization was officially named and established in 1935 at Tuskegee Institute in Alabama (Moore, 2019c). Establishing the NFA increased the demand for agricultural and extension education in school systems throughout the South. The NFA also developed concepts that can still be found and implemented in formal and non-formal educational settings today.

Author Note

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Introduction

Last year, the National FFA Organization (2023a) released an updated strategic plan for 2022-2025. A recognized opportunity gap for African American and Hispanic students helped inform the creation of three new strategic priorities: Evolve, Engage, and Empower, which are all interwoven with elements of diversity, equity, inclusion, and belonging. However, to make strides towards these stated goals, it would benefit the organization to address some of the problematic issues occurring throughout its history regarding the acceptance of underrepresented groups and try to more fully recognize the contributions of individuals working to promote opportunities and inclusion for minority students.

Before establishing the New Farmers of America organization, African American students were eager to participate in vocational agriculture. In the late 1920s, the idea of the NFA began as a local entity in Virginia to allow African American boys to participate in agricultural training and activities (New Farmers of America Records, 1929-1965). In 1927, H.O. Sargent, Federal Agent for Agricultural Education for African Americans, and G.W. Owens, Teacher-

Trainer at Virginia State College, collaborated in drafting the first constitution and bylaws for the New Farmers of Virginia (Flatt, 2022). This joint effort and movement resulted in the official formation of the New Farmers of Virginia. That same year, 400 New Farmers of Virginia members from 18 different chapters participated in a state rally to gauge interest in farming, cooperative effort, and leadership (Flatt, 2022). As the New Farmers of Virginia gained popularity, more and more chapters began to form throughout the southern region. In reaction to the emergence of new chapters, the states organized into state and sectional associations based on location: Washington, Sargent (Gulf), and Almmot (A-L-Tex-O) (New Farmers of America Records, 1929-1965). During this time, the various regions specialized in different vocational experiences. For example, Arkansas emphasized fairs and exhibits, Kentucky stressed judging, Oklahoma pursued program planning, Louisiana provided experiences in demonstrations, and many other regions adopted different vocational experiences (Fields, 1959). These chapters would then come together during the year to hold conferences and contests, unifying the state associations (New Farmers of America Records, 1929-1965). In response to these events, a national organization, the New Farmers of America, was established in 1935.

The Official FFA Student Handbook (National FFA Organization, 2022) and the Official FFA Manual (National FFA Organization, 2023b) provide an overview of FFA history commonly used by school-based agricultural education teachers in their classroom instruction. When exploring the leadership and opportunities for African American students, these documents briefly explain the NFA and make quick mention of the organization's history. With this limited information, students and teachers alike are left speculating about critical details and contributions of the NFA Organization. For example, the NFA Guide (1948) paid respects to H.O. Sargent by including a tribute in his honor. This tribute explained that “Dr. Sargent’s interest in, understanding of, and sympathy for the Southern Negro was one of his commendable virtues. He gave his undivided time, his best thought, and professional interest, in season and out of season, to the vocational education and industrial uplift of the Negro race. He has received the acclaim of both races for the service he rendered them and how he rendered it. To the Negro he was in life a friend, in death a hero” (NFA Guide, 1948, p.8). The legacy of H.O. Sargent was recognized by the creation of a loan fund and the establishment of an award in his honor. While the creation of the H.O. Sargent Award in 1996 is noted in the current version of the student handbook, it never mentions or suggests that the award was discontinued or as to why. This is one specific example of a discrepancy overlooked when recognizing the NFA and its rich history in the broader context of the National FFA Organization.

Purpose and Objectives

The primary purpose of this historical research study was to document the contributions of H.O. Sargent and how his efforts led to the establishment of the New Farmers of America organization. This study was also used to detail how the NFA advanced the livelihoods of African American students throughout the South. The existing literature on the NFA primarily focuses on the establishment of the organization, its traditions (Connors, 2021), and the perspectives of teachers and members (Gilman, 2013; Jones et al., 2021; Wakefield & Talbert, 2003) Research has also highlighted some of the essential contributions of specific individuals such as George Washington Owens (Callaghan & Hock, 2019) and S. B. Simmons (Jones et al.,

2021). More information needs to be provided on H.O. Sargent and his work to provide African American students with a quality education in vocational agriculture. This is mainly because H.O. Sargent passed away in 1936, only one year after establishing the New Farmers of America organization.

Along with the primary focus of this historical research study, this study aims to bring an increased understanding and familiarity of H.O. Sargent and his contributions to the formation of the NFA and its impacts on African American students enrolled in vocational agriculture. To facilitate the primary focus of the research study, specific objectives were created to answer the following questions:

1. Who was H.O. Sargent?
2. What is the NFA and how did H.O. Sargent contribute to this organization?
3. What impact did the NFA and H.O Sargent's contributions have on the lives of NFA participants?
4. How did the NFA honor H.O. Sargent after his passing?

Methodology and Procedures

As noted by Fraenkel et al. (2015), historical research utilizes the systematic collection and evaluation of data to provide context and understanding of previous actions or events. This research methodology encourages individuals to examine the past to learn from prior successes and failures, consider their application to present-day problems and concerns, and more fully understand current educational practices and policies.

To achieve the objectives and overall focus of this inquiry, historical research methods were utilized and involved in the search for credible sources and relevant materials containing information related to the questions at hand. This included examining documents, records, archives, genealogical reports, etc., to gain an understanding of events that occurred in the past. From these sources, primary forms of communication were preferred to authenticate information. This included interviews, books, archived records, and publications collected by state and federal organizations. Secondary sources such as journal articles, books, and other institutional publications were also used to collect information. All of the sources in this study focused on the contributions of H.O. Sargent, the NFA, and the impacts of the NFA on African American students enrolled in vocational agriculture.

When conducting a historical study, researchers must maintain a critical approach to reviewing all sources (Fraenkel et al., 2015). Therefore, it is essential to state that all resources and references were subjected to both external and internal criticism. External criticism reviews the purpose of a document, when and where it was written, and if the document is genuine (Fraenkel et al., 2015). The researcher established external criticism by carefully inspecting the records. Additional external criticism was established by utilizing resources approved for inclusion in a collection and verified by librarians and archivists. Internal criticism ensures that the contents of the resources chosen for the research are accurate and that the author is credible (Fraenkel et al., 2015). Internal criticism was established by triangulating the information

presented with other resources from established sources. Specifically, to ensure all documents were reliable, credible, and accurate, North Carolina State University library resources, multiple University Library Special Collections, and Archives were used to examine all research materials for their credibility.

Results/Findings

Question One- Who was H.O. Sargent?

H.O. Sargent, commonly referred to as one of the "Founding Fathers of the NFA," was born on October 24, 1875, on a farm near Russellville, Alabama (Alston & Wakefield, 2022). According to Alabama Census and Genealogy, H.O. Sargent was born one of the five children to Harvey Gholson and Rebecca (Harris) Sargent of Cedar Creek, Alabama (Alabama Genealogy, 2022). In his early years, H.O. Sargent attended public school in Franklin County, Alabama, and graduated from the Alabama Polytechnic Institute at Auburn in 1901 with a bachelor's degree in agriculture (Moore, 2019c). Later on, H.O. Sargent graduated from Auburn University in 1907 with a Master of Science degree and a Master of Arts degree, as well as a Doctorate of Philosophy from George Washington University in Washington, D.C. (NFA Guide, 1948). While attending college, H.O. Sargent married Minnie Jack Pearce of Marion County, Alabama (Alabama Genealogy, 2022). In 1909, the Sargents welcomed their first child, Gwendolyn. Later, in 1912, they welcomed their second child, Elenor. Lastly, in 1917, they welcomed their third and final child, Harvey Owen Sargent (Alabama Genealogy, 2022)

After graduating from Alabama Polytechnic Institute, H.O. Sargent remained at the school and served as a senior horticulturist (Moore, 2019c). Shortly after, in 1904, he was elected president of the West Alabama Agricultural School at Hamilton, where he served for 12 years (Moore, 2019c). During his time there, the school became highly known and recognized as one of the South's leading agriculture institutions (Moore, 2019c). After his 12-year tenure as the president of the West Alabama Agricultural School at Hamilton, H.O. Sargent served as a director for club work and a supervisor for agricultural high schools in Walker County, Alabama (Moore, 2019c). Shortly after, in 1917, H.O. Sargent went on to be appointed by the Federal Board for Vocational Education as the first Federal Agent for Vocational Agricultural Education for Special Groups (Black, Hispanic, and Native American citizens), where he served for 18 years as a vocational trainer for African American schools (Alston & Wakefield, 2022). During this time, H.O. Sargent's contributions led to arrangements for the first meeting of the New Farmers of America in 1935 (Alston & Wakefield, 2022).

Just a year later, H.O. Sargent was on official business when he was injured in an automobile accident near Baton Rouge, Louisiana, where he succumbed to his injuries on February 12, 1936 (Alston & Wakefield, 2022). H.O. Sargent was laid to rest in a cemetery in Maryland, just outside of Washington, D.C. (Moore, 2019c). After grieving and recovering from H.O. Sargent's passing, his position was posted, and members of the Conference of Negro Land-Grant College Presidents attempted to fill his vacancy due to having the favor of such an appointment (Norris, 1993). At various times throughout his tenure, H.O. Sargent mentioned that there would be an eventual need for a qualified African American to do the work of his position

after he was gone (Norris, 1993). Within a few months of H.O. Sargent's passing, W.N. Elam of Texas was employed in the Washington office to continue his work (Fields, 1959). This succession shocked many individuals because H.O. Sargent wanted an African American to take over his position eventually. However, this did not happen. Due to his untimely and sudden passing, H.O. Sargent could never see how his contributions and efforts shaped the future of the New Farmers of America Organization. However, H.O. Sargent's efforts did not go unnoticed, and his memory lived on through the NFA and the establishment of the H.O. Sargent Award and the H.O. Sargent Loan Fund.

Question Two- What is the NFA and how did H.O. Sargent contribute to this organization?

During his time as a Federal Agent for Vocational Agriculture, H.O. Sargent made numerous efforts to implement a program that would benefit African American students enrolled in vocational agriculture. When he began his work as a federal agent in 1917, there were 39 vocational agriculture schools for African American students. By 1936, there were 641 schools with over 47,000 students enrolled in the vocational agriculture program (Moore, 2019c). His success in African American schools was attributed to his unique personality and his being widely accepted by African American agricultural educators (Alston & Wakefield, 2022). As a regular member of the federal staff in vocational education, H.O. Sargent attended and conducted meetings such as the Teacher Trainer in Agriculture and the Conference of Negro Teacher Trainers and Supervisors in Agriculture to prepare better and support African American agricultural educators (Norris, 1993). Under his leadership as a federal agent, many African American teacher trainers, resident teacher trainers, and supervisors were awarded Julius Rosenwald fellowships for graduate study (Alston & Wakefield, 2022). Through his extensive work as a federal agent, he believed that the time had come for an organization of Black agriculture students to be established just as the Future Farmers of America had been created for white students in agriculture (Alston & Wakefield, 2022). As early as 1929, H.O. Sargent wanted to formulate an organization with a firm foundation for African American students (Fields, 1959). During this time, Sargent lobbied within the Department of Education to create an organization for African American students in segregated schools (New Farmers of America Records, 1929-1965). H.O. Sargent worked diligently in the interest of a national grouping of African American students enrolled in vocational agriculture programs (Fields, 1959). Because of his continuous efforts and beliefs, H.O. Sargent recommended that the New Farmers of America be officially established.

In 1935, H.O. Sargent arranged for the NFA's first meeting to occur at the Tuskegee Institute in Alabama (Alston & Wakefield, 2022). The program for the conference included introductions and general orientation sessions, business sessions specific to both the temporary and permanent organizations, oratorical contests, committee work, the first national judging contest, and entertainment (Norris, 1993). At that meeting on August 4, 1935, the New Farmers of America was established and recognized as a national organization. During the first six years of national existence, the NFA operated outside the U.S. Office of Education (Alston & Wakefield, 2022).

The arrangement was for a quasi-headquarters at A&T College, Greensboro, North Carolina, with S.B. Simmons and. H.O. Sargent. With this arrangement, S.B. Simmons worked out of A&T College, while H.O. Sargent did not have a set home location for his work. At this time, S.B. Simmons served as the State Supervisor of Vocational Agriculture in Negro Schools as executive secretary-treasurer, and H.O. Sargent served as a roving consultant and general advisor throughout several states (Alston & Wakefield, 2022). All communication with S.B. Simmons and H.O. Sargent was completed primarily by mail, given the far driving distance between them (Alston & Wakefield, 2022). During this time, the U.S. Department of Education did not operate as the direct authority for the NFA, and H.O. Sargent acted as a consultant to the NFA until he passed away in 1936 (New Farmers of America Records, 1929-1965). A National NFA Advisor and Executive Secretary-Treasurer, both African American Teacher Trainers, were responsible for the daily operations of the NFA as well as organizing the National Convention arrangements (New Farmers of America Records, 1929-1965).

Due to the efforts and contributions of H.O. Sargent, the New Farmers of America began as an organization for African American students enrolled in vocational agriculture in 1935. According to H.O. Sargent, the purpose of the NFA was to "create more interest in the intelligent choice of farming; to encourage cooperative effort among students of vocational agriculture; to develop rural leadership; to promote thrift; and, to advance vocational education in public-colored schools" (Norris, 1993, p.33). While acting autonomously from 1935-1941, the NFA grew to have 1,004 chapters in 12 states and more than 50,000 active members (Flatt, 2022). In 1941, the U.S. Department of Education took control of the NFA, removing authority from the current NFA leaders (Flatt, 2022). During this time, the U.S. Department of Education did not employ a single African American to represent the NFA. Because of this, NFA leaders repeatedly attempted to secure leadership positions in education departments to support their interests at local, state, and national levels (Flatt, 2022). These efforts to obtain leadership positions and representation in education departments would last almost two decades (Flatt, 2022). The NFA operated under these conditions until it merged with the FFA in 1965 (New Farmers of America Records, 1929-1965).

After 1935, NFA chapters were officially formed in local high schools, and students received training in farm technology, traditional farming, farm mechanics, and livestock care (New Farmers of America Records, 1929-1965). Like today, the vocational agriculture teacher served at the center as a mentor and guide for the program. The New Farmers of America Organization was an integral part of vocational education where teachers, teacher-trainers, and supervisors promoted the home, school, community, and general welfare of the nation (Fields, 1959). The vocational teacher encouraged and extended the opportunity for all students to join the NFA (New Farmers of America Records, 1929-1965). Once joining the NFA, the agricultural educator would travel throughout the community, visiting students' homes and working with the adults in the household. By doing this, the teacher familiarized the adults with the program and activities and allowed them to develop an appreciation for what their sons were doing (Wakefield & Talbert, 2003). The agriculture teacher worked to ensure his students emerged as community leaders and played a vital role in their communities (New Farmers of America Records, 1929-1965). This served as a motivating factor in their lives and an outlet to get students and parents involved in the program. Once involved, parents, students, community members, and leaders

valued and respected the NFA and what it was doing for the young men in their communities (Wakefield & Talbert, 2003).

Just like the Future Farmers of America, NFA chapters elected officers who helped run the program and provide support to other members. For the national organization, delegates at the National Convention elected seven students each year to serve as officers (Fields, 1959). These officer positions consisted of a president, student secretary, student treasurer, reporter, and one vice president from each of the organization's three administrative sections (Fields, 1959). The NFA also recognized adult office positions. These positions included an administrative adviser, advisor, administrative executive secretary, executive secretary, executive treasurer, and three sectional advisers from each NFA section (Alston & Wakefield, 2022). Once an officer was elected to a position, they were invited to a leadership training school in Atlanta, Georgia, that was held every January. At this training school, students would practice leadership and public speaking skills (Fields, 1959). During the following August, student and adult officers would assemble in Washington, D.C., for the annual meeting of the board of trustees and the advisory council (Fields, 1959). The student officers, adult officers, and outgoing National President constituted the Board of Trustees (Alston & Wakefield, 2022). At a chapter level, NFA members had to participate in leadership training, cooperative endeavors, business meetings, community betterment, public speaking events, and plan activities to meet the organization's primary objectives (Fields, 1959).

As a member of the NFA, members could be awarded four different degrees. The Farm Hand, Improved Farmer, Modern Farmer, and Superior Farmer were among the degrees that could be obtained (New Farmers of America Records, 1929-1965). From the Superior Farmer Degree recipients, two Regional Star Farmers and a Star Superior Farmer were chosen (New Farmers of America Records, 1929-1965). Members could also win additional awards in multiple areas of competition and for being outstanding NFA members. These awards could be given through judging contests, quiz contests, talent competitions, quartet contests, and the Honorary Superior Farmer Degree (New Farmers of America Records, 1929-1965). Of the competitions, the quartet contest remained the most popular as it allowed members to develop a greater appreciation for music, including the traditional Black spirituals (Flatt, 2022). At the National Convention each year, national awards could also be given in these areas. In 1949, Atlanta, Georgia, became the home of the NFA National Convention after years of rotating between different cities in the south (New Farmers of America Records, 1929-1965). Just like the FFA, the NFA adopted an organizational creed, and created an emblem that included a plow, owl, rising sun, open boll of cotton, American eagle, and the words NFA and Vocational Agriculture (Flatt, 2022).

In the early 1950s, changes to education and its traditional operating structure began. With those changes, agricultural education was no exception. In 1954, the Supreme Court issued a ruling in Brown v. Board of Education. This ruling was a turning point for Civil Rights and ordered an end to school segregation. In response, individual states enacted desegregation legislation, and, as a result, five of the seventeen state NFA associations merged with their state FFA associations (Flatt, 2022). During the 1960s, the Civil Rights Movement ended the era of desegregated schools throughout the United States. Due to the passage of the 1964 Civil Rights Act by President Lyndon Johnson, the NFA and FFA discussed fully merging the two

organizations on a national level (New Farmers of America Records, 1929-1965). This decision would result in a single, unified organization. On July 1, 1965, the NFA and FFA officially merged and were finalized with a ceremony at the National FFA Convention (New Farmers of America Records, 1929-1965).

This unified merger added over 50,000 members to the FFA organization (National FFA Organization Records, 1916-2008). Also, with the merger, the NFA was required to transfer all assets to the FFA. This transfer consisted of $10,445.56 in checking, $32,355.30 in savings, and $3,800 in stocks and bonds (Wakefield & Talbert, 2003). After the merger, African American teachers and state staff who had once taught about the NFA were now required to teach facts about the FFA and arrange to dispose of all NFA materials and content (Wakefield & Talbert, 2003). In addition to getting rid of and erasing all ties to the NFA, many agricultural education programs could no longer support two teachers, and Black teachers began losing their teaching jobs to white teachers (Flatt, 2022). If they did not lose their job, Black teachers were demoted from vocational agriculture teachers to lower-paying positions with fewer opportunities (Flatt, 2022).

Once the Black community began experiencing a decline in Black teachers and leaders, Black students lacked role models in agriculture and were encouraged to choose other career pathways (Flatt, 2022). Even today, African American students with the financial resources to pursue agriculture are still told to choose other career pathways (Alston & Wakefield, 2022). Additionally, underrepresented students lack awareness of the potential to succeed in agriculture because they are encouraged to pursue other outlets (Alston & Wakefield, 2022). Overall, the NFA's absorption created problems and opportunities for past members, students, and agricultural educators alike. The effects of the NFA absorption can still be observed in agricultural education programs today.

Question Three- What impact did the NFA and H.O Sargent's contributions have on the lives of NFA Participants?

Before the merger in 1965, the NFA was commended as an honorable and successful organization. The NFA achieved many accomplishments and had a rich history (Wakefield & Talbert, 2003). The New Farmers of America established values that members were expected to uphold throughout their membership and even after their memberships had ended. The NFA provided value to African American rural youth in four areas: the individual, school, home, and community (Jones et al., 2021). The organization provided many opportunities for students to achieve individual values such as improving morals and citizenship, teaching cooperation, working with others, and teaching by experience (Jones et al., 2021). The NFA also allowed African American students to learn various community values, such as providing a source of leadership, bringing new ideas to the community, and improving the community's appearance (Jones et al., 2021).

Many members of the NFA attributed their success and educational achievements to the proficiencies that they developed through the NFA organization (New Farmers of America Records, 1929-1965). Mr. Victor Frazier (2016), a former NFA member, explained in an

interview that through the help of his instructor and the NFA, he was able to learn valuable skills in working in agriculture and with livestock animals. In a second interview, two former Dunbar NFA members (Leman Lewis, Sr., and Charles Williams) talked about how their involvement with the NFA helped guide their future endeavors. In the interview, Mr. Leman Lewis Sr. explained that the NFA helped him gain valuable life experiences such as animal husbandry, welding, and making furniture (Okmulgee Public Schools, 2021). NFA members such as himself and many members before him obtained jobs through the skills they acquired while participating in the NFA (Okmulgee Public Schools, 2021). In the same interview, Mr. Charles Williams explained that he joined the NFA because he lived on a farm and wanted to learn more about agriculture. Through his participation in the NFA and the influences of his NFA advisor, Mr. Williams was motivated to pursue further education and opportunities to get himself out of the challenging living situation that he was in (Okmulgee Public Schools, 2021). Not only did NFA members learn valuable life skills through the NFA organization, but they could also travel, network, and make lifelong friends and memories.

Because of the values, experiences, and skills provided by the NFA, many members pursued higher education or careers in agriculture. According to Alston (2021), "The NFA produced many students that would go on to college to major in Agricultural Science and other academic endeavors, with numerous former members becoming educators, administrators, extension professionals, state and national agricultural governmental professionals, farmers, and agribusiness professionals" (para.2). In a study completed by Wakefield and Talbert (2003), a former NFA member explained that they developed the ability to lead and manage people and programs through the NFA, which remained applicable when they entered the workforce. The same NFA member shared that without these skills, they would not have been able to become the Executive Secretary of the NFA or the Director of Camp John Hope (Wakefield & Talbert, 2003). It was also shared by an additional NFA member that "the NFA had more to do with their success than anything else besides their parents" (Wakefield & Talbert, 2003, p. 99). Through these testimonies, we can see that without the contributions of H.O. Sargent and the NFA, many African American students would not have the opportunities in agriculture that they do today.

Question Four- How did the NFA honor H.O. Sargent after his passing

After his passing in 1936, the NFA took multiple actions to honor and commemorate H.O. Sargent's contributions to the organization. The first action was the creation of the H.O. Sargent loan fund. At the 1936 NFA Convention, the fund was established to make loans to deserving NFA members, both active and former (Moore, 2019c). The second action taken by the NFA was the founding of the H.O. Sargent Award. This award was created to recognize a former NFA member who had been deemed as the most successful former student and had completed four years of young farmer's classes (Alston & Wakefield, 2022; Moore, 2019c). In memory of her late father, H.O. Sargent's daughter made a plaque available each year to be presented to the recipient of the H.O. Sargent Award (Fields, 1959). To honor H.O. Sargent's legacy, a silver tea service set was given to his widow, Ms. Minnie Sargent, in 1937 (Moore, 2019c). Lastly, the 1941-42 National NFA officers laid a wreath on his grave to honor his contributions to the NFA (Moore, 2019c).

During the tenth anniversary of the NFA, G.W. Owens and S.B. Simmons traced the development of the NFA to pay tribute to H.O. Sargent and many others who influenced the NFA organization (Fields, 1959). Later, in 1948, the NFA Guide paid respects to H.O. Sargent by including a tribute in his honor. This tribute explained that "Dr. Sargent's interest in, understanding of, and sympathy for the Southern Negro was one of his commendable virtues. He gave his undivided time, his best thought, and professional interest, in season and out of season, to the vocational education and industrial uplift of the Negro race. He has received the acclaim of both races for the service he rendered them and how he rendered it. To the Negro he was in life a friend, in death a hero" (NFA Guide, 1948, p.8).

After the NFA and FFA merger, the H.O. Sargent Award was no longer recognized. In 1995, the H.O. Sargent Task Force established criteria, applications, and parameters for reviving the H.O. Sargent Award (Moore, 2019a). In 1996, the H.O. Sargent Award was reinstated to promote diversity among chapters (National FFA Organization Records, 1916-2008). After 2008, the award was discontinued once again. There is no mention of why the award was discontinued in any past FFA records. Many in the FFA and former NFA communities felt this loss. An integral part of the NFA and H.O. Sargent's memory, life's work, and existence was no more (Moore, 2019a).

Conclusion and Implications

The development of the New Farmers of America and the contributions of H.O. Sargent offer many insights into the barriers that African American students faced during the 1900s. The establishment of an organization in which African American students in vocational agriculture could come together to learn and engage in new experiences was crucial to the advancement of agriculture and the lives of those living in segregated communities. African American students who took part in the NFA benefited by learning essential skills, developing leadership qualities, and networking with other members from all over the United States.

During a time when opportunities for African Americans were not equitable and discrimination continued to occur, H.O. Sargent, G.W. Owens, and the NFA came together to create an organization where African Americans could pursue vocational agriculture freely. Today, it is essential to remember and reflect upon the efforts and advancements of African American students who were members of the NFA. These contributions can be made apparent through the actions of J. Levonne Chambers, Attorney at Law and former NFA member. After the NFA/FFA merger, J. Levonne Chambers advocated for NFA members negatively affected by the merger and desegregation of vocational agricultural programs. Through his work, he was able to "raise serious questions as to the role that African Americans are to play in the new system and the effect of the merger or integration on vocational agricultural teachers and students" (Wakefield & Talbert, 2000, p. 428). A second notable contribution can be seen through the remarks of the last NFA President, Adolphus Pinson, at the NFA-FFA merger in Kansas City, Missouri, in 1965. In his last remarks, Adolphus Pinson reviewed all the accomplishments of the NFA and its members over its 31 years of being chartered. In his last speech, Pinson explained that "the spirit of the New Farmers of America does not die here. Rather we awake into the dawn of a new day. Together we walk into the dawn as Future Farmers

and toward a fuller realization of our educational aim and purposes" (Moore, 2019b, para.6). Through his remarks, former NFA members became hopeful and excited for the future of agriculture in light of their new membership with the FFA.

These members and many others strongly impacted their chapters, organizations, and communities and demonstrated hard work and dedication in the face of adversity and discrimination. With the number of diverse students and educators declining from the field of agriculture, it is essential to identify and commemorate the efforts of the NFA and its founding fathers, H.O Sargent and G.W. Owens. There are implications for the profession and student organizations to examine the history of the NFA and re-evaluate how it serves all underrepresented members and advisors. Bringing awareness to these efforts can be essential in recruiting and retaining diverse students enrolled in agricultural education programs. Small actions and recognition across local chapters and student organizations can start a more significant movement to ensure that the past is not forgotten and that the NFA can finally celebrate a true merger.

Recommendations

After conducting this historical research study, it is suggested that the contributions of H.O. Sargent and the NFA be further examined from a closer standpoint to understand each entity's history better. There are limited resources for both entities, and further research could open up more knowledge and understanding of the efforts of H.O. Sargent and the NFA Organization. As a future recommendation, the activities, awards, and programs of the NFA should be re-examined and appropriate components may be incorporated into the FFA. During the NFA/FFA merger, many aspects of the NFA were no longer incorporated or held post-merger. After the merger, the NFA gave up its name, charter, constitution, by-laws, awards, emblem, jacket, Creed, banner, colors, assets, and leadership (Alston & Wakefield, 2022). Also, during this time, membership costs rose from five cents in the NFA to fifty cents in the FFA. Many students had no financial means to participate in the FFA post-merger (Flatt, 2022). Due to these losses, many traditions, history, and culture have been left behind (Alston & Wakefield, 2022). With these changes, African American representation in agricultural education began to decline and can still be seen today. In 1965, more than 52,000 African American men were members of the NFA. Today, 36,000 FFA members identify as Black, which accounts for only 5% of membership in the FFA (Flatt, 2022).

A second recommendation can be made for student leadership organizations, educators, and agricultural education leaders to develop and nurture a more inclusive National FFA Organization. To do this, the National FFA Organization can make continuous efforts to incorporate and include the history of the NFA during events such as the National FFA Convention and in agricultural education curricula across the United States. Additionally, agricultural education programs can incorporate historical components of the NFA into lessons and content delivery, as well as chapter-level events and competitions. Further research into the efforts and contributions of H.O. Sargent and the NFA will help create additional opportunities for future generations to understand the importance of the New Farmers of America and how their contributions have changed the face of modern-day agriculture.

A third and final recommendation is pursuing additional research to find and include the testimonies and experiences of past NFA members for historical documentation. Written and videotaped interviews should be conducted to capture and document the experiences of former NFA members while they are still living or have active memories of past events. Since some local NFA chapters began in the early 1920s, there are fewer surviving NFA members as the years go on. Because of this, key individuals should be identified, and their reflections should be considered and preserved for future generations. Additionally, NFA artifacts such as jackets, memorabilia, photographs, awards, pins, etc., should be cataloged, and efforts should be made to preserve these items for the NFA historical archives.

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Validation of the School-Based Agricultural Education Model of Support Instrument

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Research on the needs of school-based agricultural education (SBAE) teachers has been conducted since 1983, driven by historic attrition within the profession, yet we do not have the depth of understanding necessary to provide actionable change to SBAE teachers to empower and support them in their practice. The Conceptual Model of Support for School-Based Agricultural Education Teachers was used to frame this studies purpose of establishing a more human lens to support SBAE teachers. The instrument resulted in five components with 46 items validated through the principal component analysis with .60. Reliability for all 46 items was Cronbach's alpha of .951. Recommendations to evaluate the humanistic needs of in-service SBAE teachers. Additionally, preservice teacher preparation programs should use the instrument to evaluate the SBAE teacher aspirants during their student teaching internship. Future research should consider the current needs of SBAE teachers using the validated instrument to determine opportunities to increase the level of effectiveness and individual wellness of SBAE teachers.

Author Note: This manuscript is based on data published in the Proceedings of the Southern Region Conference of the American Association for Agricultural Education, Marsh et al., (2024).

Introduction and Theoretical Framework

Research on the needs of school-based agricultural education (SBAE) teachers has been conducted since 1983, driven by historic attrition within the profession (DiBenedetto et al., 2018; Eck & Edwards, 2019). Identified needs are recurring, including administrative program tasks, FFA program management, managing student behavior, public relations, supervised agricultural experience (SAE) development/supervision, and technology integration (DiBenedetto et al., 2018). 21st century needs of SBAE teachers continue to develop due to societal pressures and education policy changes, with stress, personal wellness, and work-life balance representing areas of focus in SBAE research due to the overwhelming amount of work, dedication, exorbitant number of tasks as well as the mental, physical, and emotional stress that comes from managing a successful program (Best et al., 2023; Marsh et al., 2023; Phipps et al., 2008; Shoulders et al., 2021).

Leading a balanced life (i.e., personal wellness, boundaries, and work-life balance) is essential for an effective SBAE teacher to maintain job satisfaction and develop necessary career specific human capital (Eck et al., 2020; Marsh et al., 2023). Marsh et al. (2023) found that 21st century programs were faced with support gaps in areas previously identified as an area of need suggesting that previous support and professional development has not resulted in actionable change for supporting the profession. Further complicating their personal wellness and job satisfaction because the support provided only frustrates their needs potentially resulting in burnout (Klassen & Chiu, 2010; Marsh et al., 2023).

Doss et al. (2023) identified six challenges that have historically impacted SBAE teachers' job satisfaction, including classroom activities, SBAE program management, relationships,

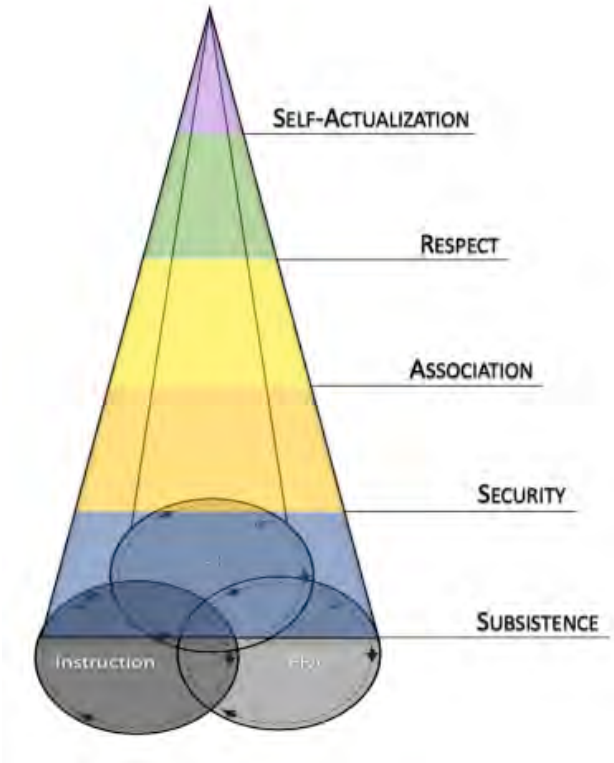
professional development, personal factors, and miscellaneous job responsibilities. SBAE teachers found that miscellaneous job responsibilities like the volume of paperwork, low salaries, school regulations, workload, unsafe workspace, time management, and stress had the most significant challenges to doing their job (Doss et al., 2023). Of these challenges, teacher burnout was the lowest-performing item, significantly negatively influencing SBAE teachers' job satisfaction. Moreover, SBAE teachers' relationships had the most significant positive impact on job satisfaction (Doss et al., 2023). Building a relationship with students in the SBAE program was the highest performing item for positively impacting job satisfaction (Doss et al., 2023).

While both historical reviews have an overlap of themes between SBAE teacher needs and job satisfaction factors, neither truly provides the depth needed for proactive solutions that could improve SBAE teacher needs or satisfaction, but both do make recommendations to further explore and develop teacher preparation and professional development to address these reoccurring issues (DiBenedetto et al., 2018; Doss et al., 2023). This task is elusive because a "one size fits all" approach to career-specific human capital development through training, workshops, or in-service will be ineffective in meeting the needs of all SBAE teachers (Klassen & Chiu, 2010). Perhaps requiring a more human lens to address SBAE teachers' human capital needs to increase personal wellness, effective SBAE teaching practices, increase job satisfaction, and reduce SBAE teacher attrition.

The Conceptual Model of Support for School-Based Agricultural Education Teachers used the Three-Component Model for Agricultural Education (FFA, 2022) as the base of the pyramid due to the interdependency of the Classroom, FFA, and SAE components and the number of overlapping roles of SBAE teachers. Human capital development takes place in each of the Classroom, FFA, and SAE components (depicted as dashed line with arrows in Figure 1) based on the needs of the individual SBAE teacher, considering their teaching effectiveness as well as their personal and professional characteristics (Eck et al., 2019). As SBAE teachers develop their human capital in each of the components (i.e., Classroom, FFA, SAE), they ascend to higher levels of Maslow's Hierarchy for Teachers (Fisher & Royster, 2016), which further develops career-specific human capital and reduces the challenges contributing to SBAE teacher attrition (Doss et al., 2023; Eck et al., 2019; FFA, n.d.; Fisher & Royster, 2016.).

Figure 1

The Conceptual Model of Support for School-Based Agricultural Education Teachers



The conceptual model of support for SBAE has been utilized in teachers' needs research to categorize identified needs as to where they fall within the hierarchy of support (Fisher & Royster, 2016; Marsh et al., 2023). Items categorized as subsistence represent "need(s) for sustaining and supporting SBAE teachers in their daily practice, helping to provide to the ability to survive within the profession." (Marsh et al., 2023, p.126). Items aligning with the level of subsistence within the hierarchy (i.e., *accessibility training, classroom management skills, and support for teacher mental health*) will need to be supported differently to meet SBAE teachers' human needs than items that are aligned at the level of association (i.e., *community support, parent support, and support from school and local administration*). Whereas association needs represent the importance of belonging and the relationships that support and surround SBAE teachers (Doss et al., 2023; Marsh et al., 2023). Evaluating SBAE teachers' human needs and where they align within the model of support can improve how we address human capital development within the profession, promoting their effective SBAE teaching practices (Eck et al., 2020; Marsh et al., 2023). Marsh et al. (2023) found that 14 of the 42 needs identified at subsistence and security represent SBAE teachers' human needs for mental, physical, and emotional wellness, which are essential to maintaining a 21st century program and critical to address before other human capital skills can be developed (Fisher & Royster, 2016; Marsh et al., 2023).

The conceptual model of SBAE teacher support is focused on individual SBAE teacher needs (see Figure 1), Maslow's hierarchy does not describe or account for how school site, community, and external factors that can influence a teacher's effectiveness and practice, such as school district policy, community resources, school culture, and professional support networks. The self-determination theory (SDT) is a motivational theory that describes that individuals have three basic needs for autonomy, competence, and relatedness (Ryan & Deci, 2000). SDT also

provides a rationale that supports how surrounding and external factors can impact, positively or negatively, an SBAE teachers level of effectiveness and individual wellness (Ryan & Deci, 2000). These surrounding and situational factors directly impact the situational and scenarios that SBAE teachers have to navigate daily in the implementation of their professional practice by actively supporting or frustrating an individual's psychological needs. Demonstrating the need for research to evaluate SBAE teachers' needs differently to identify and provide support and resources to mitigate the overwhelming stress and improve retention and recruitment of in-service and pre-service SBAE teachers.

A current limitation of the conceptual model of SBAE teacher support is that needs are conceptually aligned at the lowest potential level within the hierarchy that could be represented instead of participants providing specific insights into where their needs align. As a validated instrument, it could assess an individual's human needs, representing needs within the hierarchy and providing clear insight to meet specific human capital needs of individuals, and is further supported by recommendations of Duncan et al. (2006) to develop a valid instrument for evaluating SBAE teacher's needs to discover Nation trends within the profession. (Fisher & Royster, 2016; Marsh et al., 2023; Maslow, 1943).

Purpose and Objectives

The purpose of this study was to establish a more human lens to support SBAE teachers; the following research objectives guided the study:

1) Determine the Primary Components of an SBAE model of support.
2) Validate the Conceptual Model of Support for SBAE teachers as a potential instrument for evaluating teacher needs.
3) Determine the Internal Consistency Reliability of the Components of the Instrument.

Methods and Procedures

To address the study's three research objectives, a non-experimental survey research design (Privitera, 2020) was employed. A census population of in-service SBAE teachers within region two of NAAE representing seven states, including, Arkansas, Louisiana, Kansas, Colorado, New Mexico, Oklahoma, and Texas (N=3729), were invited to participate in the study (Privitera, 2013). The email frame was developed using existing listservs and frames from the seven state populations represented within region two. The initial email was sent on November 8th personalized by the state, followed by three points of contact to invited SBAE teachers (N=3729) to participate in the study (Dillman et al., 2014). Participants represented a diverse population of personal and professional characteristics, including career tenure, gender, certification pathway, teaching site, program size, program pathways offered in the SBAE program, and community size.

The emails used the Tailored Design Method (Dillman et al., 2014) to ensure timeliness, purpose, university logo, and lead researchers' contact information. The SBAE teachers were contacted by electronic mail to deliver the SBAE teachers model of support by Qualtrics Survey link was sent to 3729 individual addresses by complete email frame personalized by state (Dillman et al., 2014). The instrument was developed using the finding of Doss (2023) and

Marsh (2023) and focused on evaluating the job satisfaction, human capital, and individual human needs of SBAE teachers in an effort to better address attrition and SBAE teachers' support needs.

The 153 items were organized into categories based on seven historic SBAE teacher needs and job satisfaction areas research areas following the recommendation of Dillman (2014). Doss et al. (2023) identified six categories that represented constructs that impacted SBAE teachers' job satisfaction, including classroom factors (40 items), SBAE program management (31 items), relationships (26 items), professional development (9 items), personal factors (10 items), and miscellaneous job responsibilities (19 items) as well as the seventh construct represent Maslow's hierarchy of needs – individual needs (18 items). Classroom factors construct represents characteristics like *classroom management, land lab instruction, keeping student records, and lesson planning* (Boone & Boone, 2009; DiBenedetto et al., 2016; Doss et al., 2023). SBAE program management factors representing *the role of the FFA advisor, training CDE teams, SAE programs, and program planning and prioritization* (Boone & Boone, 2009; DiBenedetto et al., 2016; Doss et al., 2023; Rosser, 2020; Touchstone, 2015). Relationship factors represent interactions between SBAE teachers and others, such as students in the Ag program, the *school secretary, the superintendent, local community members, and assistant principals* (Boone & Boone, 2009; Doss et al., 2023; Fisher & Royster, 2016; Marsh et al., 2023; Rosser, 2020; Touchstone, 2015). The professional development construct factors include *state professional organizations, clear policies and procedures, life-long learner, and purposeful professional development* (Boone & Boone, 2009; Doss et al., 2023; Eck et al., 2020; Marsh et al., 2023). Personal factors construct includes *health (mental, physical, and emotional), work and home life balance, and teacher motivation* (Boone & Boone, 2009; Clark et al., 2014; Doss et al., 2023; Maslow, 1943; Marsh et al., 2023). Miscellaneous factors represented in the construct include *organizational skills, manage stress, complete paperwork, identify burnout* (Boone & Boone, 2009; DiBenedetto et al., 2016; Doss et al., 2023; Marsh et al., 2023; Touchstone, 2015). Maslow's Hierarchy – Individual needs construct includes *rest, balanced nutrition, the ability to ask for help, and the ability to navigate life crises* (Fisher & Royster, 2016; Maslow, 1943; Marsh et al., 2023).

To address research objectives 1 and 2, a Principal Component Analysis (PCA) was utilized to reduce the number of items in the instrument to a smaller dataset of related items (Costello & Osborne, 2005). The initial analysis of all 153 items used PCA with a Varimax rotation which was developed by Kaiser (1958) and was chosen with the assumption that the seven components are correlated due to relation with SBAE teacher needs (Doss et al., 2021). An orthogonal rotation was needed, so the Varimax rotation was utilized (Field, 2013). The Kaiser-Meyer-Olkin (KMO) was used to measure sampling adequacy, with the minimum accepted value of 0.6 and the ideal value of 1.0, to evaluate the beginning output (Beavers et al., 2013). Eigenvalues greater than 1.0 are components to be retained and then evaluated through parrel analysis. Any values greater than the parallel analysis are to be retained and used as components for the reduced data set. Parallel analysis is a "recommended procedure for deciding on the number of components involv[ing] extracting eigenvalues from random data sets that parallel the actual data set with regard to the number of cases and variables" (O'Connor, 2000, p. 397).

"The validity of a measurement is the extent to which a measurement for a variable or construct measures what it is purported or intended to measure" (Privitera, 2017, p. 113). The reduction of items using PCA resulted in a valid instrument that was also evaluated for content and face validity during the instrument development process (Field, 2013; Privitera, 2017). A Cronbach's alpha was used to establish the measure for reliability for the complete Model of Support for SBAE Teachers instrument (Privitera, 2017) per the third research objective.

Findings

Research Objective 1: Determine the Primary Components of an SBAE model of support

To address research objective one: Determine the primary components for the SBAE model of support instrument, the 153-item instrument (see Table 1) was analyzed to determine the primary components to reduce the model of support for SBAE instrument using PCA. The KMO measure of sampling adequacy equaled 0.774, which is within the accepted range according to Cerny and Kaiser (1977). The initial PCA resulted in 34 components loading above a 1.0 eigenvalue. The resulting parallel analysis found eight factors loading above the output, which accounts for 51.84 percent of the variance found. Data were re-analyzed (PCA with Varimax rotation), fitting the 153 items with the eight components. The component and communality loadings of the rotated matrix of all 153 items were analyzed to determine that 54 items were to be retained from Varimax-rotated PCA. Items were fixed to eight components based on loadings of 0.6 or higher in at least one component area. The 99 items not retained include identified need statements related to *managing paperwork, managing instructional time, maintaining student records, developing a program budget, lesson planning, relationships with CTE directors, relationships with university faculty in Agricultural Education, relationships with the State FFA Association, managing lab/facilities, develop curriculum, used new technology, and engage in professional organizations.* The 54 retained items were then re-analyzed using an additional PCA to verify the number of components using the reduced dataset. The analysis resulted in a KMO measure of 0.912. Six components resulted in eigenvalues about parallel analysis, demonstrating the need to re-analyze the PCA with a Varimax rotation while limiting items to fit within six components. The component loadings and communalities of the rotated matrix were analyzed using a Varimax rotation of the retained 54 items to develop the final component structure of items resulting from the six components (see Table 2).

Table 1

Retained PCA Component Loadings and Communalities (54 items, n =303)

Items	1	2	3	4	5	6	Communality
~~R_5~~					~~.535~~		~~.384~~
~~R_8~~			~~.528~~				~~.480~~
R_9					.899		.856
R_10			.629				.545
R_12			.669				.489
R_16			.824				.733

R_19				.887		.834
R_21			.762			.710
R_22			.851			.778
R_23			.836			.779
R_24			.652			.542
C_1				.666		.625
C_3				.746		.651
C_12				.676		.646
~~C_23~~				.~~590~~		.~~500~~
C_25				.660		.560
C_28				.656		.586
P_1		.726				.611
P_2		.678				.505
P_3		.720				.620
P_4		.715				.586
P_6		.806				.719
P_7		.766				.650
P_8		.725				.727
P_9		.765				.648
P_11		.760				.664
P_12		.695				.687
P_14		.801				.727
P_15		.769				.664
P_18		.679				.552
P_20		.670				.586
P_28		.620				.573
M_5	.652					.540
M_15	.750					.684
~~PR_4~~					.~~581~~	.~~426~~
~~PR_9~~					.~~546~~	.~~528~~
PE_1	.841					.750
PE_2	.688					.563
PE_3	.808					.729
PE_4	.679					.523
PE_5	.677					.565
PE_7	.849					.777
PE_8	.831					.752
PE_10	.651					.531
MH_1	.743					.581
MH_2	.810					.684
MH_3	.749					.606
MH_4	.756					.614
MH_5	.779					.652
MH_7	.666					.574
~~MH_8~~	.~~586~~					.~~444~~
MH_10	.795					.673

~~MH_15~~	~~.308~~	~~.362~~			~~.449~~
~~MH_16~~	~~.351~~	~~.321~~		~~.523~~	~~.532~~

Note. Factor loading below .300 are not displayed; Extraction values are based on communalities; R = Relationships, C = Classroom/Instruction, P = Program factors, M = Miscellaneous factors, PR = Professional factors, P = Personal factors, MH = Maslow's Hierarchy – Individual needs. Items with a strikethrough were not retained.

The PCA fit to 6 components resulted in 46 (of 54) items loading at or above a 6.0, explaining 58.7% of the variance in the dataset. The five components are outlined in Table 3, with the corresponding and updated item numbers to represent the SBAE model of support instrument. One construct and eight items did not fit the six-construct model, including *managing relationships with other teachers*, *appreciation of individual differences*, *purposeful professional development*, and *the ability to ask others for help*.

Table 2

Emerging Components and Retained Items (46 items)

Component Title	Item	Corresponding Item Description
1. Personal Needs (Safety and Security)	P_1	Ability to take care of yourself
	P_2	Manage stress
	P_3	Health (mental, physical, and emotional)
	P_4	Change in family dynamics
	P_5	Work and home life balance
	P_6	Death of a relative or close friend
	P_7	Financial loss
	P_8	Emotional health support
	P_9	Support for teacher mental health
	P_10	Teacher motivation
	P_11	Rest
	P_12	Balanced nutrition
	P_13	Exercise and physical activity
	P_14	Body function is regulated
	P_15	Good general health
	P_16	Established a routine
	P_17	I can cope with stress/anxiety in healthy ways
2. Intracurricular Program Needs	I_1	Role as the FFA advisor
	I_2	Managing the FFA chapter
	I_3	Managing the total Agricultural Education program
	I_4	Attending fairs/showing/exhibitions

Component Title	Item	Corresponding Item Description
	I_5	Training CDE teams
	I_6	Being competitive in CDEs
	I_7	Livestock and project center management
	I_8	Training LDE teams
	I_9	Being competitive in LDEs
	I_10	Being competitive with livestock projects
	I_11	SAE programs
	I_12	SAE visits
	I_13	Fundraising for FFA activities
	I_14	FFA award applications
	I_15	Resources for awarding and recognizing SAEs
3. Relationship Needs within School and Community	R_1	Relationship with principal
	R_2	Relationship with transportation director
	R_3	Relationship with superintendent
	R_4	Relationship with school board
	R_5	Competence of superintendent
	R_6	Competence of school board
	R_7	Competence of counselors
4. Classroom/Instructional Needs	C_1	Teach effectively
	C_2	Ability to use different teaching methods and strategies
	C_3	Engaging students in critical thinking activities
	C_4	Standards alignment
	C_ 5	Amount of time allotted for preparation
5. School-Based Support Needs	S_1	Relationship with assistant principals
	S_2	Competence of assistant principals

Note. P = Personal Needs, I = Intracurricular Needs, R = Relationship Needs, C = Classroom/Instructional Needs, and S = School-Based Support Needs. The numbers presented in this table will be used from this point forward.

Research Objective 2: Validation of the SBAE Model of Support Instrument

The instrument resulted in 5 components representing 46 items. All 46 items loaded at a value greater than .60 (Guadagonli & Velicer, 1988), and their communalities meet an acceptable level, according to Hair et al. (2010). The original instrument represented 153 items compiled from different validated studies Doss et al. (2023), representing 132 items having content validity and face validity, and Marsh et al. (2023), representing a validated list of 42 items. Using the consent comparative method, duplicative items from both studies were removed to create the

comprehensive original 153 items (Creswell & Poth, 2018). The resulting 46 items are considered valid based on the PCA results measuring the component (Privitera, 2017) of the model of support for SBAE. In addition to the validity of the previously developed items, a reliability estimate based on 46 items resulted in an acceptable Cronbach's alpha of .951 (Nunnally, 1978). We evaluated the deletion of any item that may have increased the total Cronbach's alpha score. After analysis of the item-total statistics, it was determined that the removal of any item would decrease the total Cronbach's alpha level instead of increasing it, resulting in the retention of all 46 items as part of the valid model of support instrument for SBAE teachers.

Research Objective 3: Determine the Internal Consistency Reliability of the Components of the Instrument

The 46-item instrument was deemed valid through a PCA loading on five components, with Cronbach's alpha of .951, reliability estimations were analyzed for the corresponding items within each of the five components. The first component, identifying Personal Needs depicting individuals' *subsistent* and *safety* needs, is a combination of 17 items, resulting in a Cronbach's alpha of .958. It was determined that the removal of any of the 17 items would result in a decreased Cronbach's alpha of the first component, leading to all items being retained. The 17 items have substantial positive correlations (Davis, 1971), demonstrating interrelated items measuring the Personal Needs component (Field, 2013). The second component, Intracurricular Program Needs, depicted program-specific needs related to FFA and SAE, two of three components of the comprehensive model of agricultural education (FFA, n.d.) are represented in the 15 validated items, resulting in a Cronbach's alpha of .945. It was determined that the removal of any of the 15 items would result in a decreased Cronbach's alpha of the second component, leading to all items being retained. The 15 items have substantial positive correlations (Davis, 1971), demonstrating interrelated items measuring the Intracurricular Program Needs component (Field, 2013).

The third component included the significant relationship needs surrounding the school and community, identifying seven items regarding relationships with and the competence of individuals who serve in support roles within proximity of the SBAE program with a Cronbach's alpha of .903. The removal of an item would reduce the Cronbach alpha for the instrument. The seven items have substantial positive correlations (Davis, 1971), demonstrating a measure of interrelated items, all items were retained. The fourth component included Classroom/Instruction Needs, which resulted in Cronbach's alpha of .827 for the 5 validated items. The detection of any item would result in a reduction of Cronbach's alpha, so all items were retained. The five items have a moderate to very strong positive correlation (Davis, 1971). The fifth component, School-Based Support Needs, included two items with a Cronbach alpha of .510. Thus falling below the *acceptable* threshold of .70 or greater (Nunnally, 1978). Eisinga et al. (2013) suggest that coefficient alpha for a two-item scale is not a meaningful measure and recommends reporting the Spearman-Brown reliability indicator. The Spearman-Brown estimate resulted in .510 for the two items, but the deletion of the two items would reduce the overall 46-item instrument reliability with a Cronbach's alpha of .951. Leading researchers to retain two items even through two-item scales are problematic (Yan & Green, 2011).

Conclusions and Recommendations

The study validated the SBAE model of support instrument. Through the PCA, the instrument was effectively reduced from 153 items and seven components to a valid 46-item, five component instrument through the findings of this study. The five components found during the analysis include Personal Needs, Intracurricular Program Needs, Relationship Needs, Classroom/Instructional Needs, and School-Based Support Needs. Six of the seven original components are represented in the final five component validated instrument, losing items, and constructs related to professionalism. School-Based Support emerged as its own component, demonstrating a difference in item performance in items that referred to relationships and competence of assistant principals versus relationships and competencies of others who serve in support roles within proximity of the SBAE program. Perhaps this is due to the administrative tasks of assistant principals who manage and engage with SBAE teachers more directly. Originally, within the relationship construct at the start of the analysis, findings suggest that there is a greater distinction between SBAE teachers' relationship and engagement with school assistant principals than that with other school-based facilities and staff.

The five components contain 46 items, which were validated as a complete instrument with an acceptable Cronbach's alpha of .951 (Nunnally, 1978) as well as establishing the reliability of the instrument through an individual analysis of each of the five components. All of these resulted in a moderate to very strong correlation between the items (Davis, 1971) each possessing acceptable Cronbach's alpha (Nunnally, 1978). Determining that the deletion of items would reduce the overall Cronbach's alpha of the instrument opting to retain all 46 items representing the complete and validated model of support instrument for SBAE.

The Personal Needs component represented the greatest amount of retained items merged from personal factors and Maslow's hierarchy of original constructs that represent human psychological needs for subsistence and safety as an individual and within the profession, aligning with the conceptual Model of Support for SBAE suggesting that SBAE teachers' basic human needs are not satisfied but more frustrated within the profession (Deci & Ryan, 2000; Fisher & Royster, 2016; Marsh et al., 2023). Further depicted by the items retained, such as *managing stress, I am able to take care of myself*, *maintain my health (mental, physical, and emotional),* and *I can cope with stress/anxiety in healthy ways.* Intracurricular needs were the second largest retained component, representing a plethora of tasks related to program planning, FFA advisement, competitive events, and SAE management.

While the Classroom/Instruction component was reduced to five items, the items are closely related to historical SBAE needs, potentially depicting the need to change tactics to support teachers in meeting these needs and aligning to the SBAE effective teaching instrument (Eck et al., 2019) representing the human capital skills needed to be effective.

It is recommended that the SBAE model of support instrument be used by stakeholders (i.e., administration, state staff, and teacher mentors) to continually evaluate the humanistic needs of in-service SBAE teachers. Additionally, preservice teacher preparation programs should use the instrument to evaluate the SBAE teacher aspirants during their student teaching internship. Future research should consider the current needs of SBAE teachers using the validated

instrument to determine opportunities to increase the level of effectiveness and individual wellness of SBAE teachers (Ryan & Deci, 2000). Perhaps such implementation could improve work-life balance and job satisfaction by helping SBAE teachers manage a successful program (Marsh et al., 2023; Phipps et al., 2008; Shoulders et al., 2021).

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Tasks Associated with Teaching School-Based Agricultural Education: Advising an FFA Chapter

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School-Based Agricultural Education (SBAE) teachers are expected to complete a variety of tasks related to their profession. These tasks are associated with a wide range of roles, responsibilities, and functions. One such area in which teachers are expected to complete tasks is advising an FFA chapter. Although the general tasks associated with teaching SBAE can be inferred from teacher needs, challenges, and characteristics of effective teachers, literature is scarce regarding specific tasks SBAE teachers are expected to complete. The purpose of this study was to identify tasks SBAE teachers are expected to perform in association with advising an FFA chapter. A three-round modified Delphi approach was used to meet the study's objective. The Delphi panel of experts was composed of doctoral students in agricultural education across the nation with at least three years of SBAE teaching experience. The panel identified 80 tasks in 12 themes that achieved consensus related to advising an FFA chapter. These tasks indicate SBAE teachers are competitive in FFA events, manage administrative tasks related to the chapter, and are engaged with the local community regarding public relations for the chapter. These findings have implications for teacher preparation programs and in-service teacher professional development offerings.

Author's Note: This manuscript is based on data published in the proceedings for the Southern AAAE Research Conference, Best et al., (2024).

Introduction

School-based agricultural education (SBAE) teachers are expected to complete a variety of tasks related to their profession (Traini et al., 2021). These tasks are associated with a wide range of roles, responsibilities, and functions (Phipps et al., 2008; Talbert et al., 2014, Terry & Briers, 2010). As such, these tasks can be inferred from literature related to needs of teachers (DiBenedetto et al., 2018; Roberts et al., 2020), challenges faced by teachers (Boone & Boone, 2007, 2009), and characteristics of effective teachers (Eck et al., 2019; Roberts & Dyer, 2004). The mixture of expectations associated with these tasks create a complex system in which teachers are expected to operate (Haddad et al., 2022; Traini et al., 2021). This complexity and the resulting expectations placed on SBAE teachers can lead to them choosing to vacate the profession altogether (Lemons et al., 2015; Solomonson & Retallick, 2018). A role in which teachers are expected to perform job-specific tasks is advising the FFA chapter affiliated with their SBAE program.

FFA is a "dynamic youth organization that changes lives and prepares members for premier leadership, personal growth and career success through agricultural education" (National FFA Organization, 2023, para. 1). FFA is structured into three levels: local chapters, state

associations, and the National FFA Organization, which offers students opportunities for success and recognition at each level (National FFA Organization, 2023). FFA serves as an intracurricular student organization intended to promote the application of skills acquired through classroom and laboratory instruction and students' Supervised Agricultural Experiences (SAE) (Hughes & Barrick, 1993). The organization provides opportunities for students to demonstrate their skills through career and leadership development events (CDEs and LDEs), agriscience fairs, proficiency and star awards, achievement of degrees, and chapter-based award programs (National FFA Organization, 2023). These opportunities emerge through competitive events, conventions, and conferences, which serve as motivation for students to learn (Jones & Edwards, 2019). These opportunities are key given SBAE teachers are advisors of local FFA chapters and facilitate activities associated with operating effective local organizations (Phipps et al., 2008).

SBAE teachers are expected to inform students of FFA activities and provide opportunities for student engagement (Smalley & Rank, 2019). Activities include FFA meetings, CDEs, LDEs, chapter banquets, conventions, officer elections, and agriscience fair participation (Doss & Rayfield, 2021). Managing a comprehensive SBAE program that adequately provides opportunities for students in these areas may increase teacher workload, which often leads to stress (Torres et al., 2009). Moreover, SBAE teachers may find it difficult to manage expectations related to their profession while balancing obligations in their personal lives (Murray et al., 2011; Sorensen & McKim, 2014; Sorensen et al., 2016). Considering the impact of teacher workload on recruitment and retention of qualified SBAE teachers (Torres, 2008), as well as teacher stress (Theiman et al., 2012), burnout (Kitchel et al., 2012), satisfaction (Chenevey et al., 2008), and efficacy (McKim & Velez, 2016), identifying the specific tasks related to teaching SBAE would delineate the workload of teachers and could have significant implications for the profession. Moreover, such identification the tasks expected of SBAE teachers could potentially impact teacher preparation programs and better inform aspiring SBAE teachers of expectations of the job, allowing them to determine whether it is the correct professional fit for them.

Theoretical Framework

The human capital (HC) theory undergirded the study. HC includes the knowledge, skills, training, experiences, and education individuals acquire and invest in themselves over time to improve their employability and success therein (Becker, 1964; Little, 2003; Shultz, 1971; Smith, 2010; Smylie, 1996). An important aspect of HC involves the employability resulting from individuals' investments in themselves and their skillsets to perform certain expectations of a job based on their education, training, skills, and experiences (Becker, 1964). Therefore, "as people increase their human capital, they become more employable . . ." (Robinson & Baker, 2013, p. 152). To this end, Smith (2010) found individuals tend to acquire specialized skills as they move toward work they prefer, giving rise to "sector-specific" (p. 42) skills that complement natural talent and occupational abilities. Moreover, Heckman (2000) maintained individuals' job performances are enhanced by the acquisition and development of such skills. Increased job performance, because of enhanced HC, is associated with improved results for employers (Lepak & Snell, 1999). As such, HC can be used to explain the roles and responsibilities of teachers and their value within their schools (Smylie, 1996). In addition, HC

can be used to describe *job-specific tasks* and the value placed on such (Autor & Handel, 2013). Autor et al. (2003) found jobs can be classified by the main tasks expected to be completed by workers, and the value of the skills required to perform those tasks can and should be assessed.

Purpose

Research indicates all jobs require both general and specific tasks (Smith, 2010). This is especially true in the profession of teaching SBAE (Torres et al., 2008; 2009). Such general tasks include excessive paperwork, working overtime, and meeting deadlines, which can be sources of stress for teachers (Torres et al., 2009). In contrast, identifying specific tasks required of SBAE teachers is a difficult undertaking. Although the tasks of teaching SBAE can be inferred from the above-mentioned professional needs, challenges, and characteristics, limited literature exists detailing the *specific* tasks SBAE teachers are expected to perform, especially in association with FFA. Identifying a comprehensive list of these tasks would offer insight into the daily demands of the profession and provide direction for future research in the field. To better understand the demands placed on SBAE teachers in the form of workload. Traini et al. (2021) recommended the development of a "flexible position description of the agriculture teaching job detailing tasks that are expected as well as those that are not expected" (p. 179). Therefore, the purpose and objective of this study was to identify the tasks SBAE teachers are expected to perform regarding advising an FFA chapter.

Methods

This study was a part of a larger investigation (Best, 2023). The study's purpose focused on specific findings related to tasks associated with FFA advisement expected while teaching SBAE. The methods of the larger study are presented here. A modified Delphi method was used to meet the objective of the study. This method is considered a multiple-round approach to collecting data in which "three iterations are often sufficient to collect the needed information and to reach a consensus in most cases" (Hsu & Sandford, 2007, p. 2).

Stitt-Gohdes and Crews (2004) stressed selection of the panel of experts is among the most crucial aspects of the Delphi method and should include those ". . . who are knowledgeable about current information and perceptions regarding the topic under investigation but are open-minded to the findings" (pp. 60–61). Therefore, the frame for this study consisted of doctoral students in agricultural education identified by department heads of agricultural education academic units across the United States. As recent, former, or current SBAE teachers, this population was identified as an appropriate group of potential Delphi panelists due to their knowledge of and competence in SBAE as well as their desire to pursue a terminal professional degree in the field. Potential panelists were deemed qualified to participate in the study based on the following criteria: (a) currently enrolled in a doctoral program (Ph.D. or Ed.D.) in agricultural education with aspirations of joining the professoriate or pursuing an advanced leadership position; (b) former or current SBAE teachers with a minimum of three years of SBAE teaching experience; and (c) "highly trained and competent within the specialized area of knowledge" (Hsu & Sandford, 2007, p. 3), i.e., SBAE.

On September 13, 2022, an electronic message was sent to department heads of 22 agricultural education programs offering a doctoral degree requesting the names and email addresses of students enrolled in their doctoral programs. Of those, 13 (59.09%) responded, identifying a total frame of 40 doctoral students as potential Delphi panelists meeting the criteria for the study. Subsequent electronic messages were sent to panelists for each round with a link embedded to respective instruments requesting their participation in the study following the Tailored Design Method (Dillman et al., 2014). In all, 23 (57.50%) of the initial 40 potential panelists responded to Round 1. Therefore, the 23 respondents were considered the panel of experts for the study. Twenty-two (95.65%) expert panelists responded to Round 2, and 20 (86.96%) expert panelists responded to Round 3.

The instruments used in this study were evaluated for face and content validity by a group of eight experts considered knowledgeable of social science research and SBAE (Gay et al., 2006). These eight included six teacher educators in agricultural education, one statistician who specialized in survey research and instrument design, and one graduate student who was a former SBAE teacher seeking an advanced degree in agricultural education at [university]. Reliability in Delphi studies is dependent on maintaining a certain threshold of participants throughout the study's duration. Dalkey et al. (1972) indicated 13 responses are needed to establish a reliability coefficient of .90 in Delphi studies. Because the response rates of this study exceeded 13 participants per round, and because each round was comprised of the same participants who responded to the three separate instruments, the study's results are assumed to be reliable (Dalkey et al., 1972).

The initial electronic message was sent to the 40 identified potential panelists on September 29, 2022, describing the study and inviting them to participate. A Qualtrics survey link to the Round 1 instrument was sent to panelists containing questions pertaining to the personal and professional characteristics of the panelists as well as the following open-ended question: *What tasks are associated with the roles and responsibilities of a SBAE teacher regarding FFA advisement in a typical year?* Panelists were asked to provide as many responses as they deemed appropriate to answer this question. The tasks identified by panelists in Round 1 were analyzed using the constant comparison procedure, and duplicated responses were eliminated (Creswell & Guetterman, 2019).

Round 2 of the Delphi study sought to establish consensus of agreement among panelists (Barrios et al., 2021). An electronic message was sent to the 23 panelists responding to Round 1 on November 22, 2022, with a Qualtrics survey link to the Round 2 instrument. Tasks identified in Round 1 were presented to panelists to assess their perceived level of agreement for each task. Panelists were asked to indicate their level of agreement using a four-point agreement scale (*1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree*). An 80.00% level of agreement was required to reach consensus, i.e., tasks receiving a score of 3 or 4 by 80.00% of panelists, were retained as tasks achieving consensus of agreement (Diamond et al., 2014). Tasks achieving 51.00% to 79.99% agreement were retained for use in Round 3. Tasks achieving less than 51.00% agreement among panelists were considered to have not reached consensus of agreement and were removed from the study.

Round 3 of the study sought to refine consensus of agreement among panelists (Brady, 2015). An electronic message was sent to the 22 panelists responding to Round 2 of the study on December 12, 2022, with a Qualtrics survey link to the Round 3 instrument. Tasks identified in Round 2 as achieving a level of agreement from 51.00% to 79.99% were again presented to the panelists to further develop consensus of agreement (Buriak & Shinn, 1989). Panelists were asked to indicate whether they agreed the task should be included by selecting either *1* for *No* or *2* for *Yes*. The 80.00% level of agreement identified *a priori* also was used for Round 3 analysis. Tasks receiving this level of agreement were considered to have reached consensus of agreement among panelists and included in the final list of tasks associated with advising an FFA chapter. Tasks achieving a level of agreement of less than 80.00% failed to reach consensus of agreement and were removed from the study. Tasks achieving the 80.00% level of agreement in Round 2 and Round 3 were combined to form a final list of tasks. For each of the three rounds of the Delphi, statistical feedback was reported per the suggestion of Sackman (1974) who indicated that modes of central tendency and a measure of dispersion (standard deviation) should be included when reporting the findings of a conventional Delphi study.

Findings

Description of the Delphi Panel of Experts

The panel consisted of experts having taught in 16 different states in SBAE programs ranging from 45 to 700 students enrolled with approximately one-half of the respondents teaching 150 or fewer students. Nine (39.13%) panelists were male, and 14 (60.87%) were female. Twenty-one panelists (91.30%) were white, and 22 (95.65%) were not Hispanic or Latino. Five (22.00%) were currently teaching SBAE, and 21 (91.30%) had taught SBAE in the past four years. The average number of years of experience teaching SBAE was 8.39 years (range of 3 to 21 years). More than 95% ($f = 22$) were traditionally certified. Sixteen respondents (69.56%) were from 25 to 35 years of age. Thirteen panelists (56.52%) taught in communities with a population of fewer than 10,000 people.

Round 1

Panelists identified 296 original tasks associated with the roles and responsibilities of a SBAE teacher associated with FFA advisement in a typical year. Duplicated tasks were removed, and 99 tasks in 13 themes remained for consideration in Round 2. Themes identified in Round 1 included Advisor Expectations ($f = 6$), Awards and Applications ($f = 9$), Chapter Advisement ($f = 27$), Clerical Work ($f = 19$), Community Engagement ($f = 11$), Competitive Student Events ($f = 6$), Fundraising ($f = 2$), Hospitality ($f = 1$), Student Conventions, Conferences, and Camps ($f = 5$), Student Recognition ($f = 3$), Student Relations ($f = 3$), Student Transportation ($f = 2$), and Supervised Agricultural Experiences ($f = 5$). In corresponding order to the above-mentioned themes, the most common tasks for each theme included: serve on various FFA committees ($f = 2$, 0.68%), assist students in developing proficiency award applications ($f = 8$, 2.70%), develop chapter program of activities ($f = 15$, 5.07%), plan chapter trips ($f = 9$, 3.04%), manage alumni relations ($f = 5$, 1.69%), prepare students for career and leadership development events ($f = 28$, 9.46%), raise funds for FFA chapter ($f = 14$, 4.73%), cook food for FFA events ($f = 2$, 0.68%), plan trip to FFA convention ($f = 4$, 1.35%), plan FFA chapter banquet ($f = 8$, 2.70%), serve as

mentor for FFA chapter members (*f* = 1, 0.34%), transport students to FFA events (*f* = 9, 3.04%), and assist students in keeping records (*f* = 3, 1.01%).

Round 2

In Round 2, panelists reached consensus of agreement for 70 of the 99 tasks (77.8%) associated with teaching SBAE associated with FFA advisement. Of the tasks achieving consensus of agreement, 29 reached 100.00% agreement among panelists. Examples of tasks with the highest mean scores by theme as indicated above include: attend professional development (*M* = 3.68, *SD* = 0.48), assist students in developing state degree applications (*M* = 3.59, *SD* = 0.50), attend chapter meetings (*M* = 3.64, *SD* = 0.49), register students for events/contests (*M* = 3.73, *SD* = 0.46), establish program culture in school/community (*M* = 3.73, *SD* = 0.46), prepare students for career and leadership development events (*M* = 3.73, *SD* = 0.46), manage funds for FFA chapter (*M* = 3.64, *SD* = 0.49), cook food for FFA events (*M* = 2.45, *SD* = 1.01), attend agricultural education teacher meetings (*M* = 3.73, *SD* = 0.46), facilitate award recognition for FFA success (*M* = 3.41, *SD* = 0.59), serve as mentor for FFA chapter members (*M* = 3.59, *SD* = 0.50), supervise students on away FFA trips (*M* = 3.68, *SD* = 0.48), and assist students in keeping records (*M* = 3.55, *SD* = 0.51). Twenty-four statements reached a level of agreement between 51.00% and 79.99% and advanced to Round 3 for consideration by the panelists. Five tasks failed to reach at least 51.00% agreement and were eliminated from the study. Table 1 displays the results of Round 2.

Table 1

Consensus of Agreement for Tasks Identified by Delphi Panelists in Response to the Question, "What tasks are associated with the roles and responsibilities of a school-based agricultural education teacher regarding FFA advisement in a typical year?" (N = 22)

Tasks	*M*	*SD*	% Agreement
Advisor Expectations			
Attend professional development	3.68	0.48	100.00
Participate in professional organizations (i.e., NAAE and state agricultural education teacher associations)	3.55	0.60	95.45
Attend state FFA degree review	3.27	0.77	81.82
Serve on various FFA committees	3.05	0.84	77.27[a]
Host FFA contests	2.68	1.04	63.64[a]
Judge FFA contests	2.50	1.06	54.55[a]
Awards and Applications			
Assist students in developing state degree applications	3.59	0.50	100.00
Assist students in applying for scholarships	3.59	0.59	95.45
Motivate students to apply for awards	3.59	0.73	95.45
Assist students in developing American degree applications	3.55	0.60	95.45
Assist students in developing chapter degree applications	3.45	0.74	95.45

Assist students in developing proficiency award applications	3.45	0.80	90.91
Edit student award applications	3.23	0.75	90.91
Assist students in developing National Chapter award applications	3.27	0.94	86.36
Assist students in developing star award applications	3.18	0.85	81.82
Chapter Advisement			
Attend chapter meetings	3.64	0.49	100.00
Manage FFA officer team	3.59	0.50	100.00
Motivate students to participate in FFA activities	3.59	0.50	100.00
Serve as FFA advisor	3.59	0.50	100.00
Assist FFA officer team with meetings	3.50	0.51	100.00
Plan chapter officer retreat	3.50	0.51	100.00
Promote FFA Chapter	3.50	0.51	100.00
Recruit future FFA members	3.45	0.51	100.00
Provide leadership training for chapter officers	3.59	0.59	95.45
Oversee the election of FFA chapter officer team	3.45	0.60	95.45
Provide leadership training for chapter members	3.41	0.67	90.91
Conduct annual review of FFA chapter	3.23	0.75	90.91
Provide retention activities for FFA members	3.23	0.75	90.91
Delegate chapter tasks to members	3.41	0.73	86.36
Budget for chapter Program of Activities	3.32	0.72	86.36
Manage FFA official dress materials	3.27	0.70	86.36
Resolve conflicts between FFA members	3.14	0.64	86.36
Organize FFA officer meetings	3.14	0.71	81.82
Teach FFA unit to all freshmen	3.23	1.11	77.27[a]
Plan FFA events	3.00	0.82	77.27[a]
Manage service projects	2.95	0.84	72.73[a]
Develop chapter Program of Activities	2.91	0.81	72.73[a]
Manage student-teacher relationships regarding missing classwork	2.86	0.89	72.73[a]
Organize chapter meetings	2.86	0.89	72.73[a]
Coordinate chapter chaos	2.86	1.21	68.18[a]
Provide agricultural literacy events	2.86	1.04	68.18[a]
Serve as FFA advisor above chapter level	2.50	0.91	50.00[b]
Clerical Work			
Register students for events/contests	3.73	0.46	100.00
Book lodging for chapter events	3.68	0.48	100.00
Plan chapter trips (i.e., field trips, competitions, camps, and conferences)	3.68	0.48	100.00
Complete required school-wide paperwork (i.e., travel requests, POs, and annual reports)	3.64	0.49	100.00
Complete state/national mandated paperwork	3.64	0.49	100.00
Gain school/administration support/approval	3.64	0.49	100.00

Write letters of recommendation	3.50	0.51	100.00
Complete the chapter roster along with dues/fees	3.64	0.58	95.45
Secure transportation for organizational events	3.59	0.59	95.45
Purchase supplies/materials for chapter events and activities	3.55	0.60	95.45
Submit student contest materials (i.e., ag issues portfolio, statements of originality, and agriscience fair reports)	3.41	0.67	90.91
Monitor student grades for eligibility to leave school	3.32	0.72	86.36
Recruit volunteers to work FFA events	3.18	0.66	86.36
Work with program report forms	3.18	0.85	81.82
Plan meetings	2.91	0.81	81.82
Establish a charter for the FFA chapter	3.00	0.82	77.27[a]
Complete entries for livestock exhibition	2.55	1.10	54.55[a]
Complete nominations for livestock exhibition	2.36	1.09	45.45[b]
Develop chapter newsletter	2.27	0.63	27.27[b]
Community Engagement			
Establish program culture in school/community	3.73	0.46	100.00
Engage with local community	3.64	0.49	100.00
Communicate with students' parents/guardians	3.50	0.51	100.00
Communicate with FFA alumni/supporters	3.45	0.51	100.00
Foster connections in local community	3.64	0.58	95.45
Advertise FFA activities to the community	3.36	0.58	95.45
Manage alumni relations	3.18	0.91	77.27[a]
Volunteer for community service activities	2.86	0.77	72.73[a]
Serve as booster club liaison	2.73	0.88	63.64[a]
Delegate program management to alumni	2.55	1.01	54.55[a]
Plan fall community gatherings	2.45	0.91	45.45[b]
Competitive Student Events			
Prepare students for Career and Leadership Development Events (i.e., CDEs, LDEs, Speaking, and Agriscience)	3.73	0.46	100.00
Set up materials for Career and Leadership Development Event (i.e., CDEs, LDEs, Speaking, and Agriscience) practices	3.59	0.50	100.00
Attend Career and Leadership Development Events (i.e., CDEs, LDEs, Speaking, and Agriscience)	3.64	0.58	95.45
Assess Career and Leadership Development Event (i.e., CDEs, LDEs, Speaking, and Agriscience) skill development	3.55	0.60	95.45
Identify volunteers to prepare students for Career and Leadership Development Events (i.e., CDEs, LDEs, Speaking, and Agriscience)	3.32	0.72	86.36

Select members to participate in Career and Leadership Development Events (i.e., CDEs, LDEs, Speaking, and Agriscience)	3.32	0.89	81.82
Fundraising			
Manage funds for FFA chapter	3.64	0.49	100.00
Raise funds for FFA chapter	3.36	0.73	86.36
Hospitality			
Cook food for FFA events	2.45	1.01	54.55[a]
Student Conventions, Conferences, and Camps			
Attend agricultural education teacher meetings (i.e., district, area, state, and national)	3.73	0.46	100.00
Plan trip to FFA convention (i.e., district, area, state, and national)	3.64	0.49	100.00
Attend FFA convention (i.e., district, area, state, and national)	3.55	0.74	95.45
Attend FFA camp (i.e., district, area, state, and national)	3.18	0.96	81.82
Attend FFA student conferences (i.e., WLC, COLT, MFE, ALD, and New Century Farmer)	2.95	1.00	77.27[a]
Student Recognition			
Facilitate award recognition for FFA success	3.41	0.59	95.45
Plan FFA chapter banquet	3.27	0.70	86.36
Plan FFA degree ceremonies	3.14	0.89	77.27[a]
Student Relations			
Serve as mentor for FFA chapter members	3.59	0.50	100.00
Serve as counselor for FFA chapter members	3.09	0.92	72.73[a]
Serve as parent for FFA chapter members	2.41	1.10	50.00[b]
Student Transportation			
Supervise students on away FFA trips	3.68	0.48	100.00
Transport students to FFA events	3.45	0.80	90.91
Supervised Agricultural Experiences			
Assist students in keeping records	3.55	0.51	100.00
Visit student SAE projects	3.36	0.85	86.36
Apply for National FFA Service-Learning Grants	2.91	0.87	68.18[a]
Supervise students at livestock shows	2.64	1.14	59.09[a]
Manage students' livestock projects	2.41	1.14	54.55[a]

Note. Responses utilized a 4-point scale 1 (*Strongly Disagree*) to 4 (*Strongly Agree*). Smaller mean (*M*) values indicate stronger disagreement, and larger mean values indicate stronger agreement; [a]Denotes 51.00% to 79.99% consensus of agreement; [b]Denotes less than 51.00% consensus of agreement.

Round 3

Of the 24 tasks achieving between 51.00% and 79.99% agreement in Round 2, panelists reached consensus of agreement (80.00% or more responding *Yes*) for 10 additional tasks across

four themes: Advisor Expectations (*f* = 1), Chapter Advisement (*f* = 6), Community Engagement (*f* = 2), and Student Recognition (*f* = 1). However, 14 tasks failed to reach consensus of agreement and were eliminated from the study. Examples of tasks failing to reach consensus included: judge FFA contests (*M* = 1.65, *SD* = 0.49), develop chapter program of activities (*M* = 1.75, *SD* = 0.44), establish a charter for the FFA chapter (*M* = 1.75, *SD* = 0.44), volunteer for community service activities (*M* = 1.75, *SD* = 0.44), cook food for FFA events (*M* = 1.40, *SD* = 0.50), attend FFA student conferences (*M* = 1.75, *SD* = 0.44), serve as counselor for FFA chapter members (*M* = 1.65, *SD* = 0.49), and apply for National FFA service-learning grants (*M* = 1.65, *SD* = 0.49). Table 2 displays the results of Round 3.

Table 2

Final Consensus of Agreement for Tasks Receiving between 51.00% to 79.99% Agreement in Round Two by Delphi Panelists in Response to the Question, "What tasks are associated with the roles and responsibilities of a school-based agricultural education teacher regarding FFA advisement in a typical year?" (N = 20)

Tasks	*M*	*SD*	% Agreement
Advisor Expectations			
Serve on various FFA committees	1.80	0.41	80.00
Judge FFA contests	1.65	0.49	65.00[a]
Host FFA contests	1.55	0.51	55.00[a]
Chapter Advisement			
Manage student-teacher relationships regarding missing classwork	1.90	0.31	90.00
Provide agricultural literacy events	1.90	0.31	90.00
Manage service projects	1.85	0.37	85.00
Teach FFA unit to all freshmen	1.85	0.37	85.00
Organize chapter meetings	1.80	0.41	80.00
Plan FFA events	1.80	0.41	80.00
Coordinate chapter chaos	1.75	0.44	75.00[a]
Develop chapter Program of Activities	1.75	0.44	75.00[a]
Clerical Work			
Establish a charter for the FFA chapter	1.75	0.44	75.00[a]
Complete entries for livestock exhibition	1.50	0.51	50.00[a]
Community Engagement			
Manage alumni relations	1.85	0.37	85.00
Serve as booster club liaison	1.80	0.41	80.00
Volunteer for community service activities	1.75	0.44	75.00[a]
Delegate program management to alumni	1.50	0.51	50.00[a]
Hospitality			
Cook food for FFA events	1.40	0.50	40.00[a]
Student Conventions, Conferences, and Camps			

Attend FFA student conferences (i.e., WLC, COLT, MFE, ALD, and New Century Farmer)	1.75	0.44	75.00[a]
Student Recognition			
Plan FFA degree ceremonies	1.85	0.37	85.00
Student Relations			
Serve as counselor for FFA chapter members	1.65	0.49	65.00[a]
Supervised Agricultural Experiences			
Apply for National FFA Service-Learning Grants	1.65	0.49	65.00[a]
Supervise students at livestock shows	1.50	0.51	50.00[a]
Manage students' livestock projects	1.40	0.50	40.00[a]

Note. Mean scores in Round 3 based on responses to *Yes* (2) or *No* (1) questions. Smaller mean (*M*) values indicate stronger disagreement, and larger mean values indicate stronger agreement; [a]Denotes consensus of agreement less than 80.00%

Final Analysis

Tasks achieving at least an 80.00% consensus of agreement in both Round 2 (70 tasks) and Round 3 (10 tasks) were compiled into a final list of tasks of SBAE teachers associated with advising an FFA chapter. In total, 80 tasks in 12 themes, determined by the authors, reached consensus of agreement. Table 9 includes the final list of tasks associated with teaching SBAE associated with FFA advisement in a typical year. Advisor Expectations had 57.14% ($f = 4$) of tasks in the theme reach consensus. Awards and Applications had 100.00% ($f = 9$) of tasks in the theme reach consensus. Chapter Advisement had 88.89% ($f = 24$) of tasks in the theme reach consensus. Clerical Work had 78.95% ($f = 15$) of tasks in the theme reach consensus. Community Engagement had 72.72% ($f = 8$) of tasks in the theme reach consensus. Competitive Student Events had 85.71% ($f = 6$) of tasks in the theme reach consensus. Fundraising had 100.00% ($f = 2$) of tasks in the theme reach consensus. Hospitality had 0.00% ($f = 0$) of tasks in the theme reach consensus. Student Conventions, Conferences, and Camps had 80.00% ($f = 4$) of tasks in the theme reach consensus. Student Recognition had 100.00% ($f = 3$) of tasks in the theme reach consensus. Student Relations had 33.33% ($f = 1$) of tasks in the theme reach consensus. Student Transportation had 100.00% ($f = 2$) of tasks in the theme reach consensus. Supervised Agricultural Experiences had 40.00% ($f = 2$) of tasks in the theme reach consensus.

Conclusions, Implications, and Recommendations

Three overarching themes emerged from tasks identified in association with SGAE teachers' role as FFA Advisor. First, SBAE teachers are competitive in FFA events. Competition in career development events (CDEs), leadership development events (LDEs), Agriscience Fair, and public speaking drive tasks related to FFA advisement. Teachers instruct and prepare students for these activities to provide opportunities for student success and recognition. This conclusion is supported by themes such as Awards and Applications; Competitive Student Events; Student Recognition; and Student Conventions, Camps, and Conferences. Tasks supporting this conclusion include: (a) motivating students to apply for awards; (b) assisting students in developing degree, star, and proficiency applications; (c) preparing for and assessing student skill development in CDEs, LDEs, speaking, and agriscience fair events; and, (d)

attending FFA convention; and facilitating award recognition for student success. This aligns with Jones' and Edwards' (2019) description of the role of competition in SBAE programs. Perhaps SBAE teachers' involvement in competitive events stems from their own positive experiences in these events as students.

Second, SBAE teachers manage administrative tasks related to FFA activities. These tasks most likely enhance students' learning experiences and promote positive experiences with FFA opportunities (Rose et al., 2016). Findings supporting this conclusion include tasks related to clerical work such as completing required paperwork for student travel to events, planning chapter trips, purchasing supplies for chapter events, and submitting student contest materials as well as tasks related to fundraising such as managing and raising chapter funds. This conclusion supports the findings of Torres et al. (2008) who found teachers spent 8% of their time on administrative tasks.

Third, SBAE teachers engage the local community with their FFA chapter. This engagement includes working with local organizations and community efforts as well as involving the community in chapter activities. Tasks related to community engagement included communicating with FFA alumni and supporters, establishing program culture in the community, fostering connections in the local community, and managing alumni relations. This conclusion supports the claim of Sherman and Sorensen (2020) that students' educational opportunities are enhanced through exposure to an external support system such as the local community. It is possible local factors such as the openness of community members to volunteer with the program greatly impact the extent students benefit from community engagement with their FFA chapter.

This study was limited to a panel of experts. As such, the findings should not be generalized to the entire SBAE profession. Instead, the study should be replicated with a larger participant size and broader scope. As such, a national study should be conducted with teachers across all career phases, i.e., early-, mid-, and late-career. Correlational analyses should be conducted with SBAE teachers who had varying levels of FFA achievement. For instance, teachers who have trained multiple national champion CDE teams should be compared with those who have not. In addition, teachers recognized as advising outstanding FFA chapters should be compared to those who have not received such recognition. Such studies could inform state leaders on appropriate FFA-related professional development for in-service teachers.

In addition, a study should be conducted with preservice SBAE teachers to determine the specific job tasks for which they are competent and the tasks for which they need additional support as it relates to FFA. Studies should be replicated across all other states as expectations associated with FFA advising my vary among states. Further, findings of this study may better inform potential teachers of the FFA Advisor tasks expected of them when entering the profession, which might allow these aspirants to better determine if the profession is the right fit for them. As such, we recommend additional research ensue regarding the person-environment fit regarding various communities' expectations of tasks associated with FFA advisement found in this study. Using tasks identified in this study might help aspiring teachers determine community expectations regarding their local FFA chapters, which could further serve as a means for teachers' decision-making regarding their fit in a given community.

Regarding practice, we recommend teacher preparation programs assess tasks required of SBAE teachers in FFA advisement to guide curriculum alignment and instructional approaches to better develop the sector-specific skills of preservice SBAE teachers. We also recommend teacher preparation programs evaluate their classes and include FFA advisement tasks found in this study in some component of their teacher preparation programs. Moreover, informing preservice teachers of the specific tasks associated with FFA advisement will help them better prepare for their clinical teaching experience and potentially motivate them to acquire the knowledge and skills required to accomplish these tasks. In addition, the study's findings can better inform decision makers of potential professional development topics related to advising an FFA chapter for teachers of all experience levels. We recommend tasks included in professional development opportunities be tailored for teachers based on career stage, i.e., early-, mid-, and late-career, to best meet the needs of all teachers.

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Tasks Associated with Teaching School-Based Agricultural Education: The Classroom and Laboratory Instruction Component

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Expectations placed on School-Based Agricultural Education (SBAE) teachers are wide and varied as they fill a vast array of roles and responsibilities. The tasks associated with teaching SBAE can be inferred from literature related to the needs, challenges, and characteristics of SBAE teachers. As an integral component of SBAE, classroom and laboratory instruction is a significant area in which SBAE teachers are expected to complete tasks. However, identifying the specific tasks associated with teaching SBAE could provide insight into the workload of SBAE teachers. Therefore, the purpose of the study was to identify the specific tasks expected of SBAE teachers regarding the classroom and laboratory instruction component. A modified Delphi method consisting of three rounds was used to respond to the study's purpose. The panel of experts consisted of 23 doctoral students in agricultural education with at least three years of SBAE teaching experience. Seventy-four tasks in 14 themes achieved consensus among the Delphi panel. The findings of the study indicated that tasks related to classroom and laboratory instruction are essential to the success of SBAE teachers. Specifically, teachers are relational, competency driven, and quality instructors.

Author's Note: This manuscript is based on data published in the proceedings for the Western AAAE Research Conference, Best et al., (2023).

Introduction

Expectations placed on SBAE teachers are wide and varied (Traini et al., 2021). They are expected to fill a vast array of roles and responsibilities (Phipps et al., 2008; Talbert et al., 2014, Terry & Briers, 2010). Needs of teachers (DiBenedetto et al., 2018; Roberts et al., 2020), challenges faced by teachers (Boone & Boone, 2007, 2009), and characteristics of effective teachers (Eck et al., 2019; Roberts & Dyer, 2004) provide insight into the nature of teaching SBAE and the roles expected of these individuals (Traini et al., 2021). Administrative support, student behavior, school resources, and professional relationships have long since played a role in the job satisfaction of SBAE teachers (Cano & Miller, 1992; Castillo & Cano, 1999; Grady & Burnett, 1985; Torres et al., 2008). Moreover, Hurrell et al. (1998) identified person-environment fit, workload, autonomy, and work pace as indicators of teacher job satisfaction. Although research has indicated SBAE teachers are generally satisfied with their job (Cano & Miller, 1992; Castillo & Cano, 1999; McKibben et al., 2022; Walker et al., 2004), there is no denying the roles they are expected to fill can often become heavy, burdensome, and difficult (Murray et al., 2011; Traini et al., 2020). The combination of professional needs, challenges, and expected characteristics creates a complex system for SBAE teachers to navigate (Haddad et al., 2022;

Traini et al., 2021). One such area in which teachers are expected to perform job-specific tasks is within the classroom and laboratory instruction.

Classroom and laboratory instruction in SBAE refers to learning activities which promote the acquisition of knowledge, skills, and competencies "within the confines of learning facilities" (Croom, 2008, p. 110). Such learning activities are developed and delivered by SBAE teachers to emphasize interdisciplinary skills within the context of agriculture (National FFA Organization, 2023; Phipps et al., 2008). SBAE is its own content area, but it can be used as a context for learning other subject areas as well (Roberts & Ball, 2009). According to the National Council for Agricultural Education (2015), eight AFNR career pathways exist on the federal level to guide SBAE classroom and laboratory instruction: Plant Systems; Power, Structural and Technical Systems; Agribusiness Systems; Animal Systems; Biotechnology Systems; Environmental Services Systems; Food Products and Processing; and Natural Resource Systems. These pathways drive the development and delivery of content across all aspects of SBAE and provide a benchmark against which to measure student knowledge and progress (National Council for Agricultural Education, 2015). Additional pathways, such as Agricultural Communications, have been incorporated by individual states to address specific, local needs (Oklahoma Career Tech, 2023).

Historically, SBAE in the United States has been "both 'hands-on' and 'minds-on' in intent, design, and delivery" (Parr & Edwards, 2004, p. 107). The use of inquiry-based and problem-solving approaches in classroom instruction provide students a rich learning environment in which skills are acquired through the context of agricultural application (Parr & Edwards, 2004; Phipps et al., 2008; Talbert et al., 2014). As such, in-depth planning and preparation are required on behalf of SBAE teachers to deliver meaningful and robust lessons (Talbert et al., 2014; Torres et al., 2008; Roberts & Kitchel, 2010). Torres et al. (2008) identified planning and instruction as key workload components of SBAE teachers. They discovered that student teachers, first-year teachers, and experienced teachers invested 61%, 62%, and 47% of their time, respectively, on planning and instruction within the classroom and laboratory component of their job expectation.

Facilities in which classroom and laboratory instruction occur include classrooms, agricultural mechanics laboratories, greenhouses, land laboratories, and food processing facilities (Twenter & Edwards, 2017). In addition, formal science laboratories have risen to prominence in SBAE programs thanks in part to increased emphasis on cross disciplinary instruction (Curriculum for Agricultural Science Education, 2023). Wells et al. (2018) posited teachers are expected to complete a wide range of tasks and roles in their positions, which includes teaching agricultural content. They suggested one such environment in which teachers accomplish this is the laboratory setting (Wells et al., 2018). Along with these laboratory learning spaces come expectations for how teachers use and interact with them (Wells et al., 2018). Such expectations include managing the learning space, employing project-based instruction, and caring for the facilities (Wells et al., 2018). Moreover, SBAE concepts learned through classroom and laboratory instruction are actively applied through FFA and SAE activities. Thus, SBAE teachers are expected to encompass appropriate tasks associated with classroom and laboratory instruction as a part of a comprehensive SBAE program.

Theoretical Framework

The Human Capital (HC) theory served as the study's theoretical framework. HC evaluates the acquisition of knowledge, skills, training, experiences, and education by individuals (Becker, 1964; Little, 2003; Shultz, 1971; Smith, 2010; Smylie, 1996). An important aspect of HC involves the explanation of employability in terms of the investment an individual makes in themselves and the attractiveness of that skillset to a prospective employer (Becker, 1964); therefore, "as people increase their human capital, they become more employable . . ." (Robinson & Baker, 2013, p. 152). To this end, Smith (2010) found that individuals tend to acquire specialized skills as they move toward work they prefer, giving rise to the phrase "sector-specific" (p. 42) skills, which complement natural talent and occupational abilities. Moreover, Heckman (2000) maintained individuals' job performances were enhanced by the acquisition and development of such skills. Increased job performance due to enhanced human capital is associated with improved results for employers (Lepak & Snell, 1999). Similarly, HC also can be used to explain teachers and their value within their schools (Smylie, 1996). In addition, HC can be used to describe job-specific tasks and the value placed on them (Autor & Handel, 2013). Autor et al. (2003) found jobs can be classified by the main tasks expected to be completed by workers, and the value of the skills required to perform those tasks can be assessed. However, it is difficult to measure and concretely connect these tasks and skills to HC (Autor & Handel, 2013). As such, Autor and Handel (2013) proposed individuals select tasks based on their perceived value to the job expectations, realizing these tasks may vary greatly based on the specific demands of the particular job in question.

Gibbons and Waldman (2004) also found tasks to be central to HC, coining the term "task-specific human capital" (p. 203). This type of HC indicates that ". . . some of the human capital an individual acquires on the job is specific to the tasks being performed . . ." (Gibbons & Waldman, 2004, p. 203). Like other types of HC, task-specific HC is dependent on the nature of the work being completed, allowing for the skills acquired to be transferred easily from one job to another (Gibbons & Waldman, 2004). The authors maintained this transfer reinforces the notion that task-specific HC is widely valued within industries and offers enhanced employability among workers. As such, HC acquisition is linked to proficiency in performing various and specific tasks (Gibbons & Waldman, 2004). Task-specific HC implies there is value in the skills associated with completing job-specific tasks (Gibbons & Waldman, 2004). Thus, tasks are central to job performance and skill acquisition (Autor et al., 2003; Autor & Handel, 2013). Therefore, tasks are central to the theoretical framework of the study. Garland (1985) defined task as "a body of work requiring mental and/or physical activity" (p. 346). In formal settings, tasks are often an individual's role and responsibility to master, and they can be either "self-selected or assigned by a superior or co-worker" (Garland, 1985, p. 346). Lewin (1951) posited that tasks create individual tension; therefore, resulting in cognitive or physical activity.

Purpose

Research indicates *general* tasks associated with teaching SBAE, such as excessive paperwork, working overtime, and meeting deadlines, can be sources of stress for teachers (Torres et al., 2009). However, determining *specific* tasks required of SBAE teachers is a difficult undertaking. Although the tasks of teaching SBAE can be inferred from the above-mentioned professional needs, challenges, and characteristics, limited literature exists detailing the specific tasks SBAE

teachers are expected to perform. Identifying a comprehensive list of such can offer insight into the daily demands of the profession and provide context and backgrounding for future research in the field. To understand the various expectations placed on SBAE teachers, Traini et al. (2021) recommended the profession should compile a "flexible position description of the agriculture teaching job detailing tasks that are expected as well as those that are not expected" (p. 179). Therefore, the purpose of the study was to identify the tasks associated with the roles and responsibilities of SBAE teachers with the objective to identify the specific tasks associated with the classroom and laboratory instruction component of the SBAE program.

Methods

This study was a part of a larger investigation (Best, 2023). The study's purpose focuses on specific findings related to tasks associated with classroom and laboratory instruction expected while teaching SBAE. The methods of the larger study are presented here. A modified Delphi method was used to meet the study's objective. This method is considered a multiple-round approach to collecting data in which "three iterations are often sufficient to collect the needed information and to reach a consensus in most cases" (Hsu & Sandford, 2007, p. 2).

Stitt-Gohdes and Crews (2004) stressed the selection of the panel of experts is among the most crucial aspects of the Delphi method and should include those ". . . who are knowledgeable about current information and perceptions regarding the topic under investigation but are open-minded to the findings" (pp. 60–61). Therefore, our study's frame consisted of doctoral students in agricultural education identified by department heads of agricultural education academic units across the United States. The assumption is that this group is recent, former, or current SBAE teachers. Therefore, this population was identified as an appropriate group of potential Delphi panelists due to their recent knowledge of and competence in SBAE as well as their desire to pursue a terminal professional degree in the field. Potential panelists were deemed qualified to participate in the study based on the following criteria: (a) potential panelists were currently enrolled in a doctoral program (i.e., Ph.D. or Ed.D.) in agricultural education with aspirations of joining the professoriate or pursuing an advanced leadership position; (b) potential panelists were former or current SBAE teachers with a minimum of three years of SBAE teaching experience; and (c) potential panelists were "highly trained and competent within the specialized area of knowledge" (Hsu & Sandford, 2007, p. 3), in this case, SBAE.

On September 13, 2022, an electronic message was sent to department heads of 22 agricultural education programs offering a doctoral degree requesting the names and email addresses of students enrolled in their doctoral programs. Of those, 13 (59.09%) responded, identifying a total frame of 40 doctoral students as potential Delphi panelists meeting the criteria for the study. Subsequent electronic messages were sent to panelists for each round with a link embedded to respective instruments requesting their participation in the study following the Tailored Design Method (Dillman et al., 2014). In all, 23 (57.50%) of the initial 40 potential panelists responded to Round 1. Therefore, the 23 respondents were considered the panel of experts for the study. Twenty-two (95.65%) expert panelists responded to Round 2, and 20 (86.96%) expert panelists responded to Round 3.

The instruments used in this study were evaluated for face and content validity by a group of eight experts considered knowledgeable of social science research and SBAE (Gay et al., 2006). These eight including six teacher educators in agricultural education, one statistician who specialized in survey research and instrument design, and one graduate student who was a former SBAE teacher and seeking an advanced degree in agricultural education at [university]. Moreover, reliability in Delphi studies is dependent on maintaining a certain threshold of participants throughout the study's duration. Dalkey et al. (1972) indicated 13 responses are needed to establish a reliability coefficient of .90 in Delphi studies. Because the response rates of this study exceeded 13 participants per round, and because each round was comprised of the same participants who responded to all three separate instruments, the study's results are assumed to be reliable (Dalkey et al., 1972).

The initial electronic message was sent to the 40 identified potential panelists on September 29, 2022 describing the study and inviting them to participate. A Qualtrics survey link to the Round 1 instrument was sent to panelists containing questions pertaining to the personal and professional characteristics of the panelists as well as the following open-ended question: *What tasks are associated with the roles and responsibilities of a SBAE teacher regarding classroom and laboratory instruction in a typical year?* Panelists were asked to provide as many responses as they deemed appropriate to answer this question. The tasks identified by panelists in Round 1 were analyzed using the constant comparison procedure, and duplicated responses were eliminated (Creswell & Guetterman, 2019).

Round 2 of the Delphi study sought to establish consensus of agreement among panelists (Barrios et al., 2021). An electronic message was sent to the 23 panelists responding to Round 1 on November 22, 2022 with a Qualtrics survey link to the Round 2 instrument. Tasks identified in Round 1 were presented to panelists to assess their perceived level of agreement for each task. Panelists were asked to indicate their level of agreement using a four-point agreement scale (*1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree*). An 80.00% level of agreement was required to reach consensus, i.e., tasks receiving a score of 3 or 4 by 80.00% of panelists, were retained as tasks achieving consensus of agreement (Diamond et al., 2014). Tasks achieving 51.00% to 79.99% agreement were retained for use in Round 3. Tasks achieving less than 51.00% agreement among panelists were considered to have not reached consensus of agreement and were removed from the study.

Round 3 of the study sought to refine consensus of agreement among panelists (Brady, 2015). An electronic message was sent to the 22 panelists responding to Round 2 of the study on December 12, 2022 with a Qualtrics survey link to the Round 3 instrument. Tasks identified in Round 2 as achieving a level of agreement from 51.00% to 79.99% were again presented to the panelists to further develop consensus of agreement, per the recommendations of Buriak and Shinn (1989). Panelists were asked to indicate whether they agreed the task should be included by selecting either *1* for *No* or *2* for *Yes*. The 80.00% level of agreement identified *a priori* also was used for Round 3 analysis. Tasks receiving this level of agreement were considered to have reached consensus of agreement among panelists and included in the final list of tasks associated with advising an FFA chapter. Tasks achieving a level of agreement of less than 80.00% failed to reach consensus of agreement and were removed from the study. Tasks achieving the 80.00% level of agreement in Round 2 and Round 3 were combined to form a final list of tasks. For all

three rounds of the study, statistical feedback was reported per the suggestion of Sackman (1974) who indicated that modes of central tendency and a measure of dispersion (standard deviation) should be included when reporting the findings of a conventional Delphi study.

Findings

Description of the Delphi Panel of Experts

The panel consisted of experts having taught in 16 different states in SBAE programs ranging from 45 to 700 students enrolled with approximately one-half of the respondents teaching 150 or fewer students. Nine (39.13%) panelists were male, and 14 (60.87%) were female. Twenty-one panelists (91.30%) were white, and 22 (95.65%) were not Hispanic or Latino. Five (22.00%) were currently teaching SBAE, and 21 (91.30%) had taught SBAE in the past four years. The average number of years of experience teaching SBAE was 8.39 years (range of 3 to 21 years). More than 95% ($f = 22$) were traditionally certified. Sixteen respondents (69.56%) were from 25 to 35 years of age. Thirteen panelists (56.52%) taught in communities with a population of fewer than 10,000 people.

Round 1

Panelists identified 265 original tasks associated with the roles and responsibilities of SBAE teachers regarding classroom and laboratory instruction in a typical year. Duplicated tasks were removed, and 84 tasks classified into 14 themes remained for consideration in Round 2. Themes identified in Round 1 included Authentic Skill Development ($f = 9$), Classroom Management ($f = 3$), Clerical Work ($f = 8$), Inclusive Teaching ($f = 8$), Instructional Design ($f = 6$), Lesson Preparation ($f = 9$), Lifelong Learning ($f = 6$), Relationships and Rapport ($f = 9$), School Safety ($f = 4$), Student Evaluation ($f = 2$), Student Motivation ($f = 2$), Teaching and Instruction ($f = 7$), Teaching and Learning Resources ($f = 10$), and Teaching and Learning Supplies ($f = 2$). In corresponding order to the above-mentioned themes, the most common tasks for each included: Assist students in obtaining industry-based certification (IBC) ($f = 5$, 1.89%), Manage the learning environment ($f = 20$, 7.55%), Manage classroom budget ($f = 6$, 2.26%), Follow student individualized educational plan (IEP)/504 modifications ($f = 4$, 1.51%), Develop instructional curriculum ($f = 9$, 3.40%), Prepare daily lesson plans ($f = 14$, 5.28%), Attend professional development ($f = 6$, 2.26%), Communicate with students' parents/guardians ($f = 6$, 2.26%), Follow safety/security protocol ($f = 2$, 0.75%), Grade student work ($f = 14$, 5.28%), Motivate students to learn ($f = 3$, 1.13%), Teach students across all AFNR pathways ($f = 14$, 5.28%), Manage teaching and learning facilities ($f = 7$, 2.64%), and Obtain classroom and laboratory supplies ($f = 11$, 4.15%).

Round 2

In Round 2, panelists reached consensus of agreement (i.e., 80.00% or greater) on a scale of 1 (*Strongly Disagree*) to 4 (*Strongly Agree*) for 72 of 84 tasks (85.70%) associated with teaching SBAE regarding classroom and laboratory instruction in a typical year. Table 1 includes the mean (M) and standard deviation (SD) of item responses (with a lower value indicating more perceived disagreement and a higher value indicating a more perceived agreement) and the

percent of agreement for tasks associated with teaching SBAE in the area of classroom and laboratory instruction. Percent of agreement is defined as the percentage of panelists selecting 3 (*Agree*) or 4 (*Strongly Agree*) in response to the item. Of the tasks achieving consensus of agreement, 45 reached 100.00% agreement among panelists. Examples of tasks with the highest mean score per theme included: Provide hands-on learning experiences (M = 3.95, SD = 0.21), Manage the learning environment (M = 3.86, SD = 0.35), Enter student grades (M = 3.59, SD = 0.50), Create an inclusive learning environment (M = 3.64, SD = 0.49), Apply curriculum concepts to real-world situations/scenarios (M = 3.91, SD = 0.29), Manage time (M = 3.86, SD = 0.35), Attend professional development (M = 3.68, SD = 0.57), Build relationships with students (M = 3.95, SD = 0.21), Follow safety/security protocol (M = 3.86, SD = 0.35), Assess student learning (M = 3.86, SD = 0.35), Motivate students to learn (M = 3.82, SD = 0.40), and Recruit students to program (M = 3.82, SD = 0.40), Supervise students in the laboratory (M = 3.77, SD = 0.43), Handle laboratory equipment (M = 3.59, SD = 0.50), and Purchase laboratory equipment (M = 3.59, SD = 0.50), and Maintain classroom/laboratory (M = 3.55, SD = 0.51). Nine statements reached a level of agreement from Round 2 between 51.00% and 79.99%, advancing to Round 3 for consideration by the panelists. Round 3 used a dichotomous response for agreement (i.e., *Yes* or *No*). Three tasks failed to reach at least 51.00% agreement; therefore, they were eliminated from the study. Table 1 displays the findings of Round 2.

Table 1

Consensus of Agreement for Tasks Identified by Delphi Panelists in Response to the Question, "What tasks are associated with the roles and responsibilities of a school-based agricultural education teacher regarding Classroom and laboratory Instruction in a typical year?" (N = 22)

Task	*M*	*SD*	% Agreement
Authentic Skill Development			
Provide hands-on learning experiences	3.95	0.21	100.00
Teach students practical skills	3.91	0.29	100.00
Teach laboratory skills	3.77	0.43	100.00
Stay current with industry trends	3.68	0.48	100.00
Provide content area expertise	3.64	0.49	100.00
Provide inquiry-based learning opportunities for all courses	3.59	0.50	100.00
Provide academic service-learning opportunities	3.23	0.69	86.36
Assist students in obtaining industry-based certification (IBC)	3.18	0.66	86.36
Obtain industry-based certification (IBC) for teachers	2.68	0.84	63.64[a]
Classroom Management			
Manage the learning environment	3.86	0.35	100.00
Provide clear instruction	3.82	0.40	100.00
Vary instruction	3.59	0.50	100.00
Clerical Work			
Enter student grades	3.59	0.50	100.00
Complete required school-wide paperwork	3.45	0.60	95.45

Use learning management system (LMS) competently	3.36	0.58	95.45
Manage classroom budget	3.50	0.67	90.91
Manage student record books	3.27	0.70	86.36
Submit instructional lesson plans	2.91	0.81	81.82
Write grants	3.05	0.79	72.73[a]
Secure funding for the learning environment	2.91	1.02	63.64[a]
Inclusive Teaching			
Create an inclusive learning environment	3.82	0.40	100.00
Scaffold content to meet individual students' needs	3.82	0.40	100.00
Follow student individualized educational plan (IEP)/504 modifications	3.77	0.43	100.00
Engage students from non-agricultural backgrounds	3.77	0.43	100.00
Create culturally competent students	3.68	0.48	100.00
Ensure equitable student access to resources	3.68	0.48	100.00
Establish a community/safe space in the classroom	3.68	0.48	100.00
Attend individualized educational plan (IEP)/504 meetings	3.64	0.49	100.00
Instructional Design			
Apply curriculum concepts to real-world situations/scenarios	3.91	0.29	100.00
Modify existing curriculum	3.68	0.48	100.00
Align curriculum to appropriate standards	3.41	0.50	100.00
Develop instructional visual aids	3.36	0.58	95.45
Develop instructional curriculum	3.32	0.57	95.45
Create a curriculum map across AFNR pathways	3.00	0.69	77.27[a]
Lesson Preparation			
Manage time	3.86	0.35	100.00
Prepare facilities for instruction	3.73	0.46	100.00
Organize teaching materials/resources	3.59	0.50	100.00
Prepare for guest speakers	3.59	0.50	100.00
Prepare lesson plans for substitute teachers	3.59	0.50	100.00
Align lessons with AFNR standards	3.50	0.51	100.00
Prepare for field trips	3.59	0.60	95.45
Practice labs ahead of time	3.23	0.69	86.36
Prepare daily lesson plans	3.36	0.79	81.82
Lifelong Learning			
Attend professional development	3.68	0.57	95.45
Collaborate with other agricultural education teachers in Professional Learning Communities (PLC)	3.59	0.59	95.45
Implement feedback from administrative evaluations	3.27	0.63	90.91
Develop leadership abilities	3.50	0.74	86.36
Coordinate with all school staff to facilitate learning	2.91	0.75	77.27[a]
Relationships and Rapport			

Build relationships with students	3.95	0.21	100.00
Communicate with students	3.86	0.35	100.00
Promote program	3.73	0.46	100.00
Serve as mentor for students	3.73	0.46	100.00
Build relationships with the community	3.59	0.50	100.00
Communicate with administrators	3.59	0.50	100.00
Communicate with students' parents/guardians	3.59	0.50	100.00
Communicate with advisory council	3.36	0.58	95.45
Coordinate community volunteers	3.23	0.61	90.91
School Safety			
Follow safety/security protocol	3.86	0.35	100.00
Model safety	3.82	0.40	100.00
Manage laboratory safety	3.77	0.43	100.00
Serve as an armed school guardian to provide campus security	1.68	0.89	18.18[b]
Student Evaluation			
Assess student learning (i.e., formative assessments, feedback, and check for understanding)	3.86	0.35	100.00
Grade student work (i.e., summative evaluations, outcome assessments, and standardized tests)	3.64	0.58	95.45
Student Motivation			
Motivate students to learn	3.82	0.40	100.00
Recruit students to program	3.82	0.40	100.00
Teaching and Instruction			
Supervise students in the laboratory	3.77	0.43	100.00
Follow school instructional policies	3.50	0.51	100.00
Take students on educational field trips	3.41	0.59	95.45
Teach students across all AFNR pathways	3.32	0.78	95.45
Serve as the agricultural content expert	3.18	0.59	90.91
Serve on various committees	2.77	0.81	63.64[a]
Adapt content for hybrid instruction	2.64	0.90	54.55[a]
Teaching and Learning Resources			
Handle laboratory equipment	3.59	0.50	100.00
Purchase laboratory equipment	3.59	0.50	100.00
Manage teaching and learning facilities (i.e., classroom, shop, greenhouse, land lab, and project facility)	3.82	0.50	95.45
Conduct annual inventory of equipment/supplies	3.55	0.60	95.45
Manage greenhouse	3.41	0.80	90.91
Maintain school equipment	2.95	0.84	81.82
Manage animals housed at school facilities	3.32	1.04	77.27[a]
Maintain school project center (i.e., land lab, school farm, and ag barn)	3.27	1.16	72.73[a]
Repair school equipment	2.41	0.91	50.00[b]

Landscape school grounds	1.86	0.89	22.73[b]
Teaching and Learning Supplies			
Maintain classroom/laboratory supplies inventory	3.55	0.51	100.00
Obtain classroom/laboratory supplies	3.41	0.59	95.45

Note. Responses utilized a 4-point scale 1 (*Strongly Disagree*) to 4 (*Strongly Agree*). Smaller mean (M) values indicate stronger disagreement, and larger mean values indicate stronger agreement; [a]Denotes 51.00% to 79.99% consensus of agreement; [b]Denotes less than 51.00% consensus of agreement.

Round 3

Of the nine tasks achieving between 51.00% and 79.99% agreement in Round 2, panelists reached consensus of agreement (80.00% of panelists or greater selecting *Yes*) for two items (see Table 2): Adapt content for hybrid instruction (M = 1.80, SD = 0.41), and Serve on various committees (M = 1.80, SD = 0.41). Both tasks comprised the Teaching and Instruction theme. Seven tasks failed to reach consensus of agreement and were eliminated from the study. In the area of Authentic Skill Development, Obtain industry-based certification (IBC) for teachers (M = 1.55, SD = 0.51) reached 55.00% agreement and was eliminated from the study. Two tasks were eliminated for Clerical Work: Secure funding for the learning environment (M = 1.75, SD = 0.44), and Write grants (M = 1.70, SD = 0.47). One task was eliminated from the area of Instructional Design: Create curriculum map across AFNR pathways (M = 1.75, SD = 0.44). One task was eliminated from Lifelong Learning: Coordinate with all school staff to facilitate learning (M = 1.75, SD = 0.44), and two tasks were eliminated from Teaching and Learning Resources: Maintain school project center (M = 1.70, SD = 0.47), and Manage animals housed at school facilities (M = 1.70, SD = 0.47). Table 2 displays the consensus of agreement for tasks retained from Round 2.

Table 2

Final Consensus of Agreement for Tasks Receiving between 51.00% to 79.99% Agreement in Round Two by Delphi Panelists in Response to the Question, "What tasks are associated with the roles and responsibilities of a school-based agricultural education teacher regarding Classroom and laboratory Instruction in a typical year?" (N = 20)

Tasks	*M*	*SD*	% Agreement
Authentic Skill Development			
Obtain industry-based certification (IBC) for teachers	1.55	0.51	55.00[a]
Clerical Work			
Secure funding for the learning environment	1.75	0.44	75.00[a]
Write grants	1.70	0.47	70.00[a]
Instructional Design			
Create a curriculum map across AFNR pathways	1.75	0.44	75.00[a]
Lifelong Learning			
Coordinate with all school staff to facilitate learning	1.75	0.44	75.00[a]
Teaching and Instruction			

Adapt content for hybrid instruction	1.80	0.41	80.00
Serve on various committees	1.80	0.41	80.00
Teaching and Learning Resources			
Maintain school project center (i.e., land lab, school farm, and ag barn)	1.70	0.47	70.00[a]
Manage animals housed at school facilities	1.70	0.47	70.00[a]

Note. Mean scores in Round 3 based on responses to *Yes* (2) or *No* (1) questions. Smaller mean (*M*) values indicate stronger disagreement, and larger mean values indicate stronger agreement; [a]Denotes consensus of agreement less than 80.00%

Final Analysis

Tasks achieving at least an 80.00% consensus of agreement in both Round 2 (72 of 84 tasks) and Round 3 (2 of 9 tasks) were compiled into a final list of tasks associated with teaching SBAE in classroom and laboratory instruction. In total, 74 tasks in 14 themes reached consensus of agreement. Authentic Skill Development had 88.89% ($f = 8$) of tasks in the theme reach consensus. Classroom Management had 100.00% ($f = 3$) of tasks in the theme reach consensus. Clerical Work had 75.00% ($f = 6$) of tasks in the theme reach consensus. Inclusive Teaching had 100.00% ($f = 8$) of tasks in the theme reach consensus. Instructional Design had 83.33% ($f = 5$) of tasks in the theme reach consensus. Lesson Preparation had 100.00% ($f = 9$) of tasks in the theme reach consensus. Lifelong Learning had 66.67% ($f = 4$) of tasks in the theme reach consensus. Relationships and Rapport had 100.00% ($f = 9$) of tasks in the theme reach consensus. School Safety had 75.00% ($f = 3$) of tasks in the theme reach consensus. Student Evaluation had 100.00% ($f = 2$) of tasks in the theme reach consensus. Student Motivation had 100.00% ($f = 2$) of tasks in the theme reach consensus. Teaching and Instruction had 100.00% ($f = 7$) of tasks in the theme reach consensus. Teaching and Learning Resources had 60.00% ($f = 6$) of tasks in the theme reach consensus. Teaching and Learning Supplies had 100.00% ($f = 2$) of tasks in the theme reach consensus.

Conclusions, Implication, and Recommendations

Based on the findings of the study, it can be reasonably concluded that tasks related to the classroom and laboratory instruction component of the SBAE program are integral to the success of SBAE teachers. As an entity of CTE, the value of the instructional component of the SBAE model has been emphasized since the passage of the Smith-Hughes Act of 1917 (Phipps et al., 2008). To that end, the findings of the study support the notion that SBAE is highly dependent on the tasks teachers are expected to perform regarding classroom and laboratory instruction. Three overarching themes emerged as conclusions related to classroom and laboratory instruction.

First, it is concluded that SBAE teachers are relationship builders. The findings of the study indicate teachers should develop relationships with students, colleagues, administrators, alumni, students' parents, and the community in which they teach. This conclusion is based on the inclusion of themes related to building relationships and rapport among students and stakeholders, motivating students to learn, and including all learners in the instructional process. Tasks related to this conclusion include serving as a mentor for students, building relationships with students, creating an inclusive learning environment, and motivating students to learn.

These conclusions align with findings from Eck et al. (2019), who found teachers should be relatable, student focused, and empathetic, and Roberts and Dyer (2004), who identified caring for students, working well with parents, establishing strong community relationships, and working well with alumni were characteristics of effective SBAE teachers.

Second, it is concluded that SBAE teachers are competency driven. From the content they teach to their own professional development, SBAE teachers value competency and technical skill acquisition. This conclusion is supported by themes such as Authentic Skill Development and Instructional Design. Specific tasks aligning with this conclusion include assisting students in obtaining industry-based certifications, teaching practical skills to students, providing inquiry-based learning opportunities for all courses, aligning curriculum to appropriate standards, and applying curriculum concepts to real-world situations and scenarios, to name a few. This reinforces findings from DiBenedetto et al. (2018) who found the acquisition of technical, competency-driven skills as a professional need of SBAE teachers. In addition, it supports the content-based model proposed by Roberts and Ball (2009) by demonstrating the need for technical agricultural skill acquisition.

Third, it is concluded that SBAE teachers are quality instructors. Specifically, SBAE teachers plan for and execute effective instruction in various settings including the classroom, laboratories, and informal teaching environments. This instruction is intentional and well thought out. Teachers spend a significant amount of time planning for instruction, which is consistent with previous research (Lambert et al., 2011; Robinson et al., 2010; Torres et al., 2008; Torres & Ulmer, 2007). These conclusions are based on the inclusion of tasks such as instructing students, managing the classroom, organizing teaching materials and resources, practicing labs ahead of time, preparing daily lesson plans, preparing lab and classroom facilities for instruction, and managing time for preparation.

Due to the sample size and the nature of the Delphi method (Hsu & Sandford, 2007), the findings of the study should not be generalized to the general SBAE population. To address this limitation, the study should be replicated with a larger participant size and broader scope. Specifically, it is recommended that a national study be conducted consisting of respondents across all career phases (i.e., early-, mid-, and late-career) which continues to explore the task-specific human capital of SBAE teachers related to the classroom and laboratory instruction. Comparisons between the groups could be used to determine which tasks are most essential. Doing so would provide an indication of which tasks SBAE teachers and stakeholders value more than others. Such an analysis would provide essential information regarding the workload of SBAE teachers as well as the importance through which they perceive individual tasks. In turn, the findings could potentially be used for context in studies examining stress, burnout, retention, and person-environment fit of SBAE teachers.

In addition, a study should be conducted with pre-service SBAE teachers to determine the specific job tasks for which they are competent and the ones in which they need additional support. Perhaps a pre- and post- clinical teaching evaluation of said sector-specific competencies would inform pre-service teachers and teacher preparation faculty alike of the students' areas of greatest need in the classroom or laboratory. Considering the variation in SBAE programs by geographical region (Washburn et al., 2001), studies should be conducted in

each state to determine the tasks of SBAE teachers specific to the state or region in which they teach. Moreover, an investigation into the impact of teacher competence in classroom and laboratory teaching tasks on SBAE student learning outcomes could be insightful for the profession. In terms of practice, it is recommended that teacher preparation programs evaluate the tasks required of SBAE for overlap with instructional content intended for pre-service teachers. Further, the findings of this study can better inform potential SBAE teachers of the specific job-task expectations of the profession, allowing them to determine if the profession is the right fit for them regarding their professional endeavors. It is possible teacher attrition and retention rates may be impacted by such decision-making as pre-service teachers who are less likely to remain in teaching may choose to pursue a different career field.

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Identifying Relationships and Differences Related to Arkansas FFA Chapter Performance in Career Development Events

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Career development events have been a part of the National FFA Organization from its beginning and are still an integral component of SBAE programs. A priority of the organization is to "Expand equitable opportunities for all students to develop their potential for premier leadership, personal growth, and career success through FFA experiences and opportunities." To determine if progress has been made toward this goal, FFA member participation in various aspects of National FFA Organization activities, including CDEs, needs to be described. Using the Multi-level Model of School-Effectiveness, this study identified relationships and examined differences related to FFA chapter CDE success in Arkansas. Based on results of this study, less than half of all chapters in the state participated in each of the competitions, indicating lower levels than found in previous studies. According to team scores, students from the Southern District are disadvantaged compared to the other districts while students from the Northwest District may have an advantage compared to other districts. Affiliated chapters had statistically higher levels of participation and performance statewide. We recommend increasing efforts in the state to support students at schools with competitive disadvantages and determining ways to fund chapter affiliation membership to maximize opportunities for students.

This manuscript is based on data published in Proceedings of the AAAE Southern Region Conference, Rodgers et al. (2024).

Introduction

In 1926 vocational agriculture students met at the National Livestock Judging Contest at the American Royal Livestock and Horse Show leading to the formation of the student organization known as the Future Farmers of America in 1928 (National FFA Organization, 2023). Almost a century later, livestock evaluation, still popular among student members of the National FFA Organization, is one of many Career Development Events (CDEs), which are an integral component of many local school-based agricultural education (SBAE) programs. Today, a priority goal of the National FFA Organization (2022) is to "Expand equitable opportunities for all students to develop their potential for premier leadership, personal growth, and career success through FFA experiences and opportunities" (p. 1). Ball et al. (2016) proffered CDEs help students develop career goals, gain leadership skills, and acquire life skills, all of which have the potential to help the National FFA Organization accomplish their goal. However, to determine if progress has been made toward this goal, FFA member participation in various aspects of National FFA Organization activities, including CDEs, needs to be described. In addition, factors contributing to equitable opportunities for student success in CDEs also need to be identified, giving rise to the need for this study.

Literature Review/Conceptual Framework

According to Talbert et al. (2022), CDEs provide students opportunities to apply knowledge learned in the classroom through a competitive activity. Competitive CDEs on the national level encompass a wide range of topics including, Agricultural Technology and Mechanical Systems, Horse Evaluation, Floriculture, Forestry, Livestock Evaluation, and Veterinary Science among others (National FFA Organization, 2023). Arkansas currently offers 19 CDE competitions in which students can participate where teams must qualify at the district then state level to advance to the national competition (Arkansas Agricultural Education and FFA, 2023). However, previous research indicated participation in CDEs has been lower than desired with just under half of FFA members reporting never participating in an event (Talbert & Balschweid, 2004). Additionally, research has shown certain CDE competitions are favored by teachers over others; Kansas schools saw high participation in Livestock, Dairy Cattle, and Horse Evaluation with over 75% of chapters training a team but lower participation levels were found in other events (Harris, 2008).

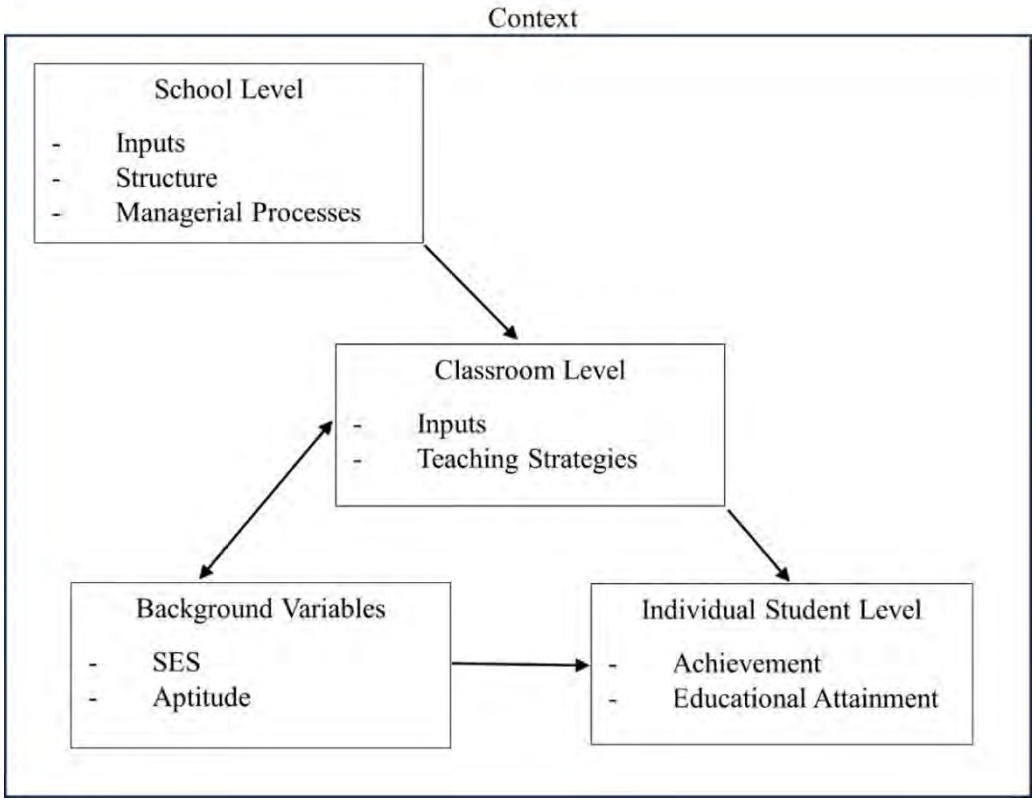
In addition to student participation, teachers' philosophies toward the purpose and implementation of CDEs have also been studied. Herren (1984) found winning, as opposed to learning, was the primary goal for many advisors who coached a livestock evaluation team. Similarly, Croom et al. (2009) reported a large majority of teachers perceived competition and achievement as being important or very important. However, more congruent with the National FFA priority goal, some teachers have indicated student development and extension of classroom learning should be the priority of CDE competition (Edwards & Booth, 2001; Goodwin & McKim, 2020; Russell et al., 2009). Teachers' philosophies toward CDEs can affect how they prepare students for competition. Pauley (2019) outlined a contentious philosophical debate in SBAE regarding CDEs, stating many teachers felt CDE preparation should be incorporated into classroom instruction, while others believed CDE preparation should augment classroom instruction outside of class time. Regardless, Goodwin and McKim (2020) suggested teachers are a critical component, and coaching behaviors, such as structure of practices, developing students' requisite knowledge, and fostering team dynamics can impact students' success in CDEs.

Various factors can influence student success in CDEs. Herren (1984) found teams from small schools successfully competed with teams from large schools and the number of students in the local program did not affect success at the national contest. In the national Agricultural Mechanics CDE, Franklin and Armbruster (2012) found students from the central region consistently performed better than students from other regions of the country; they questioned what school and SBAE program factors might have contributed to these results. Oyirifi (2016) conducted an extensive investigation of student success among all national CDE competitions and found FFA chapters from Texas, California, and Missouri had the highest accumulation of top-ten placings. Oyirifi's results showed "the FFA population of a state is a direct contributor to the number of raw competitions won" (p. 33). However, after adjusting for top-ten placements in relation to a state's population using relative advantage scores (RAS), Virginia, Connecticut, and Missouri experienced higher levels of success. Accordingly, Oyirifi recommended examining student success in CDE placings by using a combination of raw placings and relative advantage scores to determine the effectiveness of SBAE programs at preparing students. Incongruent with Franklin and Armbruster (2012), Oyirifi found no differences among FFA regions when comparing among all national CDE competitions, indicating inequities were not a result of geographic location.

Since student population directly relates to SBAE programs' CDE success, one consideration to increase the population in a local FFA chapter is through affiliation. During the 2009-2010 school year, the National FFA Organization piloted an affiliation program in five states allowing FFA chapters to pay a flat dues structure allowing all students in the SBAE program to become FFA members (Sheehan & Moore, 2019). The program was subsequently adopted at the national level and is now available to all local FFA chapters. Chapter affiliation eliminated the previous student-paid dues structure, which allowed more equitable FFA membership by students (Sheehan & Moore, 2019). Sheehan et al. (2023) reported teachers in affiliated chapters conveyed affiliation improved student participation in all FFA events including CDEs. However, data published by Sheehan and Moore (2019) showed by 2017 almost 75% of chapters were unaffiliated, but just over half of FFA members were part of an affiliated chapter. Participants in the Sheehan et al. (2023) study suggested affiliation has been a good change in terms of student participation, but paying the affiliation fee has increased the fiscal responsibility for the FFA chapter.

When attempting to describe influences affecting student achievement or success, the Multi-level Model of School-Effectiveness can be used (Scheerens & Stoel, 1988). This model (Figure 1) suggests there are contextual variables at different levels of a school system affecting student achievement. At the school level, inputs such as school size, structure, and managerial processes impact the classroom level. At the classroom level, inputs such as class size, number of teachers, and teaching strategies used, affect student achievement. Background variables such as socioeconomic status and aptitude can influence both classroom level inputs and student level achievement. When consulting the literature on the inputs at the different school levels, Egalite and Kisida (2016) found as school size increases, achievement in math and reading decreases. In an Australian study, students in rural schools, which are often smaller in size, did not perform as well as urban schools (Young, 1998). Howley (1996) found smaller schools tend to be better at educating impoverished students, while larger schools have better resources for educating affluent students, indicating socioeconomic status interacts with school characteristics in influencing academic achievement. Similarly, students from very small, rural and very large, urban schools have been found to perform lower than students from schools of moderate size (Borland & Howsen, 1999). This study sought to assess how inputs at the school and classroom (FFA chapter) levels affect student achievement in the context of CDEs.

Figure 1
Multi-level Model of School-Effectiveness (Scheerens & Stoel, 1988)



Purpose and Objectives

The purpose of this study was to identify relationships and examine differences related to FFA chapter CDE success in Arkansas. The following objectives were used to guide this study:

1. Describe Arkansas CDE participation by contest, location, and FFA chapter characteristics.
2. Compare state level CDE scores by Arkansas FFA district.
3. Describe relationships among chapter membership size, number of chapter FFA advisors, number of teams competing from each chapter, school size, and team score.
4. Compare FFA district and state level CDE scores by FFA chapter affiliation type.

Methods

This study is best described as associational research with correlational and causal-comparative components (Fraenkel et al., 2023). Arkansas is divided into three districts within the state FFA association: Eastern District, Northwest District, and Southern District (Arkansas Agricultural Education and FFA, 2023). In Arkansas there are 14 CDEs with district level competitions where eight teams from each district advance to the state level competition for a total of 24 teams competing at the state level in each CDE. Additionally, there are four CDE competitions held at the state level not requiring a district level qualifying event, so any chapter in the state may enter a team in those events at the state level.

When quantifying FFA chapters around the state, the Northwest District is characterized as having larger schools based on high school size and greater quantities of local FFA chapters, advisors, and FFA members when compared to the Eastern District. The Southern District is the smallest in terms of the same characteristics. Approximately 36% of FFA chapters in the state are affiliated, with 24 – 27 affiliated chapters in each district. Refer to Table 1 for a more detailed description of FFA districts in the state.

Table 1
Quantified Characteristics of FFA Chapters within Arkansas FFA Districts

	Eastern	Northwest	Southern	Total
Total FFA Chapters	71	83	57	211
Affiliated FFA Chapters	24	27	25	76
FFA Advisors	98	127	79	304
FFA Members	5,544	6,801	3,770	16,115
Students in School	27,171	47,219	21,703	90,093

Note. Students in School is the total students in grades 9-12 of all schools with an FFA chapter.

To accomplish the objectives of this study, data were collected from all district and state CDE competition results posted to judgingcard.com for spring 2023 competitions. Data were entered into a spreadsheet where team name, team score, and district were recorded. The state agriculture teacher directory was used to determine the number of FFA advisors for each chapter; FFA chapter size and affiliation type were determined by a report supplied by the state FFA advisor listing chapters, membership numbers, and affiliation type. This data was matched with results from judgingcard.com. To determine school size for each school with an FFA chapter, enrollment numbers for grades 9-12 were manually searched and recorded from the online Arkansas Department of Education (2023) Data Center.

To analyze collected data, frequencies were used to describe participation by district at the state level, while means and standard deviations were used to describe team scores by CDE and contest level/location. Pearson correlations were calculated to determine relationships among chapter membership size, quantity of chapter FFA advisors, number of teams competing from each chapter, school size, and team score. ANOVA was used to determine if differences existed among team scores based on district. Tukey HSD *post hoc* analyses were then used to specify where differences occurred. To conserve space, data were analyzed and reported from the 10 most popular CDEs with district qualifying events for objectives one through three: Agricultural Technology and Mechanical Systems, Agronomy, Electrification, Floriculture, Horse Evaluation, Livestock Evaluation, Milk Quality and Products, Poultry Evaluation, Veterinary Science, and Wildlife Management. Objective four analyses included all 14 district qualifying events (adding in Farm Business Management, Forestry, Land Judging, and Nursery/Landscape) plus four events held at state (Ag Communications, Food Science and Technology, Meats Evaluation and Technology, and Turf Management) not requiring a district qualifying competition. Independent samples *t*-tests were used to compare participation of affiliated FFA chapters to unaffiliated chapters. Significance was established *a priori* at $p \leq 0.05$ for all inferential statistics.

Results

Results showed Livestock Evaluation had the largest portion of FFA chapters participating at the district level, followed closely by Wildlife, Vet Science, and Horse Evaluation. Electricity and Agronomy had the lowest percentage of chapters participating when all districts were combined. Rankings of chapter participation in different CDE contests varied slightly by individual district. Table 2 provides a complete breakdown of participation by CDE contest and location/level of contest.

Table 2

Quantity of FFA Chapters with CDE Teams Competing by Contest and Location

CDE	Eastern		Northwest		Southern		Districts Combined		State
	f	%[a]	*f*	%[a]	*f*	%[a]	*f*	%[b]	*f*
Ag Mechanics	20	28.17	21	25.30	16	28.07	57	27.01	23
Agronomy	16	22.54	18	21.69	11	19.30	45	21.33	23
Electricity	13	18.31	20	24.10	14	24.56	47	22.27	23
Floriculture	16	22.54	26	31.33	11	19.30	53	25.12	22
Horse	26	36.62	44	53.01	20	35.09	90	42.65	23
Livestock	32	45.07	45	54.22	23	40.35	100	47.39	22
Milk Quality	10	14.08	23	27.71	19	33.33	52	24.64	22
Poultry	13	18.31	29	34.94	10	17.54	52	24.64	24
Vet Science	27	38.03	38	45.78	26	45.61	91	43.13	23
Wildlife	27	38.03	40	48.19	25	43.86	92	43.60	24

[a]Percentages reflected as portion of chapters in the district. [b]Percentages reflected as portion of chapters in the state.

Teams from the Eastern District generally came from larger FFA chapters with between one and two FFA advisors; sizes of participating Eastern District schools were between 400 and 600 students. The average FFA chapter and high school size was smallest in most Southern District contests. For all but three contests at the state level, the average number of chapter FFA advisors was greater than two. Table 3 provides a complete breakdown of FFA chapter characteristics for schools participating at each level/location by CDE competition.

Table 3

Descriptives of Average Chapter Size, Number of Advisors, and School Size by Contest

	Chapter Size		Advisors/Chapter		School Size	
	M	*SD*	*M*	*SD*	*M*	*SD*
Eastern District						
Ag Mechanics	145.35	169.74	1.95	1.23	587.60	528.72
Agronomy	130.69	124.10	1.75	1.24	461.31	353.22
Electricity	148.46	149.81	2.15	1.28	545.46	402.66
Floriculture	113.69	132.13	1.75	1.24	439.56	345.92
Horse	127.32	153.98	1.88	1.11	546.92	471.22
Livestock	117.94	139.90	1.66	1.07	505.38	451.09
Milk Quality	125.20	131.48	1.70	1.34	346.50	339.82
Poultry	138.54	151.72	1.92	1.38	483.69	399.42
Vet Science	120.26	151.32	1.67	1.14	491.41	466.24
Wildlife	108.33	112.85	1.70	1.07	420.89	330.24

Northwest District						
Ag Mechanics	115.43	128.66	1.71	0.96	425.95	337.01
Agronomy	122.50	139.45	1.78	0.81	642.67	846.00
Electricity	132.85	135.21	2.00	1.03	487.90	333.79
Floriculture	130.85	116.86	1.81	0.90	695.69	781.72
Horse	95.57	100.73	1.73	0.97	676.93	804.77
Livestock	95.76	96.67	1.56	0.84	544.87	640.06
Milk Quality	126.87	127.59	1.61	0.84	389.61	245.40
Poultry	115.93	117.26	1.86	0.99	789.69	858.48
Vet Science	117.42	104.65	1.76	0.97	718.92	798.34
Wildlife	106.40	103.91	1.65	0.92	650.75	734.21
Southern District						
Ag Mechanics	92.06	62.17	1.50	0.73	400.62	312.77
Agronomy	108.00	106.73	1.82	0.87	495.36	357.71
Electricity	114.43	85.77	1.43	0.76	447.29	380.10
Floriculture	74.00	59.53	1.36	0.81	359.82	341.56
Horse	94.25	84.52	1.70	0.87	417.50	354.06
Livestock	87.13	75.01	1.61	0.78	354.13	287.68
Milk Quality	102.47	87.73	1.74	0.87	477.63	372.56
Poultry	96.70	63.11	1.70	0.82	278.90	200.79
Vet Science	78.08	71.69	1.62	0.85	429.23	322.10
Wildlife	85.12	80.01	1.64	0.81	414.12	327.04
State						
Ag Mechanics	182.30	180.91	2.22	1.28	655.22	532.77
Agronomy	157.09	158.17	2.13	1.14	565.65	478.52
Electricity	161.63	143.76	1.91	1.04	427.04	320.03
Floriculture	138.73	136.42	1.86	1.08	476.32	360.90
Horse	152.22	135.73	2.04	0.83	665.39	482.27
Livestock	153.45	143.94	2.27	0.94	529.00	324.47
Milk Quality	128.32	130.93	1.68	0.89	371.55	320.72
Poultry	134.17	118.67	2.04	1.16	515.83	488.82
Vet Science	171.78	184.70	2.48	1.28	817.61	718.42
Wildlife	162.37	152.46	2.29	1.08	576.46	356.59

Note. Chapter size was based on number of FFA members/chapter. School size was quantified by the number of students in the high school (grades 9-12).

For objective two, means of state level CDE scores were compared by district using an ANOVA (Table 4). No statistically significant differences in scores between districts were found with Ag Mechanics ($F(2, 20) = 1.05$, $p = .369$), Horse Evaluation ($F(2, 20) = 2.19$, $p = .138$), Livestock Evaluation ($F(2, 19) = 0.94$, $p = .409$), or Veterinary Science ($F(2, 20) = 2.28$, $p = .128$). A statistically significant difference was found among districts' scores in Agronomy ($F(2, 20) = 4.08$, $p = .033$), Electricity ($F(2, 20) = 6.66$, $p = .006$), Floriculture ($F(2, 19) = 6.40$, $p = .007$), Milk Quality ($F(2, 19) = 13.16$, $p = .001$), Poultry ($F(2, 21) = 8.69$, $p = .002$), and Wildlife ($F(2, 21) = 3.93$, $p = .035$).

For *post hoc* analysis, Tukey HSD comparisons were made for each CDE competition where a statistically significant difference among district scores was found with the ANOVA omnibus test. For the Agronomy competition, Eastern District scores were significantly higher than Southern District scores ($p = .041$) and no other significant difference between districts were found. The Electricity competition had significantly higher scores from the Northwest District when compared to the Southern District ($p = .022$) and Eastern District ($p = .009$). There was not a significant difference detected between Eastern District and Southern District scores. The state Floriculture CDE competition had significantly higher scores from teams in the Northwest District when compared to the Southern District ($p = .005$), but no other statistically significant differences were observed between other districts. The Milk Quality CDE contest had higher scores from the Northwest District when compared to both the Eastern District ($p = .001$) and the Southern District ($p = .012$). A significant difference in scores between the Eastern District and Southern District scores in Milk Quality was not detected. For the Poultry CDE, higher scores came from teams in the Northwest district when compared to the Eastern District ($p = .002$) and Southern District ($p = .015$). Eastern District and Southern District scores were not significantly different. Wildlife team scores were significantly higher from the Northwest District when compared to the Southern District ($p = .040$). No other differences between district scores in the Wildlife competition were found.

Table 4

ANOVA Results Comparing Team Scores by FFA District at the State Level Competition

	Eastern		Northwest		Southern				
CDE	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
Ag Mechanic[a]	757.25	145.07	712.75	270.28	615.57	115.04	1.05	.369	.10
Agronomy[b]	1196.00	337.15	1161.50	252.01	853.57	`74.25	4.08	.033	.29
Electricity[c]	672.75	199.86	987.37	148.09	701.00	217.17	6.66	.006	.40
Floriculture[d]	1537.57	260.30	1740.25	185.54	1275.29	114.63	6.40	.007	.40
Horse[e]	1420.57	50.64	1491.63	31.93	1276.50	349.08	2.19	.138	.18
Livestock[f]	1683.29	89.33	1733.63	73.66	1709.71	41.08	0.94	.409	.09
Milk Quality[g]	625.83	131.79	1026.50	120.93	790.37	178.58	13.16	.001	.58
Poultry[h]	1506.37	202.05	1785.12	96.78	1569.87	93.57	8.69	.002	.63
Vet Science[i]	1598.50	175.41	1719.71	156.80	1534.38	173.26	2.28	.128	.19
Wildlife[j]	1904.25	470.64	2300.75	277.83	1819.25	323.25	3.93	.035	.27

[a]$df = 2, 20$, [b]$df = 2, 20$, [c]$df = 2, 20$, [d]$df = 2, 19$, [e]$df = 2, 20$, [f]$df = 2, 19$, [g]$df = 2, 19$, [h]$df = 2, 21$, [i]$df = 2, 20$, [j]$df = 2, 21$.

To describe relationships among team scores and FFA chapter characteristics, Pearson correlations were calculated. As shown in Table 5, the relationship between FFA chapter size (measured in number of members) and CDE team scores varied by district and CDE contest. Substantial, positive associations (Davis, 1971) were found in the Eastern District with Agronomy and Poultry while moderate, positive associations were found with Ag Mechanics, Agronomy, Electricity, Floriculture, Livestock, Milk Quality, Vet Science, and Wildlife. The Northwest District had moderate, positive associations in all CDE competitions except Horse Evaluation. The Southern District only had one moderate, positive association in Horse Evaluation, however there was one negative, very strong correlation in Poultry. Positive relationships between chapter size and team scores were moderate at the state competition in Ag

Mechanics, Electricity, Livestock, Milk Quality and Vet Science while a positive, substantial association was found with Agronomy.

Table 5
Relationships Between FFA Chapter Size and CDE Team Scores

CDE	Eastern	Northwest	Southern	State
Ag Mechanics	.44	.45*	.28	.31
Agronomy	.59*	.42	-.01	.52*
Electricity	.14	.46*	.17	.33
Floriculture	.17	.46*	.05	.24
Horse	.09	.28	.36	.18
Livestock	.27	.36*	.17	.33
Milk Quality	.13	.44*	.19	.33
Poultry	.53	.32	-.73*	.14
Vet Science	.43*	.36*	.03	.39
Wildlife	.34	.31	.22	.11

*$p \leq .05$.

As seen in Table 6, correlations between the number of FFA advisors in a chapter and team scores revealed several moderate and substantial correlations of significance. In the Eastern District, a substantial, positive correlation was found with Agronomy while moderate, positive associations were found with Ag Mechanics, Livestock, Poultry, Vet Science and Wildlife teams. At the Northwest District competition, the association between number of FFA advisors and team scores were positive and substantial in Floriculture and Milk Quality while positive, moderate associations were found in Ag Mechanics, Livestock, and Vet Science. The Southern District competition had a positive, substantial relationship in Livestock Evaluation and a negative, substantial relationship in Poultry. Positive, moderate relationships were found in Agronomy and Wildlife. At the state competition, associations were substantial and significant for Vet Science, moderate for Ag Mechanics, Agronomy, Livestock and Milk Quality.

Table 6
Relationships Between Number of Chapter Advisors and CDE Team Scores

CDE	Eastern	Northwest	Southern	State
Ag Mechanics	.44	.38	.09	.34
Agronomy	.54*	.22	.45	.34
Electricity	.09	.07	.15	.12
Floriculture	.15	.57**	-.27	.16
Horse	.15	.28	.01	-.20
Livestock	.34	.48**	.51*	.39
Milk Quality	.05	.55**	-.09	.39
Poultry	.37	.32	-.56	.29
Vet Science	.46*	.49**	.12	.56**
Wildlife	.37	.23	.33	.05

*$p \leq .05$. **$p \leq .01$.

Correlations between school size and CDE team scores (Table 7) were mostly low to moderate for the Eastern District, with a significant, moderate relationship for Vet Science. For the Northwest District, significant, moderate associations were found with Ag Mechanics and Vet Science. Southern District associations between school size and team scores were positive and substantial for Agronomy, negative and substantial for Floriculture, negative and moderate for electricity, while all other teams had low or negligible associations. Relationships at the state level were mixed with three contests having negative associations and Poultry and Vet Science having moderate, positive associations.

Table 7

Relationships Between School Size and CDE Team Scores

CDE	Eastern	Northwest	Southern	State
Ag Mechanics	.44	.46*	-.01	.23
Agronomy	.24	.22	.64*	.29
Electricity	.34	-.05	-.46	.22
Floriculture	.20	.15	-.57	.16
Horse	.10	.13	.14	-.27
Livestock	.32	.05	-.03	-.05
Milk Quality	.01	.19	-.18	.16
Poultry	.33	.19	-.16	.31
Vet Science	.47*	.42**	.17	.37
Wildlife	.19	.16	.28	-.19

Note. School size was quantified by the number of students in grades 9-12. $^{*}p \leq .05$. $^{**}p \leq .01$.

For the final objective, FFA district and state level CDE scores by FFA chapter affiliation type were compared. This included an analysis of the number of teams competing at each of the three FFA district level competitions in each of the 14 CDEs as well as their advancement to the state level competition. The four CDEs not requiring district qualifying events to compete at state were analyzed separately. Overall, the Northwest District had the most teams competing at the district level ($f = 371$). When considering FFA chapter affiliation type, the highest percentage of teams from affiliated FFA chapters was from the Southern District (52.56%). Teams from affiliated FFA chapters advanced to the state level competition most often from the Eastern District (53.40%). The Southern District had 75% of their nonqualifying state teams come from affiliated FFA chapters. Refer to Table 8 for a complete breakdown of teams competing by FFA chapter affiliation type.

Table 8

FFA District Breakdown of Teams Competing and Advancement by Chapter Affiliation Type

	Affiliated ($n = 68$)		Unaffiliated ($n = 104$)		Total
	f	%	*f*	%	*f*
Eastern District					
District Teams Competing	116	48.33	124	51.67	240
District Teams Advancing	55	53.40	48	46.60	103
Nonqualifying State Teams*	6	37.50	10	62.50	16
Northwest District					
District Teams Competing	141	38.01	230	61.99	371

District Teams Advancing	45	41.28	64	58.72	109
Nonqualifying State Teams*	8	36.36	14	63.64	22
Southern District					
District Teams Competing	113	52.56	102	47.44	215
District Teams Advancing	53	53.00	47	47.00	100
Nonqualifying State Teams*	15	75.00	5	25.00	20
State Totals					
District Teams Competing	343	42.93	456	57.07	799
District Teams Advancing	153	49.04	159	50.96	312
Nonqualifying State Teams*	29	50.00	29	50.00	58

*Nonqualifying State Teams are the teams competing at the state competition but do not require a district qualifying contest.

When comparing CDE participation and advancement by FFA chapter affiliation type (Table 9), affiliated FFA chapters had statistically higher participation in district level CDEs, greater numbers of teams qualifying for the state competition, a higher percentage of teams qualifying for the state competition, and a greater number of teams participating in the state CDE competitions.

Table 9

Comparing CDE Participation and Advancement by FFA Chapter Affiliation Type

	Affiliated (n = 68)		Unaffiliated (n = 104)				
Variable	*M*	*SD*	*M*	*SD*	*t(70)*	*p*	*d*
District Level Teams[a]	5.46	3.25	4.31	2.83	2.45	.01	0.38
Teams Advancing[b]	2.25	2.50	1.52	2.09	2.07	.04	0.32
% Teams Advancing[c]	39.21	33.89	26.83	30.64	2.48	.01	0.39
Total State Level[d]	2.82	2.81	1.80	2.47	2.52	.01	0.39

[a]District Level Teams are total teams from all districts (3) and CDEs (14) combined, [b]Teams Advancing are total teams advancing from all districts and CDEs combined, [c]% Teams Advancing is percentage of teams advancing to state from all districts and CDEs, [d]Total State Level is all teams competing in CDEs (18) at the state level including those not requiring qualification from district.

Conclusions/Discussion/Implications/Recommendations

Based on results of this study, less than half of all chapters in the state participated in each of the competitions, indicating lower levels than found in previous studies (Harris, 2008; Talbert & Balschweid, 2004). Higher percentages of chapters participated in Northwest District competitions compared to Eastern and Southern Districts for all competitions except Ag Mechanics, Agronomy, Electricity, and Milk Quality. Mixed results were found with chapter size, number of advisors, and school size for teams competing at the district level. At the state level, teams generally came from larger chapters with more FFA advisors and larger schools. Also at the state level, six out of the ten contests analyzed had statistically significant differences in team scores based on district. Teams from the Northwest district had higher team scores compared to the Southern District and higher scores compared to the Eastern District for three competitions. Based on results, it is plausible students from the Southern District are

disadvantaged compared to the other districts while students from the Northwest District may have an advantage compared to other districts, consistent with findings by Franklin and Armbruster where differences were found based on geographic location (2012).

Correlations revealed several substantial and moderate associations between chapter size and success at both the district and state levels; however, this was not consistent across districts or CDE competitions. Similar results were found relating to school size. Interestingly at the state level, three of the ten CDEs evaluated had negative correlations with school size, indicating students from smaller schools tended to perform better than those from larger schools. This was not expected based previous literature related to achievement in core academic subjects (Egalite & Kisida, 2016; Young, 1998). Although, Herren (1984) found smaller schools performed well at higher levels of competition indicating subject context may be an influence interacting with school size and location, which is supported by the Multi-level Model of School-Effectiveness (Scheerens & Stoel, 1988). At the classroom level of this model, some of the strongest correlations were found with relationships between the number of advisors in a chapter and CDE success. While it varied based on CDE competition and location of contest, this could indicate students with more advisors in their chapter have a competitive advantage.

When describing chapter participation by affiliation type, less than half the teams competing at the district level were from affiliated FFA chapters. This was to be expected as only about a third of the chapters in the state were affiliated, a number slightly higher than what was reported by Sheehan and Moore (2019). Based on comparisons made, affiliated chapters had statistically higher levels of participation statewide, aligning with findings indicating affiliated FFA chapters tend to have higher levels of participation (Sheehan et al., 2023). On average, affiliated chapters in this study had approximately five teams competing at the district level while unaffiliated chapters had four teams competing. In terms of performance, all districts had a statistically higher percentage of teams from affiliated chapters advance from the district level to the state level compared to teams from unaffiliated chapters. This indicates students who are members of an affiliated FFA chapter may have an advantage compared to those who are not. Choosing whether to operate an FFA chapter as affiliated or unaffiliated is a school-level input based on the multi-level model of school effectiveness (Scheerens & Stoel, 1988) with potential implications for overall student opportunities and performance, as observed with this study.

Based on the conclusions, we recommend increasing efforts in the state to support students at schools with competitive disadvantages, especially in the Southern District. While winning is not necessarily the goal, performance should reflect learning. Providing more training resources to all FFA members in the state may be another way to help. Results from this study could also help administrators in their decision to add additional SBAE teachers. Contest providers and CDE committees should also be cognizant of different advantages schools may have and attempt to level the playing field. With increased participation and performance observed from affiliated FFA chapters, SBAE teachers, administrators, and state SBAE staff should consider determining how to fund all students' membership through affiliation. Future studies on this topic should include a larger number of CDEs across different locations as well as analysis of other FFA competition areas such as LDEs, awards, scholarships, and agriscience fair. Additional work identifying variables, which could help improve access and competition for all students is needed. Other factors influencing student success through various avenues of

competition in SBAE education should also be explored. Studies should continue to analyze the effects of chapter affiliation type on variables such as participation, performance, and fulfillment of National FFA Organization priorities.

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A Qualitative Analysis of the Development and Implementation of the "More to Meat" Campaign in Australia

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The "More to Meat" campaign in Australia aimed to increase public awareness of the red meat industry in regional communities through transparent communication. To better understand the strategic development and implementation of this campaign, we completed a case study using semi-structured interviews with participants from four stakeholder groups. Participants were sought through purposive and snowball sampling. Data were collected over Zoom, transcribed through Otter.Ai, and analysis conducted using in vivo coding and thematic creation. Research objective one yielded four themes: 1) Changing our story, 2) There's more to processors than meets the eye, 3) Arming the industry for the future, and 4) Empowered by insights. Research objective two yielded three themes: 1) Nothing but positivity for the campaign, 2) Putting the industry's best foot forward, and 3) Room for improvement. Research objective three yielded three themes: 1) Perceptions are shifting in the right way, 2) Stakeholder engagement is critical, and 3) Let's not drop the ball now. Results indicated the campaign had increased awareness of the red meat industry and participants supported continuing the campaign. Future research should include a content analysis of the campaign content and interviews with additional stakeholder group representatives.

Introduction & Literature Review

The Australian red meat industry is comprised of beef cattle, sheep, and goat sectors (Meat & Livestock Australia [MLA], n.d.-a) as well as the post-farmgate sector of processors, retailers, and smallgoods (Australian Meat Industry Council, 2020). This industry feeds around 75 million people globally (National Farmers' Federation, 2020). Red meat sales contribute AUD$11.3 billion and AUD$13.5 billion annually in domestic and export sales, respectively (Red Meat 2030, 2021). The industry also contributes significantly to employment, particularly in rural towns, with more than 400,000 people employed directly and indirectly (Red Meat 2030, 2021). Red meat processing is an integral part of the agricultural supply chain in Australia, contributing AUD$21 billion to the Australian economy. The processing sector is supported by the Australian Meat Processing Corporation (AMPC) for research and development and the Australian Meat Industry Council (AMIC) for advocacy and policy for the sector.

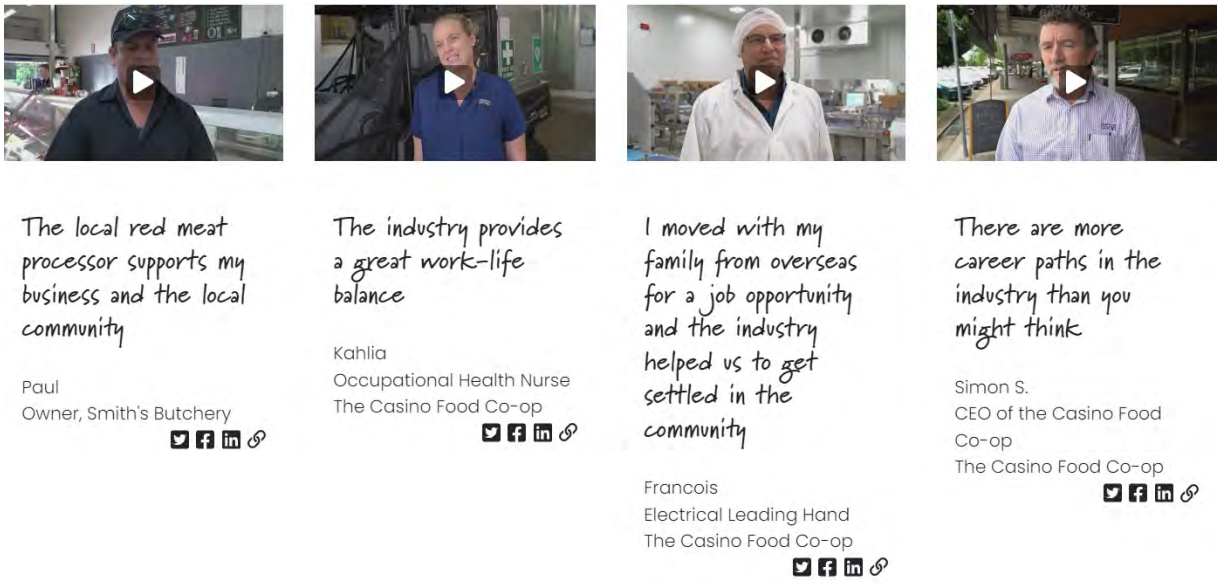
Red meat processors not only play a vital role in rural and regional employment, but also provide social, environmental, and economic sustainability (Whitewood, 2023). With fewer people having a connection to agriculture, people are turning to social media to learn about the red meat industry (Gorham et al, 2016; Packwood Freeman, 2009). Only 28% of Australian consumers reported feeling knowledgeable about the red meat industry (MLA, n.d.-b). One way to address this lack of awareness is through the development and implementation of strategic communications campaigns (Gorham et al, 2016) to provide information consumers need to make informed decisions about their food choices (Rumble & Irani, 2016). This is often

accomplished with more emphasis on transparent information and provenance stories (Bray et al., 2017; Weinreich, 2010), which is not only where food comes from, but its journey from start to finish (Barling et al., 2011).

An example of a strategic communications campaign about the agricultural industry is the "More to Meat" campaign, launched on August 8, 2022, by the Australian Meat Processing Corporation (AMPC) (Sheep Central, 2022). The campaign was guided by four objectives: 1) growing support for the industry, 2) advancing the industry's performance, 3) reducing opposition against the industry, and 4) supporting employee recruitment. The campaign highlighted "community voices" to promote the benefits of working in red meat processors (More to Meat, 2023) and demonstrate the diversity of people and roles within the industry (see Figure 1). The "More to Meat" campaign was an integrated campaign with content shared across print, paid, and social media. AMPC invested in consumer research to inform the strategic development of the campaign and its content based on current perceptions of the red meat industry, which occurred before and during the campaign. The campaign aims to positively shift consumer attitudes toward red meat processors in regional communities (Red Meat Advisory Council, 2015).

Figure 1

A selection of profiles developed for the campaign including women and international workers, and various sections of the supply chain (More to Meat, 2023).



Theoretical Framework

The theoretical framework for the study was based on stakeholder theory and corporate social responsibility. Stakeholder theory stresses the relationships between an organization and its stakeholders in terms of creating value for each group. Stakeholders can be defined as "any group or individual who can affect or is affected by the achievement of the firm's objectives" (Freeman, 1984, p. 25). Trust underpins the relationships between organizations and

stakeholders, with stakeholders placing trust in an organization to act in their best interest (Greenwood & Van Buren, 2010). When trust or trustworthiness is absent, exploitation can occur, which results in a breakdown in the relationship between stakeholders and the organization.

Serra's (2023) stakeholder management model has two variables: interest and influence. Interest refers to how concerned a stakeholder is in the outcome of an organization or project, while influence refers to the power each stakeholder has on the organization or project materials or outcomes (Mendelow, 1981). For the "More to Meat" campaign, five stakeholder groups were identified: 1) the Australian Meat Processing Corporation, 2) the campaign development company, 3) red meat processors, 4) the Australian Meat Industry Council, and 5) the public that live in regional towns where a red meat processor is present. These groups were categorized as either: 1) influential and uninterested, 2) influential and interested, 3) not influential and uninterested, and 4) not influential and interested. Figure 2 provides the stakeholder theory (Serra, 2023) category descriptions and designates the various stakeholder groups for the "More to Meat" campaign.

Figure 2

The stakeholder management model (Serra, 2023) applied to the "More to Meat" campaign.

Influential & Uninterested	**Influential & Interested**
Fulfill requests when asked • Government bodies	*Want to be regularly updated and included in key decisions* • Red meat processors in Australia • AMPC and its Board
Not Influential & Uninterested	**Not Interested & Influential**
Want to be informed of any major updates • People living in regional and rural Australian communities where a red meat processor is present	*Consider and update regularly* • Processor employees

Stakeholder theory has been linked to corporate social responsibility (CSR). Both theories emphasize the importance of acting in the best interest of stakeholders or society as a key business responsibility (Freeman & Dmytriyev, 2017). CSR is a concept where organizations and businesses attempt to manage their obligations to society beyond their stakeholders (Béji et al., 2020). An organization's CSR involvement can be based on its beliefs and values or pressure from external expectations. CSR is often related to an organization's moral obligation to fulfill not only its stakeholders' needs but also the needs of society (Wood, 1991). CSR can help shape how society and key stakeholders view a business and its reputation (Chen et al., 2020). This applies to the "More to Meat" campaign as it is aimed at increasing awareness of the red meat industry within key stakeholder groups, while also fulfilling its societal obligations of highlighting the benefits of working in the red meat sector to build trust and reputation.

The RACE formula, developed by John Marston in 1963, identified a sequence of elements to assist in creating public relations. Standing for research, action, communication, and evaluation, the RACE formula provides a linear framework that professional communicators can use (Bégin & Charbonneau, 2012). However, Guth and Marsh (2003) suggested that the model should be dynamic and that evaluation should occur at each phase. Not only is the RACE formula applicable to the "More to Meat" campaign and its development process, but it also allows campaign creators and stakeholders to appraise how the campaign was created and understand how it was being evaluated and changed throughout the process.

Purpose & Objectives

The purpose of the study was to understand the strategic development and implementation of the "More to Meat" campaign in Australia. This study was guided by the following objectives:

1. Identify the motivations for creating the campaign
2. Describe the stakeholder groups' perspectives of the campaign
3. Determine the effectiveness of the campaign in achieving its goals

Methods

To collect data to answer the research objectives, in-depth semi-structured interviews were conducted. Purposive sampling was used to select individuals who belong to one of the identified stakeholder groups and fit the following characteristics (Campbell et al., 2020): (1) an individual who was involved in, personally or through their company, and is knowledgeable about the "More to Meat" campaign, and (2) an individual who can, and is willing to, discuss the development process of the campaign and the perceived outcomes. Participants identified within each stakeholder group were contacted via email, and a follow-up email was sent two weeks later due to non-response. Snowball sampling was also used to increase the sample size and ensure that all appropriate participants were interviewed (Noy, 2008). Participants from AMPC provided a list of contacts that fit the characteristics listed above. These potential participants were also contacted via email with a follow-up email if there was no response after two weeks.

An interview guide was developed for each stakeholder group regarding the motivations for creating the campaign and its perceived success. For AMPC, the interview guide asked about the campaign development, including the intended audience, key messages, and key metrics. The campaign developers were asked about the creative process behind the campaign, how channels were selected, and how messages were developed for content. Red meat processor questions centered on their familiarity with the campaign, why participants were chosen to participate in the campaign, and how they would like to see the campaign progress. Lastly, the policy interview guide asked about how the campaign could be leveraged politically, the campaign's influence on policy, and if the campaign had increased political support for the red meat industry in Australia. Significant effort was placed on creating open-ended questions that were written in a specific order that links theoretical concepts together relating to the research objectives (Kvale & Brinkmann, 2014; Pedersen et al., 2015). As Mason et al. (2020) suggested each interview guide was reviewed by an expert panel before each participant was interviewed. The interviews were conducted, and recorded with the participant's consent, over Zoom due to the researcher residing in the United States and the participants residing in Australia. Once each interview was completed, the audio file was uploaded into Otter.Ai to convert it into a transcript. Each

transcript was reviewed to address any errors such as removing duplicate words and correcting any mistranslations. Pseudonyms were assigned to each participant's transcript (Table 1).

Table 1

Description of participants (N = 7)

Pseudonym	Stakeholder group	Company position
REBECCA	AMPC	Program Manager – People and Culture
FIONA	AMPC	Industry and Government Relations
SIMON	AMPC	Chief Executive Officer
PERRI	Red meat processor	Chief Executive Officer
HEATH	Campaign creator	Campaign Manager
MATT	Red meat processor	Director – Corporate Communications
ANNA	AMIC	Chief Executive Officer

To analyze the data, we used in vivo coding and thematic analysis. In vivo coding involves drawing the participant's own words from the interview transcripts that are often catchy and colloquial (Creswell & Poth, 2018; Saldaña, 2011). These codes encapsulate the participants' own words and allow the reader to see how significant the participant's own words are to the creation of themes (Saldaña, 2011). Thematic analysis was the next step in analyzing qualitative data. Thematic analysis brings codes together that are similar and deducts an overarching theme that explains the group of codes (Scharp & Sanders, 2019). Themes can be deduced from words already present in the codes or can be created separately (Saldaña, 2011). Themes should help answer the research questions, provide insight into participants' answers, and should be interpretations of the data collected (Saldaña, 2011).

Research rigor for this study was established through credibility, transferability, dependability, and confirmability (Creswell & Poth, 2017). Choosing appropriate research methodology as well as including multiple information sources and stakeholder groups helped determine credibility of the data collected. Detailed information regarding the methodology of the study assisted with research transferability, as well as providing documentation across all aspects of the research process for dependability. To address researcher subjectivity, the lead researcher is from Australia and has experience working in the Australia red meat industry. The researcher understands the importance of the "More to Meat" campaign to the Australian industry in securing its social license to operate in a proactive manner. Prior knowledge of the campaign was limited as the researcher was residing in the United States. Because this study is limited to the specific "More to Meat" campaign, the findings cannot be generalized to other campaigns. However, the findings can be transferred to similar campaigns that seek to promote agriculture.

Findings

RO1: Identify the motivations for creating the campaign

Four themes emerged that addressed Research Objective 1: 1) Changing our story, 2) There's more to processors than meets the eye, 3) Arming the industry for the future, and 4) Empowered by insights.

Changing our story

When asked about the rationale behind the creation of the campaign, each participant discussed the need for the narrative around the industry to be changed which led to the first theme to emerge. Participants individually stated that this stemmed from negative media attention that had caused reputational loss such as animal activists and negative animal welfare outcomes. REBECCA strongly felt "it was the negative media attention, the constant barrage that we were getting, that made us want to do something about it." PERRI echoed this, stating "there was a whole group of factors that said 'Hey, we've got to be a bit more proactive on presenting our industry in a better light.'" SIMON offered a different view, stating they were "passionate about finding ways to improve the way that the industry is perceived." Participants highlighted that the reputational issues the red meat sector was facing were due to a lack of education and awareness by the public, whether urban or rural. HEATH summarized the creation of the campaign as "primarily around building awareness and understanding of the essential role that processors play and why they are essential to the prosperity of regional towns and cities, and their contribution to the economy." ANNA expanded on this by saying perceptions also need to be changed "within key stakeholder groups" and it is not only the perceptions of consumers that need to change. Additionally, REBECCA described the need for "champions and supporters" to help bridge the gap in knowledge and awareness between the red meat industry and the public.

There's more to processors than meets the eye

The second theme emerging from the results was the need to show the public and consumers there is more to the red meat industry than the processing of animals. Participants individually discussed how the "More to Meat" campaign provided the red meat industry with the opportunity to showcase what it has to offer. FIONA stated that there are many "benefits of having a meat processor" such as employment opportunities and economic impact within rural and regional communities. HEATH echoed this by saying the industry needs to "reaffirm to people that… processors play a really important role in jobs, in supporting the local economy, [and] supporting the supply chain." The participants identified two main benefits of the campaign for the processing industry: highlighting career opportunities and community engagement. PERRI mentioned the campaign was "an opportunity to start putting in front of them [the public] more about our business. That there's more to it than just the meat works on the hill. It's actually career opportunities." ANNA supported the previous statement and said, "It's not just about the role, but it's also then how they've [the employees] integrated and become active members of the community."

Arming the industry for the future

The strength and longevity of the red meat industry were at the forefront of all participants' minds, leading to the third theme for RO1. Adopting a proactive approach can help the red meat industry thrive regardless of the media attention it may receive. MATT had a strong opinion about how the "More to Meat" campaign was able to "provide a strong and strategic voice" for the industry to leverage. MATT continued to say the campaign was "a great addition to our arsenal of programs to encourage people into our industry… we're putting our money where our mouth is." Coming from a political angle, REBECCA mentioned the campaign would "put the industry in a better position to get what they need" in terms of funding and practical support. SIMON provided an alternative opinion to strengthening the industry stating, "The industry needs to position itself to fill up its goodwill bucket so when something happens, the stakeholders and decision-makers aren't going to, you know, pull a shotgun out and shoot from

the hip." Participants mentioned that given the reactionary nature of the red meat industry to negative press and media, support is necessary from a variety of audiences. REBECCA stated, "If we're going to be supported by anyone, we first need to be supported by the people that work in our processing plants, that live near our processing plants, because without their support we may cease to exist at some point."

Empowered by insights

According to participants, the "More to Meat" campaign was developed based on years of consumer research. This research looked at consumer perceptions of the red meat industry and message testing. This led PERRI to highlight that "there was quite a substantial level of soft support… people that are undecided, they could be supportive, and they could be persuaded to be supportive." In each interview, participants said there was a large amount of effort dedicated to ensuring the success of the campaign before it began. SIMON clarified that "undertaking some reputational research in the first instance, to then inform the development of the campaign" was imperative to the campaign's success and a "critical part in the formation of the campaign strategy." HEATH elaborated on the importance of research to understand the people whose perceptions the campaign was attempting to change:

> If you're trying to change public opinion or raise awareness of something, it is essential to have an understanding of that context and adapt to that context…if you went into it and started prosecuting a campaign message without identifying what actually matters to people, you're just not going to get anywhere or you're going to really struggle.

Before launching the campaign, messages were tested with the target audience to determine if they were "salient or actually cutting through," as HEATH stated. Additionally, HEATH called attention to the need for messages and information presented in the campaign to be trustworthy stating that "they absolutely have to be credible." The research undertaken to inform the campaign allowed three main themes to be identified as potential focal points for the campaign. SIMON identified these areas as "economic contribution regionally and globally, employment in the regions, and also the piece around Australia's standing globally."

RO2: Describe the stakeholder groups' perspectives of the campaign

Three themes emerged to address Research Objective 2: 1) Nothing but positivity for the campaign, 2) Putting the industry's best foot forward, and 3) Room for improvement.

Nothing but positivity for the campaign

From all stakeholder groups interviewed, there was overwhelming positivity and support for the campaign. Support ranged from PERRI saying, "it's certainly worth celebrating," to HEATH stating they "are so glad that the industry is patting itself on the back." Given the range of issues the red meat industry faces, many participants articulated their pride in the industry for being proactive. MATT described the proactiveness of the campaign when he said "someone's been brave enough to dip their toe in, and I'm really glad as someone who's worked in the red meat industry, that it was the red meat industry that jumped in the deep end with this" when discussing his pride in the industry for trying to get ahead of negative perceptions rather than being reactive. PERRI offered a similar view from the creative perspective of the campaign: "It was so important that we actually have a campaign to do positive stories and get the message out there."

Putting the industry's best foot forward

The "More to Meat" campaign highlighted the stories of several red meat employees across the country from different processors and different ethnic backgrounds. This showcased the people and jobs available within the industry to help processors and their employees feel "personal pride [in] the workforce," as PERRI said. The campaign featured several actual employees of the processing plants. REBECCA discussed the process for finding participants for television advertisements and social media saying that they were "looking for a mum who's basically gone through the system, or… looking for a dad who basically started work there after high school and who's actually progressed through the processing plant." SIMON said, "Choosing people that have got really good stories" was also important to the campaign. HEATH built on this by highlighting that the stories filmed were "not to say red meat processing supports local towns, but its red meat processing supports Julie who has worked in the red meat sector for 20 years and met her husband there."

PERRI's processing plant had multiple women involved in the campaign. PERRI said, "Our focal point was on a couple of employees, a couple of ladies in particular, that are really champions in what they're doing… they were a shining example of where we are heading." PERRI then went on to say that "our industry has to be an influencer" and providing real stories will help achieve this. The red meat processing sector in Australia is relatively small, so it is ideal for the industry to present a united front. ANNA articulated this about the "More to Meat" campaign: "We are actually interested in what is good for the entire meat industry. Because if it's good for the meat industry, it's going to be good for us as well."

Room for improvement

Participants were asked in their interviews if they saw any areas that could be improved within the campaign and they provided open and honest answers to how the campaign could continue to grow and thrive. SIMON saw the campaign as "a platform that can be built on for other purposes…we're in the unique position where I think we can deliver something that's not bespoke, but something… relatively useful and valuable." When asked if the campaign would move to urban areas, SIMON said, "Let's just focus on regional areas to start with and see how that goes." PERRI said there was space to increase transparency within the campaign saying, "I think more openness, more transparency is certainly what consumers, and the public are demanding that and we've got to give it." Transparency between the stakeholder groups was also noted as a key area to the success and longevity of a campaign. SIMON recognized that "the only thing we could've done better or different, is really articulating how individual processing plants can benefit from the campaign." Allowing individual processing plants to build on the "More to Meat" campaign was identified by ANNA who said, "I can leverage from their campaign… that's where we would get sort of that little bit of a bang for our buck." Additionally, PERRI highlighted the need for "keeping the information and the materials up to date and relevant" specifically if the campaign is to continue for years to come. If the campaign were to be extended, ANNA wanted the company they worked for "to be acknowledged as one of those key players in [those] regions" rather than keeping the campaign neutral because processor logos and paraphernalia were excluded from video content. FIONA acknowledged the campaign could "have a bit more structure around the different areas… it seemed to be very heavily focused on the people." These different areas could have included "a sustainability pillar,

showcase the automation that's coming to industry, and the market access," which FIONA highlighted as potential areas of the campaign.

RO3: To determine the effectiveness of the campaign in achieving its goals
Three themes emerged relating to Research Objective 3: 1) Perceptions are shifting in the right way, 2) Stakeholder engagement is critical, and 3) Let's not drop the ball now.

Perceptions are shifting in the right way
The "More to Meat" campaign was underpinned by goals and objectives it wanted to achieve. One of the goals of the "More to Meat" campaign was to change the perceptions of the red meat industry, and the responses from the participants of this study emphasize that this has been achieved. SIMON was especially vocal regarding this, affirming "there's been a positive shift… I couldn't be much happier with the result." FIONA associated the success of the campaign with the increase in awareness, revealing "it's obviously got people talking about red meat processing, and possibly understanding a little bit more about the numbers of people that are employed and the contribution back to the economic area." Participants said the "More to Meat" campaign also made red meat processors understand how they can play an even bigger role in their communities. PERRI noticed this when engaging with the campaign, stating "It gave us the resources to then engage our local community and engage them either through local media or advertising." ANNA added to this by mentioning "we're actually keeping people in those communities." Not only does the "More to Meat" campaign provide opportunities to processors and their communities, but also to other commodities within the Australian agricultural industry.

Stakeholder engagement is critical
The "More to Meat" campaign was created for AMPC's stakeholders, and the continual engagement of these stakeholders will ensure the campaign remains successful for all involved. SIMON mentioned the campaign had "been relatively well received by industry stakeholders," which included "politicians [who] had quite a bit of interest." According to participants, not only have politicians begun to discuss the campaign, but also the families and friends of those employees featured. SIMON talked about "politicians [having] quite a bit of interest" and the potential leverage this could create for the red meat industry to increase support and funding. Furthermore, it is a source of pride for those involved as ANNA recognized when she said, "They're really proud to be involved in the campaign and their mates and their friends saw it." A small number of processors were involved in the production of the campaign. MATT commented, "I think some of them [members] thought they were missing out, which to me shows the power of the campaign if you're upset about missing out."

Let's not drop the ball now
With the extension of the campaign for the 2023 calendar year, participants voiced the need for the campaign to continue for years to come. Participants explained why they thought it was important to keep the momentum of the campaign going. PERRI made it clear that "there's a real need that we don't make this a one-off… think about how we keep on consolidating this good work into the future." HEATH offered a similar statement to "keep it relevant or keep it new; keep it fresh so that it doesn't result in fatigue." While many of the participants shared this outlook, SIMON highlighted some potential constraints that stakeholders may not realize,

including “resource availability… budgets to make sure that it can be something that’s sustained into the future.”

Additional findings

In addition to the themes identified for each research objective, participants continuously referenced the ability of rural and regional towns to flourish due to the red meat processors that support them. REBECCA stated, “If we’re going to be supported by anyone, we first need to be supported by the people that work in our processing plants, that live near our processing plants, because without their support we may cease to exist at some point.” SIMON identified three areas that red meat processors underpin in these communities: “economic contribution regionally and globally, employment in the regions, and also the piece around Australia’s standing globally.” HEATH echoed this when he said the industry needs to “reaffirm to people that… processors play a really important role in jobs, in supporting the local economy, [and] supporting the supply chain.” Participants understood that red meat processors were “actually keeping people in [those] communities” through employment opportunities, as stated by ANNA. The participants said by providing social, financial, and economic support to regional communities and their residents, red meat processors can help these towns become resilient.

Conclusions & Implications

The “More to Meat” campaign provided the Australian red meat industry with the opportunity to showcase its people and opportunities in an educational and relatable manner to consumers. Focused on regional and rural towns, the campaign aimed to increase awareness of the role red meat processors play in the longevity and resilience of these communities (More to Meat, 2023). Research Objective 1 was to identify the motivations for creating the campaign. All groups acknowledged that perceptions surrounding the red meat industry needed to change. This campaign considered years of research to understand consumers and their opinions and values, as well as what the industry needed to continue to thrive. This research also showed the industry’s appetite for the campaign to help rural communities become resilient while informing the public that the red meat industry provides employment opportunities and supports communities socially and economically (Gosnell et al., 2021). According to stakeholder theory, understanding influence and interest for each stakeholder group can help the organization comprehend motivations in the context of the group (Serra, 2023). The transparency efforts of the campaign provide stakeholders and society with the information they require to make informed decisions about the red meat industry, which demonstrates the red meat industry is recognizing its corporate social responsibility beyond its immediate stakeholders (Liang & Renneboog, 2017). Participants applauded the campaign’s proactive approach to taking on negative consumer perceptions with transparent information and relatable stories (Barling et al., 2011; Rumble & Irani, 2016). Participants saw this as an opportunity to show a united front as an industry to gain support from the government and public to fill up their “goodwill bucket.” By creating transparent two-way communications with the public and government, the red meat industry can build enough support and trust to negate potential negative attention (Williams & Martin, 2012).

Research Objective 2 was to describe the stakeholder groups’ perspectives of the campaign. By ensuring that each stakeholder group was involved in the development of the campaign, the consultation process, or as the intended audience, value was created for each stakeholder segment through engagement and consultation. This supports the application of stakeholder

theory to the study and highlights how two-way symmetric communication was used (Phillips et al., 2003). Holtz and Havens (2009) said transparency is necessary to help stakeholders make informed decisions. The "More to Meat" campaign's efforts demonstrated commitment to being transparent with consumers about how the industry operates by sharing relatable stories of those working in the industry. Adding a human aspect to the industry not only provides a "shining example of where we are heading [as an industry]," as mentioned by PERRI, but shows that the red meat industry is helping regional communities thrive. Showcasing these stories can help consumers relate to workers in the red meat industry if they see someone like them (e.g., a parent or an international worker), which has been seen in campaigns in the United States for companies such as McDonalds (Fischer et al., 2021). While each participant suggested areas to improve the campaign, these were minor and aimed at ensuring its continuity. Potential improvements included increasing transparency to other areas of the supply chain, ensuring campaign materials are kept relevant and up to date, as well as ensuring the processors involved in the campaign were recognized for their contributions. AMPC and the campaign development company should take these into consideration as the campaign progresses to ensure that processors feel included in the decision-making process and remain an interested and influential stakeholder (Serra, 2023). Companies can then begin to apply benefits to society at large and uphold their CSR (Freeman & Dmytriyev, 2017). AMPC and the campaign development company should also continue to support the campaign with regular consumer research, which literature has highlighted is imperative to understanding the target audience and tailoring key messages to inform campaign development (Berger et al, 2010; Lee & Kotler, 2016). This is an approach that should be adopted by any industry looking to create a campaign to increase awareness and trust and should follow the RACE formula of research, action, communication, and evaluation (Bégin & Charbonneau, 2012; Rumble & Irani, 2016).

Research Objective 3 was to describe the campaign's effectiveness in achieving its goals. The literature highlights the importance of identifying and engaging stakeholders who have a vested interest in an organization and its objectives (Freeman, 1984). While red meat processors were heavily engaged throughout the campaign's development process, engagement with groups such as local, state, and federal politicians could be increased. Gaining the support of politicians could help AMPC gain the funding required to continue the "More to Meat" campaign, as well as inform politicians of the issues facing the red meat industry including recruitment and retention of workers. While the "More to Meat" campaign was a national campaign, there could be additional work done to further engage smaller processors around the country and manage them as a separate stakeholder group from larger conglomerates (Serra, 2023). Given the extension of the "More to Meat" campaign into 2024, it is imperative that the momentum of the campaign endures and consumer perceptions continue to change in a positive manner. This highlights the continuation of education within stakeholder groups and society at large (Weinreich, 2010), particularly for consumers who do not live in a rural or regional setting. Although all participants anticipated the continuation of the campaign, there was an understanding of the constraints such as budget and available resources. Alternatively, educating processors on how they can leverage the "More to Meat" campaign within their communities with the resources already available would be a cost-effective measure.

Recommendations

Additional research regarding this campaign could analyze the campaign materials, specifically regarding how they were framed. Framing helps understand how content is perceived or understood by individuals (Goffman, 1974). It would be beneficial to determine how the "More to Meat" campaign content was framed to then provide recommendations to others in the red meat industry and broader agricultural areas to inform strategic campaign development. Another area of exploration would be consumer research and message testing to determine campaign awareness and perceptions of the developed content. This research could also examine what influence the campaign has had on trust in the red meat industry or behavioral intentions such as applying for a job in this industry. As those in the agricultural industry consider developing similar campaign efforts, they should follow the RACE formula of research, action, communication, and evaluation (Bégin & Charbonneau, 2012), which emphasizes the need for data-driven decision making.

Another avenue of research to explore would be the role influencers play in the red meat industry. Influencers can help change public opinion on contentious issues (Buddle & Bray, 2019). Some work has been done through Meat & Livestock Australia to educate a variety of influencers about on-farm production and husbandry practices. Avenues for advocacy could include using employees already showcased within the "More to Meat" campaign or finding existing influencers within, or outside, the red meat industry to help spread content. Finally, a comparative study between Australian and U.S. agricultural campaigns should be done. This could also be extended to include any country that has a red meat industry that wants to address their reputation among stakeholders. This will help determine similarities and differences in execution and success between countries to help develop better campaigns in the future.

This study provides several recommendations for practice. First, other Australian agricultural commodities should look to the "More to Meat" campaign as an example of what can be done to improve consumer perceptions. Consumer trust and transparency is vital to the survival of other commodities as mistrust is not unique to the red meat industry. The red meat industry should look to leverage the "More to Meat" campaign politically to encourage support and funding in the future. This will help ensure that any negative events that may occur do not result in a large reputational loss. Engaging politicians allows the red meat industry to leverage this relationship within the bounds of corporate social responsibility. Finally, this campaign can be used as a case study in higher education courses about agricultural communications. Campaign courses can provide students with the skills necessary to go into the workforce and help develop similar communication materials. There are currently no dedicated agricultural communications courses in Australia, so the insights from this study could inform the curriculum development process based on what is already being done in the United States. Courses in agricultural communications would help teach students who want to work in agriculture about how strategic communications can influence consumer education and organizational reputation. This would eventually provide companies and organizations in Australia with designated communications staff who have been taught how to effectively communicate about agriculture.

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Determinants of Social Media Use by Government Agricultural Extension Workers in Nepal

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Abstract

The popularity of social media has only continued to promote its application in agricultural extension internationally. In order to continue to understand this trend, a quantitative research study was carried out to investigate the determinants and barriers of using social media by governmental extension workers in Nepal. The study was conducted in the Bagmati province, Nepal with a sample size of 248 extension workers. Descriptive analyses, forced ranking method, and binary logistic regression were carried out in SPSS and Microsoft-excel for data analyses. More than two thirds of the respondents were social media users with the remaining being non-users for agricultural extension. Among the variables hypothesized to influence social media use in agricultural extension, level of education, marital status, office location, and satisfaction from internet speed were positively significant. On the other hand, family type, years of experience in agricultural extension, nature of job, and current residence were negatively significant between social media users and non-users for agricultural extension. Non-institutionalization of social media for extension services was the most influential barrier for using social media in agricultural extension, which together with other barriers such as reliability issues, should be overcome to further develop social media-based extension in Nepal.

Key Words: social media, agriculture, extension workers, agricultural extension

Introduction and Literature Review

The access and use of social media has been increasing in Nepal over time. Recent data shows that mobile phone penetration in the country has exceeded 95 percent of the total population (Nepali Telecom, 2023). In relation to social media, statistics show that 72.94 percent of households have smart phones that can support social media application use (National Population and Housing Census, 2021). Moreover, social media penetration in Nepal has reached about 45.7 percent of the total population (Digital 2022: Nepal, 2022). While social media helps to connect people to their loved ones (Ranjit et al., 2020), its use in the professional areas including agricultural extension cannot be underestimated.

Social media platforms have been gaining popularity in agricultural extension and communication (Tao et al., 2020) for some time. Social media provides wider exposure to narrow-based farmers allowing them to communicate with the large farmers outside their regions, setting it up to be used successfully as an extension media tool in agriculture (Cornelisse et al., 2011) in Nepal. Agriculture is an indispensable part of the Nepalese economy, contributing to 25.02 percentage of the national Gross Domestic Product (MoALD, 2022). In Nepal, social media is being used by extension agencies to progressively engage their audience. Timilsina and Adhikari (2022) have mentioned that Facebook (messenger), YouTube, WhatsApp, Viber, and Twitter may potentially be suitable social media platforms to use in the Nepalese agricultural extension system.

Nepal faces the problem of limited human resources in agricultural extension. The agricultural extension service is mostly covered by a government extension system which lacks coordinated efforts for social media use for agricultural outreach services (Timilsina & Nepali, 2022). Although reliability issues persist (Di Domenico, 2020; Magar, 2020), the evidence on successful uses of social media in agricultural extension worldwide at least creates a scope to think about the systematic use of social media in the Nepalese agricultural extension system. Many government extension workers in Nepal use social media for communicating various agricultural information while others do not. It is important to understand the factors underlying this scenario if there is to be an effort to effectively incorporate social media in the Nepalese agricultural extension system. While there is a dearth of literature about the factors that influence the use of social media for agricultural extension purposes less is known on the barriers. This demonstrates a gap in literature directing these researchers to study the determinants of social media use for agricultural extension activities among government agricultural extension workers in Nepal.

Previous research outside Nepalese contexts have tried to study the factors associated with social media use in agricultural extension and communication, such as the positive relationship of social media use with educational level (Kanjina, 2021; Kaur et al., 2022), higher uses among unmarried people (Kaur et al., 2022), and such. Also, evidence is divided on how, if any, gender of the user impacts social media use (Mazman & Usluel, 2011; Teo, 2008). In an organizational context, technology uses, including social media use, can be the function of factors such as professional experiences (Kinsey, 2011), and relevant trainings received by the professionals (Thomas & Laseinde, 2015). However, challenges like difficult geography and internet connectivity can hinder social media use (Andres & Woodward, 2013; Freeman et al., 2020) for some.

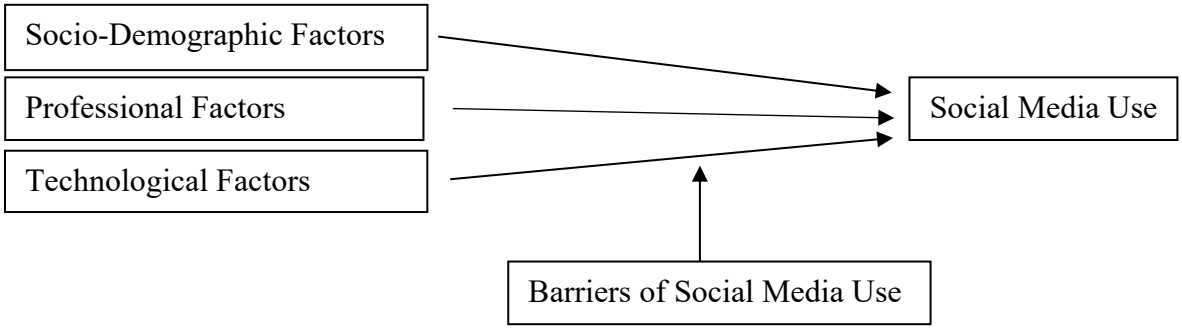
Understanding and learning from the factors affecting and barriers and use of social media in the Nepalese agricultural extension system may eventually help in timely communicating agricultural information among farmers. Considering this very possibility, Timilsina and Adhikari (2022) have suggested the need for research on determinants of social media use, among others. As per our best knowledge, this research is one of the pioneer research projects looking at this phenomenon in Nepal. The findings from this research are expected to benefit extension workers, extension policy makers, and ultimately the farmers.

Conceptual Framework

This study utilized a part of "The Innovation-Decision Process" model from Roger's "Diffusion of Innovations" theory to frame the research. The model presents a five-stage process discussing how people adopt innovations, starting with knowledge of the innovation, followed by persuasion, decision, implementation, and confirmation (Rogers, 1995). The model also mentions the factors that may play into the different stages of the innovation-decision process. In fact, this is one of the most popular models across disciplines while studying the factors affecting the adoption of an innovation (Dibra, 2015; Kumar et al., 2018; Pashaeypoor et al., 2016). Considerable use of this model in agriculture and agricultural extension can be found for the studies related to adoption (Dissanayake at al., 2022, Mbosso et al., 2015; Mustapha et al., 2022). Some of the factors as highlighted in the model include personalistic characteristics, socioeconomic factors, and the nature of the communication. To guide most of the questions in our research instrument, we applied this idea of various factors influencing the adoption of innovations arising from personal, social, and contextual

domains. To simplify the concept of the underlying factors in social media use, we classified the variables into three categories, namely socio-demographic factors, professional factors, and technological factors. When talking about the factors influencing the social media use, it might be relevant to consider barriers that may hinder the use of social media in agricultural extension. Hence, we incorporated those barriers as well in our conceptual framework as shown in figure 1.

Figure 1
Conceptual Framework



Research Purpose and Objectives

The purpose of this research was to explain the determinants of social media use by government agricultural extension workers in Nepal. The specific objectives were:

i. Predict the factors influencing the use of social media by government agricultural extension workers in Nepal
ii. Determine the barriers of using social media by government agricultural extension workers in Nepal

Research Methods

Study Site

The research was conducted in the Bagmati province of Nepal. We selected the province purposively for data collection as it consists of governmental extension offices of each level, i.e., federal, provincial, and local. Also, the province has each of the three types of geographical regions of Nepal (mountainous, hilly and terai/plain). Hence, Bagmati province can best represent the agricultural extension system of Nepal as a whole.

Population, sample, and sampling technique

The population of this study was the extension workers working currently under government agricultural offices of the Bagmati province in all three tiers of government: federal, provincial, and local. Altogether, the population was 685. The study followed a purposive sampling method for selecting the province. We used the Raosoft sample size calculator to calculate the sample size (Lawal & Adejuwon, 2023). For the population size of 685 and confidence level of 95%, we obtained the sample size of 247. Then, we proportionally divided this value of sample size based on the numbers of government agricultural extension workers working on federal, provincial, and local levels of

government. The values in each category were obtained in decimals which were adjusted by rounding off the values, resulting in the final sample size of 248. The questionnaire was created in Kobo toolbox and within each government level, data were collected from randomly selected extension workers via email and telephone calls. Data collection was continued until the desired sample size was met. Hence, a proportionate stratified sampling technique was applied, ensuring better representation of agricultural extension workers in each tier of government (Rahman et al., 2022).

Research instruments, validity, and reliability

The research instrument consisted of a structured questionnaire. The questions on socio-demographic characteristics, professional characteristics, technological characteristics, and barriers of using social media were used to address the research objectives. The social media platforms considered for research were Facebook (messenger), YouTube, WhatsApp, Viber, and Twitter (now 'X'). The instrument together with a research proposal was sent to a panel of experts consisting of five members, enabling us to address face and content validity (Taherdoost, 2016). The panel of experts consisted of three faculty (one specialized in research methods in social science and the other two specialized in agricultural extension), and two governmental agricultural extension workers (third-class officer level). The questionnaire was also pre-tested among ten government agricultural extension workers of Gandaki province and colleagues for removal of any ambiguousness and confusion while enhancing validity and reliability of the instrument.

Data analysis

The data were analyzed using Statistical Package for Social Sciences (SPSS) version 26, and Microsoft-excel. Demographic characteristics were analyzed using descriptive statistics. For fulfilling our first objective, a binary logistic regression was used as the dependent variable was a dichotomous variable (Pampel, 2020). As the assumptions of binary logistic regression, tests of outliers, independence of observation, multicollinearity, and linearity in the logit were conducted and satisfied before data analysis. Using this model, 16 different factors hypothesized to affect social media use were taken as independent variables using social media use as the dependent binary variable (1 = users, 0 = non-users). The forced ranking scale technique was used to analyze the second objective; barriers of using social media in governmental agricultural extension. Choices can be ranked in the preferred order using the forced ranking scale (Dalati, 2018). The method helps us determine the most to least important choices among the given number of choices (Krosnick, 1999).

Operationalization of variables

Dependent and independent variables used in the binary logistic regression model are presented in table 1. Independent variables were further classified in socio-demographic, professional, and technological factors.

Table 1
Operationalization of Variables Used in the Binary Logistic Regression Model

Name of the variable	Defining variable	Outcome
Dependent variable		
Social media use	If the respondent uses social media for agricultural extension purposes	Binary (1 = user, 0 = non-user)
Independent variables		
Socio-demographic factors		
Sex of the respondent	Biological sex of the respondent	Binary (1 = male, 0 = female)
Level of education	Level of education completed by respondent	Binary (1= attended university, 0 = not attended university)
Marital status	Marital status of the respondent	Binary (1 = married, 0 = never married)
Family members outside country	If the respondent has family member(s) outside of country	Binary (1 = yes, 0 = no)
Family type	Type of family of the respondent	Binary (1 = nuclear, 0 = joint)
Current residence	Where the respondent is living currently (from where s/he goes to office)	Binary (1 = own home, 0 = except home)
Office location (hilly dummy)	Geographical region of the office location of the respondent	Binary (1 = hilly, 0 =others)
Office location (inner terai dummy)	Geographical region of the office location of the respondent	Binary (1 = inner terai, 0 = others)
Professional factors		
Current position	Current position of the respondent in agricultural extension office	Binary (1 = officer and above, 0 = below officer)
Years of experience in agricultural extension	Total years of experience in the agricultural extension profession	Continuous
Nature of job	Nature of the job based on permanency	Binary (1 = permanent, 0 = temporary)
Secondary occupation	If the respondent has any secondary occupation except working in that office	Binary (1 = yes, 0 = no)
Average number of days per month to go to field	Average number of days per month that the respondent goes to visit the farmers' field/households	Continuous
Vehicle service by office	If the office has provided vehicle service to the respondent to visit the field/households	Binary (1 =yes, 0 = no)
Technological factors		

Satisfaction from internet speed	Satisfaction of respondent from the speed of the internet they use	Binary (1 = satisfied, 0 = unsatisfied)
Training related to ICT/computer	If the respondent has received training(s) related to ICT/computer for job purpose	Binary (1 = received, 0 = not received)

Results

Among the total respondents (*N* = 248), more than two-thirds used at least one of the social media platforms under study for agricultural extension purposes (*n* = 179, 72.2%), whereas the remaining were non-users of social media for agricultural extension (*n* = 69, 27.8%). From this, social media use status was categorized into social media users and non-users category throughout the study. Among the users (*n* = 179), most utilized Facebook and Facebook messenger as a social media platform for agricultural extension purposes (*n* = 168, 93.9%), followed by YouTube (*n* = 115, 64.2%), WhatsApp (*n* = 79, 44.1%), Viber (*n* = 51, 28.5), and Twitter (*n* = 40, 22.3%) respectively. The highest frequency of respondents was male (*n* = 159, 64.1%), Brahmin/Chhetri in caste/ethnicity (*n* = 163, 65.7%), Hindu in religion (*n* = 209, 84.3%), married (*n* = 160, 64.5%), and having a nuclear family (*n* = 141, 56.9%). The respondents had an average age of 32.9 years with average experience of 7.2 years.

Objective one: Factors affecting the use of social media by government agricultural extension workers

Table 2 shows the factors affecting the use of social media in agricultural extension by government extension workers in Nepal. A binary logistic regression with 16 independent variables was used to determine the factors affecting social media use in agricultural extension. The independent variables were classified in socio-demographic, professional, and technological factors. The total number of responses for all the variables was 248. The Nagelkerke R square value was 0.792, which indicates that the amount of variation in the dependent variable explained by the predictors in the model was 79.2 percent. Among the variables hypothesized to affect the use of social media in agricultural extension, level of education, marital status, office location (hilly dummy), office location (terai dummy), and satisfaction of internet speed were found positively significant. On the other hand, family type, current residence, years of experience in agricultural extension, and nature of job were found to be negatively significant. Sociodemographic, professional, and technological factors affecting the social media use are reported under subsequent sub-headings.

Table 2
Binary logistic regression results on use of social media for agricultural extension by respondents in the study area (N = 248)

S.N.	Variables	B	S.E.	Sig.	Exp (B)
1	Sex of respondent	0.726	0.574	0.206	2.066
2	Level of education**	2.413	1.167	0.039	11.164
3	Marital status*	1.366	0.737	0.064	3.920
4	Family members outside country	1.032	0.644	0.109	2.806
5	Family type**	-1.247	0.586	0.033	0.287
6	Current residence*	-1.051	0.602	0.081	0.350

7	Office location (hilly dummy)***	2.070	0.624	0.001	7.923
8	Office location (inner-terai dummy)***	4.327	1.273	0.001	75.706
9	Current position	-0.874	1.052	0.406	0.417
10	Years of experience in agricultural extension***	-0.233	0.060	0.001	0.793
11	Nature of job*	-1.412	0.764	0.064	0.244
12	Secondary occupation	-0.360	0.618	0.560	0.698
13	Average number of days per month to go to field	0.071	0.053	0.182	1.073
14	Vehicle service by office	0.701	0.722	0.332	2.016
15	Satisfaction from internet speed**	1.459	0.599	0.015	4.303
16	Training related to ICT/computer	1.224	0.718	0.117	3.406

Note: *, **, *** = Significant at p = 0.1, 0.05 and 0.01 respectively.

Socio-demographic factors

The level of education was categorized on the basis of whether the respondent had obtained a university education or not. From the binary logistic regression, the chance of respondents being a social media user was analyzed on the basis of their education level. The result shows that the odds of the extension worker to be a social media user increased by 11.16 times when s/he had studied at the university level (bachelor's, master's or above) as compared to those who had never attended a university, other variables remaining constant. The result was significant at a 5 percent level of significance.

Marital status of the respondent was another variable found positively significant at 10 percent level of significance. For binary logistic regression, marital status was classified in two categories; married and never married. Married category included married respondents including divorced and widowed (who were once married), whereas the other included the respondents who were never married. The result reveals that the odds of being a social media user for agricultural extension were 3.920 times higher for married extension workers as compared to unmarried, other variables remaining constant.

Family type of the respondents was found significant and negatively associated variable with the social media use for agricultural extension. The negative relation was due to the reason that the nuclear family was coded as 1 whereas joint family was coded as 0. Hence, the negatively significant indicates that a respondent was less likely to be a social media user if s/he had a nuclear family. The odds of a respondent being a social media user for agricultural extension was found to be changed by a factor of 0.287 if s/he had a nuclear family rather than a joint family. This finding was significant at 5 percent level of significance.

Another variable under study with a negative association to social media use was current residence of the respondents. The variable was categorized based on whether the respondent was going to an office daily from his/her own home, or not from home (living in apartment, quarter, rented room, or anywhere other than home). The result shows that the odds that an extension worker was a social media user changed by a factor of 0.350 if s/he went to an office daily from his/her home as compared to if s/he lived far from home (and hence, went to office from place other than home), other variables remaining constant. The change indicates the lesser likelihood of respondents to be a social media user if they daily

went to an office from home as compared to other residence status. The result was significant at 10 percent level of significance.

The variable 'office location' was about whether the current location of the office was in a mountainous, hilly or inner-terai region. To better fit this variable in the binary logistic regression, the variable was treated as dummy variable creating two dummy variables (dummy hill and dummy inner-terai) taking mountainous region as the benchmark. So, for hilly region, 'hilly' choice was coded as 1 otherwise zero and for inner terai region, "inner terai" was coded as 1 otherwise zero keeping the benchmark category zero in each case. The result shows that the odds of an extension worker to be a social media user were 7.923 times more if s/he was working in an office that resides in the hilly region as opposed to mountainous region. In addition, those who were working in the offices that reside on the inner terai (plain) region had the odds to being social media user 75.706 times more in comparison to that of mountainous region. Both of these results were significant at 1 percent level of significance.

Two variables under study were not significantly associated with the social media use for agricultural extension: gender of the respondents, and having family members outside of the country. The coefficient value for both of these variables were positive, however not significant based on the p-value.

Professional factors

Years of experience in agricultural extension was a continuous variable negatively influencing the social media use for agricultural extension. The result reveals that the more the respondents were experienced in agricultural extension, the less they used social media. The result suggests that with an increase in one year of experience in agricultural extension, the odds of the extension worker to be a social media user decreased by a factor of 0.793, other variables remaining constant. The result was significant at 1 percent level of significance.

The nature of the job was categorized into two categories: permanent and non-permanent. Non-permanent included temporary, contract, and other types of "not permanent" job affiliation. This variable was found negatively significant at one percent level of significance referring that presence of "permanent" character decreased the chance of an extension worker to be a social media user for agricultural extension. According to the result, the odds of the extension workers to be a social media user were changed by a factor of 0.350 for permanent job holders as opposed to non-permanent ones.

Average number of days per month in which they go to farmers' field/household was not a significant variable based on the regression. Whether a vehicle service was provided by the office to the respondents did not significantly affect the social media use. The current position of the respondents in the office, and presence of secondary occupation was also not significantly associated with the social media use in Nepalese agricultural extension.

Technological factors

The satisfaction of the respondents with the internet connections they were using was positively associated to social media use. The satisfaction from internet speed was categorized into two categories, satisfied and not satisfied. The data for this variable was

originally collected on a five-point Likert type item ranging from strongly satisfied to strongly dissatisfied as it would be hard for the respondents to answer as just satisfied or not. Later during analysis, categories "strongly satisfied and satisfied" were merged to form "satisfied" category, whereas "neural, unsatisfied and strongly unsatisfied" were merged to keep under "unsatisfied" category (Jeong & Lee, 2016). Upon regression, the variable was found significant at 5 percent level of significance meaning that the respondents who were satisfied with their internet speed were more likely to be a social media users for agricultural extension than those dissatisfied with their internet speed, other variables remaining constant. The results show that the odds of an extension worker being a social media user for agricultural extension increased by a factor of 4.303 if s/he was satisfied with his/her internet speed than if s/he was not. Whether the respondent had received any training(s) related to ICT/computer, was not significantly associated with social media use in agricultural extension.

Objective two: Barriers of using social media in agricultural extension

Table 3 shows the barriers of using social media in agricultural extension in Nepal. A forced ranking method was used to calculate the index value of barriers and most to least severe barriers were identified among the selected barriers. The result shows that non-institutionalization (*IV* = 0.744) was the most severe barrier for social media use in agricultural extension. As a clear and focused policy is lacking in our context and no proper guidance from the policy level to use social media, non-institutionalization remains a severe problem. Secondly, issues of reliability (*IV* = 0.688) had hampered social media use. The other barriers based on the priority order were lack of technical knowhow to farmers (*IV* = 0.666), farmers illiteracy (*IV* = 0.653), limited access to the internet (*IV* = 0.549), high installment cost (*IV* = 0.471), and inability of extension workers to use social media for agricultural extension (*IV* = 0.320) respectively.

Table 3
Barriers of using social media in agricultural extension in the study area (n= 248)

Constraints	Index	Rank
Non-institutionalization	0.744	I
Less reliability of information from social media	0.688	II
Lack of technical knowhow to farmers	0.666	III
Farmers' illiteracy	0.653	IV
Limited access to internet	0.549	IV
High cost of installment	0.471	VI
Inability of extension workers to use social media for agricultural extension	0.320	VII

Conclusion and Discussion

The research study was guided by two research objectives with the purpose to explain the determinants of social media use by government agricultural extension workers in Nepal. The first objective was to predict the factors influencing the use of social media by government agricultural extension workers in Nepal and second, to determine the barriers of using social media by government agricultural extension workers in Nepal. Several socio-economic, professional, and technological factors were found influencing the use of social media in the Nepalese agricultural extension system. Also, respondents ranked the barriers

hindering the social media use in agricultural extension. As social media research in agricultural extension in Nepal is in its infancy, further discussion about similar contexts/topics are discussed in the following section.

Researchers found more educated professionals using social media for agricultural extension. Kanjina (2021) in a similar context in Thailand had similar findings, reporting that more educated people use social media for agricultural extension activities than less educated ones. A similar finding was also reported by Kaur et al. (2022) in an Indian context. However, for another variable 'marital status', Kaur et al. (2022) found more use of social media by unmarried individuals whereas our findings maintained that married extension professionals were using more social media as compared to unmarried ones. Joint family as compared to a nuclear family of the professionals was also associated with higher social media use.

If the home location of the respondent was near the office location allowing the respondent to go to the office daily from home, social media use was lesser and vice-versa. Again, mountainous regions had significantly lesser social media users as compared to hilly and plain/terai region. The mountainous region of Nepal consists of mostly rural areas which have less access to internet connections and thus social media use. Rural areas often experience a problem with lower internet connectivity due to issues in speed, availability, and stability of the internet (Freeman et al., 2020). These areas should be given emphasis regarding the development of infrastructures for internet facilities if use in agricultural extension is to grow.

Our study showed no significant relationship between males and females in using social media for agricultural extension. However, previous studies have a mixed view on whether technology use differs based on gender. For instance, Mazman and Usluel (2011) found that social media use among genders were related. They further clarified that females dominated social media use when it came to educational purpose, specialized work objectives, and maintaining relationships. On the other hand, males dominated social media use when it related to building new contacts. Research by Teo (2008) concluded that pre-service teachers' attitude toward computer use were unaffected by their sex, which is in line with this study.

In our study, findings did not show a relationship between social media use and whether one or more of the respondent's family members were outside the country. According to Ranjit et al. (2020), Nepalese used Facebook as an important platform to communicate with one or more of their family members outside the country, especially during emergencies (i.e. a large earthquake in Nepal in 2015). This supports our understanding that professionals may be using social media focused on work-related activities, as their social media use did not significantly relate to the presence of their family members being outside the country.

Our findings on years of experience as it relates to social media use suggested that highly experienced professionals used social media less than newer professionals. Based on this finding, orientation programs for social media use should target those professionals who have been working longer and thus using less social media for agricultural extension. Our result is in line with the research conducted by Kinsey (2011) who evaluated the difference in uses of technology by professionals and found that nearly half of professionals who had less than ten years of experience used social media, whereas only 14 percent of professionals who served 11-20 years in their career were using social media. If we consider less experienced

professionals as generally younger than more experienced, evidence of younger people using more social media than older age group have been found (Kanjina, 2021).

Permanent job holders in our research had lower tendency to use social media for professional use than temporary job holders. Social media use is not a mandatory regulation but an alternative way for Nepalese agricultural extension workers to communicate with agricultural stakeholders, including farmers. It is possible that temporary job holders may be trying to lengthen their job duration by best using social media and showing better performance. However, permanent job holders do not have the pressure to secure their job and hence they may be avoiding utilizing technologies that are not mandatory to use based on their work regulations. Hence, the programs concentrating on motivations to use social media should be focused on permanent job holders.

Social media use based on our research was not linked to the position professionals were working on. It was also not associated with whether the professionals were engaged in another secondary occupation. Again, social media use was statistically not different whether the office provided the professionals with a vehicle service to go to the farmers' fields/households. Based on the area of service, position, and programs under implementation, professionals have a difference in average numbers of days per month that they go to the farmers' field/household for extension activities. However, this difference did not play a role in relation to social media use for agricultural extension activities.

Higher social media use in agricultural extension was associated with higher satisfaction from internet speed and vice-versa. Lower internet speed ultimately presents challenges to social media use in the agricultural extension service. Andres and Woodard (2013) indicated low internet speed restricts the use of multimedia like images and videos as they consume much more data than text. We also attempted to predict if training related to computer and/or ICT relates to social media use by agricultural extension workers. However, ICT/computer training did not significantly influence the social media use in agricultural extension in this study. Thomas and Laseinde (2015), however, reported that extension workers require training on basic skills in the use of social media to better utilize social media for extension activities.

The major barrier found in this study for the social media use was non-institutionalization of social media in government agricultural extension offices. This may be an important aspect to consider because professionals may not use technologies, including social media for professional purposes, unless mentioned clearly on their job regulations/responsibilities. Hence, the incorporation of social media in agricultural extension should be supported by formulating related policies. Lack of reliable information is found as another barrier according to this study. Di Domenico (2020) reviewed articles across disciplines and described misleading information as a problem in social media, providing explanations of fake news phenomenon in social media. Magar (2020) also mentioned that there were reliability issues in using ICT in agricultural extension in Nepal. Awareness programs and trainings may help professionals find more reliable information to use for work purposes.

Extension workers in our study perceived that illiteracy among farmers and the lack of technical knowledge to use social media among them for agricultural information acted as barriers in using social media effectively. The problem of technological knowhow, to some

extent, was reported among extension workers as well. For better utilization of social media in agricultural extension, trainings should be provided to the extension workers with less knowledge of social media use. As social media operates under internet facility, limited access to those facilities and high cost of their installment were also reported as barriers to use social media. Mountainous and the upper hilly region of Nepal especially have a difficult geography causing difficulty in terms of developing facilities like internet.

Our research utilized Rogers (1995) innovation-decision model to frame part of the study. The model considered factors such as socio-demographics, communication, personality, and perceived characteristics of innovation to influence the adoption of innovation. Based on demographic, professional, and technological factors affecting social media use in agricultural extension, our findings broadly supported Rogers' model. While we attempt to provide inferences based on the findings, cautions should be taken while generalizing the findings to a larger group of people. We also acknowledge limitations that may arise from the self-reported responses of the participants.

Implications and Recommendations

More users than non-users of social media for agricultural extension activities indicates extension workers' interest in using social media, which should be supported by policies for institutionalization. The research indicates the need for the formulation and enactment of ICT and/or social media policies for agricultural extension activities, considering reliability issues and internet regulations. More focus regarding access and establishment of good internet connection to promote social media use should be seen in areas with difficult geography. We acknowledge errors that may arise due to sample sizes and suggest future researchers to include larger sample sizes for greater generalizability.

As per our best knowledge, this research is one of the pioneer research studies considering determinants of social media use in the Nepalese agricultural extension system. Further research is necessary to understand more dimensions of social media use in agricultural extension to potentially increase social media use as an extension tool in the agricultural sector. Future research can address the attitudes, self-efficacy, perceived usefulness, and perceived ease of use that extension workers have for using social media in agricultural extension. Future studies can also explore how other factors such as perceived characteristics of social media can affect social media use based on Rogers (1995) innovation-decision model. This research study is limited to the extension service providers' side in using social media. Research is recommended to see if receivers of extension information (farmers) want/prefer agricultural information via social media. Further advances in the study could exploit social media as a potential way of communication in Nepalese agricultural extension that might help extension workers overcome problems raised due to limited communication among stakeholders of agriculture.

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Exploring Student Perceptions of an Interactive Virtual Tour of an Agricultural Facility

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Over the past three decades virtual tours have been used in many contexts, with a notable surge in usage during the COVID-19 pandemic to address travel restrictions. In educational settings, virtual tours have been used to replace on-site field trips, which can be difficult to execute due to a variety of logistical concerns. While virtual tours are widely used, there is limited research pertaining to the use of virtual tours in an agricultural education context. To address this gap and gather student input, this research explored students' perspectives of virtual tours in an agricultural educational context. Specifically, this study sought to explore learners' perceptions of a virtual tour to learn about the cotton ginning process. Guided by the Technology Acceptance Model (TAM), the research employed a convergent parallel mixed methods design. Student scores were collected quantitatively on four TAM constructs, while qualitative insights from focus group discussions were collected to elucidate quantitative data. Results indicated positive student perceptions of IVTs as learning tools but emphasized their inability to fully replace traditional field trips. These findings contribute valuable insights for researchers exploring IVT usage in agricultural education and provide guidance for future virtual tour creators, informed by student feedback.

This manuscript is based on data published in the 2023 AAAE Western Region Paper Proceedings, Harlan et al., (2023).

Introduction

While the COVID-19 pandemic impacted all industries and facets of life, the tourism sector faced tremendous loss with the onset of international travel bans (LaBreck, 2020). To keep the world's sense of wanderlust alive, virtual tours of cities, famous landmarks, museums, and even national parks, were created and offered to the public so they could continue to see and learn new things, all while staying at home (Jones, 2020). While the pandemic popularized the use of virtual tours in the tourism industry, virtual tours have been used in educational settings as alternatives to traditional, on-site field trips for several years.

Field trips are a common way for educators to provide students of all ages with hands-on, interactive learning experiences. As an experiential learning opportunity, field trips take students to locations and give them experiences that typically cannot be replicated in a classroom setting (Behrendt & Franklin, 2014). Experiential learning is "authentic, first-hand, sensory-based learning" (Behrendt & Franklin, 2014, p. 237). This type of learning can help participants increase their knowledge, develop skills, and clarify personal values (Association for Experiential Education, 2023). Field trips have been used in a variety of disciplines in both K-12 and higher education settings, such as language and writing (Rugaiyah, 2022; Alcântara, 2016), tourism (Arcodia et al., 2021), sociology (Wright, 2000), agricultural communications (Partyka et al., 2019), and science, technology, engineering, and math subjects (STEM) (Lei, 2010; Knapp, 2000).

In a STEM context, instructors said field trips were a good supplement to teaching in a classroom or laboratory and recognized field trips as a way to reinforce the materials taught in traditional learning environments (Lei, 2010). Students said field trips "make learning more

enjoyable and interesting" and also appreciated the opportunity for "learning through active participation (hands-on experience)" that field trips often provide (Lei, 2010, p. 44).

While these trips are valuable learning opportunities, field trips can be difficult to execute due to the physical location as well as financial, safety, and other logistical concerns (Cassady et al., 2008; Han, 2020). To overcome these challenges, virtual tours—along with electronic, online, and virtual field trip options—can be used as an alternative. These types of field trips and tours seek to simulate the traditional field trip experience through a variety of interactive features (Hosticka et al., 2002). An interactive virtual tour (IVT) combines various multimedia content types with cutting edge 3-D spatial technology. They also often include curriculum and other supplemental materials to encourage the integration of these tours in educational settings (Mead et al., 2019).

Although prior literature is limited, virtual tours have been used in food and agricultural science education contexts as well (Herritsch et al., 2013; Karcher & Reid, 2018). In an undergraduate chemical engineering course, a group of students explored an IVT of a milk powder plant (Herritsch et al., 2013). To assess the usefulness of the IVT, students in the course were split into two groups: those who toured the IVT and those who received the information presented in the IVT in a written document. After a week of studying their respective materials, both groups of students were administered the same test. Students who received the IVT scored better on the test and spent less time studying than the other group of students. While students said the IVT could not completely replace the social (e.g., fun factor, hanging out with friends) and real-world (e.g., smell, noise, dust) aspects of a traditional field trip, they acknowledged the IVT was a good substitute if the site was not able to be visited. In a dairy management course, Karcher and Reid (2018) assessed undergraduate students' perceptions of using virtual farm tours in the classroom. Students were able to explore three dairy farms through virtual tours. After each tour, students completed a questionnaire to evaluate their perceptions of the experience. They also completed an on-site tour of a dairy near the end of the semester and completed a similar questionnaire. They found students viewed virtual farm tours as a beneficial addition to their learning experience and student scores on the virtual farm tour and live farm tour evaluation assignments were similar (Karcher & Reid, 2018).

Theoretical Framework

The Technology Acceptance Model was used to guide this study. Davis (1985) created the Technology Acceptance Model (TAM) in an effort to measure one's intention to adopt various technologies. The widely used Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) are recognized as foundational pieces in the creation of the TAM (Marangunić & Granić, 2014). Davis (1985) adapted these theories to develop a model that could better predict the use of specific technologies by users (Marangunić & Granić, 2014). TAM has been used in a variety of contexts but is most often used in information system and technology research. Since its inception, the model has been revised and adapted to fit a multitude of situations. Originally, Davis (1985) postulated that a person's attitude toward a technology was impacted by only two factors: perceived usefulness and perceived ease of use. Perceived usefulness relates to a system enhancing an individual's job performance and perceived ease of use concerns whether an individual views using a certain system as effort free or not (Davis,

1985). In this original model, actual usage is determined by behavioral intention, which is affected by one's attitude and perceived usefulness of a system (Davis, 1989).

Through further research, Davis discovered that attitude did not fully explain the relationship of perceived usefulness, perceived ease of use, and behavioral intention (Davis, 1989). Thus, a simplified version of TAM was proposed which removed attitude from the model and included only three constructs: behavioral intention, perceived usefulness, and perceived ease of use. In 1992, an additional construct was found to be significant in predicting an individual's usage. Perceived enjoyment relates to how enjoyable a user finds the technology usage experience, despite any performance issues that may be encountered (Davis et al., 1992). Davis et al. (1992) found that the combination of perceived usefulness and perceived enjoyment mediated the effects of perceived ease of use and output quality on intention. Essentially, one's intention to use a new technology is preceded by perceived use and perceived enjoyment. Additionally, perceived use and perceived enjoyment are influenced by perceived ease of use (El-Said & Aziz, 2021). While the factor of perceived enjoyment is not always included in TAM, in virtual contexts, enjoyment is thought to play an important role in predicting users' intention to adopt IT applications in virtual environments (El-Said & Aziz, 2021).

Purpose/Research Questions

The purpose of this research was to explore students' perspectives of virtual tours in an agricultural educational context. Specifically, this study sought to explore learners' perceptions of a virtual tour to learn about the cotton ginning process. This mixed methods study was guided by five research questions. Research question one sought to address the quantitative data that were collected and research questions two through five addressed the qualitative findings.

Quantitative Research Question

RQ1: How did participants assess the virtual tour's usefulness, enjoyment, ease of use, and intention for future use?

Qualitative Research Questions

RQ2: What was the perceived educational merit of the virtual tour experience?
RQ3: What types of content and subject matter did participants enjoy most?
RQ4: How did participants describe the virtual tour's ease of use?
RQ5: What suggestions did participants provide regarding the development of virtual tours about agriculture and food science facilities?

Methods/Procedures

This study utilized a convergent parallel mixed methods research design. In this approach, quantitative and qualitative data are collected in a single study, either concurrently or sequentially, given a priority, analyzed separately, and then brought together for comparison and interpretation (Creswell & Plano Clark, 2011). The theoretical framework informed the study's research questions, the items included in the quantitative questionnaire, and the key questions asked during the focus group sessions. This allowed for similar quantitative data and qualitative findings to be related, compared, and discussed after data analysis.

The target population for this study were undergraduate students in a college of agriculture. The participants were a convenience sample of students who voluntarily chose to attend the focus group sessions ($N = 32$). Selecting an appropriate sample size and number of interviews in qualitative studies can be challenging due to the varying characteristics between studies; however, data saturation can be used as a guiding principle for guaranteeing qualitative rigor (Hennink et al., 2019). "Data saturation refers to the point in data collection when issues begin to be repeated and further data collection becomes redundant" (Hennink et al., 2019, p. 1483). While there is limited research on exact methods for assessing data saturation (Hennink et al., 2019), prior literature has found that two to three focus groups typically capture 80% of themes, including the most prevalent ones, and three to six groups account for 90% of themes in homogenous populations using a semi-structured discussion guide (Guest et al., 2017). While five to eight participants have traditionally been considered the ideal size for a focus group, smaller, or mini-focus groups, are becoming more popular. These focus groups have four to six participants, and are considered easier to recruit for, host, and are more comfortable for participants (Krueger & Casey, 2014). With these considerations in mind, six focus group discussions were held with four to eight participants in each session, resulting in 32 total focus group participants. Due to the sampling approach and small sample size, this research is not generalizable to the larger population. However, the insights gained are transferable to similar participants and to other IVTs about agricultural and food science facilities.

The instrumentation for this study was an online Qualtrics questionnaire and a moderator guide to facilitate focus group discussions. The current study adapted a portion of El-Said and Aziz's (2021) instrument pertaining to TAM and tailored it to fit the needs of the study. To establish face validity, this adapted instrument was reviewed by a panel of experts with expertise in survey instrument design, agricultural communications, and agricultural education. This panel also assessed content validity to ensure the questions addressed all aspects of the constructs. This review process refined the questions to make them relevant to the context of the cotton gin interactive virtual tour. The Qualtrics instrument contained 12 Likert-type scale statements to measure participants' perspectives about the virtual tour experience. It also had eight demographic questions and two questions regarding participants' connection to agriculture.

The moderator's guide included semi-structured interview questions as well as a detailed script of instructions for the research session. The guide began with an introduction and description of how the research session would flow, and instructions on how to access the Qualtrics instrument, which contained the link to the stimulus and the questionnaire. After participants had explored the tour and completed the questionnaire, the moderator guide shifted to focus on the focus group discussion. A brief explanation of what a focus group is, how it functions, and the role of a moderator and notetaker were provided prior to the question portion of the discussion. The semi-structured interview guide included an introduction prompt for participants, five open-ended questions, and a final question that summarized the discussion and asked for additional comments. These questions were crafted so they would address the previously stated research questions, as well as connect to the four Technology Acceptance Model constructs that were included in the quantitative instrument. Additionally, this study sought to gather user feedback and suggestions for the improvement of current and future IVTs.

All participants were exposed to the same stimulus, an IVT of a cotton gin. This tour incorporated different multimedia aspects to walk viewers through the cotton gin. Videos were used to explain the most important parts of the ginning process while photos and plain-text descriptions were used to enhance video content, provide further detail, and address items that did not have explainer videos. Participants were given a demonstration of the different ways to navigate the tour prior to their viewing. Students were given 15 minutes to navigate the tour.

Quantitative data were originally collected in Qualtrics then exported into IBM SPSS v. 29. Descriptive statistics were run for participants' demographics, connection to agriculture, and the TAM scale items. Qualitative data were collected by recording the focus group discussion into Otter ai. Each transcript was then verified for accuracy and personal identifiers were removed and replaced with participant numbers. Using DelveQDA, the data were analyzed using open, axial, and selective coding methods (Williams & Moser, 2019).

Most participants (n = 23, 71.9%) identified as female. All participants identified as Caucasian (n = 32), and two participants also identified as American Indian, Native American, or Alaska Native (n = 2, 6.3%). The majority (n = 20, 62.5%) were classified as seniors by credit hours. All participants were enrolled in the [College] (n = 32, 100%), and agricultural communications was the most common major (n = 29, 90.6%). Half of the participants (n = 16, 50%) classified their hometown as a farm in a rural area. The rest of participants' hometown classifications were as follows: subdivision in a town or city (n = 7, 21.9%), urban or suburban area outside of the city limits (n = 5, 15.6%), and rural area, not a farm (n = 4, 12.5%). Regarding prior exposure, 16 participants (50%) selected that they had visited an [agricultural site], and 15 participants selected they had not visited the site before. One participant selected "not sure."

Findings

Quantitative Research Question

The first question sought to describe how participants assessed the virtual tour's usefulness, enjoyment, ease of use, and intention for future use. Each TAM construct consisted of three Likert-type statements where 1 = *strongly disagree* and 5 = *strongly agree*. Table 1 reports the grand mean, standard deviation, and reliability coefficient for each TAM construct. The upper limit for each scale was 5.00 and each construct's grand mean was a 4.00 or greater.

Table 1.
*Grand Means, Standard Deviations, and Cronbach's Alpha for TAM Constructs (*N = *32)*

Construct	Mean	Standard Deviation	Cronbach's α
Perceived Usefulness	4.57	.58	.67
Perceived Enjoyment	4.26	.70	.78
Perceived Ease of Use	4.40	.70	.78
Intention to Use	4.00	.70	.80

Note. 1 = s*trongly disagree*, 5 = *strongly agree*

Qualitative Research Questions

Questions two through five sought to measure the qualitative insights gained through the focus group discussions. Table 2 summarizes the emergent themes for the research questions. Themes

were developed using open, axial, and selective coding methods, and are supported by participant statements (Williams & Moser, 2019).

Table 2.
Summary of Emergent Themes, Organized by Research Question

Research Question	Emergent Themes
RQ2: What was the perceived educational merit of the virtual tour experience?	1. IVTs Have a Place Inside of the Classroom 2. IVTs vs. Traditional Field Trips 3. Using IVTs in an Informal Setting
RQ3: What types of content and content matter did participants enjoy most?	1. Variety is Appreciated, but Videos are Elite 2. Quick Facts are Best
RQ4: How did participants describe the virtual tour's ease of use?	1. Multiple Ways to Navigate the Tour 2. "Go at Your Own Pace" 3. It's Easy! 4. Getting the Hang of It
RQ5: What suggestions did participants provide regarding the development and improvement of virtual tours about agriculture and food science facilities?	1. "Showcasing Any Process Within Agriculture" 2. Improving Clarity

Findings related to each research question are presented through the description of emergent themes. Themes are supported with narrative statements from participants. To ensure participation confidentiality, participant names have been replaced with participant numbers.

Research Question Two
This research question addressed how participants viewed using virtual tours in an educational context. Three emergent themes were found with some corresponding subthemes.

IVTs Have a Place Inside of the Classroom
Participants agreed that IVTs could be used inside of the classroom in a variety of ways. They mentioned it was more engaging than a typical lecture, appealed to a variety of learning types, could spark class discussions, or be integrated in an assignment context. Participant 17 said, "This is for sure an effective learning tool and there's no doubt about that… I definitely think this could be a really awesome discussion board tool or maybe just a 'what facts did you take away from this' assignment."

Additionally, participants noted that information is also shared through a variety of formats, making the IVT appealing to a variety of learning types. Participant 28 said:

> What I think is nice about it is it appeals to many different learning types because it appeals to your visual learners. And, it also will appeal to your auditory

> learners, but also your learners who learn by interacting. So, I feel like it would be beneficial in a classroom setting to appeal to a variety of learning types.

IVTs vs. Traditional Field Trips

While participants did not say IVTs could completely replace field trips, they recognized the benefits IVTs provide as well as different ways to use IVTs. The emergent subthemes were: (1) IVTs Provide Flexibility, (2) IVTs are Great, but They're Not a Replacement, (3) IVTs as Supplements to Field Trips.

IVTs Provide Flexibility. Participants recognized the obstacles that often come with taking traditional field trips and said IVTs could be a great alternative. Participant 9 said:

> You can do it from wherever. If you're at home, you're at school, you're at the coffee shop, you can sit there and do it. It's convenient you don't have to go out to the gin to just go tour it.

IVTs are Great, but They're Not A Replacement. Participants indicated they enjoyed the IVT but noted it was not a replacement for an actual field trip. Many of them wanted to be able to walk around inside of the facility. Participants who had toured a gin in person before said that it was harder to take information from the IVT because of their prior experiences. Participant 4 said, "The virtual tour was harder for me to obtain information having done a tour with a gin in person. I didn't obtain as much virtually." Participant 1 said, "I feel like nothing can compare to in-person tours, but I feel like this did a really good job of making it realistic.

IVTs as Supplements to Field Trips. While IVTs may not be a replacement for in-person field trips, participants said they could be a valuable supplement. Participants mentioned the IVT could be explored prior to students taking an actual tour to inform them about the location or after a tour as a reference material. Participant 1 said:

> Virtual tours like this one could be used in the classroom setting if you were taking your class on a tour. Maybe give them this virtual tour ahead of time, so they can think of those questions. Because we all know it can get awkward whenever they're like 'Are there any questions?' and nobody asks.

Using IVTs in an Informal Setting

Participants perceived IVTs as having educational merit not only inside of the classroom but also to educate beyond the classroom setting with people from diverse backgrounds. Participants recognized the value of "bridging the gap" between the agricultural industry and consumers as well as identified this as a potential tool to assist in those efforts. Participant 1 said, "As an agriculturist, there's always controversy on why is the outside world not understanding what we're doing in agriculture... So, I liked this aspect of not telling them, but actually showing them what goes on in agriculture."

Research Question Three

Research question three sought to understand participants' preferences, if any, for differing types of content (e.g., videos, photos, descriptions) as well as the subject matter they enjoyed most.

From this, two main themes emerged: (1) Variety is Appreciated, but Videos are Elite, and (2) Quick Facts Win. These two themes also had subthemes that are discussed below.

Variety is Appreciated, but Videos are Elite

Participants made many comments, critiques, and suggestions regarding the way the information within the tour was presented. Based on participant feedback, it is clear that while participants did enjoy an assortment of content delivery methods, they preferred videos. This led to the development of the following subthemes: (1) Include a Variety of Content Types and (2) (Short) Videos are the Favored Content Type.

Include a Variety of Content Types. Many participants mentioned they enjoyed the varying ways content was presented. The tour of the cotton gin included five video stops, six photo stops, and 11 description stops. Participants said the combination of delivery methods helped them to stay interested and appealed to a variety of learning types. Participant 17 said, "I also liked that there was a lot of transitioning between a video here and then a picture here with a scenario. I liked that it always kept you guessing like what was next."

(Short) Videos are the Favored Content Type. While participants appreciated the variety of content types, it was apparent videos are the preferred content type. Participants mentioned videos helped to keep them engaged throughout the tour and they made it easier to understand the information. The majority of participants also mentioned they enjoyed how short the videos were. The five videos ranged from 34 seconds to 50 seconds in length. Participant 19 said, "The videos were my favorite part of the experience because they're short, they give you a whole lot of information really quick and effectively. It's honestly easier to retain the reading."

Quick Facts are Best

Beyond how the content was presented, participants also noted the content they remembered from the tour and were asked to describe why they recalled the information. Participants noted "quick facts" were what they picked up on most, with varied reasoning on why this was so. Two subthemes arose from this: (1) Make it Easy to Consume and Interesting, and (2) Quantification Helps.

Make it Easy to Consume and Interesting. During the focus group, participants were asked to recall any facts or bits of information they remembered from the tour and were then asked to explain if there was a particular reason they remembered this information. Participants emphasized making the information presented "easy to consume" or "digest." Additionally, some participants said it was the smaller, more random facts they remembered best, rather than the larger picture items. Participant 20 said, "It's good that the information was pretty digestible. Especially for somebody who has no background in agriculture or a gin."

Quantification Helps. When asked what they remembered, many participants recalled facts that included numbers. Some participants specifically stated numbers helped them to recall facts. Participant 19 said, "It's the quantification of something that helps me remember it. You give me a number and now it feels more important because it is an amount of something."

Research Question Four

The fourth research question sought to understand how participants described the virtual tour's ease of use. Four themes emerged: 1) Multiple ways to navigate the tour, 2) Go at your own pace, 3) It's easy!, 4) Getting the hang of it.

Multiple Ways to Navigate the Tour

Participants recognized there are multiple ways to navigate the tour, as well as uses for the floorplan and dollhouse view tools. Two subthemes emerged from this discussion: (1) Use the Arrows and (2) The Floorplan is Your Friend.

Use the Arrows. At the beginning of the research session, participants were given a demonstration of the different ways to navigate as well as some of the tools that were available to them. There are two basic ways to navigate the tour. The first is to use the arrows to go through all of the stops in the way they were ordered. The second way to navigate was to use a "free look" approach, which is essentially moving throughout the tour with no predefined path. Participant 9 said, "I wasn't ever confused because I clicked through the arrows, but if I would have just like clicked around then I might have gotten lost and not followed the correct path."

The Floorplan is Your Friend. One of the tools available to users is the option to view the entire facility from a floorplan view. Participants mentioned this was a helpful aspect in orienting themselves in the facility. Participant 14 said, "The floor plan was really helpful; especially how it was labeled because whenever I did get lost, I would go back there and kind of reposition myself."

Go at Your Own Pace

As the previous theme and subthemes addressed, there are different ways to navigate the tour, and each person has their own preferences to which method is best. Regardless of how users choose to navigate the tour, participants mentioned they liked that they were able to go at their own pace and choose how the experienced the gin. This also enabled them to spend more time learning about content that interested them specifically. Participant 10 said:

> The 'go at your own pace' thing is really nice. Because I mean, in a tour, they're probably going to be busy. So, they want to get you in and out, and you're not going to be able to go back either.

It's Easy!

Participants said they enjoyed how easy it was to move around and explore the cotton gin. As the previous theme discussed, they liked being able to essentially control their trip. They also enjoyed navigating through the tour, for the most part. Participant 11 said, "I found it was smooth and easy to navigate your way around. Having those, even though the numbers are small, it was helpful to have those up there, so you know which order you were in."

Getting the Hang of It

While many participants described navigating the tour as "easy," several participants noted there were times they were lost, or a bit confused, and had to spend some time reorienting themselves. Participant 20 said, "It definitely got easier to navigate once I got further in. At the beginning I was kind of like, 'OK, it's a little confusing,' but I think that might be in part because of how the gin is structured."

Research Question Five

The final research question sought to identify future tour sites as well as improvements to be made for future tours. This led to the development of two themes with corresponding subthemes.

"Showcasing Any Process Within Agriculture"

Participants identified a variety of potential IVT sites in FAS. From this, four subthemes were created: (1) Animal Sciences, (2) Commodities, (3) Recruitment, and (4) Other Areas of FAS.

Animal Sciences. When asked what other virtual tours they would be interested in, many participants first named sites related to animal sciences. Popular suggestions were feedlots, processing and packing plants, and dairies. Participants said these sites could be helpful in educating those outside of the agricultural industry about where their food comes from and how it is made. Participant 10 said, "Definitely feedlots…because that's such a big part of the ag industry and I think a lot of people don't get to see that, especially where I'm from… where we don't have a lot of that kind of agriculture."

Commodities. Many different types of commodities were also suggested as future tour sites. From growing in the field to milling, participants were interested in seeing the many processes that various crops go through. Participants even mentioned production processes of less popular and often forgotten about staples such as timber, rice, fruit, almonds, and olive oil. Participant 5 said, "All grain production like sorghum, soybeans, corn, kind of the process of how all of that gets from the field to table or the field to whatever it gets turned into. I think any grain production would be good."

Recruitment. Participants also identified using IVTs as a recruitment tool. They suggested that this technology could be used to provide further insight into different facilities as well as various majors and learning opportunities at the university.

Other Areas of FAS. Outside of the aforementioned areas, participants identified several other sites for future tours. The sites mentioned pertained to a variety of the scientific processes that are seen within the agriculture industry such as genetic engineering.

Improving Clarity

Overall, participants provided helpful critiques for improving the development of future IVTs. Four subthemes emerged, which concerned improving the clarity of IVTs: (1) More Structure, (2) Identification Tags, (3) Organization of Content, and (4) Additional Content Areas.

More Structure. Participants suggested adding more structure to the IVT in order to make it more like a real tour. In order to do this, it was proposed to add more directional pieces to the tour such as arrows and more explainer "stops." The current tour has four directional stops. Participant 19 said: "I think a little more structure to the tour itself. When you're taking an in-person tour, you have a guide that's showing you everything and so typically they'll show you like the exact process and take you that way."

Identification Tags. Participants suggested changing the identification tags of to make them more descriptive or numbering the stops instead. Currently, the identification tags for each stop are categorized by content. For example, stops relating to machinery have a wrench icon and stops relating to crops have an ear of corn icon.

Provide a Beginning and an End. Participants commented on the chronological organization of content and in the future, being sure to include a brief background piece to provide more context to viewers. Participant 32 said:

> To kind of help people that don't fully understand what it is, I think having the farming part at the beginning would add a lot of context to it. Because when it was at the end, I was like, "Oh, there it is. There's the first step."

Additional Content Areas. Participants made note of a few different important content pieces, as well as identified areas for additional content in future tours, or in the revision of the cotton gin IVT. Participant 18 recommended conducting interviews with people engaged in the location to provide a human element.

Conclusions & Implications

Utilizing a convergent parallel mixed methods approach allowed the research team to collect and analyze the two complementary data sets separately, and then bring them together for comparison, discussion, and interpretation. Each of the quantitative TAM constructs were tied to a qualitative topic for comparison and discussion as described below. The findings provide insights about the use of food and agricultural science IVTs in agricultural education.

Perceived Usefulness and Educational Merit

The perceived usefulness scale had a high grand mean of 4.57 (the upper limit is 5.00), indicating students had positive perceptions of the usefulness of the IVT. This supports the qualitative findings relating to perceived educational merit. Participants deemed IVTs as an effective learning tool. While participants found the IVT to be beneficial, participants reiterated that an IVT was not a substitute for an actual field trip to the site. Previous literature evaluating student thoughts on the use of virtual tours in an educational setting echoes this sentiment (Cassady et al., 2008; Herristch et al., 2013; Spicer & Stratford, 2001). These findings indicate that IVTs are valuable educational tools. As the TAM posits, perceived usefulness is related to how technology can help one achieve a goal or complete a task (Davis, 1989). Participants recognized that the IVT was a useful way to learn more about the agricultural site and this would help them achieve classroom-related goals such as learning more about the topic.

Perceived Enjoyment and Content

Within TAM, perceived enjoyment is "the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis et al., 1992, p. 1113). Quantitatively, perceived enjoyment was measured through three scale items and had a grand mean of 4.26, suggesting that participants enjoyed the virtual tour experience. This finding supports the qualitative data as participants made comments such as "I was interested the whole time because I could either read it, or I could hear what they were saying in the videos." Previous studies have found enjoyment is an important factor when predicting users' intentions to adopt technology in virtual settings (El-Said & Aziz, 2021; Guo & Barnes, 2011; Kim & Hall, 2019; Vishwakarma et al., 2020). Perhaps the most notable finding was how much participants enjoyed the video content. Participants commented that they liked the videos because they were short and straight to the point. Participants even said they wished there were more videos.

Perceived Ease of Use and Navigation

Perceived ease of use had a grand mean of 4.40, demonstrating participants found the tour relatively easy to use. TAM literature emphasizes the importance of perceived ease of use (Davis, 1985; Davis et al., 1992), which is influenced by design features that make the technology easier or more difficult for users to learn and implement. Participants appreciated that they could navigate the tour at their own pace, and most described the tour as easy to navigate. However, some did say they first had to orient themselves and "get the hang" of the tour before it was easy. While there are multiple ways to navigate the tour, notably, most students said they preferred using the arrows to click through the tour so they could ensure they were seeing all the content.

Intention to Adopt and Future Development

The final TAM construct and qualitative question pertained to students' intention to adopt future IVTs, future food and agricultural science (FAS) sites and facilities they would like to see, and any suggestions they have for future IVTs. The intention to adopt scale had a grand mean of 4.00, which suggests most participants would use an IVT to vicariously visit an FAS site again. Students had many suggestions for IVT improvement, all of which included clarifying and adding more structure. They noted IVTs could be used to showcase "any process within agriculture," but the first suggestion was often an animal science facility.

Recommendations

Future research should replicate this study with different IVTs and collect data from a larger, more diverse student population. It is also recommended to collect feedback from the instructors who implement IVTs in their classroom and gather their students' perspectives of using IVTs as a learning tool. In terms of practice, IVT creators should use short videos (no longer than 90 seconds) as the main point of information and use photos and descriptions as a complement to the videos, rather than a replacement. Additionally, future tours could add more structural components (more identification tags, directional items, etc.) to help emulate a real tour. IVTs should be created about animal science and crop and commodity facilities and processes, alongside various other FAS processes. Finally, instructors should use IVTs as an alternative to traditional field trips. Although IVTs may not be able to fully replace on site field trips, there are many uses for them in and outside of the classroom.

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Electronic field trips and inquiry-based learning:
A combination for food and agricultural literacy

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As the food system, from production to consumption, has increasingly become complex, the need for food literacy among American school-aged children has also increased. Teaching and learning interventions using inquiry-based learning (IBL) can be used to improve food literacy. The purpose of this study was to determine how an IBL approach toward electronic field trips (EFTs) impacted students' ability to understand a systems-based process. The influence of the intervention was examined in a three-part EFT series with a focus on the tomato food system (growing, processing, and consumption) through teacher-reported feedback and student-generated drawings. Teacher observations indicated more than 80% of students demonstrated measured IBL markers. The comparative assessment of students' pre- and post-series drawings shows an increase in students' knowledge of the tomato food system. Students retained and built on their pre-existing knowledge of the tomato system, integrating more complex concepts into their post-series drawings. Results substantiate the educational value of EFTs in developing students' understanding of food systems. We, therefore, recommend the combined use of EFTs and IBL in classrooms to inform complex system topics aimed at improving food and agricultural literacy among elementary school students.

Introduction

Most American adolescents lack knowledge regarding where their food comes from, how it is processed, and how it gets to their plate each day (Brandt et al., 2017; Hess & Trexler, 2011; Powell & Agnew, 2011). Food systems, the process from growth to consumption, have increasingly become more complex; so too has the need for improved food literacy in American adolescents increased. Food literacy can be understood through six domains: "skills and behaviors, food/health choices, culture, knowledge, emotions, and food systems" (Truman et al., 2017, p. 370).

Evidence shows that adolescents' eating habits can be improved by increasing their knowledge of nutrition and cooking skills (Brooks & Begley, 2014; Markow et al., 2012; Nelson et al., 2013). A systems-based approach allows adolescents to understand the broader context of a food system, while a focus on local systems supports sustainable agricultural practices (Rotz & Fraser, 2015), improves food security (Pearson et al., 2011), and strengthens local economies (Lyson & Welsh, 2005). Food literacy goes hand-in-hand with agricultural literacy, defined as knowledge regarding food and fiber systems (National Research Council, 1988), with a focus on attitudes (Powell et al., 2008; Vallera & Bodzin, 2016), engagement in agricultural systems (Meischen & Trexler, 2003), and behaviors (Spielmaker et al., 2014). Beyond classroom learning, field trips provide the opportunity to develop an understanding of food systems and improve food literacy. The purpose of this research was to determine how an inquiry-based learning (IBL) approach toward electronic field trips impacted students' ability to understand a systems-based process found in food production.

Electronic field trips

Field trips have long served as a way for adolescents to experience events outside their normal routine (Tuthill & Klemm, 2002) and serve as a critical way for students to connect classroom learning to the real world (Tal, 2001). However, integrating field trips into the school year can be a challenge to teachers, with reduced funding for trips, plus logistical issues of time, transportation, and academic testing (Adedokun et al., 2011; Parker et al., 2010; Stoddard, 2009*)*. Electronic field trips (EFTs) present a low-or-no-cost alternative to traditional field trips and require less time away from the classroom (Tuthill & Klemm, 2002). Additionally, EFTs allow more than one classroom to participate at a time, greatly increasing their effectiveness in reaching students.

While traditional field trips connect formal learning to non-formal, EFTs blend the two, as they bring an out-of-school location into the formal classroom setting (Adedokun et al., 2012a; Adedokun et al., 2012b; Tuthill & Klemm, 2002; Loizzo et al., 2019). In recent years, EFTs have frequently been utilized to present a variety of science topics to students (Cassady et al., 2008; Loizzo et al., 2019; McLeod-Morin et al., 2020). EFTs offer students the opportunity to engage with professionals through a two-way communication system, and foster learning through inquiry (Cheng, 2022), a critical element of inquiry-based learning.

Inquiry-based learning

IBL encourages the development of scientific thinking by providing students with opportunities to ask questions, develop hypotheses, reflect on their learning, and integrate that learning with their prior knowledge (National Research Council, 2005). Generally, IBL is associated with indirect instruction methods, but it can also work with direct instruction, especially for students unfamiliar with IBL. As students become more empowered through IBL, they move toward more indirect, student-led development, testing, and reviewing of their own hypotheses (Turner et al., 2017).

IBL is often used with learning environments research, as an environment must be conducive to this style of instruction. In reflecting on the development of her inquiry-driven elementary classroom, McGonigal (1999) noted that careful thought and action were required to foster scientific inquiry in young adolescents. Special attention was needed to develop curricula containing interesting materials and encouraging observation and discovery. Teachers must cultivate a classroom environment that provides opportunities for risk-taking, exploration, revision of thinking, and reflection.

McGonigal (1999) concluded that a classroom centered around IBL fosters shared interest and ownership of learning between a teacher and their students and develops a community of active learners. Similarly, Robinson and Aldridge (2023) found that female students interacting with an IBL mathematics classroom had a positive relationship with their learning environment, subsequently increasing their enjoyment of and willingness to engage with the subject.

Turner et al. (2017) developed an instrument to assess IBL in classroom settings by observing key elements of IBL, such as developing questions and hypotheses, asking questions, generating discussion, and reflecting on learning. The instrument is intended for researcher use in classroom observations of students and teachers. The IBL instrument reported on in this manuscript was

adapted for teacher use. Teachers reported observed behaviors among their students before, during, and after EFTs. Their observations of IBL indicators provided insight into the student element of the study: student-generated drawings.

Drawing as scientific inquiry

In scientific learning, drawing has been utilized to improve students' observational skills, memory, and imagination (Steele, 1991; Stein & Power, 1996). Drawing invites students to engage in the inquiry process, develop their scientific understanding, and express their content knowledge, especially in younger students (Ainsworth, 2011; Schmeck et. al, 2014). Drawing can facilitate student comprehension and learning for more complex content, such as systems-based processes (Van Meter & Garner, 2005).

However, the successful use of student-generated drawings requires the opportunity for learners to reflect upon recently acquired information (Hall, Bailey, & Tillman, 1997), compare it against reference knowledge, and receive feedback (Landin, 2011). For effective use of drawings in scientific learning, Smith et al. (2019) recommended that prompts clearly align with what knowledge is being assessed and encourage deeper probing.

Short answer responses, characterized as one phrase to one paragraph, allow students to recall their knowledge, make scientific claims, and provide evidence to support these claims (Burrows et al. 2014; Sampson & Clark, 2008). Pairing a written response with drawings reveals underlying thoughts and encourages reflection (Campbell & Fulton, 2003).

As outlined above, drawings serve as a way for students to process information and generate a deeper understanding of a topic. However, drawings also offer a window to recognize what students are not learning and can serve as a tool to identify misconceptions (Dikmenli, 2015; Dove, Everett, & Preece,1999; Ehrlén, 2009; Köse, 2008).

For this study, students were asked to draw and describe the steps a tomato goes through to reach their school cafeteria before and after participating in the EFT series. A question prompt asked students to think through a systems process, without leading them in any particular direction. The pre-post drawing process allowed students the opportunity to reflect on their initial thoughts, identify their previous misconceptions, and recognize what they learned through the EFTs.

Purpose & Objectives

The purpose of this research was to determine how an inquiry-based learning approach toward electronic field trips impacted students' ability to understand a systems-based process. Through a two-part quantitative study, we explored student learning through teacher-reported feedback and student-generated drawings. The objectives of this study were to 1) *describe the inquiry-based learning markers observed in students by their teachers* and, 2) based on the observed markers, to *investigate if inquiry-based learning deepened students' understanding of the tomato system through the analysis of their pre- and post-series drawings*.

Methods

The three-part EFT series titled *From Seed to Fruit: Tomato Production in Ohio* was hosted in May of 2023 with each EFT lasting between 32 and 36 minutes. Each field trip covered a different element of the tomato food system: growing, processing, and consumption – which included a hands-on food demonstration. Teachers were provided five lesson plans, one for each EFT, plus an additional plan for the start and end of the series, to assist in the facilitation of learning. The EFTs were scheduled in advance, one per week, and broadcast live for classrooms to watch. Due to the live nature, classrooms were able to interact with the broadcast by sending questions in real-time to be read by the EFT moderator. This format allowed teachers to facilitate the learning process and receive the benefits of a field trip while also remaining in their familiar classroom setting. In addition, the EFTs were recorded, and the link was provided to all registrants so that they could watch the series at any time, albeit without the live, interactive component. Each EFT was hosted on Zoom and simultaneously livestreamed to YouTube. The growing EFT is available at shorturl.at/joJNO. The processing EFT is available at shorturl.at/evzK4. The consumption EFT is available at shorturl.at/hkorH. The EFTs were part of a larger farm-to-school grant project funded by the Connect and Collaborate Grant. The EFTs were targeted toward 3rd-5th grade classrooms in Ohio, though classrooms of other grades or locations were not restricted from participation.

Recruiting and Sampling

Researchers worked with Shift•ology Communication, an Ohio-based public relations firm that specializes in coordinating and conducting virtual field trips, which hosted the EFTs, to recruit instructors to participate in the EFTs and corresponding research. EFT advertising was sent to Shift•ology's list of teachers between 3rd and 5th grade and posted on their website. Additionally, advertising was sent to OSU Extension and to a list of homeschool co-ops in Ohio. Registration, live attendance, and YouTube views to date is reported in Table 1.

Table 1

Recruitment, Attendance, and Views

	Registered			Live Attendance			Views
	Instructors	Unique Classrooms	Students	Instructors	Unique Classrooms	Students	
EFT 1	52	74	1257	21	27	480	106
EFT 2	52	68	1204	23	30	608	80
EFT 3	58	77	1354	24	31	581	88

The research sample was drawn from teachers who had signed up their classroom for the EFT series. A total of 96 unique instructors registered for the EFT. Teachers were asked to opt-in to research activities: a pre-post questionnaire that assessed teacher IBL perceptions and the student drawing activity. 13 teachers completed the pre-series questionnaire, 10 teachers completed the post-series questionnaire, and 13 classrooms participated in the student drawing activity, resulting in 145 pre-series drawings and 160 post-series drawings.

Instruments

This quantitative study was conducted in two parts: a pre-post quantitative questionnaire for teachers and a quantitative content analysis of student-generated drawings. The pre-series questionnaire assessed teachers' perceptions of vegetable production and their demographics. Teachers who completed the pre-series questionnaire were shipped a food demonstration kit for their classroom to use during the third EFT, a cooking demonstration. Teachers who participated in the pre-series questionnaire were eligible to participate in the post-series questionnaire, which was adapted from Turner et al.'s (2017) classroom-observation assessment IBL instrument. In this study, teachers, instead of researchers, reported observed behaviors among their students before, during, and after EFTs. Teachers who completed the post-series questionnaire were sent a $25 gift card.

Teachers who participated in the pre-series questionnaire were also asked to conduct a pre- and post-series drawing activity with their classrooms. In the first and last lesson plan, an activity sheet was included with the prompt: *How does tomato soup get to the cafeteria for your lunch? Draw the process, then explain your drawing below.* The sheet provided students with a large area for drawing and four lines to explain their drawing. Teachers who returned completed pre- and post-series drawings received an additional $25 gift card.

Data analysis

The pre-post teacher questionnaires were analyzed using descriptive statistics. The pre-questionnaire was analyzed for descriptive values. The post-questionnaire asked teachers to report a percentage of students in which IBL behaviors were observed, based on teachers' perceptions of students demonstrating the IBL indicator. Means and standard deviations are reported for these percentages.

The drawings were received in bulk from participating teachers. Drawings were categorized based on the timing of completion (pre- or post-series). The pre-series and post-series drawings were analyzed collectively, and results were aggregated within the two categories without student or classroom matching. The researchers performed a content analysis on the drawings and accompanying text, noting key learning points of each EFT, deductively drawn from the events themselves. For instance, when assessing growing EFT indicators, researchers looked for depictions of tomato plants, planting seeds, farmers, transportation, irrigation, etc. A total of 39 key points were coded, 15 in growing, 13 in processing, and 11 in consumption. To establish inter-coder reliability, all researchers coded the first 10% of pre- and post-series drawings and then compared the coding results. After two coder-training cycles, intercoder reliability was between the range of .685 - .980 for 35 of the 39 variables. This range is considered acceptable (Riffe et al., Krippendorff, 2004). The researchers retrained on the remaining four variables and then were assigned a segment of the remaining drawings to code individually. A count was taken of the resulting data for each variable and a percent increase was used to compare pre- and post-drawing results. Percent increase was calculated using the formula % = (post/pre)*100. Due to this formula, no change in frequency is represented as 100% increase, while decreases will be represented as a number less than 100. Inferential comparisons were unable to be completed due to the anonymous nature of the drawings and small counts in some variables.

In this is a two-part quantitative study, the data from the teachers' questionnaire is intended to provide insight into the trends and changes from the students' pre-series drawings to their post-series drawings.

Results

As noted above, 13 teachers participated in the pre-series questionnaire. All teachers identified as female (n = 13) with teaching experience ranging from 5 to 33 years. Class sizes ranged from 5 to 46 students for a total of 337 students. Participants mostly represented 4th grade (n = 5) and 5th grade (n = 4) classrooms. Most teachers (n = 10) had participated in 6 or fewer virtual field trips, including this series. When asked how often they taught agriculture in their classroom, most teachers indicated including agricultural curriculum approximately once a month (n = 8).

Describe the inquiry-based learning markers observed in students by their teachers
In the post-series questionnaire, teachers were asked to report the percentage of their students demonstrating each inquiry-based learning marker for each stage of the series. Ten teachers (n = 10) completed the post-series questionnaire.

Teachers were provided with lesson plans to use in their classrooms before each EFT. When participating in the planned lessons, teachers reported that 92% of students (M = 92.2, SD = 9.041) demonstrated an understanding of the lesson content, and 86% (M = 85.5, SD = 17.704) appeared to be mastering the lesson objectives. Most students were actively participating in (M = 83.0, SD 23.195) and paying attention to (M = 81.50, SD 12.547) the lessons. Pre-series IBL markers and their corresponding means and standard deviations are reported in Table 2.

Table 2
Percentage of students demonstrating inquiry-based learning markers during the provided pre-EFT lesson plans, as reported by teachers

	n	*M*	*SD*
Demonstrate understanding of pre-trip lesson content objective	10	92.20	9.041
Appear to be mastering pre-trip lesson objective(s)	8	85.50	17.704
Actively participating in pre-trip lessons	8	83.00	23.195
Paying attention to supplied pre-work	8	81.50	12.547
Enthusiastic about pre-trip lessons	8	77.88	23.467
Generate questions beyond primary pre-trip lesson objective(s)	8	64.63	33.645
Appear frustrated with pre-trip lessons	5	7.80	14.805

Note. n represents the number of teachers reporting for each variable, not the total number of students. M and SD based on percentage of students reported by instructors.

During the EFTs, teachers indicated 92% of students (M = 92.00, SD = 9.592) students demonstrated an understanding of the content objective. In addition, students were actively participating in (M = 83.30, SD = 16.839), paying attention to (M = 82.10, SD = 16.839), and enthusiastic about (M = 81.60, SD = 17.84) the trips. EFT IBL markers and their corresponding means and standard deviations are reported in Table 3.

Table 3
Percentage of students demonstrating inquiry-based learning markers during EFTs, as reported by teachers

	n	*M*	*SD*
Demonstrate understanding of EFT content objective	8	92.00	9.592
Actively participating in EFT	10	83.30	16.839
Paying attention to EFT	10	82.10	16.121
Enthusiastic about EFT	10	81.60	17.84

Note. *n* represents the number of teachers reporting for each variable, not the total number of students. *M* and *SD* based on percentage of students reported by instructors.

After the series was completed, teachers reported that 94% of students reflected on what they had learned from the EFTs ($M = 94.10$, $SD = 11.239$). The lesson plans encouraged students to create and test hypotheses. Teachers reported that 82% of students used prior knowledge to interpret the results of ($M = 82.67$, $SD = 16.485$) and engaged in evaluating ($M = 82.00$, $SD = 13.401$) their hypotheses. Eighty percent of students were able to identify previously held misconceptions at the conclusion of the series ($M = 80.20$, $SD = 24.697$). Post-series IBL markers and their corresponding means and standard deviations are reported in Table 3.

Table 4
Percentage of students demonstrating inquiry-based learning markers after EFTs, as reported by teachers

	n	*M*	*SD*
Reflected on what they learned	10	94.10	11.239
Use prior content knowledge to interpret results	9	82.67	16.485
Engage in evaluation of their hypotheses	6	82.00	13.401
Identify misconceptions	10	80.20	24.697

Note. *n* represents the number of teachers reporting for each variable, not the total number of students. *M* and *SD* based on percentage of students reported by instructors.

Investigate if inquiry-based learning deepened students' understanding of the tomato system through the analysis of their pre- and post-series drawings.
Prior to participation in the growing EFT, student drawings most commonly included "tomato plants" (drawing $n = 66$; writing $n = 35$), "transportation from the field" (drawing $n = 40$; writing $n = 30$), "farmer" (drawing $n = 35$; writing $n = 14$), and "handpicking" (drawing $n = 30$; writing $n = 32$). These elements generally increased in frequency in the post-trip drawings and writing, though both "tomato plants" and "farmer" were slightly less frequent in post-trip writings.

Three key points had a large frequency increase in both the drawings and writings from pre- to post-trip: "machine harvest" (drawing 1100%; writing 750%), "watering/irrigation/rain" (drawing 850%; writing 1700%), and "greenhouse" (drawing 575%; writing 1400%). Visual representations of tomato blossoms increased 567% from pre- to post-trip, while "planting seeds/tomatoes" was more frequently mentioned in the post-trip writings (427%). Figure 1 depicts a pre-series drawing versus a post-series drawing with an emphasis on the growing

element. All growing EFT key points and their frequencies and percent increases are reported in Table 5.

Figure 1

Pre- and post-series student drawings with an emphasis on growing

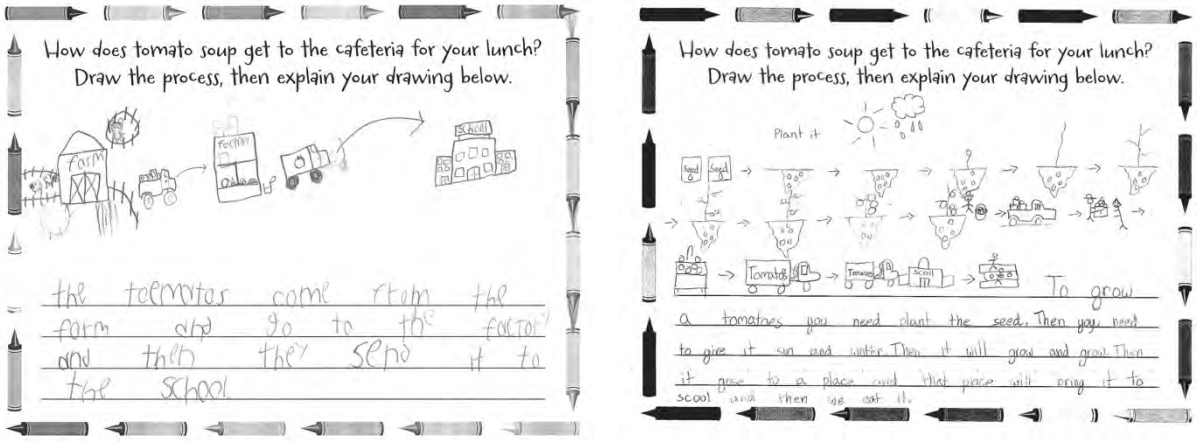

Table 5

Key points from the Growing EFT, as depicted in student drawings and writings

	Drawing			Writing		
	***n* Pre**	***n* Post**	**% increase**	***n* Pre**	***n* Post**	**% increase**
Machine harvest	1	11	1100	2	15	750
Watering/irrigation/rain	2	17	850	1	17	1700
Greenhouse	4	23	575	0	14	1400
Tomato blossoms	3	17	567	0	3	300
Composting	0	3	300	0	2	200
Seeds	18	41	228	11	33	300
Soil	15	31	207	6	5	83
Handpicking	30	47	157	32	43	134
Farmer	35	51	146	14	13	93
Transportation from field (crate/truck)	40	58	145	30	48	160
Tomato plants	66	94	142	35	31	89
Planting seeds/tomatoes	11	14	127	11	47	427
Bees	0	1	100	0	0	0
Stakes/strings	2	2	100	0	0	0
Plastic Mulch	0	0	0	0	2	200

Note. Percentage increase has been rounded to the nearest whole number.

Prior to participation in the processing EFT, student drawings most commonly included "transportation to schools/stores" (drawing $n = 47$; writing $n = 52$), "processing – crushing, juicing, cutting, squeezing" (drawing $n = 33$; writing $n = 22$), "filled cans" (drawing $n = 17$;

writing n = 18), and "factory" (drawing n = 15; writing n = 13). These elements increased in frequency in the post-trip drawings and writings, except for "processing," which decreased.

Three key points had a large frequency increase in both the drawings and writings from pre- to post-trip: "sorting for quality, desirable fruit, color, size" (drawing 900%; writing 1200%), "washing tomatoes" (drawing 660%; writing 740%), and "cooking/heating the can" (drawing 500%; writing 700%). Visual representations of conveyors increased 550% from pre- to post-trip. Figure 2 depicts a pre-series drawing versus a post-series drawing with an emphasis on the processing element. All processing EFT key points and their frequencies and percent increases are reported in Table 6.

Figure 2

Pre- and post-series student drawings with an emphasis on processing

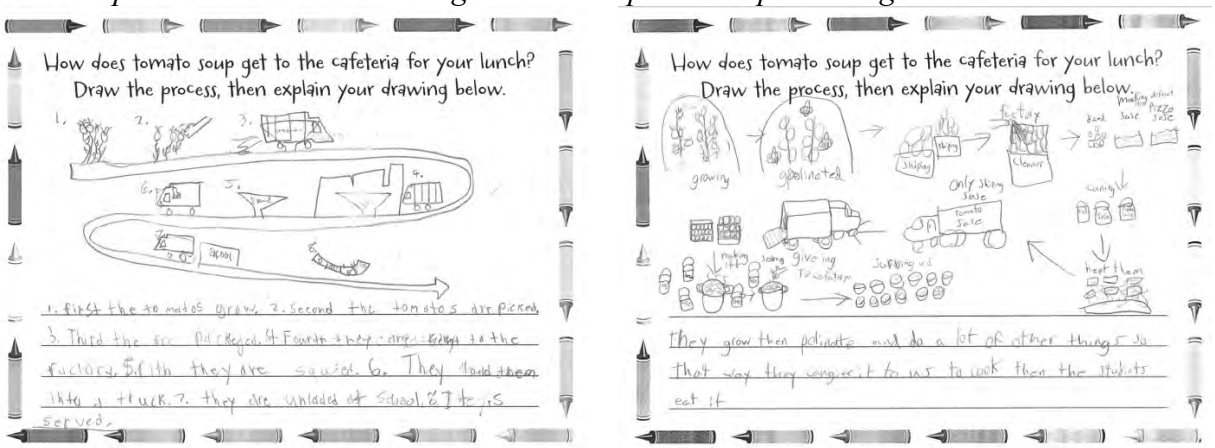

Table 6

Key points from the Processing EFT, as depicted in student drawings and writings

	Drawing			Writing		
	***n* Pre**	***n* Post**	**% increase**	***n* Pre**	***n* Post**	**% increase**
Sorting for quality, desirable fruit, color, size	1	9	900	1	12	1200
Washing tomatoes	5	33	660	5	37	740
Conveyors	2	11	550	1	2	200
Cooking/heating the can	0	5	500	0	7	700
Coating cans	0	4	400	0	2	200
Empty cans	2	6	300	1	2	200
Palletizing	2	5	250	1	3	300
Unloading tomatoes at processing plant	0	2	200	0	0	0
Filled cans	17	34	200	18	34	189
Factory	15	20	133	13	15	115
Transportation to schools/stores	47	53	113	52	62	119
Cover with lids/seal lids	1	1	100	1	2	200

Processing - crushing, juicing, cutting, squeezing	33	22	67	40	34	85

Note. Percentage increase has been rounded to the nearest whole number.

Prior to participation in the consumption EFT, student drawings most commonly included "school/school cafeteria" (drawing n = 49; writing n = 57), "preparing tomatoes – cutting, dicing, cooking" (drawing n = 46; writing n = 47), "people" (drawing n = 41; writing n = 20), "buying/transporting tomatoes from point of purchase to consumption" (drawing n = 38; writing n = 38), and "tomato soup" (drawing n = 32; writing n = 42). When compared to the post-trip drawings, however, these points generally decreased in frequency.

Three key points had a large frequency increase in both the drawings and writings from pre- to post-trip: "salsa" (drawing 450%; writing 500%), "addition of other food products" (drawing 138%; writing 112%), and "non-school setting – home/kitchen" (drawing 133%; writing 112%). Figure 3 depicts a pre-series drawing versus a post-series drawing with an emphasis on the consumption element. All consumption EFT key points and their frequencies and percent increases are reported in Table 7.

Figure 3

Pre- and post-series student drawings with an emphasis on consumption

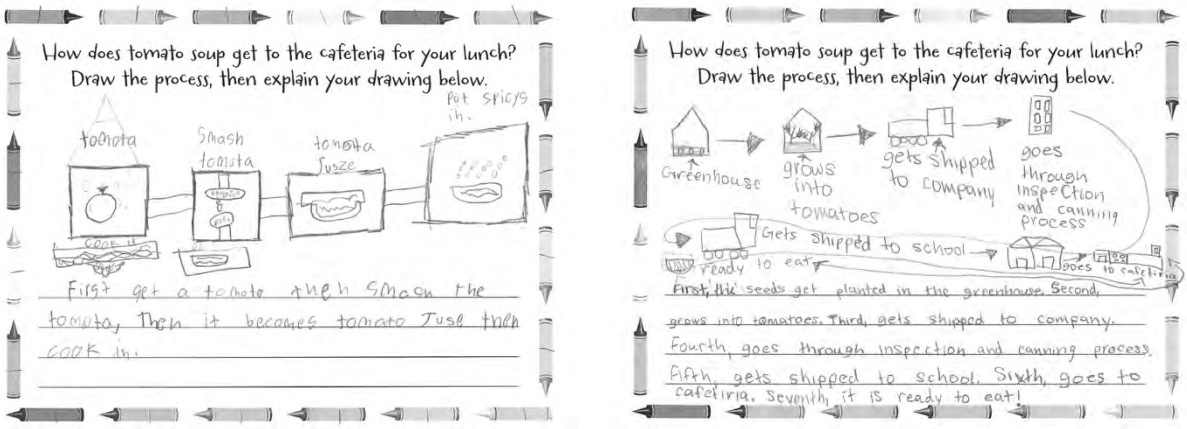

Table 7

Key points from Consumption EFT as depicted in student drawings and writings

	Drawing			Writing		
	***n* Pre**	***n* Post**	**% increase**	***n* Pre**	***n* Post**	**% increase**
Salsa	2	9	450	2	10	500
Addition of other food products	8	11	138	10	10	100
Non-school setting (home/kitchen)	24	32	133	8	9	113
People	41	46	112	20	20	100
Washing hands/wearing gloves	0	1	100	1	0	0

School/school cafeteria	49	46	94	57	68	119
Eat	15	14	94	26	25	96
Preparing tomatoes - cutting, dicing, cooking	46	33	72	47	32	68
Other tomato-based foods	13	9	69	9	6	67
Buying/transporting tomatoes from point of purchase to consumption	38	25	66	38	22	58
Tomato soup	32	16	50	42	14	33

Note. Percentage increase has been rounded to the nearest whole number.

Discussion and Recommendations

Electronic field trips have often been used to connect students with scientific topics (Cassady et al., 2008; Loizzo et al., 2019; McLeod-Morin et al., 2020) and inspire learning through inquiry (Cheng, 2022). Through inquiry-based learning, students are encouraged to ask questions, develop hypotheses, reflect on their learning, and integrate that learning with their prior knowledge (National Research Council, 2005). By creating a collaborative, student-led environment, IBL builds a community of learners excited to engage in classroom subjects (McGonigal, 1999; Robinson & Aldridge, 2023).

Turner et al. (2018) indicated classrooms utilizing inquiry-based learning were more successful when they engaged 80% of students in given markers. In the current study, teachers indicated more than 80% of students demonstrated almost all indicators of IBL measured. Students were interested and engaged in the EFTs, before, during, and after the trips. As a result, students understood the content with which they were engaging and were able to identify misconceptions, interpret results, and evaluate their hypotheses.

For younger students, such as the 4th and 5th graders who participated in this activity, drawing provided the opportunity to express their content knowledge and develop their scientific understanding (Ainsworth, 2011; Schmeck et. al, 2014). The associated short writing prompt allowed students to describe their drawings and provided greater insight to the underlying thought behind their models (Campbell & Fulton, 2003).

The drawing activity was designed in two parts to encourage inquiry-based learning. The pre-drawing was intended to foster an environment of inquiry-based learning by inspiring curiosity and excitement about the EFTs, encouraging question generation, and priming students to be observant during the trips (Steele, 1991; Stein & Power, 1996; Turner, 2018). The post-drawing focused on the reflection and misconception elements of IBL by providing an opportunity for students to depict their observations and process a complex food system that was represented over three trips (Ainsworth, 2011; Schmeck et al., 2014; Van Meter & Garner, 2005).

Prior to the EFTs, students expressed limited knowledge of the tomato food system, focusing on basic concepts related to tomato production such as “tomato plants,” “farmer,” “filled cans,” and “preparing tomatoes” in their pre-series drawings. These elements and other frequent pre-trip

indicators generally increased in frequency for the post-trip drawings and writings, indicating students generally retained and reinforced their beginning knowledge of the system.

However, there were a number of key points that had large frequency increases from pre- to post-series. These elements, including "machine harvest," "greenhouse," "sorting for quality," and "conveyors," represented more detailed, nuanced elements of the tomato food system. Paired with the retention of the introductory topics, the increase of more complex points indicates that students built on their prior knowledge to integrate additional elements of the tomato system.

While the data showed frequency increases for key points in growing and processing, consumption key points only increased slightly or decreased from pre- to post-series. We attribute this difference first to the prompt, which primed students to think about both "school cafeterias" and "tomato soup," likely influencing their response. In addition, the consumption EFT focused on making salsa by adding ingredients to tomatoes, which likely moved students' thinking toward these points. In addition, students' prior knowledge likely played a part, as many pre-series drawings dedicated more space to the consumption element, which they would have the most familiarity with. In contrast, with exposure to more details on tomato growth and processing, post-series drawings had more space dedicated to these areas.

In both pre- and post-series drawings, few key points were observed in abundance. However, it is important to recall the target age group of the series: children in 3rd to 5th grade, typically 8-11 years old. Though students may have only depicted a handful of key points, they demonstrated an increased understanding of the food system overall. This improvement reinforces the educational value of EFTs as described in previous literature in developing students' understanding of systems, as well as food and agricultural literacy (Cassady et al., 2008; Loizzo et al., 2019; McLeod-Morin et al., 2020).

Results of this study are limited to teachers and students in Ohio who participated in the EFT series and its accompanying activities. This study is limited by the small sample size as well as the inability to directly compare pre- and post-series data for either the teachers or the student-generated drawings. In addition, the evaluation of the drawings was challenging due to the age of the student participants, which sometimes resulted in incomprehensible pictures or writing.

Future research should match teacher observations with their classroom's drawings to better understand the connection between IBL markers and changes in drawings pre- to post-series. Direct comparison of individual student drawings would also assist in strengthening the results. The drawing activity could also be revised to better represent IBL markers. For instance, the pre-series drawing could ask students what they are curious about while the post-series activity could ask them what they learned and how it was different than what they thought.

Additionally, future research should explore strategies to increase the number of drawings returned, whether that's providing teachers with a large, pre-paid envelope for return mailing or a larger incentive for participating teachers. Direct administration of the drawing activity would also ensure participation and return in the research activity. For an increased understanding of IBL implementation, researchers should also plan to observe a classroom in person to measure IBL markers, though this would require a trade-off of participating classrooms and reach.

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Framing Agricultural Labor Issues: An Analysis of News Coverage of the H-2A Program

The H-2A program is a temporary agricultural worker program created by the Immigration Control and Reform Act in 1987 that allows agricultural employers in the United States to bring nonimmigrant foreign workers in when a shortage of domestic workers exists (Guan et al., 2018 & United States Department of Labor, n.d.). The H-2A program reduces labor shortages and helps to offset the incline in undocumented immigrants in the U.S. (Guan et al., 2018). The H-2A program is complex and continues to evolve as labor needs in agriculture continue to increase (Peri & Zaiour, 2022). Researchers know the news media help to shape public perceptions of complex issues (Pan & Kosicki, 1993). This study analyzed the frequency of media coverage and the frames and sources used to communicate information about the H-2A program in newspapers located in four states with the most certified H-2A workers – Florida, California, Georgia, and Washington. Results of this study indicate the influence of framing on the coverage of the H-2A program. Recommendations for future studies involving media framing and the H-2A program are addressed.

Introduction

In 1986, the Immigration Control and Reform Act created the H-2A program to allow temporary agricultural workers to legally enter the U.S. and offset the potential decline in undocumented immigrants (Guan et al., 2018). Today, H-2A remains and exists as a temporary agricultural worker program that allows U.S. employers the opportunity to bring nonimmigrant foreign workers to the U.S. when a shortage of domestic workers exists (United States Department of Labor, n.d.). Employers have the options to hire workers through the H-2A program on either a temporary, less than a year, or seasonal basis in accordance with U.S. Citizenship and Immigration Services (USCIS), which outlines qualifications and requirements for employers to follow in order to hire nonimmigrant workers (USCIS, n.d.).

To utilize the H-2A program, there may not be "sufficient able, willing, and qualified United States (U.S.) workers available to perform the agricultural labor or services of a temporary or seasonal nature for which an employer desires to hire temporary foreign workers [H-2A workers]," (USCIS, n.d.). Employers must also ensure the wages and working conditions of domestic workers are not compromised due to the employment if H-2A workers (UCIS, n.d.). The use and implementation of the H-2A program changed the ways in which the U.S., and employers, manage and support the agricultural workforce.

The ultimate goal of the H-2A program is to support the production of fresh food produced in the United States (Simms, 2000). Historically, the number of undocumented workers has continued to increase, while the number of legal domestic workers willing and able to perform agricultural jobs has continued to decrease (Roka et al., 2017). This issue has contributed to a shortage of legal, able workers to perform necessary agricultural jobs. The use of the H-2A program provides employers with the labor needed to sustain agricultural production and harvesting practices throughout the U.S. (Luckstead & Evadoss, 2019). Through the H-2A program, and the nonimmigrant workers that are involved, farmers can ensure the majority of fresh produce is harvested before becoming spoiled (Simms, 2000).

There have been identified benefits associated with the H-2A program. For many in agriculture who seek to address needs associated with labor shortages, the use of temporary agricultural workers is helpful, especially for seasonal jobs (Luckstead & Devadoss, 2019). The H-2A program allows a pathway for guest workers to enter the U.S. workforce through the legal system, ultimately reducing the amount of illegal immigration issues in agriculture (U.S. Department of Agriculture, n.d.). The H-2A program provides employers with a stable number of workers for a contracted period of time. Employers also have the ability to adjust work weeks and times more easily with H-2A workers compared to domestic workers, allowing for them to create a more productive workforce (Roka et al., 2017). As a part of the H-2A program, employers do not pay into social security for H-2A workers, which provides some financial advantages for employers (USDL, 2010). It has been found that H-2A employees also help to boost local economies by purchasing goods and services in the United States (Castillo & Charlton, 2023). The H-2A program provides employers with legal protections for their employees throughout the production and harvest season (Roka et al., 2017). With this, H-2A labor has increased fivefold since 2005 (Bier, 2020).

However, the H-2A program is not without complexities or limitations. Issues with the H-2A program consist of program requirements for employers (Vaughan et al., 2019), cost considerations, and program policies (Escalante et al., 2019). One of the main challenges with the H-2A program is the extensive hiring process (Bier, 2020). Employers must go through their local, state, and federal agencies to petition for and hire guest workers (United States Department of Labor, n.d.). After petitioning and justifying the need for H-2A workers, as well as attempting to recruit domestic workers, employers must show the lack of available domestic workers to fulfill their production needs (Roka et al., 2017). Once the need for H-2A workers is justified, potential workers must go through a background check and receive individual work visas before entering the U.S. (USDL, 2010). The employment process for H-2A workers could take up to 90 days to complete (USDL, 2010).

Another challenge with the H-2A program involves the cost considerations – especially those costs associated with the extensive, time-consuming hiring processes, and the regulations and policy requirements (Bier, 2020). Employers experience both expenditure costs as well as opportunity costs associated with the process of utilizing the H-2A program (Escalante et al., 2019). For example, time spent during the hiring process for guest workers influences the amount of time employers have available to manage and maintain an agricultural operation (Johnson, 2021). Farms can experience financial downfalls due to the decrease in available time for farm operations. The U.S. Department of Labor sets compensation requirements for all H-2A employers to follow, including salary, transportation, lodging, and food expectations (United States Department of Labor, 2022). Monetary compensation can often be higher for guest workers than employment of domestic workers, making the H-2A program a costly venture for employers (Escalante et al., 2019).

Although laws and regulations are in place to help protect guest workers, there have been cases of worker abuse due to low wages and dangerous working conditions (Nowrasteh, 2021). Claims of abuse to H-2A workers is one of the main concerns limiting the expansion of the H-2A program (Garcia, 2014). Although some research has found that workers in the H-2A program have lower death rates than U.S.-born workers with similar employment, accurate numbers of abuse and human rights violations are difficult to access due to the self-report nature of H-2A

worker concerns (Nowrasteh, 2021). It has been noted that some H-2A employers abstain from reporting cases of abuse and/or worker rights violations (Garcia, 2014). As of November 2022, the United States Department of Labor published the final rule, *Temporary Agricultural Employment of H-2A Nonimmigrants in the United States*, to "improve program protections for workers and enhance enforcement against fraud and abuse, while modernizing the H-2A application and temporary labor certification process" (United States Department of Labor, para. 2, 2022). There are also many organizations that provide extra support for migrant workers in the United States outside of government agencies (Douglas et al., 2004). The H-2A program is complex and continues to evolve as the need for migrant workers continues to grow in the United States (Peri & Zaiour, 2022).

The H-2A program is just one complicated issue among many facing the agriculture industry. When issues are controversial or complex, the news media play a role in shaping public perceptions about the issue, while also holding the potential to influence policy (Pan & Kosicki, 1993). News media messages can often be influenced by public opinion and political pressures, creating an impression of each issue covered within the minds of media consumers (Baum & Potter, 2008). News media coverage can also bring to light information about governmental programs (Schmertz, 1986). It has been found that "news and source organizations cooperate closely because each benefit from a cordial relationship" (Chermak, 1994, p. 567). The combination of frames presented can contribute to news media messages that influence the ways in which individuals think about issues. As suggested by Dunaway and Graber (2022), "the images that media create suggest which views and behaviors are acceptable and even praiseworthy and which are outside the mainstream" (p. 2).

Issues in agriculture, especially those with policy implications like H-2A, can be difficult to understand. The reporting of these issues can take on a variety of frames that may result in changes in actions or policies (Osaka, et al., 2021). Scholars have noted a recent prevalence in media coverage of the impact of COVID-19 on farmworker communities (Aday & Aday, 2020; Flocks, 2020; Rahimi et al., 2022; Ramos et al., 2020), but a general lack of studies concerning farm labor or H-2A coverage in the media exists. While researchers have investigated topics such as the impacts of COVID-19 policies (Farnsworth, 2020) and effects of contractual farming (Ruml & Qaim, 2021) on agricultural labor issues, no studies have explored how the H-2A program has been communicated in the news media.

As stakeholders work to resolve the issues associated with the H-2A program, it is important to recognize how the news media communicate the issue and the potential implications. To understand media influence on the H-2A program, it is key to understand how news frames may influence understandings of agricultural issues (Ruth et al., 2005). The purpose of this study was to explore media frames utilized to communicate about the H-2A program in states with the most documented H-2A workers.

Theoretical Framework

Framing is the selection of distinct elements associated with an issue in order to communicate and promote a specific interpretation, recommendation, or evaluation in regard to the issue (Entman, 1993). When issues are complex, the media use frames to make sense of relevant events and suggest defined themes (Gamson & Modigliani, 1989). Further, framing is a

helpful tool to the news media as it allows for the creation of simple, interpretative packages that reduce the complexity of the issue and make things easier to understand and interpret (Kim & Willis, 2007). From a news reporting standpoint, journalists use frames to make sense of incoming and unfolding information (Scheufele, 1999).

Framing suggests placing emphasis on certain elements of an issue over others can affect how the issue is viewed or perceived by the public (Chong & Druckman, 2007). To simplify and make complicated issues easier to understand, the media employ frames to share details with their audiences (Scheufele & Tewksbury, 2007). Frames help media consumers make sense of relevant events, organize key ideas, and suggest issues at hand (Gamson & Modigliani, 1989). Finally, frames can be used to define problems, diagnose causes, and suggest remedies while at the same time omitting or obscuring other associated elements of the topic (Entman, 1993), which could result in incomplete presentations of information.

Framing is used in the media to present information about a variety of topics, including health, crime, politics, and agriculture (Kim & Willis, 2007; Lawson et al., 2020; Lundy et al, 2018; Schmertz, 1986; Swenson et al., 2018). Media about issues regarding health and crime are often framed to help consumers understand the complexity of the issues (Kim & Willis, 2007). In politics, framing is often used to present new ideas or governmental programs to the public (Schmertz, 1986). Framing in agriculture has been used to both present new ideas and to simplify complex topics in the industry (Lawson et al., 2020; Lundy et al, 2018; Swenson et al., 2018). Framing theory has been applied in a variety of contexts in agricultural communication in response to the array of issues facing the industry. A number of recent agricultural communication studies have focused on describing how issues in agriculture were framed by the media. For example, a previous study found migrant worker issues to be a prevalent frame used in regard to agricultural health and safety in some Florida news media outlets (Lundy et al, 2018). In that study, Lundy et al. (2018) explored media frames used to communicate issues associated with agricultural safety and found evidence of migrant labor issues embedded in human interest frames and frames that highlighted the complexities, such as efforts to improve working conditions, faced by migrant workers. In another framing study, Swenson et al. (2018) found farm safety reporting to largely focus on accident coverage.

The media serve an important role in distributing information and hold the potential to improve knowledge and change behaviors in regard to agricultural issues (Swenson, 2018). The frames selected by the news media also hold potential to influence the public's understanding of the issue (Chong & Druckman, 2007). In short, the way a message is framed can influence perceptions, beliefs, and attitudes about issues in agriculture and beyond (Iyengar, 1990; Lawson et al., 2021). These impacts of media framing, in turn, create an atmosphere ripe for possible impact on policy formation and support in response to how the media represent the issue (Netherland & Hanson, 2016; Pan & Kosicki, 1993). As agriculture faces careful examination from outside groups and public officials, communicators face the challenge to create messages that encourage confidence in the industry (Kaufman et al., 2008). Framing provides the media with options to communicate about issues not easily understood.

Purpose and Research Objectives

The purpose of this study was to explore how major newspapers located near top agricultural production areas in states with the most H-2A workers framed the H-2A program from January 1, 2008, to March 1, 2023. Three research objectives guided this study:

1. Determine the frequency of newspaper media coverage pertaining to the H-2A program.
2. Identify and compare news frames used in media coverage pertaining to the H-2A program by newspaper.
3. Determine the sources most frequently used by the newspapers for information about the H-2A program.

Methodology

Quantitative content analysis (QCA) was applied to determine how the H-2A program was framed in the *Orlando Sentinel, The Fresno Bee, Atlanta Journal-Constitution,* and *Spokane Spokesman-Review.* QCA is "a research technique for the systematic, objective, and quantitative description of the manifest content of communication" (Berelson, 1952, p. 18). For this study, QCA was used to segment content from each news article and assign categories to be tallied for each research objective. These newspapers are located in each of the top four states accounting for approximately half of all certified H-2A jobs in the U.S. in 2021 – Florida, California, Georgia, and Washington (USDA, 2023b). At the same time, these publications were selected in order to compare two different regions in the U.S., because of their close proximities to major agricultural production sites in the states (USDA, 2023a), and for their statuses within the top 10 newspapers for daily circulation rates by regional outlet(Agility PR Solutions, 2022). Newspapers were selected for analysis because news coverage can affect perceptions of knowledge about an issue (McCombs & Valenzuela, 2020; Moy et al., 2004).

Articles for the four newspapers were collected via the NewsBank Database by searching the term "H-2A" with the period from January 1, 2008, to March 1, 2023. The NewsBank Database allows access to print and digital stories, which were both utilized for this study. Stories collected were a combination of news, features, editorials, and opinion pieces. The timeframe for this study was selected to include the Department of Homeland Security's 2008 release of countries eligible to participate in the H-2A program (Department of Homeland Security, 2008) and to capture the most recent view of the issue at the time of data collection. The initial search yielded 142 articles. Articles not primarily focused on the H-2A program were omitted from the study. After removing duplicates and articles that did not focus primarily on the issue, a final sample of 121 articles from the *Orlando Sentinel* (n = 17)*, The Fresno Bee* (n = 49)*, Atlanta Journal-Constitution* (n = 42)*,* and *Spokane Spokesman-Review* (n = 13) were included in data analysis.

A researcher-developed codebook and code sheet was the primary instrument used in this study. The instrument was developed using the emerging coding method, which allows for the establishment of categories after initial data observations (Stemler, 2000). Codebook sections included article information, frame, and sources. Article information, including publication date, article title, newspaper name, and article type, were collected prior to coding for frame and sources. Definitions for sources and frames were established to assist the researchers in identifying each article's primary frame (Table 1) Primary frames were coded as 1 = *present*, and 0 = *not present*. Individuals, organizations, and other entities were coded as sources when quoted

or referenced within the articles. Eight source types were established during data collection and included in the codebook: Non-Government Organization (NGO) representative, elected official, government agency, farmer/H2A employer, attorney, H-2A worker, university representative, and other.

Table 1

Frames Used by the Orlando Sentinel, The Fresno Bee, Atlanta Journal-Constitution*,* and Spokane Spokesman-Review *to Communicate About the H-2A Program*

Frame	Description
Economic	Refers to business and monetary influences of the H-2A program such as cost, financial benefits, and disadvantages.
Policy/Government	Government or elected official involvement on the issue. Could refer to a new policy, program, initiative, law, regulation, or other measure regarding H-2A.
Legal/Crime	Focuses on lawsuit or court hearings regarding H-2A - reference to H-2A workers as criminals, reference to illegal immigration.
Advocacy/Awareness	Non-government groups working to share information about the issue. Could be for H-2A or against involvement from stakeholders such as activists, special interest groups not affiliated with the government. Could refer to issues of housing, wages, or working conditions.
Labor	Article discusses need for (or lack of need) migrant labor.
Health/COVID-19	Impacts of COVID-19 on workers, need for PPE, testing, etc. for workers, or other health related issues.
Other	Frames of the article do not fit any of the frame descriptions listed above.

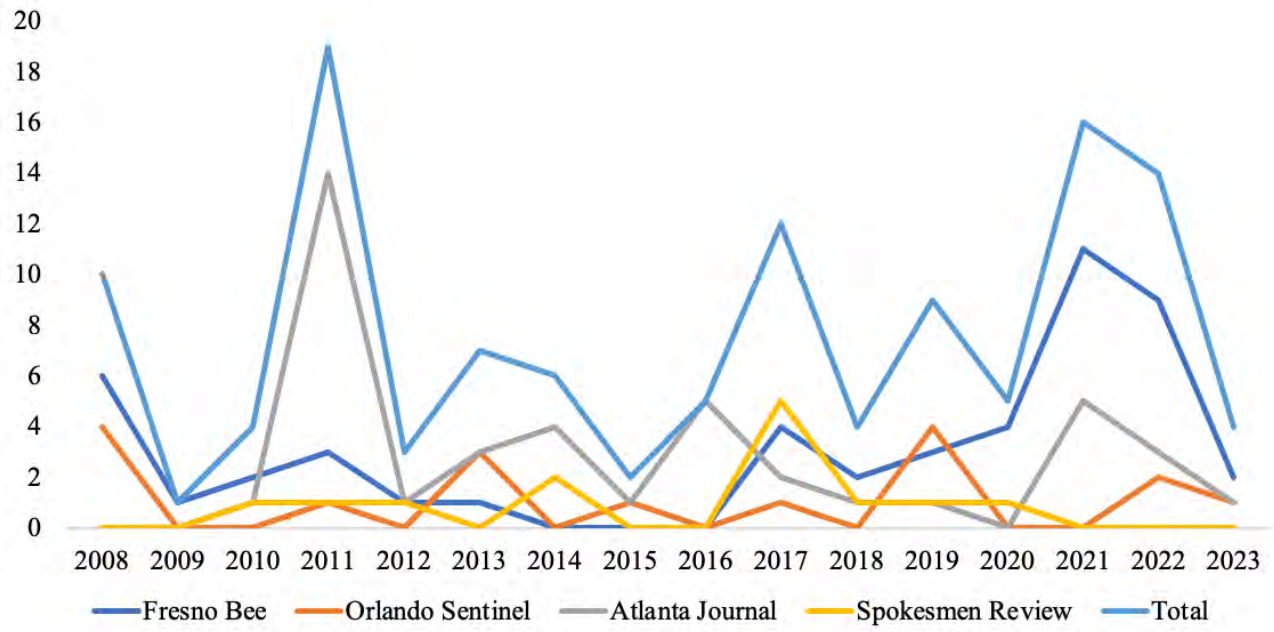
Three researchers were trained to utilize the codebook, verify clarity, and determine reliability. Riffe et al. (2014) suggest using intercoder reliability to evaluate validity and aid in study replications. A pilot test was conducted with similar articles from different newspapers prior to the evaluation of articles included in this study. There is no standard subsample size for reliability assessments (Neudendorf, 2002), but Wimmer and Dominick (2011) suggest 10% to 25% of the sample size is adequate. To determine the instrument's reliability, the researchers independently coded 14 articles and acceptable Krippendorf's alpha levels were achieved with scores ranging from .72 to 1.0 across frames (Riffe et al., 2014). Two researchers coded the remaining articles. Once all articles were coded and data were entered into a Microsoft Excel file, data were exported to IBM SPSS Statistics Version 29.0.1 for analysis. Calculations for descriptive statistics, specifically frequencies and percentages, were used to inform research objectives one through three.

Results/Findings

Research objective one sought to determine the frequency of newspaper media coverage pertaining to the H-2A program (Figure 1). News articles were analyzed over a 15-year period, starting in 2008, when a new list of countries eligible to participate in the H-2A program was published, and ending on March 1, 2023. The number of articles pertaining to the H-2A program published each year in the newspapers explored in this study were inconsistent throughout the timeframe of investigation. In 2009, only one newspaper featured one article about the H-2A program (0.8%, $n = 1$), and 2011 saw the most coverage on the topic for an individual year (15.7%, $n = 19$). Considering a two-year period, 24.8% ($n = 30$) of the articles were published in 2021 and 2022. *The Fresno Bee* (40.5%, $n = 49$) and *Atlanta Journal-Constitution* (34.7%, $n = 42$) had more than double the number of articles compared to the *Orlando Sentinel* (14.0%, $n = 17$) and the *Spokane Spokesman-Review* (10.7%, $n = 13$).

Figure 1

*Frequency of News Media Coverage on the H-2A Program (*N = *121)*



Research objective two sought to identify and compare news frames used in media coverage of the H-2A program in newspapers in the four leading H-2A states. To gain a better understanding of media coverage of the H-2A program, coders analyzed articles to identify primary frames, which referred to the most prominent focus of the articles. All 121 articles analyzed presented primary frames in one of the seven categories: "economics," "policy/government," "legal/crime," "advocacy/awareness," "labor," "health/COVID-19," and "Other" (Table 2).

Table 2

News Frames Used in Media Coverage Pertaining to the H-2A Program by Newspaper

	Fresno Bee (*n* = 49)		*Orlando Sentinel* (*n* = 17)		*Atlanta Journal-Constitution* (*n* = *42*)		*Spokesman-Review* (*n* = *13*)		Total (*N* = 121)	
Frame	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Policy/Government	28	57.1	7	41.2	22	52.4	5	46.7	62	52.0
Labor	10	20.4	2	11.8	5	11.9	4	26.7	21	17.1
Legal/Crime	5	10.2	2	11.8	10	23.8	0	0	17	13.8
Advocacy/Awareness	2	4.1	4	23.5	1	2.4	2	13.3	9	7.3
Health/COVID-19	2	4.1	0	0	2	4.8	2	13.3	6	4.9
Economics	2	4.1	1	5.9	1	2.4	0	0	4	3.3
Other	0	0	1	5.9	1	2.4	0	0	2	1.6

Newspaper articles pertaining to the H-2A program communicated information largely through the "policy/government" frame (52%, *n* = 62). "Policy and government" was the most frequently-used frame across newspapers. This frame related to government or elected official involvement on the issue. Example articles that employed this frame covered topics such as immigration reform and proposed policy changes. The second most common frame present in the dataset was "labor," (17.1%, *n* = 21). Articles implementing the "labor" frame discussed the need or lack of need for migrant labor. Of note, articles in this frame tended to focus on a lack of local farm labor and the need for H-2A labor. The "legal/crime" frame was also present (13.8%, *n* = 17), and involved the coverage of topics like incidents of illegal activity by H-2A employers, reform for pay and fair treatment of H-2A workers. Articles that featured the "advocacy/awareness" frame (7.3%, *n* = 9) involved non-government groups and activists who shared information on issues with housing, working conditions, and wages for H-2A workers. Other frames that appeared in the dataset were "health/COVID-19" (4.9%, *n* = 6), "economics" (3.3%, *n* = 4), and "other" (1.6%, *n* = 2). "Health/COVID-19" tended to discuss health impacts of working and lodging conditions for H-2A employees. Articles with an "economics" frame discussed the business and monetary influences of the H-2A program. Two articles did not fit within any of the established frame categories and thus fell into the "other."

Objective three sought to determine the sources frequently used by the newspapers for information about the H-2A program. The number of total sources appearing in the dataset across articles was 504 with an average of four sources per article. As detailed in Table 3, the most frequently referenced sources were nongovernmental organizations (NGOs) or NGO representatives, which represented 31.5% (*n* = 159) of sources used across newspapers. The NGO sources included groups in support of immigration, employee rights, and commodity

support organizations, such as the Georgia Fruit and Vegetable Growers Association, Coalition of Immokalee Workers, and Northwest Horticultural Council.

Table 3

*Sources Used in Media Coverage Pertaining to the H-2A Program by State Newspaper (*N = *504)*

	Fresno Bee (*n* = 198)		*Orlando Sentinel* (*n* = 64)		*Atlanta Journal-Constitution* (*n* = 184)		*Spokesman-Review* (*n* = 59)		Total (*N = 504*)	
Source	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
NGO / representative	86	43.4	12	18.8	45	24.5	16	27.1	159	31.5
Elected official	44	22.2	10	15.6	43	23.4	4	6.8	101	20.0
Governmental Agency / Rep	21	10.6	7	10.9	29	15.8	6	10.2	63	12.5
Farmer / H-2A Employer	12	6.0	14	21.9	19	10.3	12	20.3	57	11.3
Attorney	4	2.0	3	4.7	16	8.7	1	1.7	24	4.8
H-2A Worker	5	2.5	0	0	7	3.8	9	15.3	21	4.2
University Study/Rep	9	4.5	1	1.6	8	4.3	3	5.1	21	4.2
Other	17	8.6	17	26.6	17	9.2	8	13.6	58	11.5

Elected officials were also frequently used as sources throughout the newspapers analyzed and made up 20.0% (*n* = 101) of all sources identified. This source type included any elected official at the local, state, national, or international level. Governmental agencies or agency representatives accounted for 12.5% (*n* = 63) of all sources identified. This category included interviews with representatives of any government agency and information provided directly by the agency itself. Farmers and H-2A employers accounted for 11.3% (*n* = 57) of sources identified in the dataset and included any individual that was identified as hiring or supervising H-2A workers, or identified as a farmer or rancher. Attorneys, H-2A workers, and university representatives were the three sources least utilized in the articles analyzed. Attorneys were identified throughout the articles and accounted for 4.8% (*n* = 24) of all sources, while H-2A workers and university representatives each made up 4.2% (*n* = 21) of sources identified.

Conclusions/Recommendations

The H-2A program was established to help provide the public with fresh produce from the United States (Simms, 2000). This program is complex in nature and often controversial.

When issues are controversial or complex, the news media play a role in shaping public perceptions about the issue and can also influence policy (Pan & Kosicki, 1993). As stakeholders work to resolve the issues associated with the H-2A program, it is important to understand how the news media communicate the issue. The purpose of this study was to explore how major newspapers located near top agricultural production areas in states with the most H-2A workers framed the H-2A program from January 1, 2008, to March 1, 2023. The findings indicate articles that sought to communicate about the H-2A program have been published inconsistently since 2008, and a variety of frames and sources have been used to communicate about the H-2A program.

One hundred twenty-one articles pertaining to the H-2A program were identified between 2008 and March 1, 2023. The number of articles per year ranged from one to 19 with noticeable coverage in 2008, 2011, 2017, 2019, 2021, and 2022. The Department of Homeland Security (2008) published a new list of countries eligible to participate in the H-2A program in 2008, which accounts for the high amount of media coverage identified. In the year 2011, there were 19 articles published pertaining to H-2A in this dataset. This accounts for 15.7% of the total number of articles found. In 2017, the United States swore in President Donald Trump, which caused a shift in the federal government. Like with many new leadership roles, questions regarding governmental programs came to light in the news media (Schmertz, 1986). This change in federal leadership may have been a contributing factor to the increase in H-2A articles published in 2017. In 2019, nine articles appeared, up slightly from the previous year, which saw four articles. The year 2019 started with a governmental shutdown caused by issues with approving a federal operations budget for the 2019 fiscal year. As the H-2A program is government funded, this event may have contributed to the increase in media coverage in 2019. In 2021 and 2022, many issues regarding food production were escalated due to the COVID-19 pandemic, which again may have helped fuel increased media coverage about the H-2A program, given its relationship with food production (Aday & Aday, 2020; Rahimi et al., 2022; Ramos et al., 2020).

The H-2A program is first and foremost the result of governmental policy (Guan et al., 2018). As government and elected officials are responsible for creating and altering policies, and because concerns with policy have been cited in the past in conjunction with the H-2A program (Escalante et al., 2019), the common use of the "government and policy" frame within this study was not unusual. At the same time, the fact that all newspapers in this study most commonly utilized this frame suggests the issues associated with the H-2A program may be more of a national trend than regional. While there may be nuance in this frame between newspapers, the prominence of this frame seemingly instills the issue as one of policy and government from a media standpoint. The media hold the potential to influence policy (Pan & Kosicki, 1993), so it is reasonable to assume that framing articles in this way may have implications for future policy decisions on this issue.

Ultimately, the H-2A program was created to help address farm labor needs, which helps to explain why "labor" was also a common frame in the dataset. As agriculturalists continue to seek a resolution to farm labor needs, the H-2A program will likely play an important role (Luckstead & Evadoss, 2019). Issues within the program have been identified (Vaughan et al., 2019) and will need to be resolved to improve experiences for both workers and farmers, and thus provide a more reliable food system. As issues unfold and resolutions are sought, the media

play a role in defining problems and suggesting remedies (Entman, 1993) and influence knowledge about an issue (Moy et al., 2004). The use of the "labor" frame in this study further appears to solidify the need for and importance of the H-2A program for the agricultural workforce in the U.S.

Any government program is subject to legal considerations, including regulations regarding worker rights and employer responsibilities. Within the dataset examined in this study, the "legal/crime" frame was present in all newspapers except the *Spokesman-Review.* While this frame was not as common as others within the articles, its presence suggests a theme in the reporting of the H-2A program. Articles utilizing the "legal/crime" frame focused on the mistreatment of H-2A workers, salary requirements, and workload expectations. The lack of articles utilizing a "legal/crime" frame in the *Spokesman-Review* could be due to the lower number of overall H-2A articles and the use of other major frames when reporting these issues, suggesting possible issue nuance from region to region. Post-hoc analysis revealed NGOs, governmental agencies, and attorneys were the most utilized sources for issues regarding "legal/crime." This is not surprising as there are many NGOs that help to support migrant workers throughout the United States (Douglas, et al., 2004) and legal issues primarily deal with governmental policies and attorney councils.

There are many financial considerations associated with the H-2A program, yet "economics" rarely came up as a primary theme through the dataset. Employers receive financial advantages for hiring H-2A workers including tax deductions for social security and Medicare (USDL, 2010). Employers also save money over time due to limiting recruitment, training, and turnover cost for new employees (Roka et al., 2017). Advantages to employers are joined by the benefits to the local economy with the increased purchasing of goods and services in areas with H-2A workers (Castillo & Charlton, 2023). Although there are many documented economic considerations surrounding the H-2A program, vary few articles focused on this frame. The "economic" frame may have been overpowered by the primary use of the "policy/government" frame, which ultimately is the source for any economic considerations.

When exploring the sources utilized in articles pertaining to the H-2A program, it became evident that news media in this study had a tendency to rely upon NGO and elected official sources. Again, with the political nature of the H-2A program (Pan & Kosicki, 1993; Guan et al., 2018; Escalante et al., 2019), it is not surprising the organizations and people who greatly influence policy are the sources most utilized in the news media. There was a lack of worker representation in sources. Even though all articles analyzed were reporting on the H-2A program, the use of actual H-2A workers as sources was scarce. With the high use of political sources and lack of worker representation, there tends to be a leaning toward overall policy implications of the program rather than the impacts of individual workers. While there is no literature to support this possibility, the use of H-2A workers as sources may have been limited due to challenges with access and understanding. H-2A workers are employed on a seasonal basis during prime production periods and are provided housing and transportation through their employers (USDL, n.d). While employees do have off-hours, many rely solely on their employer for any off-site access. This means that news media would have to work with farm owners and operators to gain access H-2A workers for on-site interviews during peak production seasons. Access of these key sources may become more difficult compared to sources with regular working hours in public service positions, such as elected officials and NGOs. There is an argument for the idea that

news media may be utilizing more accessible sources, rather than sources who have first-hand knowledge and experiences with the program. Research investigating the sources used in reporting other major topics could help to identify trends in accessible source use.

The H-2A program continues to be a major source for vital seasonal workers in the agricultural industry. The continued need for an increase in food production promotes the need for, and growth of, the H-2A program (Bier, 2020). Given the role of H-2A program throughout the U.S., future studies should explore the use of frames in other newspapers across the county. Investigating additional newspapers could help to inform the commonalities found between the top four H-2A states used in this study. Other media outlets should also be investigated to determine how framing is used in communication of the H-2A program. Researchers should also investigate major issues in different news outlets for issues other than H-2A (natural disasters, political issues, health crises, etc.) to determine if there are any relationships between H-2A coverage and other significant issues facing the industry.

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Examining Consumers' Preferences for Beef Nutrition Social Media Influencer Messages

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Social media are a powerful tool for marketing within the agricultural industry. Many organizations find value in partnering with external content creators, such as social media influencers (SMI), to shape consumers' attitudes toward a topic. Consumers' attitudes and eating habits are influenced by nutrition and health advice from SMIs. To elicit positive consumer attitudes, organizations must identify the best SMI and message frame to motivate consumers' attitudes. Through a 3 X 2 framework, we tested the influence of different SMIs (registered dietitian, fitness coach, or beef industry advocate) and message frames (evidence-based or advice-based) on consumers attitudes toward beef nutrition messages on Instagram. Data were collected from 1,010 United States adult consumers through a nationwide survey distributed by Qualtrics, an opt-in sampling platform. Through pre- and post-test questions, we determined the influence of SMIs and message frame on consumers' attitudes toward beef nutrition messages. The results indicated consumers had the most positive attitudes when receiving evidence-based messages, especially from a registered dietitian. These findings suggest consumers prefer to receive evidence-based beef nutrition information from credentialed health professionals on social media. Future research should explore the impact of other SMIs or message frames on consumers' attitudes toward agricultural topics.

Introduction and Theoretical Framework

As the digital world continues to evolve, social media have become an easily accessible, useful tool for product marketing and promotion (Tuten, 2021). Between customer engagement, brand awareness and audience expansion, social media is an integral part of the integrated marketing mix that is shaping the future of marketing and advertising (HubSpot & Brandwatch, 2023). Organizations partner with external content creators, such as social media influencers (SMIs) to connect, engage, and communicate with their audiences (HubSpot & Brandwatch, 2023; Tuten, 2021). SMIs are individuals who use their large online following to influence the attitudes and decisions of their audience toward a particular product (Doan, 2023). SMIs establish tight-knit, loyal followers who often act on the recommendations provided by the SMI (HubSpot & Brandwatch, 2023; Tuten, 2021). This power allows SMIs to be a successful catalyst for product promotion, brand awareness, and influencing trust (Jaitly & Gautam, 2021; Tuten, 2021).

Agricultural commodity organizations, such as beef, dairy, or pork, are often looking for more effective ways to market the food products they produce and inform public attitudes leading to trust. Social media has proven to be an effective communication method for agricultural extension, rural development, and consumer outreach (Mamgain et al., 2020; Settle et al., 2023; Shank, 2022). Historically, credentialed medical and health professionals, such as registered dietitians and physicians, have been consumers go-to resource for nutrition and health advice and guidance (Chaudhuri et al. 2013; Keatinge, 2006). However, as consumers increasingly turn to and trust social media for nutrition and health advice, other non-credentialed sources, such as fitness coaches and beef industry advocates, can also share nutrition and health content (Funk et al., 2019; Hayman et al., 2023; HubSpot & Brandwatch, 2023; International Food Information Council (IFIC), 2023; The Beef Checkoff, 2022). Research has concluded that although most Americans have a positive view of registered dietitians and trust them to provide accurate

information (Funk et al., 2019), fitness influencers and beef industry advocates have also become popular and trustworthy sources of nutrition and health advice, especially on social media (Hayman et al., 2023; The Beef Checkoff, 2022).

Commodity organizations should explore opportunities to engage in SMI marketing through different message frames to influence consumers' attitudes toward a product, like beef (Ahmad & Bruno, 202; Cash et al., 2014; IFIC 2023). Beef is a foundational food that contains essential nutrients like high-quality protein, iron, choline, zinc, and B vitamins, which are vital for optimal growth and development (McNeill & Van Elswyk, 2016; Morton et al., 2018; Roussell et al., 2012). The nutritional makeup of beef creates a unique opportunity to educate consumers about nutritional value of eating beef, specifically through SMI marketing. While a vast amount of research has explored message framing techniques in agricultural communications, there is limited research analyzing different message frames used by SMIs sharing beef nutrition information on social media (Chambers et al., 2023; Fischer et al., 2018; Fischer et al., 2020; Olausson, 2018; Randolph et al., 2021). If SMIs can influence consumers' attitudes, research should determine the ideal beef nutrition message frame to lead to the most desirable attitudes from consumers. With this information, the beef industry could improve marketing efforts by strategically and intentionally crafting effective beef nutrition messages on social media.

SMIs use different message frames to attempt to help meet the needs of their audience, including educational, informational, persuasive, scientific, or emotional messaging (HubSpot & Brandwatch, 2023; Tuten, 2021). While SMIs can use a variety of message frames, prior literature recognizes the frequent use of evidence-based and advice-based messages for social media marketing (Tuten, 2021). As Ashley and Tuten (2015) noted, businesses find value in using functional and evidence-based messages, or emotional and advice-based messages, as they remain a driver for consumer engagement. Although brands most often use evidence-based, messages, advice- and emotional-based, messages have been shown to have stronger influence on trust and greater attitude changes for consumers (Ashley & Tuten, 2015). For the agricultural industry, SMIs play a critical function in sharing evidence-based information about the industry. For example, Shank (2022) found agricultural SMIs work to share accurate, transparent agricultural information, and their motivations are rooted in bridging the knowledge gap between producers and consumers. Additional Neves (2021) and Rogers-Randolph et al. (2021) expressed the prevalence of SMI sharing evidence-based messages to encourage consumer behavior change. This literature confirms the valuable role SMIs play in sharing accurate and authentic information about the agricultural industry; therefore, research must identify the optimal SMI and message frame for shaping consumers' attitudes about beef nutrition.

Theoretical Framework

Framing Theory involves taking a message and constructing it into a specific frame so individuals interpret the message with a particular meaning (Goffman, 1974). Framing is a common tactic used in marketing as it can strongly influence how the message is interpreted by the consumer (Goffman, 1974; Scheufele, 2006). Framing has the potential to influence consumers' decision-making, and the way an SMI frames a message has the power to influence consumer's attitudes and perceptions toward a topic (Entman, 1993). Framing has been applied to numerous other research studies to analyze multiple types of message frames used in

agricultural communications, such as scientific, analytical, functional, narrative, value-based, and emotional (Chambers et al., 2023; Fischer et al., 2018; Fischer et al., 2020).

This study used an **evidence-based message**, which includes statistical evidence, scientific facts, and an implicit conclusion statement shared with a passive voice, technical tone, and impersonal language (Chambers et al., 2023; Shen & Bigsby, 2013; Yang & Hobbs, 2020). Previously, consumers have appreciated evidence-based messaging about the agricultural industry, as it has resulted in slightly more favorable attitudes compared to narrative-framed messages (Randolph et al., 2021). This study also used an **advice-based message**, which includes testimonial and anecdotal evidence presented with an informal tone, narrative voice, personalized language, storytelling elements, and an explicit conclusion statement (Chambers et al., 2023; Shen & Bigsby, 2013; Yang & Hobbs, 2020). Prior research has found advice-based messages elicit acceptance toward food products (Chambers et al., 2023), higher elaboration and more positive attitudes in video content (Randolph et al., 2021), and stronger engagement and influence on social media (Ashley & Tuten, 2015). Although research has analyzed the impact of both evidence- and advice-based messages, one frame does not rise to the top as the best for sharing beef nutrition information on social media as it often depends on the audience's prior attitudes and involvement. This further confirms the need to identify the best message frame for consumers receiving beef nutrition messages.

We also used the **Elaboration Likelihood Model (ELM)** to understand the two mental processing routes, central and peripheral, an individual could take when considering a beef nutrition message on social media to lead to attitude change. The central route requires a high level of cognitive effort as an individual carefully considers the argument quality, scrutinizes the ideas, and determines the relevance of the issue for themselves. The ELM suggests individuals who process information with the central route tend to have more lasting attitude change as they are deeply analyzing the argument quality of the message (Petty & Cacioppo, 1986). The peripheral route requires less cognitive work as the individual almost subconsciously decides to accept or reject the message, which often leads to a weaker attitude change (Griffin et al., 2023). The processing route used is dependent on numerous factors, including their prior attitudes and topic issue involvement. When individuals find the topic to be relevant, they are more likely to critically analyze the contents of the message using the central route (Griffin et al., 2023). Scholars have reported those with higher issue involvement toward a topic prefer more scientific, evidence-based messages when communicating about the agricultural industry to elicit central route processing and lead to a stronger attitude change (Fischer et al., 2020).

Purpose and Research Questions

This study aimed to examine the effect of different message frames shared by different SMIs on consumers' attitudes toward beef nutrition. The research questions were:

RQ1: What is the influence of message type and SMI type on consumers' attitude toward beef nutrition when controlling for prior attitudes and issue involvement?

RQ2: What is the influence of message type and SMI source type on consumers' attitude toward message when controlling prior attitudes and issue involvement?

RQ3: What is the influence of message type and SMI type on consumers' attitude toward message information qualities when controlling prior attitudes and issue involvement?

Methods

Through a quantitative experimental design, we tested different conditions effects on individuals' attitudes toward beef nutrition and message quality. We distributed a questionnaire, via Qualtrics, to U.S. residents 18 years of age or older who consume beef and use social media. Through this non-probability opt-in sampling service, we used quota sampling to create a sample reflective of the U.S. population based on U.S. Census data for specific demographics. This sampling method was ideal, as we needed respondents to meet specific qualifications (Fraenkel et al., 2019; Thorson et al., 2012; Wimmer & Dominick, 2013). Based on prior literature and a G*Power assessment, we determined an optimal sample size of 1,000 respondents (Lamm & Lamm, 2019). The study received a 51.09% completion rate, and 1,010 responses were analyzed.

Table 1

Respondents Demographic Characteristics Compared to U.S. Population Based on Census Data

Demographic	Sample		U.S. Population
	f	%	%
Gender			
Female	527	52.2	50.5
Male	476	47.1	49.5
Non-binary / third gender	7	0.7	N/A
Age			
18-34	264	26.4	29.4
35-54	342	34.2	32.3
55+	404	40.4	38.3
Regionality			
Northeast	172	17.0	17.0
Midwest	201	19.9	21.0
West	239	23.7	24.0
South	398	39.4	38.0
Race[a]			
White	759	75.1	76.0
Black/African American	145	14.4	14.0
Asian or Pacific Islander	63	6.2	6.0
American Indian or Alaska Native	26	2.6	1.0
Other	38	3.8	3.0
Prefer not to say	12	1.2	N/A
Hispanic Ethnicity			
Hispanic	180	17.8	19.0
Non-Hispanic	830	82.2	81.0
Household Income			
Less than $49,999	379	37.6	36.5
$50,000-$99,999	303	30.0	29.6
$100,000-$149,999	157	15.5	16.3
$150,000 or more	171	16.9	17.7

[a] Select all that apply; therefore, percentages do not add up to 100%

Procedure and Data Collection

Respondents were contacted through market research panels by Qualtrics, provided with a consent form, then given a questionnaire that included a pre-test, a mock Instagram scenario, and a post-test. Respondents were provided with a monetary incentive, distributed by Qualtrics, for their participation. The pre-test questionnaire collected respondents' demographic information and the independent variables. The Instagram scenario included a mock Instagram influencer profile and Instagram Reel. The post-test collected respondents' attitudes toward beef nutrition and the message, as well as additional demographic and manipulation check questions to screen for bots. Following the questionnaire, we informed respondents the scenario messages were factual; however, the SMI and Instagram account was fake. We received approval from Texas Tech University's Human Research Protection Program (IRB2023-571) prior to data collection.

Independent Variables

As noted by the ELM, prior attitudes and issue involvement can influence an individual's level of attitude change (Petty & Cacioppo, 1986). We measured prior attitudes based on the top indicators of why U.S. consumers choose to consume beef (Beef Research, 2023; Flowers et al., 2019). Respondents were asked to consider their level of agreement (1 = *Strongly Disagree,* 5 = *Strongly Agree)* to the following statements: *Beef is a nutritious choice; Beef is an excellent source of protein, Beef is a healthy choice, Beef is a lean protein, Beef is a food that gives me strength; Beef is great tasting; Beef is pleasurable to eat; and Beef is good for many types of meals* (Cronbach's $\alpha = 0.92$). For issue involvement, respondents were asked: "I believe beef being a nutritious choice…" with a 3-item semantic differential scale of *Does not matter to me/Matters to me; Is of no concern to me/Is of concern to me; Is unimportant to me/Is important to me*. (Cronbach's $\alpha = 0.80$; Elmore et al., 2023; Fischer et al., 2020; Zaichowsky, 1994).

Stimuli: Instagram Scenario

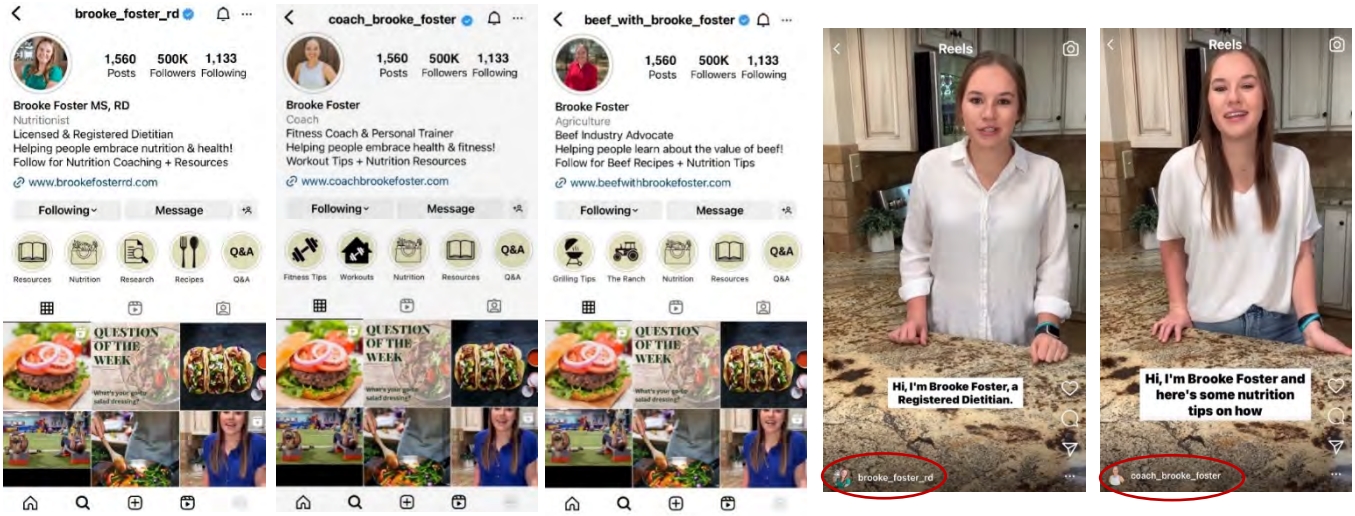
The stimuli conditions were comprised of a 3 x 2 between-subjects research design to analyze the effect of SMI *sources* (registered dietitian, fitness coach, and beef industry advocate) and *message frames* (evidence-based and advice-based). Through Qualtrics, we programmed the questionnaire to randomly distribute one mock Instagram scenario per respondent. Respondents were given instructions for viewing the scenario, and a timer was applied to the questionnaire to ensure respondents viewed the entire stimuli. Respondents were allowed to replay the video to ensure they heard and viewed the entire video. Before moving to the post-test, respondents were asked two screener questions to ensure they could see and hear the entire video. If respondents reported they could not see and hear the entire video, they were excluded from the study.

To enhance ecological validity, we created a realistic scenario to mimic SMI content. The six mock Instagram scenarios were developed using Instagram Reels, screen recorded, then uploaded to Vimeo, and embedded into the questionnaire. Each SMI was differentiated through a mock Instagram profile, and the profile contents, such as the credentials, occupation, and SMI's specialty, were manipulated to represent the three different SMI identities. Certain elements, such as the previous posts, the blue verified check mark, the number of posts, followers, and following, and the individual pictured remained consistent across all three profiles.

After receiving a mock Instagram influencer profile, participants received an advice-based or evidence-based video. Both scripts were aligned to one message theme based on the same beef nutrition facts and scientific references (U.S. Food & Drug Administration, 2023). The two message frames were differentiated with script language, tone, and source appearance to accurately match each message frame (Chambers et al., 2023; Harrington et al., 2015; Shen & Bigsby, 2016; Yang & Hobbs, 2020). For example, the evidence-based message used a passive voice with impersonal language and scientific evidence, while the advice-based message incorporated a more upbeat, storytelling tone and gave anecdotal evidence with a call to action (Chambers et al., 2023; Harrington et al., 2015; Shen & Bigsby, 2016; Yang & Hobbs, 2020). The sources appearance was also modified based on the message frame, as research shows the source's appearance, such as their clothing or hairstyle, can subconsciously impact individuals' perceptions of the source sharing the message (Hamid, 1972; Karl et al., 2013; Stone, 1962). The mock SMI in the evidence-based video wore a white collared shirt; whereas in the advice-based message the SMI wore a white casual shirt. These differences applied formal and casual appearances to align with the message frame (Behling & Williams, 1991; Cardon & Okoro, 2009; Karl et al., 2013; Morris et al., 1996; Peluchette & Karl, 2007; Slepian et al., 2015). For consistency, both message frames were filmed with the same kitchen, camera angle, props, background music, and caption format. Figure 1 demonstrates the similarities and differences between the mock Instagram profiles and Reels.

Figure 1

Mock Instagram Profile and Reel Examples



Dependent Variables

As identified in the ELM and Framing, different message frames can impact individuals' message analysis, as well as their intended attitude change (Goffman, 1974; Petty & Cacioppo, 1986). To measure respondents' attitude change, we collected data on the respondents' post-stimuli attitudes toward beef nutrition, the message, and the message information qualities.

To collect respondents' **post attitudes toward beef nutrition**, we used the same eight statements from the pre-stimuli attitude measurement: *Beef is a nutritious choice; Beef is an*

excellent source of protein, Beef is a healthy choice, Beef is a lean protein, Beef is a food that gives me strength; Beef is great tasting; Beef is pleasurable to eat; and Beef is good for many types of meals (Cronbach's α = 0.92; Beef Research, 2023; Flowers et al., 2019).

Next, we measured respondents' **attitudes toward the video content**. Based on research from Fischer et al. (2020) and Edell and Burke (1987), respondents were given the following statements: *It is safe to trust the information conveyed in the video; I have confidence in the information conveyed in the video; I trust the information conveyed in the video; I am willing to share the information I have seen in the video to my friends or family; I am willing to incorporate more beef in my diet based on the information conveyed in the video*. Respondents were asked to identify their level of agreement with a 5- point Likert scale (1 = *Strongly disagree*, 5 = *Strongly agree*; Cronbach's α = 0.93).

Finally, to understand how the respondents perceived the **message information qualities**, respondents were given the statement "The beef nutrition information I have just watched is…" with a series of 5-point semantic differential bipolar pairs: *not trustworthy at all/extremely trustworthy, not accurate at all/extremely accurate, not factual at all/extremely factual, not truthful at all/extremely truthful* (Cronbach's α = 0.89; Frewer, 1997).

Questionnaire Development and Data Analysis

The reliability and validity of this research project was established through multiple rounds of expert review, stimuli pilot testing, and a soft launch, or pilot, of the questionnaire. To assist with face and content validity, a panel of experts reviewed the questionnaire; the panel consisted of agricultural communications faculty at two universities, an expert in market research, an expert in the beef industry, and an expert in beef nutrition who was a registered dietitian. A focus group was conducted to ensure the Instagram scenario represented the desired message frames, the scenario was clear, and each profile aligned with the proper source characteristics. Once the final edits were made to the questionnaire and stimuli, we performed a soft launch with 50 respondents, then we conducted reliability tests on all the scales to ensure reliability of over 0.80. The data reported in this manuscript were part of a larger study and were analyzed independently. To do so, we first cleaned the data by excluding respondents who did not complete the survey, sped through the survey, or failed the age manipulation check. Additionally, the larger questionnaire included one open-ended question and responses that were deemed bots were excluded. After excluding unusable responses, we ran a series of statistical tests on the 1,010 usable responses, including reliability, descriptive means, standard deviations, and two-way analysis of covariance (ANCOVA).

Results

RQ1: What is the influence of message type and SMI type on consumers' *post attitude toward beef nutrition* when controlling prior attitudes and issue involvement?

Table 2 provides the descriptive statistics for beef nutrition attitudes including the means, estimated marginal means, and standard deviation based on the message type and source type when controlling for prior attitudes and issue involvement. Within the model (Table 3), we found

the covariates of prior attitude, F(1,1002) = 230.64, $p < .001$, $\eta^2 = .187$, and issue involvement, F(1,1002) = 33.73, $p < .001$, $\eta^2 = .033$, to be significantly related to the respondents' attitude toward beef nutrition.

Table 2

Beef Nutrition Attitude Descriptive Statistics & Estimated Marginal Means as a Function of Message Type & Source Type, with Prior Attitudes & Issue Involvement as Covariates

Source	Evidence			Advice			Total		
	M	M[a]	SD	M	M[a]	SD	M	M[a]	SD
Registered Dietitian	4.32	4.30	0.68	4.26	4.26	0.73	4.29	4.28	0.71
Fitness Coach	4.27	4.27	0.73	4.14	4.13	0.71	4.20	4.20	0.72
Beef Industry Advocate	4.28	4.30	0.70	4.12	4.13	0.73	4.20	4.21	0.72
Total	4.29	4.29	0.70	4.17	4.17	0.72			

Note. Items were coded as 1 - 1.49 = *Very negative*, 1.5 - 2.49 = *Negative*, 2.5 - 3.49 = *Neutral*, 3.5 - 4.49 = *Positive*, 4.49 – 5 = *Very positive.* [a] Estimated marginal means are adjusted for the covariates of prior attitudes and issue involvement

Table 3

Two-Way ANCOVA for Message Type & Source Type on Post Beef Nutrition Attitudes, with Prior Attitudes & Issue Involvement as Covariates

Source	*df*	MS	F	*p*	η^2
Prior Beef Nutrition Attitudes[a]	1	87.56	230.64	<.001	0.187
Issue Involvement[a]	1	12.81	33.73	<.001	0.033
Source Type	2	0.65	1.71	0.181	0.003
Message Type	1	3.60	9.48	0.002	0.009
Source Type X Message Type	2	0.41	1.09	0.337	0.002
Error	1002	0.38			

[a] Covariate

When controlling for prior attitudes and issue involvement, the analysis revealed a significant **main effect of message type** on attitude toward beef nutrition, F(1,1002) = 9.48, $p = 0.002$, partial $\eta^2 = .009$. Respondents who received the evidence-based message, across all source types, had more positive attitudes toward beef nutrition ($M = 4.29$, $M^a = 4.29$, $SD = 0.70$) than those who received the advice-based message ($M = 4.17$, $M^a = 4.17$, $SD = 0.72$). When controlling for prior attitudes and issue involvement, the **main effect of source type** was not significant on attitudes toward beef nutrition, F(2,1002) = 1.71, $p = 0.181$, partial $\eta^2 = 0.003$, and the **interaction effect of source type and message type** was not significant on attitudes toward beef nutrition, F(2,1002) = 1.09, $p = 0.337$, partial $\eta^2 = 0.002$.

RQ2: What is the influence of message type and SMI type on consumers' *attitude toward the message* when controlling prior attitudes and issue involvement?

Table 4 displays the descriptive statistics for attitudes toward the message, including the means, estimated marginal means, and standard deviation, based on the message type and source type when controlling for prior attitudes and issue involvement. Within the model (Table 5), we found the covariate of prior attitude, F(1,1002) = 80.79, $p = < .001$, $\eta^2 = .075$ and the covariate of issue

involvement, F(1,1002) = 6.10, p = 0.014, η^2 = .006 to be significantly related to the respondents' attitude toward the message.

Table 4

Attitudes Toward the Message Descriptive Statistics & Estimated Marginal Means as a Function of Message Type & Source Type, with Prior Attitudes & Issue Involvement as Covariates

Source	Evidence			Advice			Total		
	M	M[a]	SD	M	M[a]	SD	M	M[a]	SD
Registered Dietitian	3.80	3.79	0.95	3.72	3.72	1.00	3.76	3.76	0.98
Fitness Coach	3.83	3.83	0.91	3.49	3.48	1.03	3.65	3.66	0.99
Beef Industry Advocate	3.70	3.72	0.90	3.60	3.60	0.89	3.65	3.66	0.90
Total	3.77	3.78	0.92	3.60	3.60	0.98			

Note. Items were coded as 1 – 1.49 = *Very negative*, 1.5 – 2.49 = *Negative*, 2.5 – 3.49 = *Neutral*, 3.5 – 4.49 = *Positive*, 4.49 – 5 = *Very positive.* [a] Estimated marginal means are adjusted for the covariates of prior attitudes and issue involvement

Table 5

Two-Way ANCOVA for Message Type & Source Type on Attitudes Toward the Message, with Prior Attitudes & Issue Involvement as Covariates

Source	*df*	MS	F	*p*	η^2
Prior Beef Nutrition Attitudes[a]	1	65.75	80.79	<.001	0.075
Issue Involvement[a]	1	4.97	6.10	0.014	0.006
Source Type	2	1.15	1.41	0.245	0.003
Message Type	1	7.87	9.67	0.002	0.010
Source Type X Message Type	2	1.88	2.31	0.100	0.005
Error	1002	0.81			

[a] Covariate

When controlling for prior attitudes and issue involvement, we found the **main effect of message type** to be significant on attitudes toward the message, F(1,1002) = 9.67, p = 0.002, partial η^2 = 0.010. Respondents who received the evidence-based message, across all source types, had more positive attitudes toward the message (M = 3.77, M^a = 3.78, SD = 0.92) than those who received the advice-based message (M = 3.60, M^a = 3.60, SD = 0.98). The analysis revealed the **main effect of source type** was not significant on attitudes toward the message when controlling for prior attitudes and issue involvement, F(2,1002) = 1.41, p = 0.245, partial η^2 = 0.003, and the **interaction effect of source type and message type** was not significant on attitudes toward the message, F(2,1002) = 2.31, p = 0.100, partial η^2 = 0.005.

RQ3: What is the influence of message type and SMI type on consumers' *attitude toward message information qualities* when controlling prior attitudes and issue involvement?

Table 6 displays the descriptive statistics for message information qualities, including the means, estimated marginal means, and standard deviation, based on the message type and source type when controlling for prior attitudes and issue involvement. The model (Table 7) showed the covariates of prior attitude, F(1, 1002) = 57.20, p = < .001, η^2 = .054, and issue involvement, F(1,

1002) = 39.53, p <.001, η^2 = .038, were significantly related to the respondents' attitude toward message information qualities.

Table 6

Message Information Qualities Descriptive Statistics & Estimated Marginal Means as a Function of Message Type & Source Type, with Prior Attitudes & Issue Involvement as Covariates

Source	Evidence			Advice			Total		
	M	M[a]	SD	M	M[a]	SD	M	M[a]	SD
Registered Dietitian	3.92	3.91	0.84	3.86	3.86	0.84	3.89	3.89	0.84
Fitness Coach	3.85	3.84	0.93	3.61	3.60	0.95	3.73	3.72	0.94
Beef Industry Advocate	3.79	3.80	0.84	3.71	3.72	0.82	3.85	3.76	0.87
Total	3.85	3.85	0.87	3.73	3.73	0.87			

Note. Items were coded as 1 - 1.49 = *Very negative*, 1.5 - 2.49 = *Negative*, 2.5 - 3.49 = *Neutral*, 3.5 - 4.49 = *Positive*, 4.49 – 5 = *Very positive.* [a] Estimated marginal means are adjusted for the covariates of prior attitudes and issue involvement

Table 7

Two-Way ANCOVA for Message Type & Source Type on Message Information Qualities, with Prior Attitudes & Issue Involvement as Covariates

Source	*df*	MS	F	*p*	η^2
Prior Beef Nutrition Attitudes[a]	1	38.03	57.20	<.001	0.054
Issue Involvement[a]	1	26.28	39.53	<.001	0.038
Source Type	2	2.53	3.80	0.023	0.008
Message Type	1	3.78	5.68	0.017	0.006
Source Type X Message Type	2	0.84	1.26	0.285	0.003
Error	1002	0.67			

[a] Covariate

When controlling for prior attitudes and issue involvement, the **main effect of message type** was significant on attitudes toward message information qualities, F(1, 1002) = 5.68, p = 0.017, partial η^2 = .006. Respondents who received the evidence-based message had more positive attitudes toward message information qualities (M = 3.85, M^a = 3.85, SD = 0.87) than those who received the advice-based message (M = 3.73, M^a = 3.73, SD = 0.87). The data reported the **main effect of source type** was also significant on attitudes toward message information qualities when controlling for prior attitudes and issue involvement, F(2,1002) = 3.80, p = 0.023, partial η^2 = 0.008. Across both message types, there was a significant difference in attitudes toward message information qualities (p = 0.027) between respondents' who received information from the registered dietitian (M = 3.89, M^a = 3.89, SD = 0.84) versus the fitness coach (M = 3.73, M^a = 3.72, SD = 0.94). However, there was not a significant difference in attitudes toward message information qualities (p = 0.118) between the registered dietitian versus the beef industry advocate (M = 3.85, M^a = 3.76, SD = 0.87), nor fitness coach and beef industry advocate (p = 1.00). When controlling for prior attitudes and issue involvement, there was not a significant **interaction effect of source type and message type** on attitudes toward message information qualities, F(2,1002) = 1.26, p = 0.285, partial η^2 = 0.003.

Conclusions, Discussions, and Recommendations

The results from the data analysis led to many conclusions and opportunities for further exploration. Overall, this study showed that when controlling for prior attitudes and issue involvement, the message type led to significant differences in respondents' attitudes toward beef nutrition, the message, and message information qualities. These findings reinforce the importance of different message frames in SMI marketing, and they validate the role of evidence-based messages for shaping consumers' attitudes toward beef nutrition. The inspection of the estimated marginal means revealed the evidence-based messages elicited more positive attitudes from respondents than advice-based messages, across all dependent variables. These results coincide with prior literature which concluded consumers report more favorable attitudes and trust toward evidence-based messages, especially when discussing the agricultural industry (Chambers et al., 2023; Randolph et al., 2021). Further, this information also coincides with suggestions from the ELM that states message attributes, such as message frame or argument quality, can influence how an individual processes a message, which ultimately impacts their overall attitude change (Petty & Cacioppo, 1986). When consumers were presented with an evidence-based message, they likely used the central route to process the information because the message had stronger argument quality. As noted by the literature, the respondents may have perceived the evidence-based message to have stronger argument quality due to the cited beef nutrition facts and scientific data (Chambers et al., 2023; Shen & Bigsby, 2013; Yang & Hobbs, 2020). This enhanced argument quality strengthened attitudes toward all dependent variables when respondents received the evidence-based message. When communicating about agricultural topics, this study indicated consumers were drawn to evidence-based information, as it provided credentials, data, and statistics to back these claims. When agricultural organizations utilize evidence-based messaging on social media, it provides credibility allowing consumers to have an opportunity to trust the information.

The results also indicated that although source type did not have a significant effect on respondents' attitudes toward beef nutrition or the message, source type did have a significant effect on their attitudes toward the message information qualities. These findings could have been linked to the differences in source characteristics between each SMI. The inspection of the estimated marginal means revealed registered dietitian and beef industry advocate elicited more positive message information quality attitudes than the fitness coach. These findings can likely be attributed to respondents viewing these SMIs to having more trustworthy, accurate, factual, truthful advice about beef nutrition. These findings also align with the ELM. When consumers received an advice-based message, it can be assumed that they used the peripheral route to process the information, as the message had weaker argument quality. Due to this weaker argument quality, respondents likely allowed the SMI credentials displayed in the mock Instagram profile to influence their attitude, rather than the message contents. This conclusion is consistent with prior literature that suggests individuals trust information from credentialed sources, like registered dietitians (Chaudhuri et al. 2013; Keatinge, 2006). Although the beef industry advocate influencer did not have educational credentials, like the registered dietitian, perhaps their implied personal experience enhanced consumers' attitudes toward the message information qualities. As research suggests, when engaging with agricultural information, consumers' desire to hear from agricultural influencers, like the beef industry advocate (Neves, 2021; Rogers-Randolph et al., 2021; Shank, 2022; The Beef Checkoff, 2022). This research

shows how a message is framed, in addition to the SMI sharing the message, can influence an individual's overall attitude and trust toward the message. Overall, this research adds to the literature supporting the use of SMIs sharing evidence-based messages for sharing nutrition, health, and agricultural information. For the agricultural industry, this information is vital for advocating, supporting, and promoting trust within the industry, specifically the beef industry, through different message frames.

Recommendations

While future research needs to be conducted to address different variables that can impact attitude change on social media, this research can inform the future use of evidence-based messages by SMIs sharing nutrition information. Based on the effect size on different dependent variables, we concluded consumers had more favorable attitudes toward all dependent variables when they received an evidence-based message; therefore, commodity organizations need to consider partnering with SMIs to share evidence-based messages when communicating about the agricultural industry. In future agricultural communication strategies, communicators should provide evidence-based messages presenting scientific facts and research, rather than advice-based messages, so consumers can make informed, critical decisions about the information they are receiving. This research also offers suggestions for improvements in curriculum by supporting the need to demonstrate the value of message framing through SMI marketing in shaping consumers attitudes toward agricultural topics. Curriculum should focus on identifying and creating effective message frames to influence an individual's overall attitudes toward a topic. Additionally, curriculum could outline how to collaborate with SMIs to develop the right kind of content, such as an evidence-based or advice-based messages, to best communicate on behalf of the brand.

This research also lays the foundation for many future research opportunities. Future research should seek to examine other message frames that can influence attitude change based on Framing Theory, such as value-based, personal, narrative, or comedic messages. Additional research should expand the scope of messages to other sectors of beef nutrition, such as the value of beef for growth and development in children and adolescents, beef supporting heart health, and beef's role in a healthy, sustainable diet. Further opportunities include exploring other social media content types and platforms, analyzing different demographics of beef consumers, and testing the effect of different SMI sources.

Limitations

This study attempted to mimic a real-life scenario; however, there were still uncontrollable factors that could have influenced the outcome of the study, such as the presentation of the video. The mock Instagram Reel video also did not have captions. Perhaps adding captions to the Instagram Reel could have strengthened the argument quality of the message frame through data, statistics, and scientific references. An additional limitation of the study was potential researcher bias, as the primary researcher has personal involvement in the beef industry. Additionally, the study sampling method was limited as we only had access to respondents' who were available through Qualtrics Research Services.

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Emerging Practices in Science Communication: A Scoping Review on the Design and Delivery of Professional Development Opportunities for Aspiring Agricultural Scientists

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Abstract

Integrating science communication training into graduate-level preparation is essential to equip aspiring scientists with the necessary skills to effectively communicate complex concepts and enhance the societal impact of agriculture. As such, the current study explored the integration of science communication for aspiring agricultural scientists, regarding the type and delivery of professional development received. To accomplish this, we employed a scoping review approach to evaluate the published literature on this phenomenon. The investigation drew upon human capital theory and the theory of change to assess the benefits of science communication professional development training, revealing a scarcity of systematically reported opportunities in agriculture, which impeded such programs' assessment and accessibility. Moving forward, we recommend the creation of an online resource that agricultural professionals can use to design and deliver effective professional development for science communication. This resource could not only compile available opportunities but also systematically catalog diverse forms of science communication knowledge and skills. Such a resource could serve as a foundation to adequately prepare emerging agricultural scientists for communicating science-based information in diverse and far-reaching contexts.

Introduction and Review of Literature

Public audiences communicate about science for various reasons, and the social context around these topics varies greatly. Although scientists are often held in high esteem by the public, a significant gap has existed in science literacy, making it challenging for scientists to communicate effectively (National Academies of Sciences [NAS], 2017). Previous literature has suggested that the public may already understand scientific concepts but may reject scientific claims for many reasons (NAS, 2017). Addressing this challenge necessitates comprehensive training in science communication.

Science communication is not merely about communicating facts. Burns et al. (2003) defined science communication as a process that enhances public scientific awareness, understanding, literacy, and culture, encapsulated by awareness, enjoyment, interest, opinion-forming, and understanding (AEIOU) responses. This definition also emphasized two-way communication and meaningful engagement with the public, transcending the mere transmission of scientific information. As such, scientists must ignite interest, shape opinions, and foster an appreciation for science in which they engage the public in a meaningful dialogue (Burns et al., 2003).

Scientists are adept at communicating within academic circles, utilizing standardized formats such as peer-reviewed publications and conference presentations. However, transitioning to non-

academic settings can be challenging for many scientists after years of technical training (Ritchie et al., 2022). As such, Washburn et al. (2022) stressed the importance of communication professional development for graduate students, highlighting its relevance for emerging scientists entering academic and non-academic domains. In fields such as agriculture, science communication has played a pivotal role in advocating for improved communication practices (Pigg & Scheper, 2022). Further, Pigg and Scheper (2022) argued that collaborations between technical communicators and agricultural scientists were essential for reaching underrepresented community audiences and building trust.

Providing aspiring scientists with science communication skills is also critical for advancing science and its societal impact (Bankston & McDowell, 2018). Although graduate programs excel at effectively equipping students with proficient research skills, they often need to provide comprehensive communication training. This creates a significant gap in the essential skills scientists need to communicate complex concepts efficiently to diverse audiences. A pressing need has emerged to integrate science communication training into graduate-level coursework and through professional development opportunities to ensure aspiring scientists are well-prepared for diverse communication contexts (Ritchie et al., 2022).

Clarkson et al. (2018) explained that the current academic landscape revealed a multitude of science communication professional development opportunities scattered across various domains and focus areas. Despite the array of workshops, programs, and resources to enhance communication skills, there is a marked absence of scholarly literature that systematically catalogs and analyzes these opportunities. This lack of documentation not only hampers the accessibility of valuable resources for emerging scientists but also impedes the academic community's ability to assess the efficacy of existing programs (Clarkson et al., 2018).

To address this critical need, Bankston and McDowell (2018) proposed centralizing information within an online resource, which could be a foundational component of a comprehensive science communication program. However, the pressing need goes beyond the mere compilation of available resources. The absence of scholarly literature describing these opportunities in the context of agriculture poses a formidable obstacle to understanding their nuances, effectiveness, and alignment with the evolving needs of aspiring scientists.

An online resource has the potential to facilitate the training of aspiring scientists, thereby enabling academic institutions to meet the evolving needs of their students and bridge the existing gap in science communication proficiency (Pigg & Scheper, 2022). The diversity in the forms of science communication training further complicates the landscape (Washburn et al., 2022; Clarkson et al., 2018). Workshops, courses, mentoring programs, and online resources constitute a rich tapestry of developmental avenues, each with unique benefits and challenges. Without a systematic exploration of these diverse approaches in scholarly literature, academia is deprived of the necessary insights to design tailored and effective science communication professional development for aspiring agricultural scientists. The absence of documentation impedes accessibility and evaluation, making it crucial to centralize resources and systematically catalog and analyze various forms of science communication training (Washburn et al., 2022; Bankston & McDowell, 2018). Addressing this gap is essential for ensuring emerging scientists are well-equipped for diverse communication contexts.

Theoretical Frameworks

We grounded this investigation in two theoretical frameworks: (a) human capital theory and (b) theory of change. In human capital theory, researchers seek to understand how investments in individuals' education, skills, and training (Becker, 1964; Little, 2003; Shultz, 1971; Smith, 2010; Smylie, 1996) can enhance their careers. As such, human capital, as conceptualized in this theory, assumes that critical investments, such as professional development and other forms of educational training, can facilitate greater employability for individuals across diverse sectors (Smith, 2010). Therefore, the accrual of human capital can augment an individual's competence in their chosen profession or vocation (Shultz, 1971). The acquisition of human capital is pivotal and largely contingent on the knowledge and skills desired by employers (Lepak & Snell, 1999). Consequently, it becomes imperative to ensure that human capital is relevant to the individual and tailored to the needs of specific industries or professions (Smith, 2010).

So far, the existing literature has not reported the specific human capital requisites for aspiring agricultural scientists. Further, considering the higher education landscape has historically been characterized by the *publish-or-perish* mentality and its focus on grant dollars earned, little incentive has existed for agricultural scientists to learn new skills to communicate their work to the broader public. However, because of a rise in the skepticism of scientific findings in recent years, a need has emerged for scientists to begin to explain their work in ways that can be more palatable to average consumers of agriculture, food, and fiber products (Washburn et al., 2022; Bankston & McDowell, 2018). Against this backdrop, it has become essential to delineate the described emerging practices used to provide professional development to enhance aspiring agricultural scientists' knowledge and skills in science communication.

The second theoretical framework used was the theory of change. Taplin and Clark (2012) described the theory of change as an intervention, such as a program or coordinated initiative, that brings about planned outcomes. Fischhoff (2018) used the theory of change to evaluate science communication programming by looking at three elements: (a) staffing, (b) internal consultation, and (c) external consultation. Staffing critically examines the individuals involved with the programming, assesses the communication between scientists and external constituents, and evaluates the communication between scientists and their stakeholders. In the current study, therefore, we sought to understand the existing trends reported in the literature regarding how investments in human capital, through professional development, have led to positive changes in the desired outcomes of aspiring agricultural scientists.

Significance of the Study, Statement of Purpose, and Research Questions

The study of science communication holds significant importance for the scientific community and broader society. The pressing issue of the deficiency in science literacy, coupled with the need for scientists to communicate with the public effectively, highlights the critical nature of this research (NAS, 2017). In an era where public understanding and acceptance of scientific concepts are essential for informed decision-making, the study addresses the challenge of enhancing science communication skills among emerging agricultural scientists (Bankston & McDowell, 2018). Although effective in imparting research skills, graduate programs often fall short of providing communication training (Ritchie et al., 2022). Integrating science

communication training into graduate-level coursework, as suggested by Bankston and McDowell (2018), offers a promising solution. The significance of this study extends beyond academia, as it acknowledges the multifaceted goals of science communication, emphasizing meaningful dialogue and interaction with the public (Burns et al., 2003). Further, the study explores innovative professional development programs that address the growing need for effective science communication, which is essential for bridging the gap between complex scientific research and the public (McCartney et al., 2018). By recognizing the diverse needs of various audience categories, the study contributes to a deeper appreciation for science across a spectrum of audiences (Ellefson et al., 2019).

The purpose of this study was to synthesize the published literature on science communication opportunities available to aspiring agricultural scientists to gain a better understanding of the type of opportunities available and existing trends. Through a scoping of existing peer-reviewed literature, we addressed the following research question: *What trends existed in the published literature regarding the effective design and delivery of professional development programs focused on science communication for aspiring agricultural scientists?*

Methodology

To address the research question, a scoping review of the literature was conducted in which we synthesized the scholarly articles that evaluated contemporary practices in science communication and its applications (Walsh & Downe, 2005). The initial step in this process involved retrieving relevant literature from the Louisiana State University Libraries' online database powered by the research platform EBSCOhost. The screening process was employed to select articles that met predefined inclusion criteria (Cooper, 2017).

Data Collection and Search Criteria

In the search, we employed specific keywords and phrases using Boolean search operators, including "science communication," "professional development," "workshop," "training," and "graduate student*," to ensure that the retrieved articles were aligned with our research objectives. The database research resulted in 121 unique publications. To ensure that articles catered to the audience of aspiring scientists in agricultural sciences, articles must also have included references to a specific agricultural sciences discipline. Search terms for "animal sciences," "soil sciences," "natural resources," and "food science," yielded an additional 25 peer-reviewed articles. This approach ensured that the selected articles provided an insightful exploration of the activities and entities responsible for facilitating science communication within the agricultural context. Further, to ensure the timeliness and relevance of the content, we exclusively considered articles published within the past decade (from 2013 to the present day), originating from peer-reviewed journals, and directly addressing the subject of science communication.

These criteria were meticulously adhered to in line with our search strategies, and articles not meeting these criteria were excluded from our analysis. We systematically reviewed abstracts of the 146 articles to determine if they met the predefined inclusion criteria: (a) there must be a communication-focused professional development opportunity (b) the article must describe the

professional development opportunity, (c) it must be delivered to aspiring scientists, i.e., graduate student populations, and (d) the article must explicitly state that the target audience was an agricultural-related field on study. As a result of excluding articles based on these criteria, seven articles emerged as meeting the inclusion criteria for this study, obtained through various peer-referred academic journals.

Data Collection and Analysis

The articles meeting the established criteria were digitally archived and meticulously analyzed, with relevant details recorded in a comprehensive bibliographic database. This database encompassed information such as author(s), publication year, research objectives, participant demographics, publication context, and research outcomes, drawing inspiration from Cooper (2017). Following the initial search and data collection, we proceeded to identify and code the skills, communication mediums, and key personnel involved in science communication. This coding process aimed to provide insights and facilitate our response to the research question.

To begin this process, we coded skills that the aspiring agricultural scientists developed through science communication professional development as codes such as "presentation," "online media," and "message distillation" to capture the science-oriented communication skills and competencies taught (Washburn et al., 2022), and a fourth category "other." The mediums in which science was communicated were coded using the system developed by the Graduate Student Science Communication (GSSC) questionnaire by Ritchie et al. (2022). Ritchie et al. (2022) developed the GSSC to investigate where graduate students received science communication training and used it to describe the experience. Themes from the GSSC were (a) oral communication, such as public lectures/talks, conversations, and interviews; (b) written communication, such as books, newspapers, and research publications; (c) social media, including YouTube, Twitter, Facebook, and blogs, and (d) no mediums, which were defined too broadly to fit into a category. Fischoff (2018) underscored the importance of three essential components for developing effective science programs: selecting the appropriate staff members, fostering internal discussions and planning within the team, and seeking external input from the individuals who will utilize or benefit from the program. Finally, to distinguish between internal and external consultations in program design, the origin of expertise was determined by identifying whether internal or external experts were involved in content delivery. Internal experts coding indicated the use of in-house experts for program facilitation, while external experts coding pointed to the involvement of professionals and stakeholders from outside the institution. As a result of this process, a narrative was created to describe the emergent findings that aligned with the research question of this investigation.

Findings

Our analysis of the peer-referred literature revealed trends, gaps, and emergent themes in articles addressing science communication professional development opportunities for aspiring scientists in agriculture. Message distillation emerged as the most frequently addressed skill targeted in professional development programs in articles focusing on science communication abilities, constituting 85.7% (n = 6) of reviewed studies. Developing skills for online media was described in two articles, with 28.6% (n = 2), and presentation skills were emphasized in two articles, with

28.6% (*n* = 2). Notably, two articles highlighted skills of a more overarching nature beyond the definitional scope outlined by Washburn et al. (2022), which included public engagement, best practices, and confidence. Findings regarding the skills targeted during the program design of professional development opportunities on science communication for aspiring agricultural scientists were summarized in Table 1.

Table 1

Summary of Key Factors in Program Design: Skills

Code	Description	#[b]	%[c]
Message distillation	Audience awareness and adaptability	6	85.7
Online media	News websites and social media platforms	2	28.6
Presentation	Effective presentation techniques	2	28.6
Other	Too broad to sit into a category	2	28.6

[a] Labels follow skills developed through science communication as identified by Washburn et al. (2022) with the addition of "other."
[b] # = number of times the code was used; note that some articles qualified for multiple codes.
[c] % = percent of codes based on a total of seven articles that qualified for the study.

The primary communication mediums focused on in the published literature on professional development for science communication, were oral communication and written communication, each representing 57.1% of the reviewed studies (*n* = 4, for both). Meanwhile, social media emerged as a focal communication medium in two articles, comprising 28.6% of the literature (*n* = 2). All identified mediums aligned with the categories defined by Ritchie et al. (2022), and none were deemed too broad to be classified within a specific category. Table 2 provides a summary of the key communication mediums targeted during professional development programs on science communication for aspiring agricultural scientists.

Table 2

Summary of Key Factors in Program Design: Communication Mediums Targeted

Code	Description	#[b]	%[c]
Oral communication	Public lectures/talks, conversation, and interviews	4	57.1
Written communication	Books, newspapers, and research publications	4	57.1
Social media	Utilization of a social media platform such as YouTube, Twitter, Facebook, and blogs	2	28.6
No mediums	Too broad to sit into a category	0	0

[a] Labels follow the coding system of the GSSC questionnaire developed by Ritchie et al. (2022).

[b] # = number of times the code was used; note that some articles qualified for multiple codes.
[c] % = percent of codes based on a total of seven articles that qualified for the study.

Among the reviewed articles, external stakeholders were identified as the primary target group in 85.7% (*n* = 6) of cases (see Table 3). In contrast, 42.6% (*n* = 3*)* detailed efforts to engage the scientist-to-scientist community.

Table 3

Summary of Key Factors in Program Design: Target Groups

Code	Description	#[b]	%[c]
External stakeholder	Geared to communicating with a non-scientific audience	6	85.7
Scientist-to-scientist	Geared to communicate with other scientists inside and outside of their discipline	3	42.6

[a] Labels follow two of the elements identified by Fischhoff (2018) for evaluating science communication programs, excluding staffing.
= number of times the code was used; note that some articles qualified for multiple codes.
[c] % = percent of codes based on a total of seven articles that qualified for the study.

The staffing for science communication professional development efforts were predominantly led by institutional experts, accounting for 100% (*n = 7*) of the instances (see Table 4). External experts were involved in staffing only in two instances, constituting 28.6% (*n = 2*) of the cases.

Table 4

Summary of Internal and External Experts Consultation Implementing Science Communication at the Institutional Level

Code	Description	#[b]	%[c]
Institutional expert	Communication experts within the home institution	7	100
External expert	Communication experts outside the home institution	2	28.6

[a] Labels follow the element of staffing as identified by Fischhoff (2018), broken into two categories.
[b] # = number of times the code was used; note that some articles qualified for multiple codes.
[c] % = percent of codes based on a total of 7 articles that qualified for the study.

Among the skills focused on during professional development for science communication in the reviewed articles, message distillation emerged as the most frequently addressed, being described in six out of the seven articles (see Table 5). The study that did not discuss message distillation focused exclusively on scientific writing and was coded as “other.” In particular, Druschke et al. (2022) work focused on development opportunities regarding writing. Two articles highlighted skills in online media usage, and two articles specifically concentrated on

presentation skills. Hunnell et al. (2020) presented the most comprehensive training in skills including message distillation, online media, and presentation skills.

Table 5

Synthesis of the Communication Skills Targeted During Science Communication Professional Development Opportunities for Aspiring Students in Agriculture Disciplines (n = 7)

Title	Messages Distillation	Online media	Oral Presentation	Other
Druschke et al. (2022)				X
Druschke et al. (2018)	X			X
Fletcher et al. (2020)	X	X		
Hunnell et al. (2020)	X	X	X	
Lawrence-Dill et al. (2018)	X			
Pérez (2018)	X		X	
Wade et al. (2020)	X			

Ritchie et al. (2022) defined communication mediums as the various platforms and methods used by STEM graduate students for science communication. Differing from this, Washburn et al. (2022) emphasized that technical skills, unlike mediums, are primarily focused on practical application in communication. This highlighted a distinction between the channels of communication (mediums) and the practical skills required for effective communication in these mediums. Oral communication and written communication emerged as the two most employed mediums in the reviewed articles. The choice of mediums often mirrored the focus on specific skills. For instance, both Druschke et al. (2022) and Druschke et al. (2018) concentrated on written communication mediums, aligning with their emphasis on written communication skills (see Table 6). Similarly, Fletcher et al. (2020) and Hunnell et al. (2020) illuminated social media mediums, complementing their focus on online media skills.

Table 6

Synthesis of the Communication Mediums Taught During Science Communication Professional Development Opportunities for Aspiring in Agricultural Scientists (n = 7)

Title	Social Media	Oral Communication	Written Communication
Druschke et al. (2022)			X
Druschke et al. (2018)			X

Title	Social Media	Oral Communication	Written Communication
Fletcher et al. (2020)	X		X
Hunnell et al. (2020)	X	X	
Lawrence-Dill et al. (2018)		X	
Pérez (2018)		X	X
Wade et al. (2020)		X	

To create successful science communication programs, Fischoff (2018) emphasized three key elements: (a) choosing the right people for your team (staffing the right people), (b) having discussions and planning within your team (internal consultation), and (c) talking to and getting input from the people who will use or benefit from your program (external consultation). In all articles reviewed, institutional experts played a pivotal role in staffing and delivering science communication development opportunities. Only two instances were identified where an external expert was enlisted for additional support. Notably, none of the professional development opportunities were exclusively led by external experts (see Table 7).

Table 7

Synthesis of Staffing Types Used for Science Communication Professional Development Opportunities for Aspiring Agricultural Scientists (n =7)

Title	Institutional Experts	External Experts
Druschke et al. (2022)	X	
Druschke et al. (2018)	X	
Fletcher et al. (2020)	X	
Hunnell et al. (2020)	X	X
Lawrence-Dill et al. (2018)	X	
Pérez (2018)	X	X
Wade et al. (2020)	X	

The majority of science communication professional development opportunities focused on consultation with external stakeholders, spanning from non-scientific public engagement to interactions with policymakers. A singular opportunity concentrated on scientist-to-scientist communication. Notably, all articles that centered on scientist-to-scientist communication, Lawrence-Dill et al. (2018), Pérez (2018), and Wade et al. (2020), emphasized the importance of message distillation skills and utilized oral communication mediums (see Table 8).

Table 8

Synthesis of the Target Group Types Used in Science Communication Professional Development Opportunities for Graduate Students in Agriculture Disciplines (n =7).

Title	External Stakeholder	Scientist-to-Scientist
Druschke et al. (2022)	X	
Druschke et al. (2018)	X	
Fletcher et al. (2020)	X	
Hunnell et al. (2020)	X	
Lawrence-Dill et al. (2018)		X
Pérez (2018)	X	X
Wade et al. (2020)	X	X

Conclusions, Discussion, Implications, and Recommendations

This scoping review reinforced the critical need for integrating science communication into graduate-level preparation in agriculture to better prepare aspiring scientists. The evolving landscape of science communication demands that aspiring scientists not only excel in research skills but also possess the ability to effectively communicate complex concepts to diverse audiences (Bankston & McDowell, 2018; Washburn et al., 2022). Further, this study emphasized the importance of a two-way communication process that goes beyond the mere transmission of information, as highlighted by Burns et al. (2003). Using the Burns et al. (2003) AEIOU approach, agricultural scientists must begin to engage in meaningful dialogue, ignite interest, shape opinions, and foster an appreciation for science among the public. Addressing the challenges and opportunities in science communication is vital for the advancement of scientific knowledge and its societal impact (Bankston & McDowell, 2018). This study also served as a foundation for future research and initiatives aimed at closing the gap in science literacy and equipping emerging scientists in agricultural disciplines with the necessary skills to engage with diverse audiences effectively.

As a result, we identified a notable gap in the existing literature specifically related to the design and delivery of science communication professional development programs for aspiring agricultural scientists. Perhaps the lack of literature on this topic indicates a lack of opportunities being provided by colleges of agriculture regarding science communication for this population. Moving forward, we recommend identifying and analyzing this deficiency in knowledge to inform the creation of professional development programs tailored to the specific needs of aspiring scientists in agriculture across the globe. Despite the existing opportunities for science communication, there was a noticeable lack of scholarly literature systematically documenting

and analyzing professional development programs on this topic in agriculture. This lack of documentation hinders accessibility and evaluation (Clarkson et al., 2018), reinforcing the importance of not only centralizing resources online as recommended by Bankston and McDowell (2018) but also systematically cataloging and analyzing diverse forms of science communication training.

We also conclude that the theoretical frameworks used in this study, human capital theory and the theory of change, offered a systematic approach to understanding how professional development can serve as an investment in human capital that leads to positive outcomes for aspiring agricultural scientists regarding science communication (Becker, 1964; Little, 2003; Shultz, 1971; Smith, 2010; Smylie, 1996). In particular, this scoping review highlighted how key factors in program design, such as emphasizing message distillation and diverse communication mediums, emerged as crucial skills that led to positive changes in the knowledge and skills of aspiring agricultural scientists (Taplin & Clark, 2012). Moving forward, we recommend that future research explore how these two theories might be further integrated to create a holistic understanding of the positive changes experienced by aspiring agricultural scientists as they participate in professional development and learn how to frame their scientific contributions in ways that be more easily understood by the public.

We found that institutional experts staffed and delivered science communication professional development opportunities at their institutions in each instance of the published literature, with only a few instances of institutions utilizing external consultation. The recognition of institutional experts as central figures in science communication training design demonstrates the importance of internal expertise in shaping effective programs. Fischhoff (2018) suggested that successful science communications led to better decision-making and proposed evaluating their effectiveness through a theory of change, involving a systems approach with appropriate staffing, internal and external consultations, and understanding the limits of scientists and practitioners. Encouraging a diverse mix of program designers and staff helps prevent issues such as factual errors or message distortion (Fischhoff, 2018). The involvement of external stakeholders and institutional experts in staffing further emphasized the collaborative and institutional nature of effective science communication initiatives. As such, future research should explore the extent to which institutional experts feel confident in delivering professional development for aspiring agricultural scientists at their institutions. Further, additional work should be conducted to examine the instructional and curricular needs of these professionals to deliver quality professional development experiences for science communication in colleges of agriculture.

This study highlighted the importance of message distillation as a key skill for scientists, aligning with Washburn et al. (2022) findings on the need for scientists to simplify complex concepts for varied audiences. It also suggested that professional development programs should focus more on enhancing these message distillation skills, including audience awareness and adaptability, to improve decision-making and science communication effectiveness (Fischoff, 2018). Additionally, the value of having a diverse group of decision-makers in science communication was emphasized. Therefore, science communication professionals should tailor professional development programs to include diverse staff and experts, ensuring they meet the specific knowledge and skills needed in their fields.

The acknowledgment of skills beyond those outlined in existing frameworks in the published literature indicated the evolving nature of science communication, urging program designers to adopt a holistic approach that considers a diverse set of competencies. For example, the prominence of oral and written communication as the primary mediums for science communication professional development further emphasized the importance of mastering these channels (Druschke et al., 2018, 2022; Fletcher et al., 2020; Hunnell et al., 2020). Institutions of higher education and program designers should recognize the value of integrating opportunities for aspiring agricultural scientists to engage in public speaking, writing, and other communication activities to ensure well-rounded proficiency.

The inclusion of social media as a focal communication medium also emphasized the changing landscape of communication, necessitating adaptability and familiarity with various platforms (Lawrence-Dill et al., 2018; Pérez, 2018; Wade et al., 2020). The consultation patterns identified in this scoping review, particularly the high reliance on external stakeholders and limited focus on scientist-to-scientist communication, reinforced that communication was an essential component needed to extend knowledge to diverse audiences.

This study had several limitations. First, the allocated resources for this project, particularly in manpower, may also have influenced the study's comprehensiveness. Further, because this study relied on our interpretations of the published literature, the authors' personal biases and experiences could have influenced reporting. These limitations should be considered when interpreting findings, potentially affecting the resulting transferability. As such, we recommend that future research seek to expand this scoping review to include applications of science communication in STEM fields, seeking descriptions that may be applicable to agriculture students. Such work could yield practical and theoretical insights that could positively influence professional development in science communication for aspiring agricultural scientists.

Moving forward, we also recommend the creation of a centralized online resource that agricultural professionals can use to effectively design and deliver professional development on science communication (Bankston & McDowell, 2018). This resource should not only compile available opportunities but also systematically catalog and analyze diverse forms of science communication knowledge and skills needed in agriculture. Such a resource could serve as a foundation to prepare emerging agricultural scientists for communicating science-based information in diverse and far-reaching contexts. Overcoming barriers, engaging in meaningful collaborations, and continuous evaluation and improvement are vital components ensuring such an initiative could be successful (Druschke et al., 2018, 2022; Fletcher et al., 2020; Hunnell et al., 2020). By promoting two-way communication, utilizing online media effectively, and embracing diverse approaches, the scientific community can contribute significantly to bridging the gap in science communication proficiency, thereby advancing science and fostering informed decision-making in society (Lawrence-Dill et al., 2018; Pérez, 2018; Wade et al., 2020).

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What Do You Remember? An Analysis of Information Retention and Recall Through Data Visualization Use in Infographics

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Abstract

The decline in agricultural literacy results from fewer consumers working directly or engaging in agricultural practices. This has led consumers to question the integrity of the industry, and the amount of misinformation in the media is growing. To address this issue, infographics and data visualization are tools to help disseminate information more effectively to consumers. However, there is a gap in research about how data visualization can support agricultural topics. To better understand how data visualization displays can aid agricultural communicators, an eye-tracking study was employed to investigate this. An agricultural infographic was selected, and the data were manipulated to be shown as 1) charts, 2) illustrations, or 3) pictographs. Participants were randomly assigned to view one of the infographics and proceeded to answer free and cued recall questions to determine what they remembered from the infographic. Findings from the study did not show one type of data visualization to be more effective than another, yet there were queries posed that are worthy of further exploration. However, this study provides valuable insights for future replications and investigations of this topic.

Introduction

Fewer people are involved with agriculture now than 100 years ago resulting in consumers having a much lower level of agricultural literacy than ever before (Keller, 2023; Waller et al., 2020). According to Powell et al. (2008), "agricultural literacy revolves around the ability to think critically and make value judgments about the impact of agriculture as an economic and environmental activity" (p. 86). To be agriculturally literate, a person should be able to evaluate the tradeoffs between an individual and the respective industry (Powell, 2008). This means an individual should possess the background knowledge needed to assess impacts within sectors of the agricultural industry (i.e., livestock, crops, food products) and how they influence the producer or consumers. This background knowledge will allow individuals to make more practical judgments about the agricultural industry.

Consumers take in messages through various media sources, which can often be shared through stories, designs, and images. However, because of the decline of agricultural literacy, misinformation is a growing concern, and it has flooded the industry and consumer media channels with false and inaccurate information about agricultural practices (Baerg, 2018; Speer, 2017). Misinformation has been defined as information that has been proven to be false (Ecker et al., 2022) and poses an incredible challenge for agricultural communicators (Capecchi, 2017; Speer, 2017; Talwar et al., 2019). One main issue with misinformation is how quickly it can be spread through media channels (Lewandowsky et al., 2012). There has been a growth in the number of media channels consumers can source information from in recent years, and social

media is one source frequently utilized for information seeking (Enders et al., 2021; Holt & Cartmell, 2013). However, when consumers seek out information through social media, they may not consider that some information they see may be inaccurate (Karlova & Fisher, 2013) making the need to stay on top of misinformation, particularly about the agricultural industry, an increasing area of concern (Kumar & Shah, 2018). More importantly, if consumers cannot access accurate information about the agricultural industry (Jiang & Fang, 2019), they may not be able to evaluate and interpret the information being shared effectively.

The decrease in agricultural literacy and the growth of misinformation on social media are pushing agricultural communicators to find new and innovative ways to engage consumers to make educated decisions about food and fiber systems (Baerg, 2017; Speer, 2017; Taylor, 2021). When effective communication tools are utilized to help filter misinformation, communicators can provide consumers with accurate information that will aid in meaningful retention of what is being presented. Visual communication is one way agriculturists can communicate complex information to consumers to increase their agricultural knowledge level and combat the misinformation they interact with, particularly online (Whitaker, 2020). Visual communication uses images, videos, graphics, colors, and text to convey information and ideas so anyone can understand what is being presented, regardless of their knowledge level of the topic (Yang, 2023). As our brains process 75% of information visually (Sharma, 2012), visual communication presents a unique and powerful opportunity to help address the gap of knowledge between producers and consumers and encourage retention of information more effectively (Jamal & Mustaffa, 2023).

One form of visual communication, data visualizations, present data in a simplified manner, allowing for increased comprehension of information. Data visualizations make complex information easier to understand through their "transformation of quantified data which is not visual into a visual representation" (Manovich, 2011, p. 45). Data visualizations present data in pictorial, graphical, or illustrated forms and allow complex information to be presented more clearly and concisely for a better understanding by audiences (Kirk, 2012; Sadiku et al., 2016). Various types of data visualizations are commonly found within infographics, which are a form of visual communication that can help to convey information to consumers more effectively and efficiently by present complex data in a more concise and consumable manner. Infographics have been found to help with the understanding and processing of information (Hissom-Daugherty, 2013) and can aid agricultural communicators when sharing complex or unfamiliar topics with consumers (Burnett et al., 2019). "Effective infographics are based on principles from the fields of psychology, usability, graphic design, and statistics with the aim of reducing barriers (limited time, information overload) to understanding important information" (Otten et al., 2015, p. 1901). Infographics are valuable communication tools online, particularly on social media platforms. Kunze et al. (2021) determined that infographics received greater attention on social media than other communication or scientific articles. Infographics have also been found to be more effective than text-only narratives when sharing information about complex agricultural issues (Tu et al., 2018).

While data visualization use in science communication has been researched for decades (O'Brien, 2017), few studies have focused on how displays of graphical or visual information aid in information retention and recall, especially in agricultural topics. When infographics with data

visualization are presented to an audience, agricultural communicators must determine which types of visuals will resonate with their audiences based on the type of data being shared. However, communicators may not have received proper training in creating science communication visuals to engage with their audiences (Grainger et al., 2020; McIntosh et al., 2011; Zulkafli et al., 2017). Thus, audience members may not fully understand what is being presented, and the possibility of comprehension may decrease (Grainger et al., 2020; McIntosh, 2011). Gaining a better understanding of which data visualization types are the most effective for information retention and recall provides the first step toward improving our efforts as agricultural communicators sharing complex agricultural information to an uneducated public.

Theoretical Framework

The Limited Capacity Model of Motivated Mediated Message Processing (LC4MP) provided an applicable logic for pursuing the topic of this study. The Cognitive Load Theory (CLT) is the framework that preceded the LC4MP and describes the cognitive resources needed to process and learn the information presented. The CLT describes how an individual's working memory is limited by their ability to retain information effectively (Jong, 2010). If information is confusing or a task requires too much capacity, viewers will not retain the information presented to them. If too much information is provided to an individual at one time, the learning and retaining process will be interrupted, and they will be unable to recall information later (Pappas, 2014). The CLT also describes how individuals are always exposed to new information, and subconsciously decide what to focus their attention on and cognitively process (Bannert, 2002).

The Limited Capacity Model of Motivated Mediated Message Processing (LC4MP) was conceptualized after the CLT and explains how and why an individual comprehends information. The LC4MP is a model to help understand the connection between mediated messages and human information processing (Fisher et al., 2018; Lang, 2000). The LC4MP hopes to open the "black box" of human information processing to determine how "activation and interaction of the cognitive, emotional, physiological, and behavioral systems guide message processes and effects" (Fisher & Weber, 2020, p. 1). The LC4MP further discusses the encoding, storage, and retrieval stages associated with the cognitive processing of information (Lang, 2000; Lang, 2006). Different parts of a message can influence the motivational and cognitive systems of how an individual perceives a message and, eventually, encodes, stores, and retrieves the information within that message (Lang, 2006).

The thought process influenced by the LC4MP is specific to encoding, which is the process in which individuals subconsciously label parts of a message that sticks out to them based on current knowledge or new information that draws their attention (Lang, 2000). If an individual can properly encode a message, they then store that information and transfer it to their long-term memory. Visual saliency includes the elements or features of a message that make it stand apart and receive specific visual attention by viewers (Gong, 2016) and is crucial to how designs can attract the attention of viewers. We can incorporate tools within visual saliency to help encourage attention from the viewer and promote information retention. If the information presented does or does not align with prior beliefs or attitudes toward a topic, this could affect how they encode and store the information (Lang, 2000). Similarly, how the information is presented (i.e., colors, font, and graphic elements) can induce the participant to encode

information (Fischer et al., 2023). Motivational saliency refers to elements within a message that are interesting or relevant to the viewer. If individuals find pieces within a message interesting, they are more likely to pay attention to those elements (Fischer et al., 2020). Both visual and motivational saliency are crucial in how a viewer can approach, provide attention, and interact with the information. If communicators include visual and motivational saliency within their communication efforts, the viewer may be encouraged to process the information, which, in turn, can promote encoding, storage, and retrieval of the information.

Purpose and Research Objectives

Agricultural practices and topics can be difficult for consumers to understand due to their lack of knowledge and connection to the industry. This makes it even more crucial to understand how messages, particularly visual messages, about these topics are constructed and what factors impacts viewer retention of information. If agricultural communicators can create visual messages using data visualization that increase information retention and recall, consumers' knowledge of agricultural topics could be increased. This study aimed to determine the effects of various types of data visualizations used within an infographic on information retention and recall. The use of data visualizations within infographics could help combat the spread of misinformation and, in turn, create more trust between the agricultural industry and consumers. The following objectives guided this study:

RO1: Determine if free recall of information varied by data visualization type.
RO2: Determine if cued recall of information varied by data visualization type.
RO3: Determine if visual attention of the infographic varied by data visualization type.
RO4: Determine if visual attention of headers, graphics, and text varied by data visualization type.

Methods

This study employed a quantitative, true experimental research design. “Quantitative research is an approach for testing objective theories by examining the relationships among variables” (Creswell, 2014, p. 4). Quantitative research designs may be utilized to examine relationships between variables (Baker et al., 2017), which can be determined by conducting a true experimental research study. True experimental research design provides two functions to these types of studies: “(1) it establishes the conditions for the comparisons required to test the hypotheses of the experiment, and (2) it enables the experimenter, through statistical analysis of the data, to make a meaningful interpretation of the results of the study” (Ary et al., 2010, p. 271). True experimental research aims to identify whether a certain treatment impacts a result.

To identify how data visualizations aid in information retention and recall, eye-tracking was utilized to help us analyze these differences. Eye-tracking allows researchers to determine the usability of visual information and can provide insight into the design and development of future projects (Leggette et al., 2018). Within an eye-tracking device, we can create areas of interest to learn about what the viewer looked at and for how long (Stanton & Fischer, 2020). Eye-tracking allows us to collect multiple data points to record eye motion across time and task (Carter & Luke, 2020). Additionally, eye-tracking is especially effective when assessing “where a person is

looking at any given time, and how their eyes are moving from one location to another" (Poole & Ball, 2006, p. 1).

One focus within eye-tracking is visual attention allocation. Eye-tracking tools help to study visual attention allocation in digital content, including messages, graphics, and images (Cummins, 2017). This refers to the eye movement on identified areas within a stimulus (Duchowski, 2017). The focus on visual attention allocation allows for effectively measuring salient messages and the cognitive load needed to process information (Stanton & Fischer, 2020). Because of the ability to collect data on visual attention allocation, eye-tracking can be a beneficial tool for agricultural communicators and researchers when determining the saliency of a message or how visual elements stood out and seemed important to viewers. While there is limited research on the use of eye-tracking within agricultural communications (Leggette et al., 2018), the studies conducted have provided valuable insight into how the stimuli and areas of interest were seen by viewers (Stanton & Fischer, 2020). In addition to using eye-tracking to determine what elements attracted the participants, we also employed information recall questions to determine how they encoded, stored, and retrieved information.

Participants

The population of this study consisted of undergraduate college students enrolled at Texas Tech University. This population was valuable and appropriate for the study because of the population's strong connection to visual communication messages. Most undergraduate students today grew up with visual content close to their fingertips (Pillen, 2022) and have never known a life without social media and the internet (Hadley, 2023). Due to the high use of social media and visual content by undergraduate students (Yadav & Rai, 2017), they have likely encountered visual communication, such as infographics, before (Fahmy et al., 2014; Stahl & Kaihovirta, 2019). A convenience sample of participants was recruited for participation through the College of Media & Communications SONA system. These participants voluntarily signed up to participate in the study and were conveniently available to actively participate (Fraenkel et al., 2018; Thorson et al., 2012). In the SONA system, students can earn course credit or extra credit for participating in research studies. A total of 60 participants completed this study fully and viewed one of three stimuli treatments. An additional 24 participants served as a control group for this study. These participants did not view a stimuli treatment and only answered the cued memory recall questions of the instrument. As suggested by Pandey (2015), employing control groups in experimental research allows us to examine differences between the experimental and controlled variables in a study.

Independent Variables

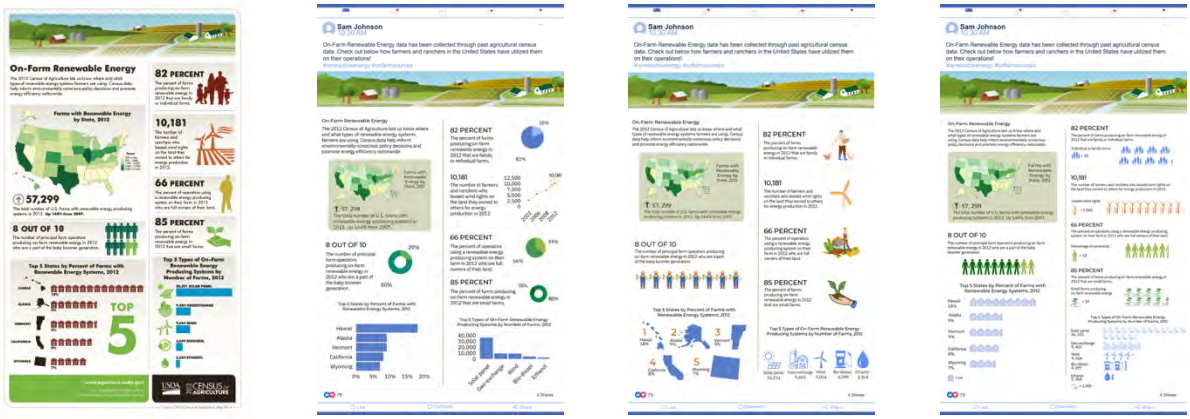
The independent variables for this study were the data visualizations used within the infographic stimuli. For this study, we utilized charts, illustrations, and pictographs as the data visualizations manipulated in each stimulus.

An infographic initially created by the United States Department of Agriculture - National Agricultural Statistics Service (USDA-NASS) was selected as the stimulus for this study. This infographic showcased data about on-farm renewable energy usage in the United States in 2012 as collected by the Census of Agriculture. The selected infographic was posted in an infographic archive file on the USDA website, which could be freely accessed online. To create the stimuli

for this study, the original infographic was manipulated to present its data using one of three data visualization types – charts, illustrations, or pictographs, which were identified based on findings from Fischer et al. (2023) that showed these data visualizations to be effective tools for promoting information retention and recall. All data remained the same among the three stimuli, and only the way it was visually displayed varied. Figure 1 shows the original infographic and the three stimuli manipulated for this study.

Figure 1

Original Infographic and Stimuli Used in the Study (Left to right – Original, Stimuli - Charts, Illustrations, Pictographs)



Participants were randomly assigned to view one of the three stimuli manipulations. The stimuli were provided to participants in the Tobii Pro Lab, an eye-tracking software, to look like mock Facebook posts within a series of mock posts presented to them. This format for the stimuli was chosen due to the platform's popularity, with over three million active monthly users (Shewale, 2023), particularly among the population sampled.

Dependent Variables

The dependent variables used in this study were participants' ability to recall (both freely and cued) design elements and information within the infographic. Information recall measures can be employed to determine how an individual retained elements within a message. Memory recall, or information recall, has been defined as the retrieval process of information that has been previously stored (Lang, 2000). Recall questions were collected in Qualtrics and were asked after the participants viewed one of the three stimuli.

Free Recall

Free recall can help determine how effectively an individual can retrieve information on their own (Lang, 2000). These types of questions allow participants to openly explain or provide responses to what a question is asking of them with no prompts or cues to help them. After viewing the stimuli manipulation assigned to them, participants were given a department-issued iPad to complete the Qualtrics questionnaire. Participants were asked three free recall questions: 1) What do you remember about the infographic?, 2) What information do you remember about

the infographic?, and 3) What data visualization elements do you remember? Participants were given a large text area to respond as much or as little as they would like for each question.

Cued Recall

Cued recall can be described as a measure to determine how effectively information has been stored in an individual's memory (Lang, 2000). When cued recall questions are employed, participants are given cues or prompts within a question to retrieve information that has been previously stored. Following the free recall questions, participants then proceeded to answer seven cued recall questions based on information presented within the infographic: 1) The number of U.S. farms with renewable energy-producing systems in 2012 is up what percent since 2007., 2) The number of principal farm operators producing on-farm renewable energy are typically millennials., 3) What state has the highest percentage of farms with renewable energy systems?, 4) The percentage of farms producing on-farm renewable energy in 2012 are medium to large-scale farms., 5) Please list how many farmers and ranchers leased wind rights on land they owned for energy production., 6) What percent of farmers and ranchers using renewable energy on their farms are complete landowners?, and 7) What are the top three types of on-farm renewable energy producing systems? These questions were presented in the form of multiple choice, true/false, and short answer questions.

Data Analysis

Data from the free and cued recall questions were exported from Qualtrics and uploaded into Microsoft Excel for cleaning and coding. The same procedure was followed for the eye-tracking data, which was exported from Tobii Pro Lab v.1.207.44884. The type of Tobii device used in this study was a screen-based device, which connected directly to a laptop that the program was hosted on. Both data files were then combined to be further cleaned and coded. Once cleaning and coding were completed, the combined data file was uploaded into SPSS v.29 for analysis. Research objectives one and two were first analyzed as qualitative data. A codebook was adapted from Fischer et al. (2023) and was used to code the free and cued recall questions from the Qualtrics questionnaire. Participants' responses were coded as (1) mentioned or (0) not mentioned which was then entered into SPSS for further analysis. The eye-tracking data pertaining to research objectives three and four were exported from the eye-tracking system and then combined with scores from research objectives one and two. From the eye-tracking program, we exported fixation duration as it pertained to the areas of interest and the infographic as a whole. Descriptive and inferential statistics were employed to provide an overview of the data, including participants' demographic information and analyses of the research objectives.

A panel of experts was identified when data analysis began to determine the intercoder reliability of the coded data (Dillman & Redline, 2004). For this study, we utilized Krippendorf's agreement coefficient alpha to determine reliability within the codebook to analyze the participants' responses from the Qualtrics questionnaire. Once coding was completed by three researchers, each variable achieved an appropriate level of agreeance of .80 or higher, as suggested by Neuendorf (2017). Regarding validity, a panel of experts agreed upon an infographic about renewable energy to serve as the stimuli for the study. Based on the literature review regarding data visualization displays, the panel of experts agreed to use charts, illustrations, and pictographs to present the information on the infographic. Once final manipulations and the questionnaire were created, the panel of experts approved both

instruments. This process allowed for content validity to be addressed, as the instrument was reviewed by the panel of experts and approved for accurate measurement of the instruments (Fraenkel et al., 2011).

Results

RO1: Determine if Free Recall of Information Varied by Data Visualization Type

Free Recall of Design Elements

No significant main effects on participants' ability to freely recall design elements in the infographics presented to them was found – $F(2,59) = .775$, $p = .466$, $\eta^2 = .026$ represents a small effect (Maher et al., 2013). While the Bonferroni post hoc analysis did not show any significant main effects, there were visual differences found within the means among treatment groups. Participants who viewed the infographic utilizing pictographs had a higher overall mean score ($M = 7.33$, $SD = 3.5$) for design element recall than participants who viewed the infographic utilizing charts ($M = 6.20$, $SD = 2.58$, $p = .667$) or the infographic utilizing illustrations ($M = 6.86$, $SD = 2.35$, $p = 1$).

Free Recall of Information

Again, no significant main effect on participants' ability to freely recall information displayed within the infographics presented to them was found – $F(2,59) = 2.053$, $p = .138$, $\eta^2 = .067$, represents a medium effect (Maher et al., 2013). The Bonferroni post hoc analysis of the free recall of information within the infographics showed no significant main effects. However, the post hoc analysis for information recall showed an even greater visible difference than the design element recall. Participants who viewed the infographic utilizing illustrations had a higher overall mean score ($M = 4.55$, $SD = 3.87$) than participants who viewed the infographic utilizing charts ($M = 2.55$, $SD = 1.9$, $p = .148$) or the infographic utilizing pictographs ($M = 3.83$, $SD = 3.46$, $p = 1$). Table 1 below showcases the differences between data visualization types and free recall of design elements and information among participants.

Table 1

One-Way Analysis of Variance for the Effects of Data Visualization Type on Free Recall of Design Elements and Information

	Total (N = 60)		Chart (n = 20)		Illustration (n = 22)		Pictograph (n = 18)				
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	F(2,59)	*p*	η^2
Design Element Free Recall	6.78	2.81	6.2	2.58	6.86	2.35	7.33	3.53	.775	.466	.026
Information Free Recall	3.67	3.27	2.5	1.9	4.5	3.87	3.83	3.46	2.053	.138	.067

RO2: Determine if Cued Recall of Information Varies by Data Visualization Type

A significant main effect for the cued recall of information displayed within the infographics based on data visualization type was found – $F(2,59) = .334$, $p = .717$, $\eta^2 = .087$ represents a large effect (Maher et al., 2013). A Bonferroni post hoc comparison did not show any significant

main effects among participants who viewed the infographic utilizing charts (M = 3, SD = 2.05, p = 1), the infographic utilizing illustrations (M = 3.36, SD = 2.25, p = 1), or the infographic utilizing pictographs (M = 3.56, SD = 2.09, p = 1). Table 2 illustrates the differences among data visualization type and cued recall of information among participants.

Table 2

One-Way Analysis of Variance for the Effects of Data Visualization Type on Cued Recall of Information

	Total (N = 60)		Chart (n = 20)		Illustration (n = 22)		Pictograph (n = 18)				
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	F(2,59)	*p*	η^2
Cued Recall	3.30	2.11	3.0	2.05	3.36	2.25	3.56	2.09	.334	.717	.087

Control Group

The cued recall of information by the control group did not show any significant main effects – $F(3,83) = .288$, p = .834, $\eta^2 = .011$ represents a small effect (Maher et al., 2013). A Bonferroni post hoc analysis did not show any significant main effects among the control group (M =3.21, SD = 1.25, p = 1), participants who viewed the infographic utilizing charts (M = 3, SD = 2.05, p = 1), participants who viewed the infographic utilizing illustrations (M = 3.36, SD = 2.25, p = 1), or participants who viewed the infographic utilizing pictographs (M = 3.56, SD = 2.09, p = 1). Table 3 showcases the differences in the cued recall among participants within the control group and non-control groups.

Table 3

One-Way Analysis of Variance for Control Group Cued Recall of Information

	Total (N = 60)		Chart (n = 20)		Illustration (n = 22)		Pictograph (n = 18)				
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
Cued Recall	3.30	2.11	3.0	2.05	3.36	2.25	3.56	2.09	.334	.717	.087
Control Cued Recall (N = 24)	3.21	1.25							.288	.834	.011

RO3: Determine if Visual Attention to the Infographic Varies by Data Visualization Type

No significant main effects were found when analyzing the differences between visual attention among the three infographic stimuli based on data visualization type utilized – $F(2,59) = .570$, p = .569, $\eta^2 = .020$ represents a small effect (Maher et al., 2013). A Bonferroni post hoc analysis did not show any significant main effects between the mean scores of the participants who viewed the infographic utilizing charts (M = 55.15, SD = 28.78, p = 1) or the participants who viewed the infographic utilizing pictographs (M = 54.09, SD = 35.94, p = 1); however, there were visible differences seen in the visual attention from participants who viewed the infographic utilizing illustrations (M = 45, SD = 36.28, p = 1). Table 4 illustrates the differences among visual attention durations based on data visualization types viewed.

Table 4

One-Way Analysis of Variance for the Visual Attention to Stimuli in Seconds

	Total (N = 60)		Chart (n = 20)		Illustration (n = 22)		Pictograph (n = 18)				
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2,59)	*p*	η^2
Overall Duration	51.11	33.61	55.15	28.78	45	36.28	54.09	35.94	.570	.569	.020

RO4: Determine if Visual Attention of Headers, Graphics, and Text Varies by Data Visualization Type

No significant main effects were found when analyzing visual attention given to overall headers ($F(2,59) = .864$, $p = .427$, $\eta^2 = .029$), graphics ($F(2,59) = .961$, $p = .389$, $\eta^2 = .033$), or text ($F(2,59) = .384$, $p = .683$, $\eta^2 = .013$) within the infographic stimuli. All represented only small effects (Maher et al., 2013). While the Bonferroni post hoc analysis showed no significant main effects among each area of interest within the infographics, there were visible differences seen among the mean scores. For the header area of interest, there were no significant main effects found between the means of the participants who viewed the infographic utilizing illustrations ($M = 3.05$, $SD = 2.52$, $p = 1$) and participants who viewed the infographic utilizing pictographs ($M = 3.27$, $SD = 2.46$, $p = 1$). Yet, there was a visible difference seen in the mean scores of participants who viewed the infographic utilizing charts ($M = 4.10$, $SD = 3.01$, $p = .639$). Again, no significant main effects were found for the graphics area of interest; however, there was a visible difference seen among the means for participants who viewed the infographic utilizing charts ($M = 14.15$, $SD = 9.69$, $p = 1$), participants who viewed the infographic utilizing illustrations ($M = 10.82$, $SD = 12.64$, $p = 1$), and participants who viewed the infographic utilizing pictographs ($M = 16.40$, $SD = 15.84$, $p = .532$). For the final area of interest, text, participants who viewed the infographic utilizing charts had a visibly higher overall mean score ($M = 17.97$, $SD = 14.12$, $p = 1$) compared to participants who viewed the infographic utilizing illustrations ($M = 14.98$, $SD = 14.98$, $p = 1$) or participants who viewed the infographic utilizing pictographs ($M = 14.03$, $SD = 14.78$, $p = 1$). Table 5 showcases the differences among visual attention durations among the three areas of interest based on data visualization types viewed.

Table 5

One-Way Analysis of Variance of Overall Area of Interest Fixation Duration Based on Data Visualization in Seconds

	Total (N = 60)		Chart (n = 20)		Illustration (n = 22)		Pictograph (n = 18)				
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2,59)	*p*	η^2
Header	3.46	2.67	4.10	3.01	3.05	2.52	3.27	2.46	.864	.427	.029
Graphic	13.60	12.84	14.15	9.69	10.82	12.64	16.40	15.84	.961	.389	.033
Text	15.69	14.49	17.97	14.12	14.98	14.98	14.03	14.78	.384	.683	.013

Conclusions, Discussions, and Recommendations

The results of this study did not show one type of data visualization used in infographics presented to participants to be more effective when aiding participants' information retention and recall over another. While each research objective showed differing results for each data visualization type, there was not one type of data visualization that consistently fulfilled the research objectives. This primarily resulted from the small sample size of this study and unequal participant numbers between treatment groups. Though each research objective resulted in different significant main effects for each analysis, there was also a significant lack of power within the study. Many research objectives resulted in small to medium size effects, and only one variable resulted in a medium to large effect. This lack of power coincides with the lack of significance within each research objective. If power within the study could have been increased, there is a chance we could have seen more significant main effects among the variables (Thorson et al., 2012).

By analyzing the findings from this study, we can infer that participants could have been overloaded with information presented to them as was shown in how participants recalled information and described what they remembered from the infographic. When considering the questionnaire, participants were not required to answer the questions and could leave them blank. Many participants left text boxes blank (n = 58) and did not expound on the elements the questions were asking. Furthermore, this overload of information could also be a result of how much information was presented in the infographic stimuli. The CLT explains how cognitive resources are limited by an individual's working memory (Jong, 2010). There were numerous instances where participants said they had difficulty seeing the visuals on the infographic due to the sizing of the graphics. This should be improved in future studies replicating these efforts.

Additionally, the number of data visualization displays on the infographic stimuli could have impacted participants' comprehension of information. With the addition of headers and text alongside the visual displays, the gutter space between each area of interest was small. Based on the presentation and layout of the infographic, the CLT can help explain why participants were unable to effectively recall information from the infographic. Participants may have had difficulty comprehending each of the elements on the infographic, which increased their cognitive resources and did not allow them to effectively retain the information (Jong, 2010).

Participants' interest in the infographic topic could have affected their ability to retain the information. If participants did not find the information presented relevant to their lives or important to remember, they may not have actively sought to read it. The CLT explains viewer attention to certain visual aspects coincides with participants' interest in the topic. When exposed to new information, individuals subconsciously choose what to cognitively process (Bannert, 2002). When a viewer first looks at information, they scan the document and pick pieces of content to engage with (Bannert, 2002). If the participant was not interested in the topic, this could have caused them to disregard the information and not read it.

Recommendations for Practice – Education & Design

Communicators and educators who work on behalf of agricultural literacy campaigns should provide consumers with practical and meaningful information to help narrow the knowledge gap between producers and consumers as misinformation is a growing concern for the agricultural industry (Baerg, 2018; Speer, 2017). One way communicators and educators can do this is through visual communication tools like infographics. The creation of infographics provides viewers with a dynamic visual that allows for easier comprehension of information (Smiciklas, 2012). Similarly, studies on the use of infographic in the classroom across all ages and school groups have supported visual communication in an educational context and classrooms across all subjects (Mocek, 2017; Ozdamli et al., 2016; Steyn et al., 2018). Educators should consider how visual communication can aid in instructional materials while teaching new subjects to students. Visual communication tools could replace current teaching materials or provide supplemental information for students. Professional development opportunities based on the findings on this study for both communicators and educators would be an essential first step towards a more effective use of infographics.

Agricultural communicators and designers should consider how data visualizations, such as charts, illustrations, and pictographs, benefit the messages they present and how the amount of text placed on an infographic impacts message comprehension and storage by viewers. Participants may be more likely to retain information if the text complements the visual elements. Therefore, agricultural communicators and designers should continue or increase their use of visual elements.

Recommendations for Research

As suggested by Leggette et al. (2018), eye-tracking has been underutilized within agricultural communications research. The gap in the research literature and findings on how eye-tracking can benefit communicators is a driving force for the continued need for these studies to be conducted. Eye-tracking provides researchers with a valuable methodology to determine the effectiveness of visuals, message frames, etc. Eye-tracking studies within agricultural communications should continue to be conducted to provide valuable findings for practitioners and educators.

One limitation of this study was the participants' ability to fully comprehend the information presented in the infographic. Many participants stated after completing their participation, they could not focus on sections of the infographic because of how much data was being presented. A similar study should be replicated to determine the effects of data visualizations on information retention and recall - but with fewer datasets presented on the infographics. This would allow participants who view the stimuli to focus more of their attention on the data presented since the infographics would be less congested.

Most importantly, this type of study should be replicated with a larger sample size (Thorson et al., 2012). Because the sample size and power for this study were so small, making definitive conclusions on which type of data visualization to use for the highest amount of information retention and recall was challenging. Thus, a similar study could be replicated to analyze the retention and recall of information through data visualization displays with a larger sample size.

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Hispanic Student Motivation and Satisfaction after Participating in Organizations and Programs in the Gordon W. Davis College of Agricultural Sciences & Natural Resources

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Abstract

The Gordon W. Davis College of Agricultural Sciences & Natural Resources (Davis College) at Texas Tech University has reported an overwhelming increase in its enrollment of Hispanic students. Hispanic student participation in Davis College organizations and programs has also increased. The purpose of this study was to identify Hispanic student motivation and satisfaction after participating in organizations and programs. Results of the study were obtained through two focus group sessions with Hispanic students actively participating in Davis College organizations and programs. Study discussions concluded Hispanic students attend Texas Tech because of the reputation of Davis College and Texas Tech's academic benefits. Hispanic students are likely to major in a college of agriculture because of their prior involvement in agriculture and their desire to implement change based on their interests and passions. Discussions also concluded Hispanic students join Davis College student organizations and programs to fulfill their need for community and a supportive environment. Organizations and programs benefit Hispanic students by providing professional networking abilities and career preparation. The discussion finally concluded that Davis College organizations and programs need more emphasis on inclusivity and increased recruitment efforts.

Introduction

The United States is continuously growing more racially and ethnically diverse although the population growth has dramatically slowed since the 1990s (Mather, 2023). This population shift indicates a nation more diverse than ever before revealing nearly one out of 10 Americans identifying with a race or ethnic group that is not white (Frey, 2020). The Hispanic population growth alone accounts for 51% of the nation's overall population increase which is a higher share than any other racial or ethnic group (Passel et al., 2022). Hispanics have been identified as the second-largest ethnic minority group in the United States because of this dramatic population increase (Funk & Lopez, 2022). The increased population diversity in the U.S. has also translated to all levels of higher education (Espinosa et al., 2019).

Hispanics in Higher Education

The Hispanic enrollment at postsecondary institutions in the U.S. has exponentially increased over the last few decades (Mora, 2022). The number of Hispanic individuals aged 18 to 24 enrolled in higher education increased from 1.2 million in 2005 to 2.4 million in 2021 (Hernandez & McElrath, 2023). Hispanic students in higher education institutions continue to underperform and have higher attrition rates compared to other student groups although their enrollment numbers are steadily increasing (Mora, 2022). Hispanic student persistence in higher

education institutions is not the result of just one influential factor, but typically a combination of personal, environmental, involvement, and socio-cultural factors (Hernandez & Lopez, 2007).

Parental Involvement

Studies have determined there is a link between a child's learning and parental involvement (Marerro, 2016). Family participation is crucial to a student's academic success, especially if the student is from a vulnerable population or ethnic minority, such as the Hispanic population (Camarero-Figuerola et al., 2020). Parental involvement can vary from family to family, but it generally focuses on parents' behavior toward their child's school life, participation in school-related activities, helping with homework and other school projects, and communication with teachers and school officials (Ribeiro et al., 2021). Parental involvement has been deemed a prominent factor in a child's academic career regardless of family social and economic background (Wilder, 2014). Teachers, administrators, and policymakers have recognized parental involvement as widely impactful and should be integrated into future educational reforms and initiatives (Wilder, 2014).

Sociocultural Factors

There is an imperative need for educators, communities, families, and policymakers to understand the sociocultural factors impeding the educational success of Hispanics (Fry & Gonzales, 2008). Sociocultural factors refer to the various societal and cultural influences impacting thoughts, feelings, and behaviors (Gonzalez & Birnbaum-Weitzman, 2020). The term is encompassed by several dimensions including race, ethnicity, religion, sex, language, acculturation, attitudes, beliefs and value systems (Gonzalez & Birnbaum-Weitzman, 2020). It is crucial to understand how sociocultural factors impact students' educational success or failure (Marrero, 2016). Bridging the gaps between homelife, school, and community by linking culture to academics can help increase students' educational success (Marrero, 2016).

Cultural and Family Influences

The motivations influencing minority students' decisions to attend college are often influenced by their cultural and family values (Phinney et al., 2006). Students with individual motivations attend college for their own personal reasons, and those with collective motivations attend college to meet the demands and expectations of others, usually family members (Markus & Kitayama, 1991). Family members have been identified as significantly influential in terms of students' decisions to enter college (Koçak et al., 2021). Parental influences are especially important regarding student matriculation (Flint, 1992). Many minority students coming from lower socio-economic backgrounds see higher education as a means to better their lives and avoid any difficulties their parents may have had (Lopez, 2001). A supportive parental relationship has been shown to be an important factor for the overall maintenance of the psychological well-being of ethnic minority students (Rodriguez et al., 2003). There have been indications that strong familial ties in distinct educational settings positively impact Hispanic students' academic and social transition to college, in addition to overall persistence and success (Nora, 2001).

Hispanic Student Personal Motivation

Research has noted Hispanic students are convinced higher education is the only way to achieve greater opportunities, financial rewards, better jobs, and more satisfying work (Santos, 2004). Cohen and Brawer (1996) focused on minority student motivations for entering higher education and identified a spectrum of motives from finding a satisfying and well-paying job to serving their community and enriching themselves academically, aesthetically, and socially. The disparity between these goals and the means used to achieve them is often great and relates to students' desires to expand their intellectual horizons (Santos, 2004).

Benefits from Organization and Program Participation

Hispanic student persistence in higher education has been found relative to student organization participation (O'Hara, 2020). Participation in extracurricular activities has been labeled as "the other education" as it provides students with opportunities to apply their classroom education to real-world settings and therefore develop skills which will benefit them in the practical realities of life after college graduation (Astin, 1994; Kuh, 1995). The added supplement of participation in extracurricular activities including college student organizations has proven to be a significant contributing factor in a college student's experience (Montelongo, 2002). Previous research on extracurricular involvement pointed out the importance of supplementing academic classroom learning with additional learning outside of the traditional classroom setting (Montelongo, 2002). Extracurricular activities including involvement in college organizations are associated with a variety of student development changes regarding cognitive and affective growth (Montelongo, 2002). Astin (1994) noted student involvement in extracurricular activities cultivates remarkable changes in a student's behavior traits and personality characteristics.

Theoretical Framework

The theoretical framework used to guide this study was Luthans and Youssef-Morgan's (2017) Psychological Capital (PsyCap), which is a core construct drawing from positive psychology and positive organizational behavior (POB). PsyCap is made up of the positive psychological resources of hope, efficacy, resilience, and optimism (HERO) which makes up the HERO within oneself (Luthans & Youssef-Morgan, 2017). Psychological capital is about one's positive subjective experience of well-being and satisfaction occurring in the past, integrated with happiness and pleasures of the present time, and encouraged cognition of the future meaning one's hope, optimism, and faith (Seligman, 2002). Hope, efficacy, resilience, and optimism share commonalities of one's feeling of sense of control, the intentionality of choices, and overall goal pursuit which applies to the motivated effort to persevere through challenges (Luthans & Youssef-Morgan, 2017).

The impact of PsyCap has primarily been used to evaluate satisfaction and well-being in an organizational, workplace environment, but it has been found to be applicable to the satisfaction and well-being of college students (Liran & Miller, 2017). Siu et al. (2014) found a relationship between PsyCap and college student's overall engagement, satisfaction, and success. It is suggested PsyCap acts as a positive predictor of a student's GPA, as students with higher

levels of PsyCap had a higher GPA than students with lower levels of PsyCap (Liran & Miller, 2017). Siu et al. (2014) also found students with a higher level of PsyCap had a greater level of study engagement, or how interested the students were in their studies. This relationship between PsyCap and student's overall interest and engagement in their college studies is indicative of intrinsic motivation (Liran & Miller, 2017). Intrinsic motivation was found to be a mediator of the two variables, meaning students with a higher level of PsyCap also had a higher level of intrinsic motivation, and therefore, were more likely to experience enhanced overall motivation and engagement (Liran & Miller, 2017).

Purpose and Research Questions

The purpose of this study was to identify Hispanic student motivations and satisfaction after participating in organizations and programs within Gordon W. Davis College of Agricultural Sciences & Natural Resources (Davis College). The study was guided by the following research questions:

1. What motivates Hispanic students to attend Texas Tech University?
2. What motivates Hispanic students to major in agriculture at Texas Tech University?
3. What motivates Hispanic students to join organizations and programs within Davis College?
4. How do Davis College organizations and programs benefit Hispanic students?
5. How can Davis College improve organizations and programs to better serve Hispanic students?

Methodology

This study was qualitative in nature. Qualitative research helps divulge the motives, reasons, values, and goals of the researcher's participants to answer a study's guiding questions (Fraenkel & Wallen, 2018). Two mini-focus group sessions were conducted. Mini-focus groups can be used when the research topic needs to be explored in greater depth and when the study participants have long and substantial experiences, they are able to share with other group members (Nyumba et al., 2018). Moderators' guides served as the instrumentation for this study. Both guides included open-ended questions which were conversational in nature to create a relaxed environment where participants would be more willing and comfortable to share their thoughts and opinions with others in the discussion (Krueger & Casey, 2014). The instruments were reviewed by a panel of experts in advance of the focus group discussions. A total of seven participants made up the first focus group discussion and five participants made up the second discussion.

Population and Sample

The population for this study consisted of Hispanic students enrolled in Davis College as of Spring 2023. A purposive sampling method was conducted to obtain participants. Purposive sampling is a non-random technique used when a researcher determines what needs to be known and then identifies participants who can and are willing to provide the information the study is seeking (Etikan et al., 2016). The sample for this study was comprised of Hispanic students involved in student organizations or programs within Davis College. Participants for the first

focus group discussion were sampled from the student organization Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS). MANRRS promotes the academic and professional development of minority students in agriculture, natural resources, and related sciences. A total of seven participants contributed to this focus group session. This discussion will be referred to as Focus Group #1. Participants for the second focus group discussion were sampled from a new student undergraduate research program within Davis College known as Young Agri-Scientists. This program is part of a new initiative to better involve Hispanic students in undergraduate research and other support initiatives which offer experiential learning opportunities including internships. A total of five participants contributed to this focus group discussion. This discussion will be referred to Focus Group #2.

Data Collection and Analysis

Both focus group discussions were audio and video recorded for the sake of data collection. Field notes were also taken during each focus group to indicate emphasis on participant body language, tone of voice, and key similarities of discussion remarks. The audio files were uploaded to Otter.ai, a digital transcription service, where intelligent transcriptions were produced to assist in the data analysis stages. The transcripts produced using Otter.ai were then uploaded to Delve, a qualitative data analysis tool, to begin to process of data analysis. Thematic coding served as the basis of data analysis for this study. Morse and Richards (2013) define coding as the development of appropriate category names for each response or set of responses. "A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2009, p.3). The first cycle of coding included the process of in vivo coding. Manning (2017) described in vivo coding as a form of data analysis where emphasis is placed on participants' actual spoken words. In vivo coding is also referred to as verbatim coding, literal coding, and natural coding (Saldaña, 2016). Following the cycle of in vivo coding, pattern coding was utilized to form relationships between the codes and to identify overarching themes (Saldaña, 2016).

Research Rigor

Transparency was maintained throughout stages of data collection and analysis to establish quality within the study (Tracy, 2010). Participants were required to sign a consent form prior to engaging in the focus group session and were informed their involvement would remain confidential during and after the conclusion of the study. Participant's thoughts and opinions remained true during data analysis through the use of in vivo coding. To maintain participant confidentiality, participant names were redacted from the data and replaced with a randomly assigned number.

Findings

Participants of both focus groups shared similar thoughts and opinions about their experiences at Texas Tech and their participation in Davis College student organizations and

programs as Hispanic students. The first research question sought to identify Hispanic student motivations for attending Texas Tech University. Emergent themes for RQ1 included: (a) reputation of Davis College; and (b) academic benefits. The second research question sought to identify what motivated Hispanic students to major in agriculture. Emergent themes for RQ2 were: (a) influence of prior involvement in agriculture; and (b) desire to implement change. The third research question sought to determine the motivations of Hispanic students to join organizations and programs within Davis College. Emergent themes for RQ3 were: (a) need for community; and (b) supportive environment. The fourth research question sought to determine how Davis College organizations and programs benefit Hispanic students. Emergent themes for RQ4 were: (a) professional networking abilities; and (b) career preparation. The fifth research question sought to determine how Davis College can improve organizations and programs to better serve Hispanic students. Emergent themes for RQ5 were: (a) better emphasis on inclusivity; and (b) increased recruitment efforts.

Reputation of [College of Agriculture]

The first research question sought to identify Hispanic student motivations for attending Texas Tech. The first emergent theme of this research question determined that Hispanic students were motivated by the reputation of Davis College to attend Texas Tech. Many of the focus group participants were interested in majoring in agriculture prior to their decision to attend Texas Tech and the Davis College strengthened their decisions. Additionally, participants suggested Davis College is superior to other colleges of agriculture and has the capability to continuously draw in Hispanic students who historically attend universities closer to their homes and families. A participant from Focus Group #1 stated,
"I really didn't know anything about Texas Tech until my senior year, so I Googled best ag schools in Texas and Tech was there." Similarly, a participant from Focus Group #2 stated, "All my friends were going to Texas A&M and I hadn't really considered anything else. Texas Tech had actually sent me something so I went and toured it and fell in love with the campus and atmosphere. Everyone was super friendly including all the professors in the ag department. I just felt at home."

Academic Benefits

The second emergent theme from RQ1 determined that Hispanic students were motivated to attend Texas Tech University because the academic benefits exceeded those of other universities. Participants identified specific benefits they perceived to have personally motivated them to attend Texas Tech. A participant from Focus Group #1 noted that the Davis College scholarship opportunities positively influenced their decision to attend Texas Tech. This participant stated, "I was very appreciative that they're invested in scholarships." Another participant from Focus Group #1 mentioned that Tech was one of the only universities that would accept all of her dual credit hours from high school. This participant said, "My parents didn't want me to go and said if Texas Tech was going to accept more credits than A&M Kingsville, then I could go. I spent the entire night googling how many credits Tech was going to accept, and they accepted all of them. Like around 40 of my college hours." Participants from both discussions determined Texas Tech's major options to also positively influence their decisions to attend. A participant from Focus Group #2 discussed their specific study of interest

and said, “I was able to find my little niche major of landscape architecture.” Another participant from the same discussion divulged to the group they could not choose between majors and said, “I came here and learned I could double major which was cool.”

Influence of Prior Involvement in Agriculture

The second research question sought to identify what motivated Hispanic students to major in agriculture. The first emergent theme of this research question suggested the influence of an agricultural background to be a motivator for Hispanic students to major in agriculture. Several participants noted their families had ties to agriculture and, therefore, sought to study agriculture in the field of their interest. A participant from Focus Group #1 spoke about their upbringing in agriculture by saying, “Ever since I was little, I always wanted to pursue a degree in agriculture, especially since a lot of my family members consisted of being farmers in Mexico. I grew up watching them cultivate products, work on the farm, and interact with farmers was inspiring to me.” A couple participants from Focus Group #1 discussion spoke of their experiences in high school which influenced them to major in an agricultural field of study. One stated, “I knew I wanted to do ag because I grew up in 4-H and in FFA, so I knew I wanted to pursue that.” Similarly, another participant stated, “I took agricultural science courses in high school and really enjoyed them.”

Desire to Implement Change

The second emergent theme of RQ2 determined that Hispanic students were motivated to major in agriculture because of their desire to implement change in their area of interest. It is important to point out the participants who were not influenced to major in agriculture by prior participation in agriculture were motivated by their interest in agriculture and hopes of solving a pertinent problem in the industry. Several participants from Focus Group #1 spoke of personal issues that have driven their interest in majoring in an agricultural field of study. One participant stated, “My dad and uncles asked if I was sure I wanted to study agriculture because it’s mostly sexist men. After doing my research, I saw that many more women are getting involved especially in the United States. That’s sort of what inspired me to pursue the degree since it’s an underrepresented field.” Another participant expressed their concerns and interest by stating, “I’m an agricultural leadership major and there have been times where I’ve questioned whether or not I wanted to work in agriculture based on if it was an inclusive environment or not. I realized that could be an opportunity for me to play a role in agriculture in terms of getting more people involved in agriculture, eliminating inequities, and having those conversations about growth and representation.” For another participant of Focus Group #2, the lack of agricultural educators was a driving force for majoring in agriculture. This participant stated, “I see the lack of ag teachers across the nation, and solving that issue is important. We need more people in agriculture, and we need more people to educate others on the industry as well. That’s what brought me into this career path.”

Need for Community

The third research question sought to determine the motivations of Hispanic students to join organizations and programs within Davis College. The first theme that emerged from this

research question emphasizes the need for community. Participants noted the importance of finding a community through student organizations and programs within the Davis College. Participants suggested Hispanic students seek out organizations and programs that provide a community similar to the one in which they grew up or currently reside. Several participants stressed the importance of finding a community where they could be themselves. A participant of Focus Group #1 spoke about their reasons for joining and said, "I joined MANRRS with the intention of being able to surround myself with people who share the same background as me through a cultural lens." Similarly, another participant of Focus Group #1 shared their motive for joining MANRRS by stating, "I think in my first year, one of my biggest challenges was trying to find a community in the ag college. Looking back, I really tried to conform to other people because all my friends were white. I was the only Hispanic in my friend group. It was really a year of trying to make friends versus actually being myself and celebrating myself. I wanted to leave. I told my dad I wanted to transfer because I didn't feel comfortable." Participants of Focus Group #2 expressed their reasons for joining Young Agri-Scientists and although this program's mission is different than MANRRS, members sought after the group to find a sense of community. A participant from Focus Group #2 stated, "It's just cool knowing there's a spot for you that you can feel comfortable in."

Supportive Environment

The second emergent theme of RQ3 identified that participants sought to find a supportive environment on campus. Participants noted that Hispanic students, particularly those in Davis College seek an environment in which they feel comfortable to express themselves. MANRRS and Young Agri-Scientists were two student organizations and programs in which Hispanics in Davis College found the supportive environment they were searching for. A participant from Focus Group #1 noted of the importance of having a supportive environment by stating, "To understand others, you have to surround yourself with people who are different than you. I wanted that space I couldn't find anywhere else. It was MANRRS because ultimately, I want to be a better ally for everyone. I think that I've been able to have very candid conversations with the members of MANRRS that I might not have had in a different space". Another participant of Focus Group #1 praised the environment of MANRRS by stating, "Finding MANRRS and finding an organization where I'm able to share all these little inside jokes about our childhood that other people understand is a really good feeling because I didn't have that my first year. This is the one place I get to come to and get very excited about because I get to talk to people who understand me. Even if they don't fully understand me, there's still empathy in this space and that's really nice."

Professional Networking Abilities

The first emergent theme of RQ4 identified the ability to professionally network as a benefit Hispanic students can obtain from their participation in Davis College organizations and programs. Participants noted the ability to professionally network in Davis College organizations and programs provides Hispanic students with a way to communicate with others in their field of interest. Many participants claimed they would not have been able to professionally network without the opportunities made available to them through their organizations and programs. A participant from Focus Group #1 expressed their gratitude on this matter by stating, "I know for

a fact if it wasn't for the organization, I would have not been able to network and meet people. If you want to get a job, you have to network. The thing I like about MANRRS is that they give you the opportunity to network and go out and see the type of environment you would like to involve yourself in. MANRRS has definitely been a big support." Similarly, a participant from Focus Group #2 also expressed their appreciation by stating, "Because of my experience in the museum here, I was able to go up to Cleveland for an internship at their museum. I think it was just the sheer fact that my boss up there knew my boss here."

Career Preparation

The second emergent theme of R 4 determined that Hispanic students benefit from participation in Davis College student organizations and programs because of opportunities for career preparation. Participants stated the importance of gaining experience in their field of interest while in college to better prepare themselves for future careers. The participants identified internships and real-world exposure as benefits to career preparation. A participant from Focus Group #1 noted many minority students often do not receive adequate opportunities to prepare for their careers which is why participation in student organizations such as MANRRS is important for Hispanics. This participant said, "Being able to see how people of minority groups from across the nation were getting offered internships and the investments made for them honestly made me so happy. I wish my mom and dad could see that these students are getting offered so many opportunities in the industry." Another participant doted on MANRRS' mission to help minority students professionally by stating, "I felt like at the conference, it was a common denominator for all employers, academic institutions, and governmental agencies to have a priority of diversity, equity, inclusion, and accessibility. The conversations being held and the intentionality of the conversations meant they wanted people to be successful in those spaces to transition out of college, to eventually end up in a place where they can be successful in a career." While the participants of Focus Group #2 are focused more on undergraduate research, they still attributed the program to their career preparation. A participant from Focus Group #2 said, "I have a job right now and I'm looking for those internships. But I figured the best thing would be research. I also wanted to make those close relationships and get those networking opportunities. That was my main thing because I felt like research was really important. It looks really good on a vet school application."

Better Emphasis on Inclusivity

The first emergent theme of RQ5 determined [College of Agriculture] student organizations and programs need better emphasis on inclusivity to adequately serve Hispanic students. Participants noted Davis College student programs and organizations could better recruit Hispanic students if prospective students were able to more easily recognize the inclusivity these organizations and programs offer to their members. A participant from Focus Group #1 mentioned how they felt Davis College needs to do a better job at emphasizing its inclusivity efforts by stating, "I also think that our college gets a bad rep for not being a very inclusive space. I don't know if there's very much action being done to change that. I do think there is work that needs to be done, to not only like change the narrative for our college, but also just to create that space where students feel like they can come and be a part of Davis College and be their whole selves." Taking a slightly different approach, participants of Focus Group #2

discussed the lack of Hispanic male students involved in undergraduate research programs. A participant from Focus Group #2 said, “From my experience, I think in the Hispanic culture, a lot of things are handed to the males. I guess they don’t have to work as hard as females to get the same amount of recognition. Maybe they feel they don’t need to do this (research program).”

Increased Recruitment Efforts

The second emergent theme of RQ5 determined that Davis College student organizations and programs need to increase recruitment efforts. Participants noted encouraging Hispanic students through stronger incentives and motivators could aid the recruitment process and better serve students by making the benefits associated with participation in student organizations and programs more known. A participant from Focus Group #1 discussed how they felt Texas Tech University should better emphasize its status as a Hispanic Serving Institution, which could increase its recruitment of Hispanic students. This participant specifically said, “Tech as a whole does a pretty decent job of promoting that it’s a Hispanic Serving Institution, but I definitely think they could do a way better job. I do think our College is doing a better job of moving forward, especially with all the research and studies that have been done.” Similarly, participants of Focus Group #2 discussed the lack of Hispanic students attending Davis College from deep South Texas and the need to better recruit from that area. This participant from Focus Group #2 said, “I do think the College should attract more Hispanics. I have seen a lot more Hispanics in my classes and it’s good to see that, but I think they need to recruit more. I’m from the Valley and many students still go to Texas A&M and I don’t know how we could change.”

Discussion and Recommendations

Research question one sought to identify Hispanic students' motivations for applying to Texas Tech University. Participants praised the Davis College and felt as though it was the best college of agriculture among their institutional choices. Hispanic enrollment in the Davis College grew a total of 176% from 2014 to 2022 (S. Addo, personal communication, September 27, 2023). This dramatic increase in Hispanic student enrollment in Davis College from 2014 to 2022 suggests many other Hispanic students also felt like Davis Collge was a top choice among other colleges of agriculture. There was also an indication the initial interactions between the participants and faculty and staff contributed to their decision to attend Texas Tech University. This finding is consistent with research stating faculty and staff should welcome students to the university and familiarize students with institutional values, customs, culture, and available resources (Tovar, 2015). Similarly, within this study, institutional choice can be attributed to participants’ remarks such as “I was able to find my little niche major of landscape architecture,” and “I learned I could double major.” This notion is consistent with previous research determining Hispanic students’ academic expectations directly influence institutional choice (Cabrera et al., 2001).

Research question two sought to identify Hispanic students’ motivations for majoring in agriculture at Texas Tech. College major choice is influenced by individual perspectives including experiences, environment, and competencies (Ma, 2009), which explains why students are more likely to major in agriculture if they grew up in an agricultural environment or had experiences in agriculture that preceded their college enrollment. It is suggested students will be

more successful and satisfied if they choose a major that aligns with their personality, interests, and beliefs (Porter & Umbach, 2006). Hispanic students' choice to major in agriculture is highly dependent on personal interests and experience. Previous research concluded that many individuals base their college major decisions on perceived outcome expectations for future events (Edmonds, 2012). Participants were highly aware of issues affecting the agricultural industry and some noted their desire to mitigate those issues was why they chose to major in agriculture.

Research question three sought to determine the motivations of Hispanic students to join organizations and programs within the Davis College. The college experience begins with a student's first introduction to a new space with a different culture and lifestyle, and they often search for a sense of belonging to ease the transition (Passano, 2021; Strayhorn, 2018). Participants who struggled at the beginning of their undergraduate program to find a sense of community at Texas Tech had thoughts of transferring to a different university. College educators must foster a sense of belonging among students to improve minority students' persistence in degree completion (Museus et al., 2017). A positive school environment is a place where students feel emotionally safe and respected by others (Cohen et al., 2009) and where there are opportunities for meaningful engagements with other peers and adults (Eccles et al., 1993). Hispanic students value their culture and are more likely to enjoy and persist in college if they are able to find an environment that does not just support them as students but supports their culture.

Research question four sought to determine how Davis College organizations and programs are beneficial to Hispanic students. Establishing a professional network is a result of student engagement (Strayhorn, 2008; Tinto, 1993) and is important for ethnic minorities to increase the likelihood of mentorship and the facilitation of their academic and career journeys (Davis & Warfield, 2011). Hispanic students greatly benefit from professional networks acquired through participation in Davis College organizations and programs. Discussions between the participants also noted the importance of real-world exposure. Prior research suggests college students need the development of a wide range of knowledge, skills, abilities, and personal resources for career success (Hooker & Brand, 2010). Examining how current Hispanic students benefit from participating in Davis College organizations and programs helps explain what Hispanic students are hoping to receive from their participation.

Research question five sought to determine how the Davis College can improve organizations and programs to better serve Hispanic students. Participants brought attention to Davis College getting "a bad rep for not being a very inclusive space," and "that recruiting people outside of the traditional ag student is important." Professional educators need to understand the importance of well-designed student organizations that are inclusive of all students (Wolf-Wendel et al., 2009). Participants who currently participate in Davis College organizations and programs recognize the importance of participating in student organizations and programs and shared they wished other students were also aware of these benefits. The thoughts and opinions of the participants shine a light on how Davis College can improve organizations and programs to better serve Hispanic students.

Recommendations for Practice

Previous literature states Hispanic students are less likely to attend universities far from their home and their overall retention is less than that of other students. However, this literature can be questioned given the dramatic increase of Hispanic students in the Davis College. Davis College faculty and staff should continue to follow current recruitment and retention plans for Hispanic students as well as adhere to its strategic goals for educating and empowering a diverse study body. However, Davis College should increase recruitment efforts in South Texas as that many Hispanic students from that area are historically less likely to attend Texas Tech given the distance from their hometowns and cultural differences of the area. Faculty and staff should ask questions such as, "Why are more Hispanic students from South Texas not attending Texas Tech?", "Why are some Hispanic students from South Texas attending Texas Tech?", and "How can we better recruit Hispanic students from South Texas or other parts of Texas whose location is a considerable distance from Texas Tech?"

There is an indication Davis College is not perceived as a completely inclusive community if minority students are searching for an alternative space to find it. Participants were able to find a sense of community through Davis College organizations and programs, but given that there are many Hispanic students who are not participating in organizations and programs, it is likely they do not feel a sense of community in the Davis College. It is important for Davis College organizations and programs to continue to provide students with a sense of community, but it is even more crucial for Davis College as a whole to foster a sense of community for the increased recruitment of Hispanic students. Faculty and staff should reflect on why it is perceived by some Hispanic students as not being a very inclusive college and how to change that narrative.

Recommendations for Research

Investigating this study's research questions using quantitative measures with all Davis College populations, not limited to students of a specific ethnic group, should be conducted. Using quantitative instrumentation such as survey questionnaires would provide more specific and generalizable findings relating to intrinsic motivations and satisfaction. Davis College and the rest of Texas Tech University should also focus on why Hispanic students are not participating in ethnic organizations and programs. Participants were motivated to participate in Davis College organizations and programs for reasons such as finding a community and gaining educational and professional benefits, but the College should determine reasons why there may be a lack of Hispanic student participation. Is the lack of Hispanic student participation in college organizations and programs because they do not feel like a minority? Or is it because students who fall into the ethnic minority category would prefer to not further exclude themselves by only participating in organizations and programs for minority students?

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Does Sense of Belonging Predict Student Retention in a College of Agriculture?

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Abstract

To meet the increasing demand for a highly qualified workforce, colleges of agriculture have been tasked with increasing the supply of graduates. This can be accomplished by increasing the retention of agricultural college students from freshman year to graduation. Many factors contributing to retention have been identified including precollegiate and collegiate experiences, students' sense of belonging while in college, and various personal characteristics. Using the Collegiate Outcomes Model, this study investigated the relationship between freshmen to sophomore retention, students' perceived sense of belonging, students' precollegiate and collegiate experiences, and sociodemographic variables in a college of agriculture. Data from 233 freshman students were collected and matched a year later with sophomore retention data. For predicting retention at the University of Arkansas, high school GPA was the only significant predictor. On the college level, athletic event attendance, major within the college, and intent to switch to a major outside of the college were significant predictors of retention. Recommendations included identifying why HESC students are more likely to leave the college, improving college events to emphasize retention, and conducting a follow up study with students who changed to a major outside of the college but remained at the university to identify reasons for the move.

This manuscript is based on data published in the Proceedings of the AAAE Southern Region Meeting, James et al., (2024).

Introduction and Literature Review

Scholars have predicted an imminent shortage of qualified workers for the agricultural industry (Alston et al., 2019; Fernandez et al., 2020), and considering emergent agricultural issues, such as population growth, climate change, and ever-shifting consumer perceptions of agriculture (National Research Council, 2009), the need for a highly qualified agricultural workforce has been exacerbated. Consequently, colleges of agriculture have been tasked with increasing the supply of graduates to meet the industry's needs. To produce the necessary graduates, however, retention rates among agricultural undergraduate students must be improved (Alston et al., 2019) as student attrition from colleges of agriculture has affected the pipeline of available agricultural graduates (Codallo, 2019). Previous retention studies have shown that anywhere from two-thirds to three-quarters of students retain in colleges of agriculture from their freshman to sophomore year, while just over 60% graduate with an agricultural degree (Estepp et al., 2023; Johnson et al., 2018). Codallo (2019) cited literature suggesting colleges of agriculture improve retention by recruiting students with previous agricultural experience. However, fewer students are finishing high school with agricultural experience, thus limiting the recruitment pool, and prior agricultural experience has not been shown to influence students' decisions to pursue an agricultural degree (Foreman, et al., 2018; Rayfield et al., 2013). Accordingly, examining strategies to improve student retention in colleges of agriculture is critical.

Various institutional and student factors have contributed to undergraduate student retention (Huang et al., 2017; Millea et al., 2018; Reason & Braxton, 2023; Sass et al., 2018; Seidman, 2012; Smathers et al., 2022). Institutional characteristics, such as the size and type of institution, institutional mission and programming, student-faculty ratios, availability of learning communities, and offering of designated first-year courses have all predicted whether a student will persist (Dunn et al., 2013; Millea et al., 2018; Seidman, 2012), particularly when the institutional characteristics impact a student's college experience (Reason & Braxton, 2023). De los Rios and Oseguera (2023) suggested that institutional policies, practices, norms, and procedures can all affect the quality of the student collegiate experience, and Means and Kniess (2023) proffered that, "there are larger or macro-level systems of higher education including institutional context, policies, and practices that support or hinder student persistence and retention" (p.113). The intersection of institutional factors and student experience is an important determinant for student retention. Tinto (2003) concluded that student retention is individual and contextual based upon the institution of enrollment and the student's experience at the institution.

Individual student factors including sociodemographic characteristics and academic preparation have also tended to impact student success and perseverance in college (Means & Kniess, 2023; Millea et al., 2018; Pedler et al., 2022). Means and Kniess (2023) reported that finances, first-generation college student status, and race/ethnicity were major sociodemographic characteristics related to student retention; lower-income students, first-generation college students, and Black, Indigenous, and People of Color (BIPOC) students all tend to have higher attrition rates. Financial concerns have also been deemed a multifaceted determinant of student retention (Means & Kniess, 2023). With the total cost of attendance at public, four-year institutions increasing by 11% over the last 10 years after adjusting for inflation (Smathers et al., 2022), students' reliance on varying types of financial aid has grown, and Millea et al. (2018) found retention of low-income students was affected by the type of financial aid received, with grant recipients more likely to persist than loan recipients. Financial issues have been particularly difficult for low-income students as research has shown these students typically have more family and work responsibilities, which can manifest in poor study behaviors and more academic, social, and emotional challenges (Means & Kniess, 2023). While research has been unclear whether first-generation student status directly impacts retention, first-generation college students typically do not possess the support systems and knowledge to be able to navigate the social and academic challenges associated with attending college, which can lead to attrition (Pratt et al., 2019). Lastly, BIPOC students have typically departed college at higher rates than non-minoritized students (Means & Kniess, 2023). While the challenges for various racial and ethnic groups differ (Porter, 2020) unwelcoming campus environments have fostered feelings of not belonging among BIPOC students (Means & Kniess, 2023).

Precollegiate academic preparation has been another student factor shown to affect student retention (Sommerfeld, 2011). Variables such as high school grade point average (GPA), standardized test scores, and high school rank have historically been the standard for determining college readiness. Empirical data has shown that college-bound students who score higher on

standardized exams, such as the ACT and SAT, as well as those with higher high school GPAs were more likely to experience success in college (Barbera et al., 2020). However, research has indicated these types of academic measures create educational disparities for BIPOC students, first-generation college students, non-traditional aged students, and students with learning disabilities (Means & Kniess, 2023; Sommerfeld, 2011).

Within colleges of agriculture, researchers (Estepp et al., 2020; Garton et al., 2000; Garton et al., 2002; Koon et al., 2009) have found similar results regarding academic variables and student retention. However, some have shown that while higher-achieving agriculture students were more likely to retain at the university, they were more likely to leave colleges of agriculture (Dyer et al., 2002; Johnson et al., 2018; Shoulders et al., 2019). Codallo (2019) reported that students who intended to leave a college of agriculture had trouble integrating academically and socially at the university and college level and had career goals inconsistent with agricultural majors. Many of Codallo's respondents reported feelings of not belonging in classroom settings and within student organizations due to their lack of agricultural knowledge and experience. Codallo recommended that colleges of agriculture be more intentional to not academically and socially "other" students with less agricultural experience, and to ensure that all students understand the plethora of career opportunities in the agricultural industry.

While a variety of institutional, sociodemographic, academic, and cognitive factors have been shown to predict student retention (Huang et al., 2017; Reason & Braxton, 2023; Sass et al., 2018; Seidman, 2012; Smathers et al., 2022), Sommerfeld (2011) suggested researchers also focus on students' motivational and non-academic factors. One such factor includes students' sense of belonging, which prior research has shown to be related to increased undergraduate student retention (Bentrim & Henning, 2022; Hausmann et al., 2007; Pedler et al., 2022; Rhee, 2008; Strayhorn, 2018). As previously noted, the interaction between student and institutional factors can be important for retention (Tinto, 2003) and likely influences students' sense of belonging. This study specifically examined the role undergraduate students' sense of belonging played in retention, where retention was defined as students returning to the same institution and college of agriculture from their freshman to sophomore fall semesters.

Strayhorn (2018) defined college students' sense of belonging as students' "perceived social support on campus, a feeling or sensation of connectedness, the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the group (e.g., campus community) or others on campus (e.g., faculty, peers)" (p. 29). Fixed student characteristics, such as sociodemographics, academic history, and parental college experience, as well as variables faculty members can influence, such as caring about student learning, facilitating peer-to-peer contact, well-designed instruction, professor/student rapport, and encouraging student participation have been associated with students' sense of belonging (Dunn et al., 2013; Estepp et al., 2023; Freeman et al., 2007). Moreover, sense of belonging has been connected with increased academic engagement, confidence, motivation, and enjoyment among other positive student behaviors and emotions (Freeman et al., 2007; Pedler et al., 2022). Factors affecting sense of belonging, such as student-faculty interactions, student-advisor interactions, and

extracurricular involvement, have also been shown to increase academic achievement and retention (Dunn et al., 2013; Xiao et al., 2019). Pedler et al., (2022) found students with a low sense of belonging had more thoughts of dropping out of college before degree completion, while Bentrim and Henning (2022) found relationships between increased students' sense of belonging and continued commitment to the institution and higher likelihood of persistence.

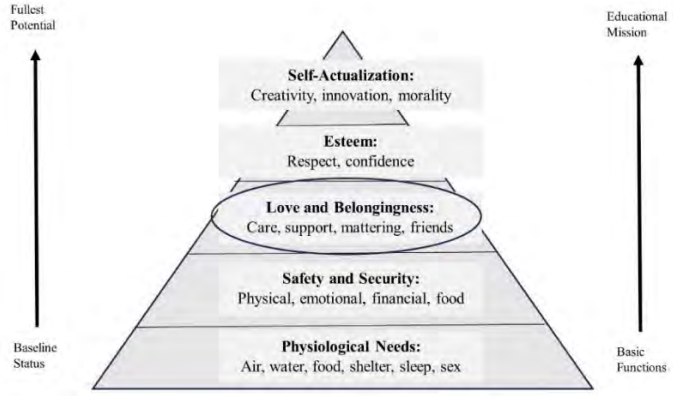
Theoretical/Conceptual Framework

The theoretical framework for this study was Maslow's (1954) Hierarchy of Needs motivational theory. According to Maslow (1954), human motivation is contingent upon certain needs being met. Maslow (1970) posited that human needs can be divided into deficiency needs, cognitive needs, and aesthetic needs. Deficiency needs have been characterized by an individual's motivation to decrease a deficiency in a certain area, including biological and physiological needs, safety needs, love and belonging needs, and esteem needs. Cognitive and aesthetic needs are higher level needs focusing on learning, knowledge, and an appreciation of beauty (Maslow, 1970). While Maslow (1954) originally hypothesized that lower-level needs must be met before an individual can be motivated to pursue behaviors related to higher level needs, he later (Maslow, 1987) suggested that motivational "behavior tends to be determined by several or all of the basic needs simultaneously rather than by only one of them" (p. 71). In the context of this study, we specifically examined belonging needs in the context of freshmen to sophomore retention of undergraduate students in a college of agriculture.

Two conceptual frameworks guided this study: Strayhorn's (2018) Model of College Students' Sense of Belonging and Foreman et al.'s (2018) Collegiate Outcomes Model. Strayhorn's framework (Figure 1), rooted in Maslow's (1954) hierarchy of needs, posits that sense of belonging is an essential human need and motivator. Strayhorn's model suggests that the presence of sense of belonging motivates an individual to pursue higher-order needs such as knowledge-seeking and self-actualization, which in the context of higher education could connect to academic success. Accordingly, belonging is a necessary component for students to meet their full academic potential and the institution to achieve its educational mission.

Figure 1

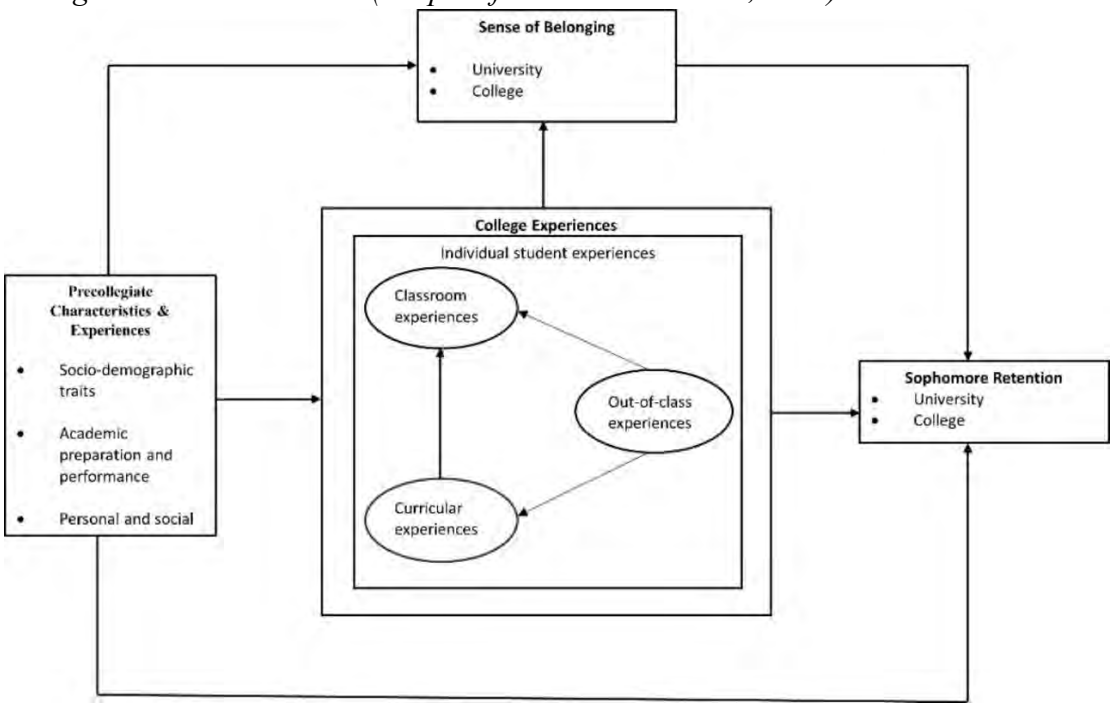
Model of College Students' Sense of Belonging (Strayhorn, 2018)



The second conceptual framework, the Collegiate Outcomes Model (Foreman et al., 2018), which was grounded in Astin's (1993) Input-Environmental-Output (E-I-O) model, posits that students' precollegiate characteristics and experiences independently and in unison with students' college experiences influence academic outcomes. Precollegiate characteristics and experiences consist of sociodemographic traits, academic preparation, academic performance, and personal experiences (Foreman et al., 2018). College experiences consist of students' individual experiences with peers and faculty in and out of the classroom (Foreman et al., 2018). According to the literature (Alston et al., 2019; Dunn et al., 2013; Estepp et al., 2023; Freeman et al., 2007), many of the variables influencing sense of belonging fit into the precollegiate and college experience categories. Consequently, we adapted Foreman et al.'s model to include students' sense of belonging as a variable stemming from students' precollegiate and college experiences (Figure 2).

Figure 2

Collegiate Outcomes Model (adapted from Foreman et al., 2018)



Purpose

Undergraduate students' sense of belonging has been related to increased student retention; however, little research has been conducted examining sense of belonging and student retention within colleges of agriculture. Therefore, the purpose of this study was to investigate the relationship between freshmen to sophomore retention, students' perceived sense of belonging, students' precollegiate and collegiate experiences, and sociodemographic variables in a college of agriculture. The specific objectives guiding this study were:

1. Describe freshmen students' perceived sense of belonging to the University of Arkansas and the College of Agricultural Food and Life Sciences (AFLS).
2. Determine the relationships among students' perceived sense of belonging to the University of Arkansas and AFLS, sociodemographic variables, precollegiate and collegiate experiences, and freshmen to sophomore retention.
3. Determine if a linear combination of students' perceived sense of belonging to the University of Arkansas and AFLS, precollegiate and collegiate experiences, and sociodemographic variables can predict freshmen to sophomore retention.

Methods

All freshmen students within AFLS at the University of Arkansas during the fall 2022 semester ($N = 503$) were considered the population of interest for this study. After receiving IRB approval, an invitation email was sent to the instructors of all AFLS course sections of UNIV 1001 (required of all freshmen students), *University Perspectives*, requesting student participation in an in-person survey administration. All instructors agreed to allow time for students to complete the survey during class and provided the QR code and URL to the Microsoft Forms survey instrument for students attending class during the seventh week of the semester. This timing for administration of the instrument was chosen, as the UNIV 1001 course is an eight-week course. A response rate of 46.3% ($n = 233$) was achieved. Due to the low response rate, results of this study should not be generalized beyond respondents. However, "Studies yielding valid results of interest to the profession from a specific groups [sic] of respondents, regardless of their generalizability, can add to the body of knowledge and assist researchers as they design and conduct research" (Johnson & Shoulders, 2017, pp. 310-311).

Two scales, each comprised of 5 Likert-type items (Hurtado & Carter, 1997), which were part of a larger 32-item instrument were used to measure students' sense of belonging to the AFLS ($\alpha = .91$) community and to the University of Arkansas ($\alpha = .90$) community. A sample item measuring students' sense of belonging was, "I see myself as part of the University of Arkansas (or AFLS) community" and was rated on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. An additional 16 items measured student precollegiate and collegiate experiences and participant demographics. Precollegiate characteristics assessed included high school GPA and highest level of education earned by parents. Collegiate experiences included participation in student organization meetings, attending university athletic events, attending the AFLS welcome event, location of student residence, major, and frequency of travel to parents' home. To track freshmen to sophomore retention, fall 2023 enrollment data was requested from the University of Arkansas Office of Strategic Analytics and Insights and matched with the data collected in UNIV 1001 during fall 2022. Data were analyzed using SAS v.9.4 and analyses for objective one utilized descriptive statistics including frequencies and summated means. Data for objectives two and three utilized phi and point biserial correlations and logistic regression, respectively.

Results

Of the 229 usable responses, 79.0% were White, 7.5% were Hispanic, 5.3% were Black, 4.4% were of two or more ethnicities, 3.1% declined to respond, and 1.0% were Asian. Most students identified as female (75.1%); were majoring in agriculture (59.6%), as opposed to Human Environmental Sciences (HESC); were living in an on-campus dorm (77.7%); and reported high school GPAs of 3.50 or higher (83.4%). Fewer than one in five (18.3%) were first-generation college students. Based on ZIP code data, the median distance from the students' home communities to campus was 236.00 miles (*IQR* = 263.50), with a range of 0.00 to 2,078.00 miles. A majority (81.2%) of students reported traveling home at least two times each month. Students reported participating in a variety of campus events; a majority (60.7%) had attended at least one meeting of a campus student organization, attended a university athletic event (82.5%), and participated in the annual AFLS welcome event (76.0%).

Shown in Table 1, most students felt a *high* or *very high* sense of belonging to the university and AFLS at 91.7% and 88.6%, respectively. Students' mean sense of belonging to the university was slightly higher than for AFLS.

Table 1

Students' Sense of Belonging to the University of Arkansas and AFLS

Unit	*n*	Very Low (%)	Low (%)	Neutral (%)	High (%)	Very High (%)	*M*	*SD*
University	229	0.4	0.9	7.0	37.1	54.6	4.44	0.60
AFLS	228	0.4	1.8	9.2	45.6	43.0	4.30	0.68

Note. Percentages are based on real limits (Colwell & Carter, 2012) of 1.00 -1.49 = very low, 1.50 – 2.49 = low, 2.50 – 3.49 = neutral, 3.50 – 4.49 = high, and 4.50 – 5.00 = very high.

Each student responded to a single Likert-type item asking the likelihood (1 = *very unlikely* and 5 = *very likely*) they would transfer to a major outside AFLS. Of the 228 responding students, 40.4% were *very unlikely*, 25.9% were *unlikely*, 19.3% were *uncertain*, 9.6% were *likely*, and 4.8% were *very likely* to change to a major outside AFLS. Approximately one-third of respondents were not strongly committed to their major within the college.

As shown in Table 2, 85.6% of freshmen were retained as sophomores at the University of Arkansas, while 74.2% were retained as sophomores in AFLS. Thus, out-of-college transfers accounted for 44.1% of freshmen who did not return to AFLS as sophomores. Of the 26 students who changed to majors outside of AFLS, 12 students transferred to the College of Arts and Sciences, six transferred to the College of Education and Health Professions, four transferred to the College of Business, and three transferred to the College of Engineering.

Table 2

Freshmen-to-Sophomore Retention in the University and College

	Retained		Not Retained	
Unit	*f*	%	*f*	%
University	196	85.6	33	14.4

AFLS	170	74.2	59	25.8

Based on the levels of measurement, appropriate bivariate measures of association (phi coefficients and point biserial correlations) were calculated between selected sociodemographic variables (measured on nominal and interval scales) and the dichotomous categorical variables of freshman-to-sophomore retention in the university and AFLS (1 = retained and 0 = not retained). As shown in Table 3, major (HESC = 0 and agriculture = 1), high school GPA, and sense of belonging at the University of Arkansas had significant, low (Davis, 1971), positive correlations with retention at the university. Attendance at athletic and college welcome events, gender, major, and sense of belonging to AFLS had low, positive correlations with sophomore retention in AFLS. Conversely, intent to transfer to a major outside AFLS had a low, negative correlation with sophomore retention in AFLS.

Table 3

Relationships Between Precollegiate/Collegiate, Sociodemographic, and Belonging Variables with Sophomore Retention within the University and College

	Retention[g]	
Variable	University	AFLS
Attended one or more student club meetings[a]	.12	.08
Attended an athletic event[a]	.07	.19**
Attended AFLS welcome event[a]	.07	.15*
First-generation college student[a]	.10	.03
Ethnicity[b]	.10	-.05
Gender[c]	.04	.15*
Live on-campus[a]	.12	.03
Major[d]	.16*	.23**
Distance (miles) from campus to home	-.07	-.05
High school GPA[e]	.23*	.13
Sense of belonging to the University of Arkansas[f]	.14*	.00
Sense of belonging toAFLS[f]	.06	.16*
Likelihood of changing to major outside AFLS[f]	.11	-.20**

[a]no = 0, yes = 1. [b]minority = 0, non-minority = 1. [c]female = 0, male = 1. [d]HESC = 0, agriculture = 1. [e]1 = 2.50 – 2.99 to 5 = >4.00. [f]Summated scale where 1 = *very low* and 5 = *very high*. [g]not retained = 0, retained = 1. $^{*}p \leq .05$. $^{**}p \leq .01$.

Two logistic regression models were estimated. The first model predicted sophomore retention in the university. The second model predicted retention in AFLS for students (n = 196) who returned to the university as sophomores. Residuals statistics for each model were examined and no violations of the assumptions for logistic regression were identified (Field & Miles, 2012).

For the university retention model, the three statistically significant bivariate variables (major, high school GPA, and sense of belonging to the University of Arkansas) were used as

potential predictors. The resulting model was statistically significant, $\chi^2(3) = 13.33$, $p < .01$, max-rescaled $R^2 = .10$. High school GPA was the only statistically significant predictor (Table 4) of returning to the university as a sophomore. The odds ratio of 1.64 indicated each one-point categorical increase in GPA was associated with a 64% increase in the odds of returning to the University of Arkansas as a sophomore. Sense of belonging at the University of Arkansas and major were not significant predictors of sophomore retention.

Table 4

Logistic Regression Model Predicting Freshman-to-Sophomore Retention at the University

				CI$_{95}$ *for Odds Ratio*	
	β	*SE*	Odds Ratio	L. Limit	U. Limit
Intercept	-1.74	1.35	--	--	--
Major[a]	-0.36	0.23	0.70	0.45	1.09
High school GPA[b]	0.50*	0.20	1.64	1.10	2.45
University sense of belonging	0.50	0.24	1.65	0.96	2.85

[a]HESC = 0, agriculture = 1. [b] Coded as 1 = 2.50 – 2.99, 2 = 3.00 – 3.49, 3 = 3.50 – 3.99, 4 = 4.00, and 5 > 4.00. *$p \leq .05$.

Six variables (attendance at athletic and the AFLS welcome events, gender, major, sense of belonging to AFLS, and likelihood of changing to a major outside of AFLS) had statistically significant bivariate correlations with sophomore retention in AFLS and were used as potential predictors of returning to AFLS as sophomores. The resulting model was statistically significant, $\chi^2(6) = 34.69$, $p < .001$, max-rescaled $R^2 = .30$. Major and attendance at an athletic event had significant, positive regression coefficients, while intent to switch to a major outside of AFLS had a significant, negative regression coefficient. The regression coefficients for attendance at the AFLS welcome event, gender, and sense of belonging in AFLS were not statistically significant (Table 5).

Based on odds ratios (*OR*), returning sophomores majoring in agriculture as freshmen were four times (*OR* = 4.16) more likely to be retained in AFLS than returning sophomores majoring in HESC as freshmen. Students who reported attending a University of Arkansas athletic event were also approximately eight times (*OR* = 8.24) more likely to be retained in majors within AFLS. Males were over three times (*OR* = 3.67) more likely to be retained in the college compared to females. Finally, each one standard deviation increase in intent to change majors outside AFLS was associated with a 45% (*OR* = 0.55) increase in the likelihood a returning student would transfer outside of AFLS.

Table 5

Logistic Regression Model Predicting AFLS Retention for Students Returning to the University of Arkansas as Sophomores.

				CI$_{95}$ for Odds Ratio	
	β	*SE*	Odds Ratio	L. Limit	U. Limit
Intercept	-0.23	1.73	--	--	--

Athletic event attendance[a]	2.11***	0.64	8.24	2.35	28.92
AFLS welcome event attendance[a]	0.98	0.53	2.68	0.94	7.62
Gender[b]	1.30	0.86	3.67	0.68	19.85
Major[c]	1.42*	0.60	4.16	1.28	13.53
AFLS sense of belonging[d]	0.06	0.35	1.06	0.54	2.08
Intent to switch to major outside of AFLS[d]	-0.59**	0.23	0.55	0.35	0.86

[a]no = 0, yes =1. [b]female = 0, male = 1. [c]HESC = 0, agriculture = 1. [d]Measured on a 1 (*very low*) to 5 (*very high*) scale and converted to *z* scores. *$p < .05$. **$p < .01$. ***$p < .001$.

Conclusions/Discussion/Implications/Recommendations

Based on the results, freshmen had a high perceived sense of belonging to the university and AFLS, and over 65% indicated they were unlikely to switch majors outside of the AFLS. Freshmen-to-sophomore retention was slightly higher at the university level when compared to the college level, however approximately three-fourths of students were retained in the college from fall 2022 to fall 2023 reflecting previous findings on agricultural college retention (Johnson et al., 2018). Approximately one in four students left AFLS, mostly HESC students. HESC degree programs include apparel merchandising, human nutrition, and other non-traditional agriculture programs, which might explain why these students were not as connected to AFLS. Additionally, nearly half of the students who remained at the University of Arkansas but transferred out of AFLS went to the College of Arts and Sciences. While this college has majors such as Biology, Chemistry, Advertising, and Communication, which are similar to majors within AFLS, perhaps students who transferred did not feel integrated with agriculture and pursued majors outside of the college to align with their career goals, similar to Codallo's (2019) respondents.

When examining relationships between precollegiate/collegiate, sociodemographic, and belonging variables as related to retention, the magnitude and direction of correlations differed depending on if retention was at the college or university level. Major, high school GPA, and sense of belonging at the University of Arkansas had low, positive correlations with retention at the university. Students with an agriculture major rather than HESC major retained better at the university level. Additionally, a better high school GPA was associated with retention at the university level, supporting previous findings related to precollegiate variables (Sommerfeld, 2011). Sense of belonging at the University of Arkansas was also positively associated with retention at the university level, congruent with previous studies (Bentrim & Henning, 2022; Hausmann et al., 2007; Pedler et al., 2022; Rhee, 2008; Strayhorn, 2018). Attending athletic events, attending the AFLS welcome event, identifying as male, having a higher sense of belonging to AFLS, and having an agriculture major were all variables related to retention at the college level, similar to previous findings (Bentrim & Henning, 2022; Freeman et al., 2007; Pedler et al., 2022; Xiao et al., 2019). As might be expected, those who had a lower intent to transfer to a major outside AFLS were more likely to be retained.

Precollegiate/Collegiate, sociodemographic, and belonging variables with statistically significant correlations with retention were used to develop a model to predict retention at both the university and college levels; however, not all variables anticipated from the literature emerged as predictors. For predicting retention at the university level, high school GPA was the only significant predictor of retention, which confirmed reported findings from Sommerfeld (2011). Major and university sense of belonging were not significant predictors of retention at the university level. The inability of university sense of belonging to predict student retention differed from previous reports (Bentrim & Henning, 2022; Hausmann et al., 2007; Pedler et al., 2022; Rhee, 2008; Strayhorn, 2018).

When predicting retention on the college level, athletic event attendance, major within the college, and intent to switch to a major outside of the AFLS were the only significant predictors. For students who attended an athletic event, they were eight times more likely to be retained from freshman to sophomore year, even though this was a university level activity. With agricultural majors having a higher likelihood of being retained within the AFLS compared to HESC majors, additional investigation into reasons for this may be warranted. Intent to switch majors was a negative predictor of retention in AFLS indicating students' initial commitment to the college can predict retention (Bentrim and Henning, 2022); however, this was not observed with retention at the university level.

Several predictors of retention were observed at the college and university levels indicating potential unique factors influencing retention at each level. Based on the results, evaluating sense of belonging and applying Strayhorn's (2018) model at the university level may be more appropriate than at the college level. However, low response rates make this difficult to conclude. Only about half of freshmen AFLS students responded to this survey, and it is plausible that nonrespondents possess different levels of perceived belonging to the college than respondents. In the case of this study, neither AFLS nor university sense of belonging were predictors of student retention at their respective levels. This was surprising based on findings from the literature indicating sense of belonging was related to increased undergraduate student retention (Bentrim & Henning, 2022; Hausmann et al., 2007; Pedler et al., 2022; Rhee, 2008; Strayhorn, 2018).

When analyzing how sense of belonging fits into Foreman et al.'s (2018) Collegiate Outcomes Model, sense of belonging can be directly influenced by precollegiate characteristics or college experiences (Estepp et al., 2023), which should potentially impact sophomore retention. However, identified predictors of retention from this study included high school GPA for university level retention and attending athletic events, majoring in agriculture rather than HESC, and intent to switch to a major outside AFLS for college level retention. While each of these variables has the potential to influence students' sense of belonging, this study revealed they can also directly influence retention. One possible explanation for why sense of belonging was not a predictor of retention could be that sense of belonging may be more of a mediating variable with a smaller effect on retention. The combination of sense of belonging, precollegiate

characteristics, and collegiate experiences has the potential to be a more powerful predictor of retention (Tinto, 2003).

Based on the results of this study, there are several recommendations for practice and further research. To improve retention, faculty and administrators in AFLS should identify why HESC students are more likely to leave the college and focus more effort on retention. Attendance at a University of Arkansas athletic event appears to be a strong predictor of retention. Perhaps college faculty and administrators should consider encouraging students to attend one or more of these, possibly as a group with admission sponsored by the college. Since intent to switch majors was identified as a negative predictor of retention, working to identify students early who intend to switch majors could help with retention, especially if one-on-one advising and consultation could occur. Some of the items measured, such as attending a student club meeting or the AFLS welcome event, were not strongly related to retention nor predicted retention at the university or college level. These events may need to be restructured with a focus on retaining students. Perhaps a continuation of events following the AFLS welcome event would help retain students from their freshman to sophomore years.

Future studies should attempt to gain more representative samples and test other levels of Strayhorn's (2018) model to evaluate its ability to predict retention on the college level and compare results to the university level. As sense of belonging has been shown to be an important variable for student retention, further analyses, particularly those using path analysis or showing variable interactions, should be conducted to determine how sense of belonging fits into the Collegiate Outcomes Model (Foreman et al., 2018). Additionally, qualitative inquiries should follow up with students who choose to transfer to a different college. This could lead to information that would influence future AFLS retention programs. Several student characteristics such as being a first-generation college student, ethnicity, gender, living on campus, and distance from home were not statistically significant predictors of retention. The literature suggested these variables were influential on college success and retention; however, this was not the case in this study. Further research should quantify the impact these variables can have on retention in colleges of agriculture to determine how much time college retention personnel should devote to each. This study was limited to retention from freshman to sophomore years. This line of inquiry should be continued longitudinally to examine the long-term impacts of precollege experiences/characteristics, college experiences, and sense of belonging on retention and ultimately graduation.

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Successful Programming for the Recruitment of Underrepresented Student Populations in Agriculture: A Case Study of a Diversity Initiative at an 1862 Land-Grant University

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Abstract

Effective recruitment initiatives for underrepresented student populations interested in pursuing degrees in agricultural-related sciences have the potential to diversify colleges of agriculture while also increasing enrollment. In the current study, we used a qualitative case study approach to examine the effectiveness of the recruitment initiative, called the Ag Fellows Program, designed to attract underrepresented populations to agricultural-related majors. The case was bounded by time and place; for instance, we analyzed the outcomes from the Ag Fellows Program from Fall 2021 and 2022 cohorts at an 1862 Land-Grant University. As a result, the underrepresented student populations reported lacking information about the agricultural industry before the Ag Fellows Program and perceived that agriculture was limited to farming, ranching, and other related careers. Further, they indicated that academic interests, financial aid, and an amiable atmosphere were influential factors when deciding to pursue a degree in agricultural-related sciences. As a result, we recommend conducting additional research to evaluate the effectiveness of other strategic programming initiatives designed by colleges of agriculture to attract more educated, diverse employees into the agricultural workforce.

Introduction and Review of Literature

Limited research has been conducted on the recruitment of underrepresented populations in U.S. colleges of agriculture. To complicate this issue further, the 2017 Census of Agriculture reported that 95.4% of farm producers in the U.S. were white/non-Hispanic (United States Department of Agriculture [USDA], 2018). However, trends published by the National Center for Education Statistics (NCES) documented a shift in the racial and ethnic distribution of students populating public schools in the U.S. over the last two decades (Aud et al., 2012). As a result, the racial makeup of the agricultural industry has been predicted to have an influx of individuals identifying as a racial minority (Alston et al., 2019, 2020).

Efforts to recruit underrepresented populations will be critical, considering that in 2050, the global population is expected to exceed 9 billion people (Food and Agriculture Organization [FAO], 2023). Therefore, the agricultural industry will be responsible for providing more food, feed, fiber, and biofuel feedstock than ever before; consequently, the recruitment and retention of a skilled workforce will become even more critical (FAO, 2023). On this point, The FAO (2023) estimated that 40% of the global workforce was involved in agricultural labor. However, the agricultural workforce will need to significantly increase the number of individuals employed in the industry to meet the demands of a growing world population. In the U.S., universities have been called to meet this challenge by preparing students to navigate an increasingly globalized

economy that requires them to interact and build professional relationships with individuals who hold different racial and sociocultural identities from themselves (Platt, 2004). In response, the current investigation examined a strategy implemented by the LSU College of Agriculture that aimed to attract underrepresented populations to agricultural-related majors, including (a) racial minorities, (b) low-socio-economic students, (c) individuals representing the lesbian, gay, bisexual, transgender, queer or questioning, and other genders and sexualities (LGBTQ+) community, and (d) first-generation college students. Consequently, it was critical to describe how each underrepresented student population has been situated in the landscape of higher education.

Racially Diverse Students

In U.S. higher education, racial minority students often represent individuals who identify as non-White and include Alaska Natives and Native Americans, Asians, Blacks, Hispanics, multiracial, and other racial minority groups (Burke, 2020). Racial minority student populations have been found to be less likely to attend four-year universities because of negative historical associations, sociodemographic factors, and other educational barriers (Beyl et al., 2016). Such findings have fueled calls for new, innovative recruitment approaches to increase the enrollment and graduation rates of students representing racial minority groups (Alston et al., 2020; Drape et al., 2017). As such, U.S. colleges of agriculture must promote opportunities that can shift racial minority students' perceptions of the agricultural industry (Hobbs et al., 2023). For example, Hobbs et al. (2023) called for colleges of agriculture to feature degree opportunities and programming that better align with racial minorities' career aspirations and educational plans.

Prospective college students from racial minority communities may also lack an understanding of the mission and purpose of colleges of agriculture (Alston et al., 2019). On this point, Jones and Larke (2001) argued that there was a lack of racial minority professionals in agriculture who could serve as role models for students representing these populations. As a result, it was recommended that colleges of agriculture use alumni who represent these populations to serve as valuable assets in the recruitment and retention of racial minority students (Jones & Larke, 2001). Minority racial groups have also been found to be more likely to experience multidimensional poverty than their White counterparts (Reeves et al., 2016). Race, ethnicity, and socioeconomic status have also demonstrated statistically significant differences regarding access to community resources (Williams et al., 2010).

Students of Low Socioeconomic Status

Students of low socioeconomic status (SES) come from financially disadvantaged households, which makes enrollment in post-secondary institutions more challenging for this population due to costs associated with student fees, food, housing, tuition, and other related financial burdens (Wyner et al., 2022). Choy (2000) explained that *financial need* was an umbrella term that described the financial burden of attending a post-secondary institution and what the student was expected to pay based on the family's financial circumstances. To offset this burden, low SES students often require *financial aid* through scholarships or grants, which can help offset the cost of postsecondary education (Choy et al., 2000).

A comparison of enrollment rates of two-year community colleges and four-year universities found that over the past three decades, the U.S. higher education system has grown almost

exclusively in the community college sector (Long & Kurlaender, 2009). This growth has been attributed to two-year institutions that have provided more affordable options for low-SES students (Bastedo & Jaquette, 2011; Rehr et al., 2022). It has also been found that low SES students attending four-year colleges were far less likely to graduate with a bachelor's degree than students attending colleges due to budgetary constraints (Bastedo & Jaquette, 2011). Low SES students have also been reported to be less likely to utilize opportunities for collegiate organizational engagement, which negatively affects their retention (Rehr et al., 2022). As such, students from a low SES background often exhibit financial burdens that require economic solutions to be successful in university settings (Bastedo & Jaquette, 2011; Rehr et al., 2022).

LGBTQ+ Students

LGBTQ+ students face unique challenges in colleges of agriculture (Elliot-Engel et al., 2019). For example, due to the lack of representation of LGBTQ+ students, Gray (2009) reported that colleges of agriculture students often perceive that individuals from this population have not historically been present in the industry or, in some instances, feel they have no place. In recent years, collegiate student organizations have begun to offer LGBTQ+ student support during their academic careers. A specific organization supporting LGBTQ+ students in agriculture is the Cultivating Change Collegiate Affiliate Program (CAP). Despite such progress, however, Murray et al. (2020) critiqued the lack of empirical studies in agriculture that seek to understand the needs of LGBTQ+ youth, especially regarding the support needed for this population to be successful.

Perhaps the lack of empirical evidence on the LGBTQ+ community in the peer-referred literature in agriculture speaks to the lack of representation and opportunities for this population in the industry (Murray et al., 2020). On this point, Granché (2021) reported that gay males did not perceive agriculture as a space that valued diversity regarding individuals' sexual identity. Further, Elliot-Engel et al. (2019) found that LGBTQ+ students were more likely to consider leaving their university than their peers because they perceived they did not belong. These experiences and perspectives, therefore, create significant challenges for the recruitment and retention of LGBTQ+ students in colleges of agriculture.

First-Generation College Students

First-generation college students also face many challenges in higher education (Irlbeck et al., 2014). This underrepresented group has been defined as a student whose parents have earned a high school diploma or less (Taylor & Bicak, 2020). Irlbeck et al. (2014) reported that one in six students fit the definition of a first-generation college student. Typically belonging to working-class families, first-generation college students often represent a variety of cultural and ethnic backgrounds (Irlbeck et al., 2014). Individuals identifying as first-generation college students have been reported to be more likely to (a) begin at a community college, (b) attend college part-time, (c) live off campus, (d) delay entering college after high school, and/or (e) work full time (Gibbons & Shoffner, 2004; Inman et al., 1999). Further, to successfully support first-generation college students, colleges of agriculture must be prepared to answer questions and provide additional support since this population often cannot turn to a family member for advice.

Statement of the Problem

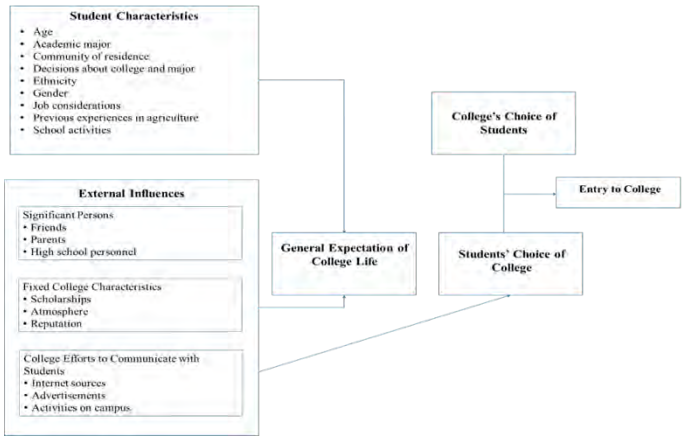
The recruitment of underrepresented student populations has become critical to meeting the demands of a growing global population. Incorporating diverse individuals into the agricultural industry has also become essential to colleges of agriculture and stakeholders' future viability (Talbert et al., 1997). The USDA (2020) reported that although the educational attainment of ethnic and racial minority groups increased over the last two decades, they remained only half as likely as White students to have a bachelor's degree or higher. Many students from underserved communities, notably racial minority students, have historically held negative connotations about the agricultural industry (Alston et al., 2020). This misperception may hinder prospective students' judgment regarding potential academic interests in agriculture (Alston et al., 2019). By developing strategic recruitment initiatives for underrepresented student populations, colleges of agriculture may attract more prospective students and increase enrollment rates (Drape et al., 2017, 2019). Despite the benefits of attracting more diverse students, however, a problem has persisted regarding a lack of knowledge about successful programming strategies that colleges of agriculture can use to attract underrepresented populations of students. This deficiency in knowledge motivated the current investigation.

Conceptual Framework

This study was guided by Chapman's (1981) model of student success (see Figure 1). Chapman (1981) suggested that students were motivated to enroll and pursue a degree by factors such as (a) personal characteristics, (b) external factors, including significant persons, fixed college characteristics, and college communication efforts, (c) general college expectations, and (d) choice of college. In the current investigation, we employed Chapman's (1981) model to describe differences in students' motivation to pursue an agricultural degree at the Louisiana State University (LSU) College of Agriculture based on their inclusion in a diversity initiative for underrepresented student populations. By identifying potential factors influencing enrollment decisions, the LSU College of Agriculture may be able to more effectively design recruitment strategies for underrepresented prospective student populations.

Figure 1

Chapman's (1981) Model of Student Success



Background of Study

Effective recruitment initiatives for underrepresented student populations interested in pursuing degrees in agricultural-related sciences have the potential to diversify colleges of agriculture while increasing enrollment rates (Alston et al., 2019, 2020). In response, the LSU College of Agriculture created the Ag Fellows Program to provide underserved student populations with additional knowledge and resources to help them better navigate the matriculation process.

This study analyzed the Ag Fellows Program outcomes from the Fall 2021 and 2022 cohorts. Underrepresented populations included but were not limited to (a) African Americans, Alaskan Natives, Asian Americans, Native Hawaiians, Pacific Islanders, Latin Americans/Hispanics, multiracial, Native American students, (b) low SES students, (c) LGBTQ+ students, and (d) first-generation college students, i.e., neither biological parent has completed a four-year college degree. Students interested in participating in the Ag Fellows Program applied by submitting a 500-word essay on the topic "What are the biggest issues facing our growing population?" and "How do your career goals fit into solving these global challenges?" After applying, the LSU College of Agriculture Diversity Council assisted in the application review process. Every student selected for the program was invited to an on-campus event. In both years of the program, $14,000 in scholarships were awarded to Ag Fellows Program participants. As a result of completing the Ag Fellows Program, the goal was that underrepresented students would be better equipped personally and academically for their college careers than those who did not complete the program. Consequently, the findings of this study could provide critical insight into ways that recruitment initiatives for underrepresented students in agriculture could be better supported. Further, this study could allow the LSU College of Agriculture to adapt their recruitment approaches for these populations appropriately.

Purpose of Study

The purpose of this case study was to describe the participants' perceptions of the Ag Fellows Program's effectiveness in recruiting and preparing them to navigate the College of Agriculture and university successfully. One research question guided this investigation: How did the LSU Ag Fellows Program support students identifying as an underrepresented population?

Methodology

Throughout this investigation, we used an instrumental case study design to examine the experiences of Fall 2021 and Fall 2022 Ag Fellows Program participants, a program facilitated by the LSU College of Agriculture (Stake, 1995). This approach assisted in deepening knowledge regarding the impacts of diversity recruitment initiatives for students identifying as an underrepresented population who may be interested in pursuing a postsecondary degree in agriculture.

Case Selection and Description

In this study, the case was bounded by time and place; for example, the participants were all former or current members of the Fall 2021 and Fall 2022 Ag Fellows Program cohort and identified as belonging to an underserved student population in the LSU College of Agriculture.

The Ag Fellows Program participants (n = 6) were selected based on their responses to a web-based survey, which asked if they would be willing to provide additional insights into their experience through a qualitative study. The participants varied from current high school seniors to first-year college students who expressed interest in pursuing a degree in the LSU College of Agriculture. Students accepted into the Ag Fellows Program were invited to attend the initial program session in the fall semester of their senior year of high school. The program session consisted of (a) keynote messages from the College of Agriculture administrators, (b) a personal visit with faculty from each of the agricultural academic departments, (c) interaction with current LSU students, (d) meetings with LSU Admissions representatives, and (e) formal tours of the university campus. After the visit, the College of Agriculture provided students with a supplemental scholarship on the premise that they enrolled in the university. The participants' prior experiences in agriculture or agricultural youth development organizations ranged from no experience to highly experienced. Of the participants, five identified as female and one as male. Table 1 provides an overview of the participants' academic and personal characteristics.

Table 1

Participants' Academic and Personal Characteristics

Pseudonym	Race	Gender	Hometown Population	Socioeconomic Status	Academic Interest	Sexual Orientation
Ciara	African American	Female	Urban	Middle Class	Environmental Management Systems	Heterosexual
Li	Asian	Female	Urban	Upper Class	Animal Sciences	Heterosexual
Manuel	Hispanic	Male	Urban	Middle Class	Agricultural Business	Heterosexual
Sam	White	Female	Urban	Middle Class	Natural Resources Ecology and Management	LGBTQ+
Anne	White	Female	Rural	Lower Class	Animal Sciences	Heterosexual
Amy	White	Female	Rural	Lower Class	Agricultural Education	Heterosexual

Note. We used the U.S. Census Bureau's (2022) definition of urban as having 50,000 people or more. Further, rural was defined as an area not considered urban per the U.S. Census guidelines.

Reflexivity

Creswell and Poth (2018) explained that in qualitative investigations, researchers are the instrument. Therefore, they must be conscious of how their biases, values, and experiences influence their interpretation of data. As a result, we must acknowledge and disclose our relevant background and experiences. The lead researcher identified as a white, cisgender female. She attended college at LSU
as an undergraduate student studying agricultural education and animal sciences. During data collection, she was enrolled at LSU in the College of Agriculture as a master's student.

Additionally, the lead researcher was a graduate assistant in the LSU College of Agriculture Office of Recruitment and Retention, where she helped facilitate recruitment events and initiatives, including the Ag Fellows Program. Additional collaborating researchers assisting in data interpretation were faculty at LSU. We were all proponents of advancing effective diversity, equity, inclusion, and belonging (DEIB) recruitment initiatives and advocated for the progression of cultural competence in the agricultural industry.

Data Sources and Analysis

Before their acceptance into the Ag Fellows Program, students were required to submit a formal application detailing contact information, academic status, and respond to an essay prompt. After collecting and reviewing applications, the LSU College of Agriculture Diversity Council selected students who met the academic and demographic qualifications. As a result, we analyzed participants' program applications and essay responses as data for this study. Then, through retrospective interviews, we asked the participants to recall information and assumptions about the LSU College of Agriculture before attending the Ag Fellows Program. In particular, the participants were asked to describe how the Ag Fellows Program contributed to their personal and academic development. As a result, we used the following sources of data to emerge the findings of this investigation: (a) interviews, (b) program participants' application and essay responses, (c) the program website, (d) open-ended responses to feedback surveys, and (e) communication created for the advertisement of the Ag Fellows Program.

In total, six Ag Fellows program participants agreed to participate in this study. Stake (1995) noted that small sample sizes were appropriate for qualitative case studies since more emphasis is placed on understanding the depth of individuals' experiences rather than generalizing findings. Interviews were conducted individually through Zoom video conference software based on participants' availability. Example questions we asked participants during the interview, included: "How did the Ag Fellows Program better prepare you for college?" "What was the most beneficial part of the Ag Fellows Program?" and "How can the Ag Fellows Program be adapted to serve underrepresented student populations better?" The interviews were transcribed via Sonix transcription software to ensure clarity.

After completing data collection, Saldaña's (2021) qualitative coding procedures were implemented. Saldaña (2021) explained that a code is "…often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (p. 4). To analyze each data source, we performed the first cycle of coding using attribute, in vivo, and values coding approaches (Saldaña, 2021). Attribute coding features a descriptive approach to analyzing data. Lofland et al. (2006) stated that attribute coding should offer setting-specific information and identify participant characteristics. Meanwhile, in vivo coding refers to examining verbatim dialog in the data record

(Saldaña, 2021; Strauss, 1987). The final first-cycle coding approach we employed, values coding, was the culmination of codes representative of the participant's attitudes, beliefs, or perspectives. In total, 284 unique codes emerged after completing the first cycle of coding. We employed axial coding to reduce codes into categories to explore existing relationships of first-cycle codes. This method of second-cycle coding helped emerge patterns in data and assisted our efforts in distilling the dimensions of each category. After employing our second-cycle coding, we met as a research team to negotiate findings using a thematic analysis, which ultimately helped emerge the study's three themes.

Rigor and Trustworthiness

Qualitative research is often reported as being too subjective or laden with biases (Creswell & Poth, 2018). Stake (1995) argued that "all researchers have great privilege and obligation: the privilege to pay attention to what they consider worthy of attention and the obligation to make conclusions drawn from those choices meaningful to colleagues and clients" (p. 49). It is essential to accurately report the findings so that they may be representative of study participants' thoughts and beliefs. In this study, we implemented Lincoln's and Guba's (1985) perspectives on quality in qualitative research through the application of (a) credibility, (b) transferability, (c) dependability, and (d) confirmability. Credibility was achieved through observations of the Ag Fellows Program during program sessions. Retrospective interviews were conducted with both cohorts, Fall 2021 and Fall 2022, to attain transferability and dependability through two applicant groups and program sessions. To ensure confirmability, as researchers, we noted our personal biases prior to beginning the data collection process. We also established a clear coding schema and analyzed data to verify that results coincided with emerging patterns. Using these standards of qualitative research helped promote rigor and trustworthiness throughout the process (Creswell & Poth, 2018).

Findings

The findings for this investigation emerged through three themes, representing the participants' perceptions of the Ag Fellows Program's effectiveness and how it influenced their decision to pursue a degree in the LSU College of Agriculture. The themes included (1) motivation to pursue an academic interest in agriculture, (2) overcoming concerns, and (3) belonging through cohort.

Theme #1: Motivation to Pursue an Academic Interest in Agriculture

In the first theme, the participants reported that their experience during the Ag Fellows Program inspired them to pursue a degree in agriculture. For example, each participant outlined how experiences in the Ag Fellows Program exposed them to potential jobs, volunteering opportunities, and involvement in student organizations that aided in their academic major selection process. Ciara, a freshman from an urban area, explained: "I really care about nature and the environment and volunteer at my local nature preserve. I kind of just fell in love with the idea of majoring in agriculture after I became exposed to all of the opportunities through the Ag Fellows Program."

Similarly, Sam, a freshman studying Renewable Natural Resources, explained that she first discovered her academic interests while interacting with other students through the Ag Fellows

program who were researching the endangerment of Siberian tigers and other large cat species. Sam explained: “Because of my participation in the Ag Fellows Program, I set the goal of becoming a wildlife specialist to do research and be able to find a way to help up [large cat] numbers and preserve their environments.” Exposure to experiential learning opportunities during the Ag Fellows Program, therefore, motivated the students to become engaged in a field of study within the LSU College of Agriculture.

Three out of six participants also reported that the personalized departmental meetings with faculty through the Ag Fellows Program “clarified” their potential degree program or “solidified” their decisions about academic pathways. On this point, Sam reported: “[Departmental visits] pretty much just solidified my decision to major in agriculture at LSU. I obviously had been accepted, but I was continually getting accepted by other colleges. So, I was just like, ‘No, LSU College of Agriculture is where I want to be.” Therefore, the Ag Fellows Program allowed prospective students to meet with faculty before enrollment to understand their degree requirements and future career opportunities better. Meanwhile, Li, an active member of 4-H, stated that her interest in pursuing a degree in animal sciences increased after participating in the program. She explained: “I just want to give back to the [industry] that gave me so much. The Ag Fellows Program helped me realize that a degree in agriculture was the best way to accomplish this.” Therefore, because of their participation in the Ag Fellows Program, the underrepresented students appeared to become more inclined to choose an agricultural-related degree at LSU.

Theme #2: Overcoming Concerns

Four out of the six program participants in this investigation reported having little to no agricultural experience prior to their involvement in the Ag Fellows Program. “I have never had any experience with agriculture in my entire life. This program completely exposed something new to me regarding the agricultural industry,” said Ashley. However, students expressed optimism in adapting to the challenge of having limited exposure to agriculture. Li stated: “I don’t really have much background in [traditional] agriculture. You think it would put me at a disadvantage, but the Ag Fellows Program helped me realize I could have a place in agriculture.”

Half of the study participants reported that they “did not have” or “did not hear about” agricultural youth programs such as FFA and 4-H during high school. On this point, Sam explained:

> I do not have any experience from 4-H, or anybody who has ever been in an ag program… it’s just really hard as somebody who came from the city, who loves nature and agriculture. I thought the College of Agriculture was going to expect me to already have all of this knowledge of agriculture. But the Ag Fellows Program opened my eyes that I could still do agriculture as a major and feel welcomed.

The participants also assumed that LSU College of Agriculture staff and faculty would represent traditional stereotypes of the agricultural industry. For example, Manuel, who had little experience with the agricultural industry before enrolling as an agricultural business major, expressed: “I was expecting a lot more people from a farm background. I guess you know, classic, straw in the mouth, straw hat, all that stuff...” He continued: “I expected much more

classic country or rural people. I guess people who talk with a twang, and the Ag Fellows Program helped expand my perspective on what ag people were really like." Ciara reported viewing agriculture as a "predominately white and male" industry, which made her fear she may not be welcomed into the LSU College of Agriculture. However, after her participation in the Ag Fellows Program, she realized "not having an ag background was okay."

Sam, a member of the LGBTQ+ community, disclosed that she felt anxious prior to engaging in the Ag Fellows Program: "I always get scared that people are going to be like, 'You're lying. No, you're not [LGBTQ+]." Five out of six participants reported concerns about judgment from the LSU staff or fellow participants before participating in the Ag Fellows Program. However, after participation, they reported that such issues were no longer a concern – a notion not reflected in Chapman's (1981) model.

Theme #3: Belonging through Cohort

Through the Ag Fellows Program, the participants met with faculty members in the department of their academic interests. Amy stated that during her visit, she "was toured by [a faculty member], and she is such an amazing lady. She was so excited about the nutrition and food sciences program that she made me want to be there." Participants also discussed the aspects of the program they felt were most beneficial in their experience on campus. Li, interested in the animal sciences degree program, described that the Ag Fellows Program "made me feel more comfortable, and getting some more details with a person one-on-one. I loved going to speak to some of the students. I thought that was so cool. I definitely would keep that in the program." Familiarity with current students and the LSU College of Agriculture administration also allowed the Ag Fellows Program participants to grow more comfortable on campus.

After inquiring about participants' reasoning for applying to the Ag Fellows Program, Anne, a low-SES student, replied: "I was honestly just kind of looking for more ways to help pay for college." The participants expressed that the supplemental scholarship awarded through the Ag Fellows Program helped alleviate the burden of tuition, reduced feelings of anxiety about the costs of college enrollment, and made them feel like they belonged. Amy stated: "[My mom] mentioned that it was a scholarship, and I should definitely apply because she was gonna be helping me pay for college, and it was definitely going to be a hard battle, especially since LSU is out of state." Amy also reported that the Ag Fellows Program was beneficial because it "[provided] a scholarship for a low-income student like me; I really was nervous about tuition before coming to LSU. After the scholarship, I felt like I belonged and was part of the group." Sam reported that the Ag Fellows Program offered financial aid through a "scholarship that isn't based on 4-H or FFA experience." Similarly, Manuel communicated that "$1,000 is $1,000" and that he was "extremely thrilled" to be receiving financial assistance, and now she felt like he "could be an ag student."

Each of the study participants revealed feelings of anxiety and nervousness prior to attending the Ag Fellows Program on campus. Sam stated, "I was a little nervous. It's not really common for me to see programs that are this open about accepting students like me." Participants also reported that they were met with a "welcoming" and "accepting" attitude from the LSU College of Agriculture faculty, staff, and administration. Ciara expressed: "We are all a part of a minor demographic, but they were really kind and accepting." Students also communicated feeling

more relaxed once they recognized familiar faces in attendance. “I recognized some of the people presenting there, which really made it feel like I was already at home,” said Li. Throughout the duration of the program session, students began to engage in conversation with peers and faculty. The Ag Fellows Program participants reported that they also learned about resources and student organizations offered by the College of Agriculture.

Conclusions

Through an analysis of the data, we determined that the themes that emerged in this investigation could be beneficial to assisting the LSU College of Agriculture with the strategic planning and advancement of future recruitment initiatives for underrepresented student populations. Academic interests and experiences during the Ag Fellows Program appeared to influence participants’ decision to pursue a degree in agriculture. In this investigation, we also discovered that instrumental mentors assisted in guiding students’ interest in degree programs related to agriculture. Such findings align with Chapman’s (1981) model as well as data reported in the broader literature on the recruitment of diverse students to colleges of agriculture (Alston et al., 2019, 2020). In this study, half of the participants reported that they had little to no agricultural industry experience. The remaining participants reported having some exposure to traditional agriculture, such as owning livestock and planting a garden – a finding supported by the work of Bullock et al. (2021). Therefore, we conclude that the participants faced challenges as non-traditional agricultural students regarding their decision to enroll in an agricultural-related degree program – a finding reinforced by the broader literature (Drape et al., 2017, 2019; Irlbeck et al., 2014). Participants who had little to no traditional agricultural experience had stereotypical misperceptions about individuals working in the industry prior to participating in the Ag Fellows Program. For example, participants reported expecting industry leaders to be White and male. As such, we conclude that Ag Fellows Program helped widen students’ perspectives on the types of individuals who can find employment in agriculture. A notion that does not appear to have been previously explored in the broader literature.

Each of the participants reported that the financial incentive that accompanied the Ag Fellows Program was their primary motivation for applying. From this, we conclude that the scholarship provided by the LSU College of Agriculture’s Ag Fellows Program was an influential factor in recruiting students from underrepresented populations to the program – a concept that aligns with Chapman’s (1981) model of student success. We also conclude that participation in departmental visits with faculty in the student’s major of interest allowed the Ag Fellows to learn more about the degree programs offered by the LSU College of Agriculture. Through these interactions with faculty, the participants were able to better plan their academic journey and receive a deeper understanding of potential career opportunities available in the agricultural industry after graduation. As such, we conclude that program personnel, including the LSU College of Agriculture staff and administration, promoted a sense of belonging amongst the program’s cohort. However, some participants reported being nervous and experiencing increased anxiety prior to attending the Ag Fellows Program. Meanwhile, introducing the participants to the campus environment and resources available to underserved student populations contributed to their feelings of support.

Discussions, Implications, Limitations, and Recommendations

By identifying potential trends and strategies that attract underrepresented groups to baccalaureate degrees in agriculture, the findings of this study could be used to introduce more diversity to the agricultural industry (Alston et al., 2020). Chapman's (1981) model for student success framed this investigation conceptually, which helped illuminate the major factors that influenced students' decision to engage in the Ag Fellows Program as well as enroll in the LSU College of Agriculture. Responses from participants largely supported Chapman's (1981) model regarding the importance of significant persons and the college's atmosphere to the recruitment process. Unique to this study, however, was how the Ag Fellows Program helped participants overcome their concerns about majoring in agriculture. Therefore, this finding warrants further consideration and could lead to the refinement of Chapman's (1981) model.

Therefore, we recommend that the LSU College of Agriculture dedicate resources to designing a communication campaign to better reach underrepresented students regarding the benefits of undergraduate programs in agriculture. Through greater exposure, the Ag Fellows Program could expand in participant numbers to offer support to students across the nation identifying as an underrepresented population. To achieve a wider program outreach, we recommend that the LSU College of Agriculture make communication of event details and advertisement of the Ag Fellows Program application more accessible to underserved student populations. The dissemination of the program information can be achieved through sponsored social media advertisement posts, a dedicated website page, an email campaign, and letters sent to students in school districts that historically serve underrepresented student populations. Through this investigation, we also discovered that the participants received little to no follow-up communication or mentorship opportunities after the Ag Fellows Program concluded. Additional program sessions with university DEI administration may more profoundly prepare students for personal and academic development prior to their freshman year in the College of Agriculture at LSU. Because familiarity with the LSU College of Agriculture departmental faculty and staff was found to influence underserved students' decisions, we also recommend that networking opportunities be created with these individuals so that high school students may ponder a degree in agriculture more deeply. Finally, we recommend that administrators, faculty, and recruiters in the LSU College of Agriculture more clearly articulate scholarship and funding opportunities associated with agricultural degree programs to potential underrepresented student populations.

As the global population expands and the demand for food and fiber increases, U.S. colleges of agriculture must further investigate effective recruitment methods for underrepresented student populations (Alston et al., 2019, 2020). Additional research will be needed for the creation and evaluation of strategic programming, such as the Ag Fellows Program, to influence an influx of educated, diverse employees into the agricultural workforce. Further, additional studies should examine the effect of increased outreach to parents/guardians of underrepresented students interested in agriculture. Researchers may also consider the effect of including the LSU College of Agriculture alumni, who identify as an underrepresented population, in intentional recruitment initiatives. Perhaps the inclusion of underrepresented alumni could help underrepresented students perceive they belong in colleges of agriculture and the broader industry.

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SBAE Student Perceptions of Motivation through the Lens of Situated-Expectancy Value Theory

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Abstract

Teachers' most essential task is ensuring the learning environment motivates students to engage. A widely researched theory within motivation is the Expectancy Value Theory; however, after decades of data, it was determined that situations and settings were also impactful in student motivation. Thus, the Situated Expectancy-Value Theory was established within the motivation theory literature, postulating that situational learning impacts student motivation. School-Based Agricultural Education programs are unique given the aspects of student elective enrollment, hands-on learning, and career preparation; however, Situated Expectancy-Value Theory has not been applied to these settings previously. This study sought to explain student perceptions of their motivational connections to the aspects of SEVT. We found that within the classroom, the impactful factor was utility value, within the Supervised Agricultural Experience, the impactful factor was student age, and within the FFA program aspect, the impactful factors were student age, utility value, and expectancy for success. It is recommended that teachers support student learning by intentionally supporting each aspect of the Situated Expectancy-Value Theory. Teacher educators should expose students to motivation-supporting strategies for managing their program. State staff should offer professional development that exposes teachers to the latest evidence-based strategies for improving student motivation.

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Introduction

Motivation can be built using different tactics based on a large number of factors, including student age, teacher age, course content, learning environment setup, and student interest in the content (Patrick, 2022; Ryan & Deci, 2020; Schunk et al., 2019; Wigfield & Koenka, 2020). Career-Technical Education (CTE) is unique from other education subjects because CTE courses are typically not required, and students, with their families, decide to enroll in the program annually. Within CTE, the learning environment examined in this study was School-Based Agricultural Education (SBAE), which is associated with one of the largest youth development student organizations in the United States, the National FFA Organization (FFA, 2022). SBAE is the largest CTE offering in the state of Ohio (Ohio Department of Education, N.D.).

The SBAE Three-Circle Model is posited to offer much flexibility regarding teacher and student choice to build a meaningful program for a wide variety of student backgrounds (Talbert et al., 2014). The overall model of SBAE involves intracurricular programming, meaning that the activities within SBAE occur both inside and outside the classroom setting, with the activities outside of the classroom directly connecting to the curriculum (Phillips & Osborne, 1988; Talbert et al., 2014). The intracurricular portions of SBAE are a motivating factor for students in the program as they offer a wide variety of opportunities for students to learn about the industry (Baker & Robinson, 2017; Chumbley et al., 2015; Talbert et al., 2014). Talbert et al. (2014)

claim SBAE teachers are student-centered professionals priding themselves on offering meaningful opportunities for all the students in their program. These student-centered SBAE teachers work to identify learning opportunities for each student in their program to help students retain their motivation during their enrollment in the program (Anderson, 2013; Delay & Swan, 2014; Talbert, et al., 2014). However, the environment built by the teacher is essential to maximizing the opportunity for student motivation and engagement to flourish (Baker & Robinson, 2017; Bowling & Ball, 2020).

SBAE is a learning environment with unique aspects that bolster motivation, including hands-on learning, elective enrollment, student-driven activities, and mentorship (Anderson, 2013; Baker & Robinson, 2017; Bowling, 2017; Curry, 2017). SBAE offers various activities for students to engage in across the classroom, SAE, and FFA, which can be a positive factor for student motivation (Baker & Robinson, 2017; Chumbley et al., 2015). Teacher tactics to boost motivation have been an area of concern within SBAE, and in other educational settings (Bowling & Ball, 2020; Patrick, 2022; Schunk et al., 2019). Additionally, it is important to recognize SBAE is not immune from factors that can drive student apathy, amotivation, and disengagement (Delay & Swan, 2014). Given all of this, it's important to understand how best to support student motivation within SBAE to avoid thwarting the learning environment with apathy or amotivation.

This study will build on literature about motivational coaching methods (Bowling, 2017; Curry, 2017), selection of activities (Baker & Robinson, 2017; Knobloch et al., 2016), and student enrollment (Anderson, 2013) to gain insight into SBAE student motivation. This prior research has encouraged future research to use applicable motivation theories to learn more about student perspectives on their motivation (Bowling, 2017; Bowling & Ball, 2020; Baker & Robinson, 2017; Curry, 2017; Knobloch et al., 2017). Currently, SEVT has not been utilized in SBAE research, and this study sought to address this gap by learning about student motivation from the perspective of SBAE students.

Theoretical Framework

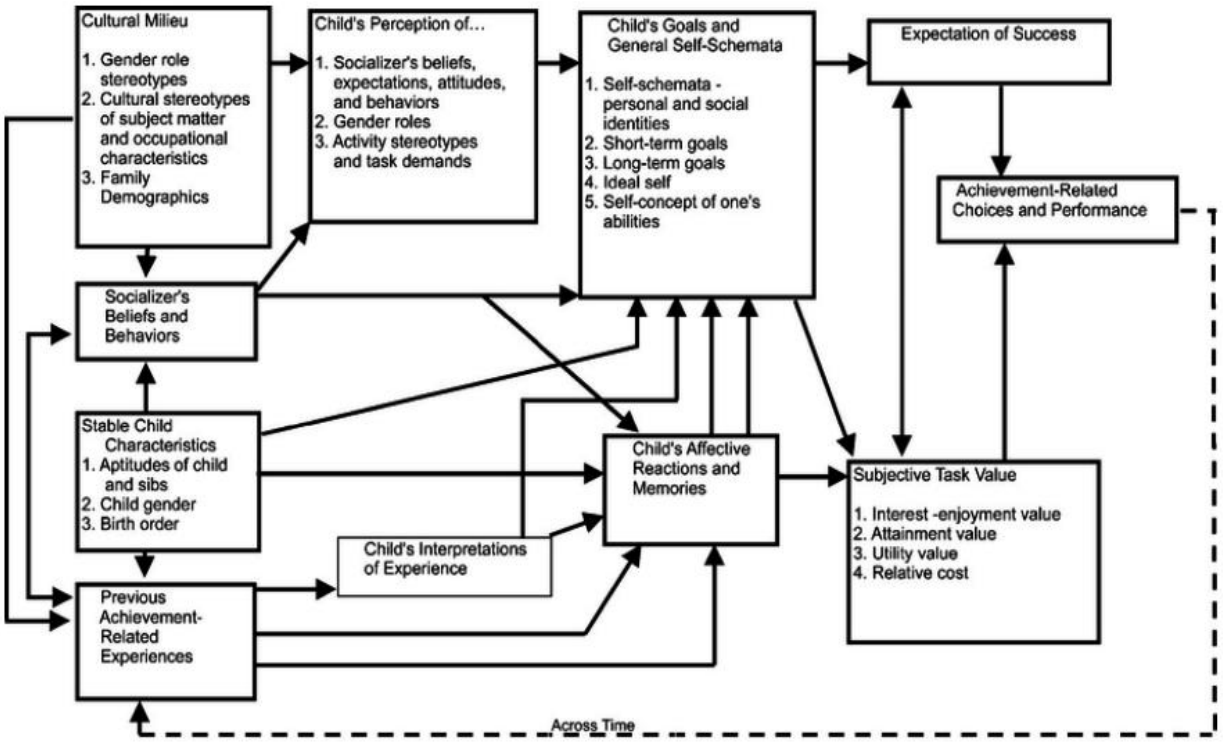
Expectancy-Value Theory is the historically most utilized theory that has been used to explore motivation within learning environments (Schunk et al., 2019). The latest development within this line of inquiry has been the development of the Situated Expectancy-Value Theory (SEVT; see Figure 1). Essentially, what SEVT seeks to formalize is the existence of many structures that drive decision-making for students in the learning environment (Eccles & Wigfield, 2020). SEVT was developed based on the strong finding that motivation differs for students based on their specific learning environment and context (Eccles & Wigfield, 2020). Research within Expectancy-Value Theory has demonstrated that much of the task, utility, attainment, and intrinsic values students hold change in different situations (Eccles & Wigfield, 2020). As a motivation theory, SEVT is unique in that a change in the learning environment is considered within the theory (Eccles & Wigfield, 2020; Schunk et al., 2019). Eccles & Wigfield (2020) state that SEVT postulates student motivation will shift with different learning environments and over time. SEVT also allows for changes from the impact of society, parents/guardians, and teachers on expectancy for successes and subjective task values to be more clearly seen in exploring student motivation (Eccles & Wigfield, 2020). SEVT can also be applied to non-classroom facets of student learning, such as sports, clubs, and other educationally

related experiences (Lens & Decruyenaere, 1991; Wigfield & Koenka, 2020). SEVT allows for the change in motivation over time to be more effectively observed through student motivation, confidence, beliefs, and engagement in learning over time and throughout their developmental growth (Eccles & Wigfield, 2020; Nicholls et al., 1989). SEVT is one of the most versatile and easily applicable theories to student motivation in the learning environment, regardless of the content area (Patrick, 2023).

Tenets of SEVT explored through this study include expectancy for success (ES), relative cost (RC), utility value (UV), and achievement-related choices and performance (ARCP). Expectancy for success is explained to be the beliefs held by students that they will perform well in an environment (Eccles & Wigfield, 2020). Relative cost refers to the time, effort, and other resources utilized to perform well or prepare for engagement in an activity (Eccles & Wigfield, 2020). Utility value is the value and emphasis of the content from the learning environment based on its perceived importance for the future (Eccles & Wigfield, 2020). Achievement-related choices and performance are explained as the types of choices and performances provided by the student based on their success in the learning environment (Eccles & Wigfield, 2020). Each of these aspects of student motivation can be applied to any learning environment; therefore, they can be utilized within Career-Technical Education (CTE), including School-Based Agricultural Education (SBAE).

Figure 1

Situated Expectancy Value Theory Model (Eccles & Wigfield, 2020)



Purpose and Objectives

This study aimed to explain the relationship between student age and years in SBAE and SEVT tenets on the students' ARCP within SBAE. The following objectives guided this study:

1. Describe SBAE students' perceptions of ES, UV, RC, and ARCP experienced within their SBAE program.
2. Determine if student age, SBAE enrollment years, and SEVT tenets explain a significant proportion of variance in ARCP within SBAE programs.

Methods

This study utilized explanatory, relational quantitative research methods to address the research objectives conveyed above.

Population and Sample

This study utilized a target population of Ohio SBAE students enrolled in single-teacher programs with an enrollment of 50-90 students. We purposively sampled ten programs and conducted a census of all students in the programs. One program was selected from each of the ten FFA districts within the state. Ohio Department of Education and Ohio FFA staff helped identify the ten programs with at least one effective activity in each aspect of the three-circle model. State Staff selected the SBAE programs through their knowledge of the program's engagement in student-centered activities and perceived student morale. Some examples of these components would include student engagement in FFA contests, leadership development, or conventions at the state level, with each student maintaining a Supervised Agricultural Experience and powerful classroom learning that has led to high performance on state-mandated tests. The total sample included the 774 students in the sampled programs. The usable data sample included 70 students, 40 (57.1%) females and 30 (42.9%) males. The average student age was 16.8 years (*SD* = 1.28). The class distribution included 15 (21.4%) freshmen, 10 (14.3%) sophomores, 14 (20%) juniors, and 31 (44.3%) seniors. The students averaged 2.6 years (*SD* = 1.18) in SBAE. FFA membership length included 18 first-year (25.7%), 15 (21.4%) second-year, 14 (20%) third-year, and 23 (32.9%) fourth-year members.

Instrumentation

We utilized the Expectancy-Value-Cost Survey provided by Barron et al. (2017). The instrument poses questions to students about their learning environment by having each item align with a specific aspect of SEVT. The questionnaire is designed to collect data about ES, UV, and RC using questions that ask about the student's perception of their in-environment experiences. The questionnaire was modified for this study to examine all aspects of the SBAE three-circle model. For example, the question "I believe my class is important" was included to capture the classroom component and then was also shifted to "I believe my SAE project is important" and "I believe my FFA activities are important" to capture the remaining aspects of the three-circle model. Students were asked to respond to each statement on a Likert scale of 1 to 6, which ranged from Strongly Disagree, Disagree, Slightly Disagree, Slightly Agree, Agree, and Strongly Agree. The questionnaire was also modified, and researcher-developed questions were added to address the goals achieved, recognition earned, class grades, and GPA for each student. Before use, the questionnaire underwent a review by a panel of experts to establish face and

content validity that included four SBAE teacher educators who have prior teaching experience, and two current SBAE teachers who also have experience with quantitative research. The panel found that after minor shifts in content, the questionnaire was appropriate for the study. The reliability of the Expectancy-Value-Cost Survey of Student Motivation was examined for each of the three different concepts: success expectancies, relative cost, and utility value by Getty et al. (2017). For success expectancies, the range of reliability was $\alpha = 0.67$ to $\alpha = 0.94$, in which all the upper portion of the range is acceptable (Getty et al., 2017; Nunnally, 1978). For utility value, the reliability estimates ranged from $\alpha = 0.69$ to $\alpha = 0.96$, within the upper portion within an acceptable range (Getty et al., 2017; Nunnally, 1978). For relative cost, the reliability estimates ranged from $\alpha = 0.60$ to $\alpha = 0.89$, within the upper portion of the range is acceptable (Getty et al., 2017; Nunnally, 1978). to meet the thresholds required for reliability and was validated by a panel of experts (Barron et al., 2017; Nunnally, 1978). Post-hoc Cronbach's alpha values were calculated for the SEVT tenets in the questionnaire. Each calculation met the threshold for reliability for an exploratory study; expectancies for success ($\alpha = 0.72$), task value ($\alpha = 0.68$), and relative cost ($\alpha = 0.76$) (Nunnally, 1978).

A pilot study was conducted for the three researcher-created questionnaire items regarding Achievement Choice and Performance (ARCP) metrics. The pre, post-pilot study was run at a single-teacher SBAE program that has a presence in each of the three circles of the Agricultural Education Model but was not included in the sample's study. Data analysis for the pilot test reliability used a Pearson-Product Moment Correlation Test conducted through SPSS revealed the participants ($n = 40$) had a high correlation between the participants' responses for each of the three measures of student ARCP measures (Field, 2019). For the first area of the ARCP measurement, student ($n = 40$) beliefs about their achievements within their SBAE classroom held a significant reliability ($r = 0.88$). For the second area of ARCP measurement, student ($n = 40$) beliefs about their achievements within their SAE program held significant reliability ($r = 0.88$). For the third area of ARCP measurement, student ($n = 40$) beliefs about their achievements within their FFA activities held significant reliability ($r = 0.94$). Given these strong reliability relationships within the ARCP scale, the scale was found to have been reliable and could be incorporated into the final questionnaire (Field, 2019).

Data Collection

To begin data collection, we mailed all study invitations and reminder postcards containing the questionnaire link to all sampled SBAE programs. SBAE teachers were then asked to distribute invitations to all students enrolled in their program. The teachers were then asked to distribute the postcard reminders once a week for the following four weeks (Dillman et al., 2016). We received 88 responses with 70 usable responses in the sample for a 9% response rate. This response rate was impacted due to our inability, due to IRB requirements, to directly contact students face-to-face in their SBAE classroom. Additionally, youth response rates tend to be lower due to the complex process of gaining parental consent (Lenhart, 2013).

Data Analysis

Nonresponse error was addressed by sampling 14% ($n = 10$) of the early and late responders and calculating independent samples *t*-tests to ensure these respondents were not statistically different in their responses to the Likert scales (Field, 2019). The independent samples t-test found that on average late responders ($M = 4.99$, $SD = 0.15$) did not respond significantly differently regarding their motivation perceptions about expectancy for success than

early responders (M = 4.89, SD = 0.20). This difference, -0.1, BCa 95% CI [-0.63, 0.43], was not significant t_{10} = -0.39, p = 0.70. The independent samples t-test found that on average late responders (M = 4.92, SD = 0.21) did not respond significantly differently regarding their motivation perceptions about task value than early responders (M = 4.94, SD = 0.20). This difference, 0.94, BCa 95% CI [-0.59, 0.64], was not significant t_{10} = 0.76, p = 0.94. The independent samples t-test found that on average late responders (M = 3.07, SD = 0.35) did not respond significantly differently regarding their motivation perceptions about relative cost than early responders (M = 3.23, SD = 0.24). This difference, 0.72, BCa 95% CI [-0.76, 1.07], was not significant t_{10} = 0.36, p = 0.72. Additionally, to address non-response error, 14% (n = 10) of the early and late responders were selected and independent samples t-tests were generated to ensure they were not statistically different from the other study participants regarding the completed goals they had reached thus far in their experience in the SBAE program (Field, 2019). The same sample of early and late responders was utilized for this statistical analysis. The findings of the assumptions found that both samples were normally distributed, and no significant findings were identified. The independent samples t-test found that on average late responders (M = 7.80, SD = 0.64) did not respond significantly differently regarding the goals they had been able to complete thus far in their agriculture class than early responders (M = 8.40, SD = 0.51). This difference, 0.60 BCa 95% CI [-1.09, 2.29], was not significant t_{10} = 0.75, p = 0.09. The independent samples t-test found that on average late responders (M = 6.60, SD = 0.58) did not respond significantly differently regarding the goals they had been able to complete thus far in their SAE than early responders (M = 6.90, SD = 0.76). This difference, 0.30 BCa 95% CI [-1.68, 2.27], was not significant t_{10} = 0.32, p = 0.51. The independent samples t-test found that on average late responders (M = 7.20, SD = 0.62) did not respond significantly differently regarding the goals they had been able to complete thus far in their FFA than early responders (M = 7.60, SE = 0.51). This difference, 0.40 BCa 95% CI [-1.29, 2.09], was not significant t_{10} = 0.50, p = 0.35. Given these findings, it was decided that the data was able to be used for the analysis of the study objectives.

Following addressing non-response error, a summated score for each theory construct was created to convey the student's perception of their motivation in each aspect of the theory (Barron et al., 2017). Data were analyzed using descriptive statistics for objective one, using real limits for analysis (Fife-Schaw, 2006). Objective two involved conducting hierarchical regressions. The dependent variable was the ARCP, operationalized by the percentage of accomplished goals. The independent variables in each model were calculated in two levels; the first included the SEVT tenets, and the second added student age and years of SBAE membership. All statistical assumptions were analyzed and upheld for the hierarchical regression (Field, 2019).

Limitations

Several limitations arose from this study. The first limitation is that the findings of this study cannot be generalized to other chapters within Ohio or elsewhere due to the purposeful sampling used in selecting SBAE programs for this study. Therefore, the findings of this study cannot be assumed to represent all programs in Ohio or elsewhere. Another limitation of the study is the low response rate of 9% (n = 70).

Findings

Objective One

Objective one sought to describe the perceptions held by students about their ES, UV, and RC in SBAE, with results in Table 1. We found students agreed (M = 5.40, SD = 0.52) that they could be successful in their class, SAE (M = 4.99, SD = 0.76), and FFA (M = 5.39, SD = 0.71). Students also agreed their class (M = 5.46, SD = 0.61), SAE (M = 4.83, SD = 0.96) and FFA activities (M = 5.37, SD = 0.79) upheld UV. In addition, students slightly disagreed that there was an RC for their class (M = 2.59, SD = 2.05), SAE (M = 2.90, SD = 2.07), and FFA activities (M = 3.05, SD = 1.29).

The results regarding ARCP in SBAE are reported in Tables 2 and 3. Related to ARCP, students reported to have met 84.30% of their goals in class, 70.40% in SAE, and 76.70% in their FFA activities. Most students (84.30%; n = 59) stated they were earning an A (91-100%) in class, and 91.4% (n = 64) stated they were earning a GPA higher than 3.1. Most of the student recognition and awards were earned at the local level, with 22.9% (n = 16) earned recognition for their SAE, 52.80% (n = 37) earned recognition for their FFA leadership, and 72.80% (n = 51) earned recognition for their FFA competition activities.

Table 1

Descriptive Analysis of Students' Perceived SEVT Tenets (n = 70)

SEVT Tenet	SBAE Area	*M*	*SD*	Range
Expectancy for Success	Classroom	5.40	0.52	4.33-6.00
	SAE	4.99	0.77	1.67-6.00
	FFA	5.30	0.71	2.00-6.00
	Overall	5.23	0.54	3.56-6.00
Utility Value	Classroom	5.46	0.61	3.67-6.00
	SAE	4.84	0.96	1.00-6.00
	FFA	5.37	0.78	2.00-6.00
	Overall	5.22	0.63	3.44-6.00
Relative Cost	Classroom	2.59	1.05	1.00-5.75
	SAE	2.90	1.08	1.00-5.25
	FFA	3.05	1.29	1.00-6.00
	Overall	2.85	0.94	1.00-4.83

Note. Real limits for this Likert Scale: 1.00 to 1.50 represents strongly disagree, 1.51 to 2.50 represents disagree, 2.51 to 3.50 represents slightly disagree, 3.51 to 4.50 represents slightly agree, 4.51 to 5.50 represents agree, 5.51 to 6.00 represents strongly agree (Fife-Schaw, 2006).

Table 2

Descriptive Statistics for ARCP Data (n = 70)

SBAE Area	Percent Students Who Met Goals
Classroom	84.30%
SAE	70.40%
FFA	76.70%

Table 3

Performance Data for all other ARCP Aspects Explored (n = 70)

Aspect of Performance	*n*	Percentage of Sample
Earning an 'A' in ag. class	59	84.30%
Earning a GPA higher than 3.1	64	91.4%
Earned recognition at the local level for SAE	16	22.90%
Earned recognition at the local level for FFA leadership	37	52.80%
Earned recognition at the local level for FFA competition activities	51	72.80%

Objective Two

Objective two sought to determine if student age, SBAE enrollment years, and SEVT tenets explain a significant proportion of variance in ARCP within SBAE programs; however, this calculation specifically explored the variance in classroom goals. Hierarchical multiple linear regression (HMLR) was calculated to regress classroom goals achieved on the SEVT tenets in Model 1, with Model 2 adding student age and years in SBAE. Within Model 1, utility value was a significant predictor ($t_{70} = 2.82$, $p = .006$), accounting for approximately 26% of the variance in ARCP ($R^2_{adj} = 0.26$, $F = 9.06$, $p < .001$). Within Model 2, the combination of the SEVT tenets, student age, and years in SBAE accounted for approximately 26% of the variance in ARCP ($R^2_{adj} = 0.26$, $F = 5.76$, $p < .001$). Therefore, the overall model change was significant.

Table 4

HLMR Predicting Classroom ARCP (n = 70)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	*SE B*	β
(Constant)	0.46	2.38		-3.91	4.67	
Exp. For Success	0.42	0.44	0.12	0.46	0.44	0.14
Utility Value	1.15*	0.41	0.39	1.20*	.41	0.41
Relative Cost	-0.21	0.20	-0.13	-0.21	0.20	-0.13
Student Age				0.28	0.24	0.20
Years in SBAE				-0.33	0.25	-0.22
Adj. R^2		0.26			0.26	
R^2 Change		0.028			0.20	
F		9.06 (219.43)			5.75 (219.43)	

* p < .05

Objective two sought to determine if student age, SBAE enrollment years, and SEVT tenets explain a significant proportion of variance in ARCP within SBAE programs; however, this calculation explored variance in Supervised Agricultural Experience ARCP. An HLMR was calculated to regress SAE goals achieved on the SEVT tenets in Model 1; student age and years in SBAE were added to Model 2. Model 1 was not significant (R^2_{adj} = -0.02, F = 0.63, p = .60). The non-significant variables included success expectancy (t_{70} = -0.32, p = .75), utility value (t_{70} = 0.62, p = .54), and relative cost (t_{70} = -0.87, p = .39). Within Model 2 the linear combination of the SEVT tenets, student age, and years in SBAE accounted for approximately 16% of the variance (R^2_{adj} = 0.16, F = 3.71, p = .005). Student age was a significant predictor (t_{70} = 2.80, p = 0.007). The analysis indicated that when student age increased by one year the SAE goals increased by 5% (*95% CI*: 0.26, 1.55; β = 0.50) if all other variables are held constant. The remaining variable of years in SBAE (t_{70} = -0.40, p = .69) within Model 2 was not significant.

Table 5

HLMR Predicting SAE ARCP (n = 70)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	SE B	β
(Constant)	7.27	2.46		-8.90	5.49	
Exp. For Success	-0.20	0.61	-0.07	-0.05	0.56	-0.02
Utility Value	0.31	0.50	0.13	0.41	0.46	0.17
Relative Cost	-0.25	0.29	-0.12	-0.22	0.26	-0.10
Student Age				0.90*	0.32	0.51
Years in SBAE				0.14	0.35	-0.07
Adj. R^2		-0.02			0.16	
R^2 Change		0.03			0.20	
F		0.63 (362.87)			3.71 (362.87)	

* p < .05

Objective two sought to determine if student age, SBAE enrollment years, and SEVT tenets explain a significant proportion of variance in ARCP within SBAE programs; however, this calculation explored FFA ARCP. HLMR was calculated to regress FFA goals achieved on the SEVT tenets in Model 1 and Model 2 adding student age and years enrolled in SBAE. A hierarchical multiple linear regression was calculated to regress perceived FFA goals achieved on the three SEVT tenets in Model 1, and regress perceived FFA goals achieved on the three SEVT tenets, age, and years enrolled in the SBAE program in Model 2. Within Model 1, expectancy for success was a significant predictor ($t_{70} = 4.05$, $p < .001$), accounting for approximately 20% of the variance ($R^2_{adj} = 0.20$, $F = 6.75$, $p < .001$). Within Model 2, the linear combination of the SEVT tenets, student age, and years enrolled in the SBAE program accounted for approximately 32% of the variance in student ARCP ($R^2_{adj} = 0.32$, $F = 7.61$, $p < .001$). Expectancy for success ($t_{70} = 4.05$, $p < .001$), utility value ($t_{70} = -2.29$, $p < .001$) and student age ($t_{70} = 3.15$, $p = .002$) were significant predictors.

Table 6

HLMR Predicting FFA ARCP (n = 70)

	Model 1			Model 2		
Variable	*B*	*SE B*	β	*B*	SE B	β
(Constant)	2.14	2.44		-11.17	4.66	
Exp. For Success	2.38*	0.68	0.79	2.55*	0.63	0.85
Utility Value	-1.24	0.64	-0.46	-1.35*	0.59	-0.50
Relative Cost	-.15	.21	-0.09	-0.33	0.20	-0.20
Student Age				.86*	0.27	0.52
Years in SBAE				-0.34	0.29	-0.19
Adj. R^2		0.20			0.32	
R^2 Change		0.24			0.14	
F		6.75 (313.44)			7.61 (313.44)	

* $p < .05$

Conclusions and Recommendations

The data allowed the research team to conclude that students felt they experienced the tenets of SEVT, to some extent, within SBAE. Prior research demonstrated that teachers can be an important factor in helping students set goals, frame activities' expectations, and foster self-efficacy (Eccles & Wigfield, 2020; Schunk et al., 2019). SBAE is a unique environment that allows student interests to be present, which increases student motivation (Baker & Robinson, 2017). Interactive activities, such as those found in SBAE programs, can increase motivation in the course and lead to students recommending SBAE to peers in the future (Baker & Robinson, 2017). To enhance students' ES, SBAE teachers should consider activities to teach students about SAE and FFA activities to help them feel more confident.

The study led the research team to conclude that students did not feel strongly about the resources needed to succeed in SBAE. Prior research has shown that teachers must work with students to evaluate the resources needed for successful experiences (Eccles & Wigfield, 2020). Without re-evaluating the costs involved in SBAE, programs may lose student engagement. Teacher educators must prepare preservice educators to evaluate and support students in addressing relative costs. SBAE, as a whole, may need to reevaluate the use of student time and effort within the program. However, data indicated that the cost of engagement in SBAE was not yet problematic for the youth involved in these programs.

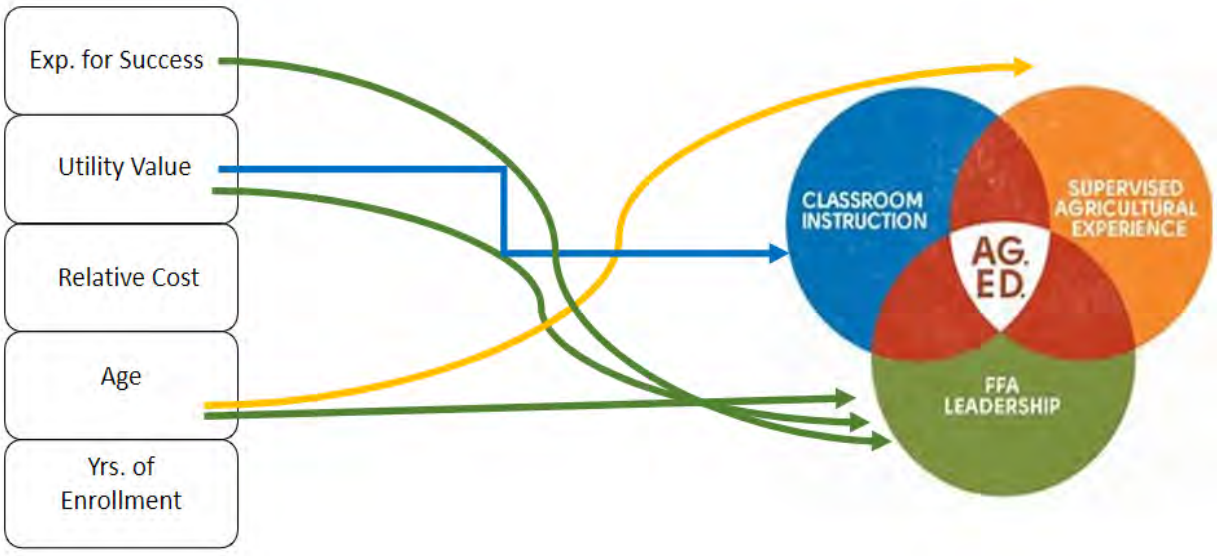
Another conclusion from the study was that students were engaged in activities to help them meet their SBAE goals to some extent. SBAE research has demonstrated a strong culture of coaching and mentoring (Bowling, 2017; Curry, 2017); therefore, it is important to consider the tactics used in those settings. Teachers must consider the way they offer performance-based

feedback and find ways to include encouraging messages in the same setting (Schunk et al., 2019). In settings where effort is valued over performance, relevant incentives must be offered to support motivation (Schunk et al., 2019). Teacher educators and State Staff should provide instruction about supporting student motivation through activities beyond the classroom. The results from the study demonstrated that motivation was supported in the classroom, but that wasn't true for those aspects of the program that were outside the classroom component of the SBAE program.

The overall study conclusion was that SEVT, in its original model, was not fully supported by SBAE within the studied programs. SEVT postulates that student age, years in a learning environment, and the SEVT tenets explored are all significant factors in predicting ARCP (Eccles & Wigfield, 2020); however, only some of these factors were significant for this study. Figure 2, below, demonstrates the significant factors from this study. Since not all of the postulated relationships were present at a significant level, it would be wise to utilize this questionnaire with larger audiences to see if increasing the sample size would provide a clearer, more complete picture of whether or not the SEVT model fits within each state or the country regarding SBAE program student motivation. In this way, future research could address the suitability of the current model for SEVT in SBAE. Simply put, more data and more nationally generalizable data are needed to determine if SEVT is supported within SBAE. Additionally, working to conduct related research to learn more about student perspectives about each of the SEVT tenets within their SBAE program experience would be meaningful toward tailoring a questionnaire for students to complete that is specific to SBAE programs. Other aspects of CTE could also be explored to include other learning environments outside of the SBAE pathway. The finite amount of motivation research available regarding SBAE and other CTE areas needs to be expanded to better inform teacher practice and preservice teacher preparation.

Figure 2

Significant Predictors of ARCP in the SBAE Model



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Internal Dilemmas and External Burdens: Exploring Student Teacher Lesson Planning

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Abstract

Learning to teach is challenging as preservice teachers apply a multitude of knowledge and skills in complex situations. Preservice and student teachers struggle to effectively use metacognition and lack the ability to address numerous motivational factors in their learning. We do not know how student teachers utilize these ideas while lesson planning. This multiple case study explored student teacher lesson planning motivation, knowledge transfer, and metacognition. The themes of teacher identity development, giving permission to overcome stress and procrastination, learning to adapt lessons, and stress impacting lesson planning emerged. The findings indicate student teacher growth throughout the practicum and provide insights for teacher educators to enhance motivation, metacognition, and knowledge transfer. We recommend teacher educators consider how they intentionally incorporate knowledge transfer and metacognition in their programs. Further, teacher educators should conceptualize how they scaffold lesson planning skill development, clearly communicate expectations, and use lesson plan templates to help address student teacher stress and procrastination. Future research should continue to explore ways to improve metacognition and knowledge transfer within the student teaching field experience and during lesson planning.

This manuscript is based on data presented at American Educational Research Association Annual Meeting, Bowling, Claflin, Martin, Parker, Ramsier, Owiti (2024).

Introduction

Learning to teach is an ongoing process that begins for many within a university teacher preparation program (National Research Council, 2010). Within those programs, teacher educators are tasked with preparing competent educators ("Introduction - Council for the Accreditation of Educator Preparation," 2015). Hammerness et al. (2005) highlight preservice teachers' challenges such as the problem with complexity as teachers shuffle between multiple outcomes that change based on student needs and unanticipated tasks. Preservice teachers also face the two-worlds problem: the disconnect between the academic space of teacher preparation and the context-dependent classes taught in schools (Feiman-Nemser & Buchanan, 1985).

Preservice teachers also struggle with *enactment*, typically lacking the needed understanding of the context to know exactly how to act in the moment. Relatedly, preservice teachers are also building their *adaptive expertise*, or the ability to complete activities without thinking about how to do them (Bransford et al., 2005). Preservice teachers are also influenced by their preconceived notions about how learning and teaching work based on their experiences as students, also known as the *apprenticeship of observation* (Lortie, 2020). One area where preservice teachers grapple with the intersection of these concepts is lesson planning.

Lesson planning, a foundational task for educators (Kang, 2017), is challenging for novice teachers due to a lack of experience and the ability to draw from multiple knowledge sources

(Ball et al., 2007; John, 2006; Kang, 2017). A mismatch exists between the linear approach taught by faculty and how student teachers plan their lessons (Ball et al., 2007; Kang, 2017). This leads to tension between university expectations during student teaching and the reality of planning, further illuminating the *two-worlds problem* (Beckmann & Ehmke, 2023; John, 2006).

One way to assist preservice teachers as they develop is to promote metacognition (Hammerness et al., 2005). Metacognition allows for meaning-making (Darling-Hammond & Bransford, 2005), is tied to adaptive expertise (National Research Council, 2000), and is critical for the transfer of learning (National Academies of Sciences, 2018). However, previous research has highlighted that preservice teachers have a narrow focus on metacognition (Bowling et al., 2022), which can hinder enactment. Further, motivational factors such as procrastination, stress, and avoidance behaviors of preservice teachers can influence performance (Akdemir, 2019; Bekdemir, 2010; Klassen & Chiu, 2011; Özer & Yetkin, 2018) but have not been fully explored in their relation to planning, metacognition, the transfer of knowledge, and enactment. While Grossman (1992) posits novice teachers can improve with the right kind of support without waiting to master certain aspects of teaching, we do not have empirical studies or best practices for teacher educators to use in supporting novice teachers during student teaching, including around a core task of teaching, lesson planning.

Theoretical Perspectives/Conceptual Framework

The conceptual framework for this study focuses on two facets which intervein between preservice preparation coursework and enactment: the situated context of the practicum and motivational factors (see Figure 1). Building on the challenges with learning to teach, we recognize that learning is a complex developmental process influenced by social and cultural aspects and requires the learner to transfer their knowledge to different contexts (National Academies of Sciences, 2018). This view of situated learning (Lave & Wenger, 1991) recognizes that knowledge is utilized differently depending on the circumstances and where learning is a social endeavor (Lave, 1988). Recommendations for teacher education to focus on the context where the expertise of teachers will be developed as it assists with the transfer of knowledge and allows students to go beyond the theoretical ideas of teaching (Darling-Hammond et al., 2005) and reinforces the *two-worlds problem* (Feiman-Nemser & Buchanan, 1985) to be cognizant of the two distinct domains we ask student teachers to inhabit.

Within the motivational factors, we focus on three main aspects: stress, self-efficacy, and procrastination. Stress can be defined in several ways (Geving, 2007) as it differs in how each individual characterizes it, though often tied to a negative consequence (Danyluk, 2013). The student teaching practicum is connected to high levels of stress, worries, and anxiety (Paker, 2011). Student teachers have experienced stress due to needing to meet program requirements, being unsuccessful (Paker, 2011), the workload and routines (Dunyluk, 2013), as well as their future teaching responsibilities (Thieman et al., 2014). However, evaluation (Paker, 2011) and lesson planning (Dunyluk, 2013) are two of the most stressful parts of student teaching.

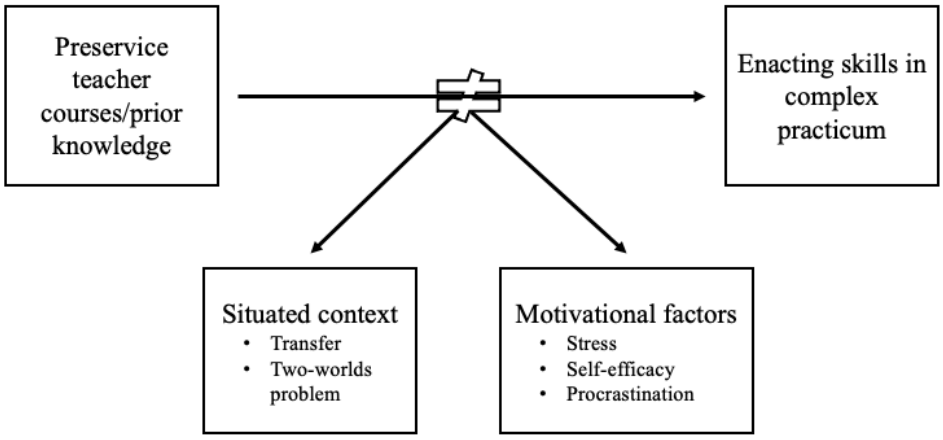
This study was also guided by teacher efficacy which is teacher's belief in their abilities to complete a teaching-related task (Tschannen-Moran et al., 1998) Teacher efficacy builds on

Bandura's (1986) work on self-efficacy. A lack of efficacy can impact whether an individual will stress over, delay, or complete a task. For instance, if individuals do not believe a task is aligned with their ability to complete it successfully, they often will not attempt it (Bandura, 1986). Teacher self-efficacy is tied to teacher effectiveness and career commitment (Knobloch & Whittington, 2003; Tschannen-Moran et al., 1998). Agricultural education student teachers face the lowest levels of self-efficacy during the midpoint of their experience, with the highest level after student teaching (Harlin et al., 2007).

Procrastination is a "trait or behavioral disposition to postpone, delay, and avoid performing tasks or decisions (Milgram & Tenne, 2000, p. 41). According to Milgram and Tenne, there are four different types of procrastination: academic (i.e., relating to assignments), life routine (i.e., difficulty in managing personal life), decisional (i.e., struggle in making minor decisions), and compulsive (i.e., decisional and task procrastination by the same person). Teachers often delay tasks due to disliking the task and experiencing negative emotions (Laybourn et al., 2019). However, task aversion is not based solely on the task but depends on the individual's perception (Laybourn et al., 2019). Procrastination is linked to stress (Laybourn et al., 2019) and low self-efficacy (Gün et al., 2020; Laybourn et al., 2019).

Figure 1

The Situated Context and Motivational Factors Related to Preservice Teacher Skill Enactment Conceptual Framework



Purpose and Research Questions

This case study explored student teacher lesson planning motivation, knowledge transfer, and metacognition during student teaching. The central question was, “what is student teacher lesson planning motivation, knowledge transfer, and metacognition, during student teaching?”

Methods

For this qualitative, exploratory study we utilized a multiple case study design (Merriam, 1998; Yin, 1994). While we did diverge from the more positivist replication approach of Yin, using multiple cases allowed us to analyze the unique context for each program and then explore convergent findings across cases. We utilized an interpretivist epistemology (Crotty, 1998) because we believed the student constructed their knowledge as they interpreted their student teaching and program experiences. Additionally, we identified our positionality related to the phenomena. We are all previous secondary agriculture teachers and current faculty and/or graduate students and we acknowledged our perceptions to allow for data emergence.

We purposively sampled the cases from two agricultural education teacher preparation programs. The first case was given the pseudonym of Great Lakes University, and the second case was given the pseudonym of Great Plains University. Both cases were large Midwestern universities, with four-year undergraduate agricultural education teacher preparation programs, with a 14-week student teaching capstone occurred during the spring senior semester. Both programs developed and required the use of their own lesson plan template which could be altered partway through student teaching with approval. The Great Lakes University student teachers were required to submit lesson and unit plans and received overall grades from cooperating educator and university supervisor. The Great Plains University student teachers were required to submit lesson plans, unit plans and additional program documents and received overall grades from cooperating educator and university supervisor. The bounded case for each program consisted of the 2023 spring, senior student teachers (Great Lakes University $n = 13$; Great Plains University $n = 18$) with eight participants (Great Lakes University $n = 5$; Great Plains University $n = 3$).

Multiple data sources were collected for each case. For each case the primary data sources included focus groups, field notes, and memos. The ancillary data sources included the required lesson plan template and student teaching handout/expectations. Three semi-structured focus groups were conducted at each site: one three weeks in, one at the halfway point, and one at the conclusion of student teaching. We used constant comparative analysis (Saldaña, 2013) to allow for data emergence and we adjusted focus group questions to align with the emerging data.

Data sources from each case were analyzed separately to allow for the emergence of the phenomena within each case. Data analysis consisted of a three-stage coding process where we began with line-by-line coding, then combined like codes into categories, and then allowed for like categories to emerge into themes (Saldaña, 2013). Lastly, themes from each case were then analyzed for similarities and differences for the cross-case analysis. Following Merriam's recommendations, we utilized multiple strategies to uphold internal and external validity and reliability (1998). To ensure internal validity and reliability we conducted participatory research, long-term investigations, member checks and peer examinations, triangulated our data sources, maintained an audit trail, and disclosed our biases. To enhance external validity we used thick, rich descriptions, documented typical or modal categories, and used a multi-site design.

Findings

GREAT LAKES UNIVERSITY

Theme 1: Teacher Identity Development

It emerged that the student teachers developed their teacher identity as they progressed through their student teaching experience. It is important to note that their teacher identity was almost nonexistent at the beginning of student teaching, Stephanie discussed at the beginning of student teaching how she struggled with what seemed like juggling two personalities. She stated, “The more time I spend with the students, and the more I think I just let myself be myself, instead of just trying to be like having Stephanie and Miss [last name] be 2 different personalities and have Stephanie and Miss [last name] be one personality”. Then, their teacher identities started to form at the halfway point, and finally began to solidify at the conclusion of their experience. At the end of the experience Stephanie reflected on how her confidence and teacher identity changed over time and now has a positive career outlook, “Going in, I felt like I was unprepared in that I was probably going to be bottom of the barrel and stuff but now I feel I can confidently go into a classroom in the next coming school years and have a successful experience and be a successful teacher”. Part of the phenomena we sought to explore included the use of metacognition during student teaching. While the student teachers certainly learned a lot about themselves as potential future educators, they were not explicit in discussing how they explored and better understood their own learning. When prompted about their identity or learning they offer turned towards outward experiences related to their students or lesson planning.

Subtheme 1: Developing Connections with Students

The student teachers strongly acknowledged the importance of building connections with their students. However, they described how they struggled to develop student connections at the beginning of student teaching. Laying out her early struggles with students, she stated, “The kids like verbally said like, ‘I literally hate you. And I hate this class’. So I'm like ‘great’. So, it's been really difficult”. While the other participants did not experience this level of difficulty when connecting with students, they did express their inability early on to explore students' interests and needs to cater lessons to them. In contrast, Steve reflected, “In general, I think having the relationships built early on has really helped me and I've kind of always been seeing the real side of my students and it makes me sad to leave in all honesty because I do feel that we've grown enough, and I've taught enough myself that they feel like my own students”. He was able to connect with his students sooner than his peers and felt the success of those relationships even at the halfway point of student teaching.

Student connections began to improve throughout student teaching as the student teachers’ identities began to form and then solidify. This was a cyclical process where improved student connections helped the student teachers start to visualize themselves as teachers and as their teacher identity formed, they felt more confident to build student relationships. Further, the student teachers were motivated by these relationships, where “student engagement” was motivating for Jennifer and Stephanie said, “Seeing the students like what I was teaching and wanting to know more about what I was teaching, made it fun. It made it that I wanted to finish the lesson plan and then teach the lesson to see the reactions of the students”. Building student

connections and the development of their teacher identity helped to improve their lesson planning confidence and motivation and reduce stress.

Subtheme 2: Confident Lesson Planning

The student teachers struggled with lesson planning early in their experience but saw improvement as they progressed. They did not have access to state mandated curriculum or lesson plans. Cooperating educators might have provided lessons, but it was up to the student teacher to choose to use the provided resources or create their own. Early on they struggled with feeling satisfied with their created lessons. Jennifer said, "...I looked at my, the lesson I had planned for it is heavy lecture based. I was like, no scrap the whole thing. And we broke out into groups...". Furthermore, the student teachers felt overwhelmed early on as they felt they had to learn the content they were teaching right along with the students. Stephanie reflected, "I've literally had to look up the subject before I teach it, because I like, did not learn it in college". The most prevalent lesson planning struggle that the student teachers discussed was gathering and altering lesson resources. Early on, the student teachers relied on internet resources instead of the cooperating teacher's resources. Kassie stated, "I probably put like 3 hours into a lesson plan but after like typing it all out and everything. I probably put 6 extra hours into just knowing the content… I'm reading an anatomy book to learn about anatomy, physiology". Stephanie discussed the lack of engaging resources on google left her having to significantly alter them, which took a significant amount of time. It was not until the midway point that they began to feel more confident in their resource gathering and altering abilities. Additionally, they described how they struggled to make decisions related to teaching methods. This struggle centered around their lack of confidence to pick what they perceived as the "correct" method for the content and students needs or motivation.

Subtheme 3: Outside Tensions Decreasing

The student teachers experienced stressors from outside sources during student teaching. At the beginning, they were very overwhelmed by the lesson plan template required by the teacher preparation program. Towards the mid-point, if deemed appropriate, the template could be reduced or changed completely to remove the tension. Jennifer described the negative impact on her, "I feel like I'm planning lessons four times for three classes... [I'm] feeling like a failure because I am falling behind with the lesson plan submissions. I am not failing in the classroom; I feel like I am failing planning". Another outside tension expressed by the student teachers was balancing their work, life, and family responsibilities. While the other tensions subsided during student teaching, these tensions never fully went away. This tension was less visible in the first focus group compared to the second and third. During the second focus group the students acknowledged that they saw the need for and importance of rest, recovery, and family time but found it difficult to balance these with the time required to plan lessons and fulfill their other teaching and advising responsibilities. Additionally, at the end of student teaching, they recognized the importance of family and rest but reflected on the fact that they felt like they used these as procrastination outlets. The student teachers described feeling self-shame when they used their life outside of school to relieve stress but avoid work-based activities. Steve described

how his cooperating educator had a spouse and children and modeled work-life balance well for him, and he felt like he could achieve a more balanced experience.

Theme 2: Giving Permission to Overcome Lesson Planning Stress and Procrastination

The student teachers began by experiencing much lesson planning decision fatigue and stress. The inability to make clear and confident decisions led to the students experiencing procrastination. It was not until they gave themselves permission to not be perfect, use predeveloped resources, and seek support that they were able to cope with the stress and their procrastination subsided.

Subtheme 1: Decision Fatigue to Procrastination

Since the student teachers rarely used pre-made lesson plans, they were faced with numerous planning decisions which caused decision fatigue. The students then procrastinated lesson planning to avoid the decisions they could not make. “Right now, I'm [teaching] diseases and I just found out yesterday there are 205 animal diseases. Which of those 205 am I going to teach my students?” [Stephanie]. The decision fatigue was prevalent during the beginning and midway through student teaching. As lesson planning confidence increased, they sought support, and they altered the template decision fatigue decreased.

Subtheme 2: Gave Permission to Cope

Through continued lesson planning stress, the student teachers ultimately gave themselves permission to find ways to cope. Halfway through student teaching, they gave themselves permission to not need a perfect lesson, “…sometimes not everything is going to work out perfectly and I accept that” [Tara]. Concurrently, they also gave themselves permission to seek support. The student teachers realized they could not succeed on their own and sought help from the cooperating educators. “Something that has gotten easier for lesson planning for me is assessments... And a lot of that has been talking to my cooperating educator and be like, what do you do?” [Tara]. Additionally, the students reached out to their peers for guidance and became more comfortable connecting with in-service teachers. Simultaneously, the student teachers were starting to transfer the skills they learned from their preservice teacher courses into their actions. However, the students were not transferring the knowledge or *why* behind the skills.

GREAT PLAINS UNIVERSITY

Theme 1: Learning How to Adapt Lesson Plans

The lesson planning process during student teaching depended on whether your cooperating teacher provided pre-existing lesson plans, either personally created by the cooperating teacher or CASE curriculum). The students given pre-existing curriculum, such as Sara, could progress through the process of learning how to and from lesson planning. The student who did not have pre-existing lesson plans to work from, Rebecca, fell behind the process of lesson planning compared to their peers.

Subtheme 1: Learned to Adapt the Process of Lesson Planning

Student teachers followed the adaptation patterns of their cooperating teacher at the start of the practicum. Sara related how they took everything their cooperating teacher gave them in terms of curriculum, including how they adapted curriculum. *"*She [cooperating teacher] already has all her adaptations that she wants made, made, and then when I grab it, she usually just tells me like, "I don't usually do this. I don't usually do that'." Sara later described how the cooperating teacher and her would make these adaptations together. "Sometimes we'll skip an activity if it's not something that we have time for or we don't want to do. We collectively decide to just skip it so we can move on." The cooperating teacher was mentoring them to develop more autonomy in lesson plan adaptations within the first month of student teacher.

Sara and Emily both talked about making an adaptation to the lesson plan strategy they learned in their preservice university methods course within the first weeks of student teaching. The student teachers were all trained on how to use the university suggested lesson plan template which would usually become 2–3 page document for each lesson. However, the student teachers were given a lesson plan notebook which encouraged them to plan in a more concise manner. This notebook style of a common tool for lesson planning by many teachers. Emily talked about using the notebooks rather than the university suggested lesson plan template. "That's really been working well for me." The early adaptation of lesson plan format helped Sara and Emily cope with taking on more of the instructional duties as student teaching progress.

Subtheme 2: Advantages to Adapting the Preexisting Lesson Plans

There were advantages to having pre-existing lesson plans, such as the Curriculum for Agricultural Science Education (CASE), in student teaching. CASE curriculum was not a direct option for the student teacher. The cooperating teacher needed to be certified in CASE in specific content area(s) for CASE curriculum to be available for a student teacher. Typically, an agriculture teacher would have a few courses with an approved CASE curriculum as the training requires professional development and financial resources. Sara was teaching at a school which had CASE approved curriculum for more than one class. She had developed habits around lesson planning, mainly adapting CASE curriculum, 6-7 weeks into student teaching. Sara said, "I have a set date. I like to do them on Sundays the week before and just get everything down… could still work on that a little bit, but I feel like I've gotten better with setting deadline…" Sara's experience with utilizing a pre-existing curriculum for lesson plan creation and adaptations was not shared in the focus groups.

Rebecca did not have a cooperating teacher who utilized CASE curriculum nor have any pre-existing lesson plans to share according to her. The stress of creating curriculum for courses from scratch, textbooks, or resources found online was weighing on Rebecca. She was able to start the process but seemed to struggle finding time to finish plans. *"*I guess I'm behind on making my lesson plans on the [university suggested] template. I have all my stuff written down that needs to go into it. It's just a matter of doing it." Whereas Sara had curriculum to start with when lesson planning, Rebecca felt the strain of working on the computer for long periods of time. "I feel like

I spend a lot of time on my computer, so when I get home at night, the last thing I want to do is be on my computer....” This stress led Rebecca to find her form of lesson planning as a coping mechanism. She did not utilize the university suggested template or a lesson plan notebook, rather she utilized sticky notes created the night before. “I'm lucky if I plan anything[ready].... I have a sticky note, the sticky notes that you can have on your computer, and I write those the night before and give myself the big picture for the day…”

Subtheme 3: Thinking about Students while Lesson Planning

The student teachers talked about connecting lesson planning to student learning in two ways beyond just content acquisition. First, student teachers talked about stress of lesson planning for class with learners in various cognitive levels. Emily reported, “It just feels like I have students in 10 different places too. So that kind of affects my lesson plans as well, and that stresses me out...”. While this quote may seem like Emily is really struggling with this concept it is important to note two things. Frist, this was during the first focus group near the start of student teaching. She was going to stress about this because it is challenging. Second, Emily noticed the role that lesson planning with this situation. She was learning how lesson planning can play a role in these real-world classroom challenges.

The second concept student teachers connected to lesson was managing student behavior. Sara reported, “I try to put [behavior management planning] into my plans like, ‘Okay. If blank student does this, give them good praise or just give them a certain look...’ I try to put some notes in there [lesson plan].” Even Rebecca, who struggled to keep up with lesson planning echoed what Sara said in the focus group. “So, I'm trying to incorporate it into my lesson plan. I do want to make notes like Sara had just said like, “Keep an eye out for this student if they do this.’”

Theme 2: Stress Impacting Lesson Planning

The preservice teachers from Great Plains University experienced an abundant amount stress from outside of their student teaching placement. This stress included the need to make money to live and the requirements placed on them from the university.

Subtheme 1: Stress Outside of School Create Distractions to Planning

The student teachers about the general stress they were feeling during student teaching. The stress was so great, that Emily felt overwhelmed, “I'm kind of overwhelmed when it comes to job stuff and trying to manage a classroom... while being an FFA advisor... and trying to figure out my own future while trying to get these kids a good quality education...” The stress that Rebecca was feeling was compounded by her cooperating teacher not having pre-existing lesson plans for them to utilize. She reported during the first focus group, “I'm going to be honest, I don't do a lot of lesson planning, so I don't know how to answer this question this far.” Rebecca’s stress was explained in more detail during the second focus group a month later. She was experiencing heavy financial stress. “I am extra broke right now, so I've been trying to work as much as I can, which also doesn't help. But... I need to eat and drive to survive, so I don't really

have a choice." Sara reported the same financial stress during the third and last focus group. "I cry more now. I think a big thing for me… is the financial side of things. Because my card literally declined for a $1.75." Rebecca reflected on the financial stress during the final focus group as well. "I think financially has been a big stressor, too, just not having any money. And then the school of education really tells you, you shouldn't have a job, but I've had a job."

Subtheme 2: Instruction on Lesson Planning Creating Barriers

A reoccurring topic for the student teachers was the negativity towards the university suggested lesson plan template. Student teachers learned that this template asks for more detailed than is typically expected from a teacher in the field. Emily's cooperating teacher told her as much. "I showed my cooperating teacher my lesson plan template, and she is like, 'You're not going to use that template when you actually go out and teach.' And I'm like, 'Then why am I learning it?'" Rebecca had a similar experience with the other teachers in her student teacher site. "I have been told by the whole entire PLC team that I was never going to use that in my entire life." Even Sara had similar thoughts. "...Those professors said several times that... you're not going to use it forever. It's a good place to start.... But I think the concern is, do I have to be using it right now?" The university template caused them stress for two reasons. They were unsure if switching to another lesson planning system would cause their grade to drop in student teaching and how to use another system. In the last focus group, the student teachers recommended that the university teach multiple ways to lesson plan.

Theme 3: Positive Influences for Lesson Planning

The student teachers talked about how their cooperating teachers were a positive influence in their efforts to improve on lesson planning and teaching. Rebecca had strong positive emotions towards her cooperating teacher who had left her a note one day telling her he was proud of her. She said the note made her realize that "I'm okay to admit that I know that things aren't going well if they aren't, and that's helped me relax to realize that I can ask for help whenever I need it." This was an important moment for Rebecca because she had openly discussed in the focus group how she struggled with having no pre-existing lesson plans for her cooperating teacher. Emily reported a similar positive interaction with her cooperating teacher. "She is lifesaving. She just gives me that voice of reason..."

Discussion

This multiple case study explored student teacher lesson planning motivation, knowledge transfer, and metacognition during student teaching. Overall, student teachers were influenced by motivational factors, like their students, during lesson planning while struggling with knowledge transfer and metacognition. Participants from both institutions faced stressors during their student-teaching experience that influenced their planning ability. They felt overwhelmed by outside factors influencing their planning, including balancing school and life, and handling financial stressors, reflecting previous research (John, 2006; Kang, 2017). Additionally, the lesson plan template for both institutions was a source of stress as there was confusion over expectations and a lack congruence with what was being used by teachers. This finding corresponds to core research in the field (Ball et al., 2007; Feiman-Nemser & Buchanan, 1985).

Students were one of the main sources of motivation for the student teachers. The Great Lakes University group discussed the challenges with building connections and getting to know their students, however as the semester progressed their relationships building with students grew. The Great Plains University group specifically talked about their students influencing their planning as they considered the cognitive levels of the students and how they could build classroom management into their lessons. Student teachers also were supported in their motivations around lesson planning by their cooperating teachers, as well as teacher peers and in-service teachers, through helping them gain experience and confidence.

Student teachers from both institutions faced stressors during their student teaching experience that influenced their ability to plan. One of the main challenges for both sets of student teachers was adapting premade lessons and/or resources. Great Lakes University participants highlighted decisional procrastination strategies (Milgram & Tenne, 2000) due to decision fatigue, not knowing what to choose with so many choices, or because they wanted to have a "perfect" lesson. Both university participants felt overwhelmed with outside factors that influenced their planning including balancing school and life and handing financial stressors, which can indicate life routine procrastination (Milgram & Tenne, 2000). Additionally, the lesson plan template for both institutions was a source of stress as there was confusion over what was required and may affect their grade and the lack of connection with what was really being used by teachers. However, recognizing that the lessons did not need to be perfect and that they could adapt to the more formal way of planning using the university templates helped most of the student teachers cope with the stressors.

The student teachers struggled to effectively transfer previous knowledge or develop metacognitive skills to plan lessons effectively. Participants discussed knowledge transfer only regarding skills used in classes but never focused on the why. The depth of metacognition of participants were suppressed as seen in previous research (Bowling et al., 2022) and focused more on identity growth versus understanding their learning. Overall, the stress of student teaching and the mismatch between university expectations and reality inhibited metacognition and knowledge transfer which echo previous research on the challenges of learning to teach (Feiman-Nemser & Buchanan, 1985; Hammerness et al., 2005).

There are some important implications to this data. First, student teachers are indicating the lesson plan template provided to them by the university was not grounded in the reality of teaching. Furthermore, there were multiple meanings for what one meant by "lesson plans". For example, some lesson plan formats can look more like the unit plan outline utilized in preservice coursework, yet teachers in the field treat these as lesson plans. Some of the preservice teachers identified these issues as points of stress. The apparent lack of consistency between university expectations and resources versus real-world approaches to lesson planning seemed to inhibit the transference of learning between preservice course work and student teaching. The lesson plan template and lack of clear expectations further catalyzes the two-worlds problem (Feiman-Nemser & Buchanan, 1985) in a way not previously discussed in research. Structured lesson planning without clear guidance kept the student teachers in limbo between trying to be successful students and addressing the reality and complexity of teaching.

Further influences of lesson planning stress and procrastination were unpacked which have implications for teacher preparation programs. Decision fatigue and a lack of confidence to alter lesson planning resources all negatively impacted student teacher stress and procrastination. While these implications are supported by previous research (Dunyluk, 2013), the nuance around the number of lesson planning decisions student teachers faced coupled with a lack of efficacy to alter resources to help reduce these decisions can help faculty develop and support decision making skills in their program. Lastly, student relationships emerged as a positive influence on teacher identity development, lesson planning decision making and stress. Taken together, teacher educators can more explicitly link these ideas which are not unfamiliar within teacher preparation programs, to theory and the reason why they impact planning.

Recommendations for practice include the need for teacher preparation programs to consider alternative approaches to the lesson planning process and expectations. This includes transparency about expectations of what the process and literal creation of lesson planning can look like in student teaching. This work would begin in the preservice course work by offering students the opportunity to work with various formats and alter various planning resources with connections to how planning looks within an agricultural education program. The goal of this instruction should be focused on pre-service students' efficacy of usage over detailed completion. Further, student teaching lesson planning expectations must be set and consider the reality of teaching to lessen the two-world problem and increase motivation and confidence. To do this teacher preparation programs should consider how they scaffold lesson planning opportunities, the use of their templates, and expectations throughout their program. Further, teacher preparation programs need to be explicit when planning for and speaking about knowledge transfer and metacognition to help students better understand the importance of and strategies to support these processes (Azevedo, 2020). Further, teacher preparation programs should develop cooperating educator mentoring professional development which specifically highlights their role in helping student teachers increase knowledge transfer and promote metacognition. Lastly, faculty need to recognize the unique work-life balance and financial stress of student teaching and how it placed some student teachers in a survival mentality and inhibited their ability to practice metacognition about their lesson planning strategies. University supervisors and cooperating teachers need to be able to respond to this type of stress or student teachers may struggle through their experience and let student teachers know that they are supported.

The findings also have implications for future research. This study should be replicated to include additional teacher preparation programs to maximize variance in lesson planning requirements, length of program, and length of field experience. Additionally, longitudinal studies should be conducted to explore knowledge transfer and metacognition throughout students’ tenure in a teacher preparation program. Further, researchers should explore needed coping strategies to address stress, decision fatigue, procrastination, and work-life balance during student teaching. The data also has implication for how researchers conceive different types of stress during student teaching. Some of the student teachers had to work a paying job to pay bills during student teaching. This financial stress impacted the ability of some student teachers to lesson plan and could be explored further. Overall, future research should continue to explore the complexity of learning to teach and more specifically ways to improve student teacher knowledge transfer and metacognition in the lesson planning process.

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Student Teacher Needs-Supporting and -Frustrating Experiences Through Guided Reflective Journaling: A Case Study of Triumphs and Tribulations

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Abstract

Teacher educators are tasked with preparing teachers who make multiple decisions every day. One way to prepare teacher candidates to balance their multitudes of demands is through reflective practice. This study aimed to explore Ohio State University SBAE student teachers' placement experience through the lens of psychological needs and motivation through guided reflective journaling of triumph (needs-satisfying) and tribulation (needs-frustrating) experiences. Tenets from Self-Determination Theory were used as a lens to guide the theoretical framework for this study. A directed content analysis approach was used to analyze journal entries. Reflective journal entries were bound by thirteen SBAE student teachers over fifteen weeks. Findings were categorized into needs-satisfying and needs-frustrating themes. Findings highlight student teachers discuss their psychological needs of autonomy, competency, and relatedness through the lens of self-determination theory. We recommend teacher educators provide opportunities for student teachers to reflect on their psychological needs to increase self-regulation and internalization. Further, we recommend research integrates motivational theories to explore how teacher preparation programs can support the complexities of learning to teach.

This manuscript is based on data presented at the North Central Region Conference of the American Association of Agricultural Education, Parker, Claflin, and Bowling (2023).

Introduction

Teaching is complex and demanding (Clark & Lampert, 1986) as teachers learn to teach through practice (Darling-Hammond & Sykes, 1999). Teacher educators are tasked with preparing teachers who make multiple decisions every day, informed by several distinct types of knowledge (Darling-Hammond & Bransford, 2005). Within teacher education programs, student teaching allows preservice teachers to continue developing their content, pedagogical knowledge, skills, and teacher identity (Edgar et al., 2011; Franzak, 2002). One way to prepare teacher candidates to balance the multitudes of demands they face is through reflective practice, either on-action or in-action (Schön, 1987). Providing preservice teachers with tools to be reflective practitioners supports their experiences, as reflection is critical to learning (Darling-Hammond & Bransford, 2005; Mezirow, 1991). Prior research examined the effects of different types of reflection (Epler et al., 2013; Greiman & Covington, 2007; Lambert et al., 2014; Roberts, 2014) and the impact of reflection on metacognition (Bowling et al., 2022), with all studies underscoring the importance of reflection for educators, especially preservice teachers.

Reflective practices are a tool teacher preparation programs utilize to support educational outcomes and preservice teachers' needs through their field placement. Reflective practices are a critical aspect of learning (Darling-Hammond & Bransford, 2005; Mezirow, 1991) and learning is a complex developmental process that includes many facets. As a novice educator, the development of content knowledge and pedagogy can be a daunting task. Novice educators often

develop those skills through their field experience, commonly known as student teaching. During this experience, reflective practices occur for novice educators to think about the newly acquired knowledge and pedagogy in the classroom (Darling-Hammond & Bransford, 2005). Additionally, reflective practices allow individuals to think beyond their worldview and critically assess their actions (Lin & Lucey, 2010). A novice educator is faced with the stress of balancing a new career, unplanned challenges with students, administration, parents/guardians, and lesson planning for rigorous student engagement.

Reflection is shown to provide support to preservice teachers. However, student teachers' motivation can also influence their desire to teach and intent to stay in the profession (Sinclair, 2008). Previous literature has highlighted the importance of self-efficacy during student teaching (Swan et al., 2011; Wolf et al., 2010) and the relationship with the cooperating educator (CE; Edgar et al., 2011; Jones et al., 2014), but little is known about student teacher motivation during this time. While Sorensen et al. (2018) utilized student teacher reflective journals to understand the development of student teachers through the lens of teacher concerns, reflective journals have not been used to explore the motivation of student teachers. Understanding the motivational aspects of student teachers' experiences through reflective journals will provide a deeper look into their experiences to add to the literature and provide concrete ideas of how mentors can help support student teachers through the complex task of learning to teach. As student teachers interact with mentors and students in a complex social environment and continue to form their identity through cognitive reflective practices, this study explored the experiences of student teacher motivation through guided reflective journaling.

Theoretical Framework

Tenets from Self-Determination Theory (SDT; Ryan & Deci, 2017) were used as a lens to guide the theoretical framework for this study. SDT explores human motivation through the intrinsic and extrinsic values of individuals during social interactions and cognitive development experiences (Ryan & Deci, 2017). Ryan and colleagues (2021) approach motivation from a person-centered focus, exploring how we understand one's sense of volition and initiative. Under the metatheory of SDT, six mini theories have been established to explore human motivation (Ryan, 2023). For this study, we have focused on the Basic Psychological Needs Satisfaction (BPNS) mini theory (Ryan, 2023). Autonomy, relatedness, and competence are described as basic psychological needs that support or thwart motivation (Ryan & Deci, 2017). *Autonomy* is bound by intrinsic feelings within oneself. *Relatedness* is the feeling of being connected to others. Lastly, *competence* is expressed by feeling successful or efficacious (Ryan, 2023). Experiences supporting one's fulfillment of autonomy, relatedness, and competence are argued to foster higher quality forms of motivation and engagement for activities to enhance performance, persistence, and creativity (Ryan & Deci, 2017).

Student teaching occurs in a highly social learning context between the student teacher, university supervisor, school community, peers, and beyond (Darling-Hamond & Bransford, 2005). Ryan and Deci (2010) argue social context factors play an essential role in advancing or halting motivation. The facets of BPNS apply to student teaching as the needs for autonomy, relatedness, and competency are met when student teachers follow their interests, including their values, build relationships with mentors and students, and express efficacy in content and pedagogy as they change their behavior as a novice educator (Deci & Ryan, 2008).

Autonomy can be expressed through feeling a sense of choice in our actions (Ryan & Deci, 2008). The need for competence can be expressed by feeling efficacious in interacting with social environments and positive experiences exploring new skills (Ryan & Deci, 2008). Lastly, the need for relatedness can be fulfilled through colleagues and peers within the university system (Wang et al., 2019). Relatedness contributes to a sense of belonging, promoting collaboration and resource sharing (Wang et al., 2019). Needs-satisfying experiences can increase student teachers' feelings of fulfillment, being challenged, and feeling satisfied (Deci & Ryan, 2008). In contrast, needs-frustrating experiences can lead to maladaptive functioning, negative emotions, and stress (Bartholomew et al., 2011; Haerens et al., 2015). Kaplan and Madjar (2017) explored pre-service teachers' perceptions of need support and satisfaction of their needs for competence and relatedness, and autonomous motivation. They found positive relationships between needs support and student teacher motivation (Kaplan & Madjar, 2017). However, Kaplan & Madjar (2017) suggest further exploration into how teacher preparation programs can support student teacher needs.

Purpose and Research Question

This study aimed to explore Ohio State University SBAE student teachers' placement experience through the lens of psychological needs and motivation through guided reflective journaling of triumph (needs-satisfying) and tribulation (needs-frustrating) experiences. Two questions were established to guide this research:

1. What types of triumphs and tribulations are experienced during student teaching? (Quantitative)
2. How do student teachers discuss triumphs and tribulations through reflective journaling? (Qualitative)

Methods

Reflexivity and Philosophical Perspectives

For this study, we utilized a qualitative positivist approach (Prasad & Prasad, 2002; Yin, 2018). A qualitative positivist approach leans on assumptions of nature and social reality as a source of knowledge while utilizing qualitative methodologies (Prasad & Prasad, 2002; Yin, 2018). Due to the qualitative nature of the study, we recognize the importance of establishing trustworthiness and rigor (Lincoln & Guba, 1985). All authors worked with the agricultural education preparation program at The Ohio State University and supervised student teachers during data collection. We maintained a reflexive practice to ensure our biases and previous experiences did not malign the research (Malterud, 2001). To establish trustworthiness and credibility, we used raw data with thick, rich descriptions to capture an accurate representation of student teacher responses in the findings (Lincoln & Guba, 1985). In addition, we use peer debriefing when analyzing qualitative data to enhance the accuracy of interpretations (Lincoln & Guba, 1985).

Case Study Design

This study utilized a case study approach to identify our sample. Reflective journal entries were bound by time and place by the student teacher cohort of thirteen Ohio State University SBAE student teachers during the spring 2023 semester who completed weekly guided reflective journal entries over fifteen weeks (Yin, 2018). In certain circumstances when

exploring a contemporary phenomenon, case study design may need to follow its own customized, systematic design procedure (Yin, 2018). Our philosophical approach guided the instrument design and data analysis using previous literature on needs-satisfying and needs-frustrating experiences. For the final analysis, 147 independent and complete entries were used to answer research question one quantitatively and question two qualitatively (Creswell & Creswell, 2017).

Guided Reflective Journal Instrument

Guided reflective journals were completed through a Qualtrics survey form utilizing skip logic depending on if the student teacher sought to reflect on a triumph or tribulation. Question prompts for triumphs and tribulations were informed by SDT and guided students to reflect on a specific experience related to needs-satisfaction (triumphs) and needs-frustrations (tribulations). Student teachers responded to both closed-ended and open-ended questions. Close-ended questions were analyzed to answer research question one (quantitative) and open-ended questions were analyzed to answer research question two (qualitative). A panel of five experts, made up of current teacher educators and graduate students in agricultural education, reviewed the instrument for face and content validity.

At the beginning of the spring semester before beginning student teaching, student teachers received a link to the Qualtrics survey and were asked to complete weekly reflections by Sunday each week. At the beginning of the Qualtrics survey, each student teacher was asked to enter the date, a summary of activities they participated in during the week, and a prompt asking if they wanted to reflect on a triumph or tribulation experience. Table 1 shows examples of closed-ended questions student teachers could answer. Table 2 shows examples of open-ended questions.

Table 1.
Closed-Ended Guided Questions and Responses

Question Stem	Triumph Guided Response	Tribulation Guided Response
There was an instance today where I felt (check all that apply):	Happiness Accomplished Motivated Other:	Stressed Overwhelmed Uncertain Worried I was going to fail Other:
Because I felt this way I (check all that apply):	Completed the task Was motivated to tackle another task Felt like time passed quickly as I completed the task Other:	Couldn't decide about what to do Avoided the task until the last minute Completely avoided the task Other:
The event(s) that triggered the emotion/response was (check all that apply):	Finding resources for lessons Identifying content standards Developing enabling objectives Planning teaching methods Planning activities Planning assessments Grading Other:	Finding resources for lessons Identifying content standards Developing enabling objectives Planning teaching methods Planning activities Planning assessments Grading Other:

Table 2.
Open-Ended Questions

Triumph	Tribulation
Describe in detail how you felt during the task:	Describe in detail how you felt during the task:
Discuss what helped you accomplish the task (examples might include cooperating educator, previous OSU courses, professional developments, etc.) and how they helped you accomplish the task:	Describe what made you struggle/feel negative emotions:
	Describe what you did to delay or avoid the task:
What advice would you give to others as they work through a similar task:	How did you overcome to complete the task:
What did you learn about yourself as you worked through this task:	What did you learn about yourself as you worked through this task:
Following the reflections for this week, set one teaching goal for the coming week:	Following the reflections for this week, set one teaching goal for the coming week:

Quantitative Analysis

The first research question sought to describe what types of triumphs and tribulations are experienced during student teaching. Frequencies were utilized to describe how often student teachers reflected on a triumph or tribulation experience and the related prompts. Frequencies were used to complement and enhance the narrative of the qualitative findings (Maxwell, 2010).

Qualitative Analysis

To answer the second research question, we employed directed content analysis, which utilizes a deductive coding process (Hsieh & Shannon, 2005). A directed content analysis approach validates or expands on existing theory (Hsieh & Shannon, 2005). In this study, we structured the analysis in SDT's basic psychological needs: autonomy, competence, and relatedness. Open-ended response data were exported from Qualtrics to an Excel file and were first sorted by participants and then by weeks of the student teaching experience. The first round of qualitative using a line-by-line technique to initiate codes (Charmaz, 2006). In the second round of coding, codes were collapsed into categories and sorted into themes representing needs-satisfying and needs-frustrating experiences. Categories were then placed into autonomy, competence, and relatedness –supporting or –frustrating themes. Representative quotes were used to capture raw data of participants in their journal reflections and used in the findings section. Table 3 displays an example of our coding procedure.

Table 3.
Examples of coding procedure

Raw Reflection Extract	Initial Coding	Category	Theme
I tried not to delay or avoid this task I just could not simply connect with the content to	Task avoidance Frustration with content/resources	Low PCK	Competency-frustration
create something I understood and was proud of. I sat and stared and looked at numerous	Time constraint Change of schedule	Flexibility Constraints	Autonomy-frustration

resources for a long time. This task would have been less stress if not for the time restraint unintentionally put on it, by changing around my schedule the day of. (4, W1)

Findings

Research Question #1

To address question one, we utilized frequency counts of the needs-supporting and frustration experiences documented in the reflective journals. It is important to note that student teachers could document multiple triumphs and/or tribulations per week, and they could select multiple emotions, actions taken, and/or initiating experiences per entry. Additionally, while one entry per week was a program requirement, not all student teachers completed a reflective journal entry for each week.

The student teachers documented a substantial number of triumphs ($f = 108$) or needs-supporting experiences throughout student teaching (see Table 4). When the students experienced their needs being supported, they felt accomplished ($f = 66$) or happiness ($f = 48$). When the student teacher's needs were met, they felt they were able to complete the task at hand ($f = 72$), felt like time passed quickly ($f = 47$), or were motivated to tackle another task ($f = 44$). The most frequent category of experience relating to supporting their needs was the "other" category ($f = 58$). When analyzing the text entries provided by student teachers when "other" was selected, the most frequent needs-supporting experiences were related to building rapport and relationships with students, their role as the FFA advisor, and teacher and learner successes such as successfully managing behavior issues or their students expressing their excitement to learn. The subsequent highest needs-supporting experiences were planning teaching methods ($f = 37$) and developing enabling objectives ($f = 27$).

The student teachers indicated that they did experience tribulations or needs-frustrating experiences during student teaching ($f = 39$; see Table 5). However, these experiences occurred at a much lesser rate when compared to the triumphs. When reviewing the weekly frequency counts, tribulations peaked at week two and remained steady until after week 12. The tribulations then decreased and remained steady through the end of student teaching. The student teachers specified that they experienced stress ($f = 24$) and feeling overwhelmed ($f = 22$) when their needs were frustrated. When the student teachers experienced a tribulation, they stated that they could not decide what to do ($f = 15$) but also indicated that they took "other" actions ($f = 18$) at a higher rate. When analyzing the text entries provided by students when "other" was selected, the most frequent actions taken were continuing with planning the lesson and attempting to complete all the tasks at once. The student teachers indicated the most frequent experiences that thwarted their needs were planning activities ($f = 20$), teaching methods ($f = 18$), and assessments ($f = 14$). Students also specified that there were "other" tribulating experiences ($f = 11$), and the most frequent text entries focused on classroom and behavior management and pacing lessons and content.

Table 4.

Frequency of Triumphs Experienced During 15-Week Student Teaching Experience (n = 13)

	Total
Triumphs: Total Entries	108
Triumphs: Felt Emotions	
Happiness	48
Motivated	17
Accomplished	66
Other	4
Triumphs: Actions Taken	
Completed the task	72
Motivated to tackle another task	21
Felt like time passed quickly	44
Other	47
Triumphs: Initiating Experience	
Finding resources for lessons	13
Identifying content standards	5
Developing enabling objectives	5
Planning teaching methods	27
Planning activities	37
Planning assessments	16
Grading	16
Other	58

Table 5.

Frequency of Tribulations Experienced During 15-Week Student Teaching Experience (n = 13)

	Total
Tribulations: Total Entries	39
Tribulation: Felt Emotions	
Stressed	24
Overwhelmed	22
Uncertain	7
Worried that I was going to fail	9
Other	4
Tribulation: Actions Taken	
Couldn't decide what to do	15
Avoided task until the last minute	8
Completely avoided the task	5
Other	18
Tribulation: Initiating Experience	
Finding resources for lessons	8
Identifying content standards	4
Developing enabling objectives	7
Planning teaching methods	18
Planning activities	20
Planning assessments	14
Grading	5
Other	11

Research Question #2

To address question two, we utilized a directed content analysis approach (Hsieh & Shannon, 2005) of the needs-supporting and frustration experiences documented in the reflective journals. The qualitative findings are categorized into needs-supporting and needs-frustrating themes related to SDT. The findings introduce student teachers reflections on student teaching experiences that are either needs-supporting and needs-frustrating. Representative quotes are labeled "(student #, week #)."

Autonomy-Support

Student teachers sought to have autonomy during their placement experience. One way student teachers sought out autonomy-support is through integrating their students' choices into the planning process. Student teachers reflected early on during their experience on how to seek student interests. Student teachers identified students' interests through various methods: informal conversations, first-day of class introductions, and questionnaires. Seeking out student interests and incorporating what students wanted to learn was associated with triumphal reflections. However, some tribulation reflections showed student teachers creating goals to gain student interests and overcome a challenging experience:

> I had them fill out some open-ended questions about what they wanted to learn during my time student teaching...I was surprised by the amount of things the students wanted to learn and how fast I was able to contort lessons arounds those topics without giving up the integrity of the standards. (4, W1)

Beyond student interest, student teachers expressed the need for flexibility in planning, perseverance to overcome challenging experiences, and the opportunity to reflect on their own or with their mentors, "...the most important thing you can do is pick yourself up reflect on where you went wrong and make appropriate changes to let it never happen again," (6, W2).

Competency-Support

When student teachers recognized their teaching ability, they began to identify as a teacher rather than a student. Those individuals who recognized their teaching and planning abilities in their reflections demonstrated an association with their teaching identity, "I felt more confident in my abilities to teach and plan lessons following the content standards. Furthermore, I feel a lot better about my abilities and position at the school" (1, W3).

In addition to student teachers recognizing their ability to teach, reflections revealed that they enjoyed reflecting on times when students acknowledged the student teachers' ability:

> I just felt accomplished, like everything I had spent the last 3.5 years learning was finally paying off and this is just the beginning. It is nice to know that your students appreciate what they are learning because it makes all the long planning hours worth it. (10, W12)

Student teachers showed growth in their ability to reteach and modify lessons. Students reflected that they felt frustrated but understood they needed to be flexible. However, toward the end of the field experience, individuals began to think critically about why modifications to lessons are an integral part of planning:

> I just felt like I needed to rush through. However, I then took some time and thought about things and this topic is a topic the students wanted to learn about so their

> motivation will be high, and it has been. I just felt like I needed to get through it, but plans change. (9, W3)
>
> ...talking with some students on how they might adjust [completing an activity] if given a second chance. This prompted me to go back through the resources I created. This was just as much a positive learning experience for me as it was for them. (4, W15)

The final findings within *competency-support* integrate sources of content and pedagogical knowledge. They acknowledged previous experiences, courses, or resources they were using to support their planning process, "I used knowledge I had from my time as a vet assistant to develop the injection lab and resources from my farm's veterinarian for supplies," (3, W12).

Relatedness-Support

Student teachers noted the importance of mentorship and a community of support. Different individuals provided support in various capacities. For example, cohort peers supported each other as they related to similar experiences. Student teachers noted feeling isolated but appreciated that other peers were experiencing similar challenges during their field experience. Connecting with colleagues was identified through experiences outside the classroom, "I attended state degree evaluations within our district and was able to connect with several ag teachers. I felt welcomed and appreciated" (11, W3).

Encouraging conversations with the CE was described with positive outcomes for student teachers. Student teachers pointed out that asking for help or bouncing ideas with their CE was nerve-racking. However, once the channel of communication was open, student teachers expressed that their fears faded.

> I learned that it is okay to ask [CE] for help when I get stuck. I was nervous at first to ask her for assistance because, I am not sure why, maybe disappointment? Once I opened that channel of communication, I was able to overcome the block that interfered with my planning. (4, W2)

Finally, establishing rapport with students supports the need fulfillment for relatedness. Student teachers reflected on relationship building early into the field experience, stating, "build those relationships with students! They will respect, listen, learn, and enjoy having you as their teacher" (2, W2).

Autonomy-Frustration

The lesson plan template was the greatest barrier for student teachers when reflecting on lesson planning. The template was described as lengthy and took time away from the creative aspect of planning. Several students discussed parts that were not applicable and were pointless to fill out. Additionally, student teachers were expected to turn in lesson plans once per week. The deadline added additional stress to student teachers as their workload increased throughout the field experience. "The OSU lesson plan began to hurt the quality of my lessons. So, I stopped using [the template] and the quality of my lessons increased" (1, W9).

Beyond the lesson plan template being a constraint, students reflected on the frustration aspect of modifying lessons at the last minute. Some students contributed this to a lack of time management or planning, while others noted they felt their lessons were useless.

> On Friday the old saying rained true, no plan survives first contact with the enemy, the plan being my original lessons, and the enemy being confusion and implementation. I spent my lunch and second period fixing my lessons and it worked out perfectly. (6, W1)

Competency-Frustration

Low efficacy was expressed in many aspects of the field experience, but prevalent in student teachers' confidence in content knowledge. Lack of content knowledge was often associated with tribulation reflections due to pressure to turn in lesson plans, feeling like they have to "get it right" or struggling with where to find resources. "I think some days I come disappointed with myself because I struggle to take content deeper because I lack the knowledge. It makes me feel incompetent" (8, W8). Another student noted, "I felt like I didn't know what to do. I was planning a lesson that I do not have a lot of background knowledge on and was having trouble finding resources on. (5, W4).

Beyond the low efficacy of content knowledge, student teachers felt that their confidence to teach depended on external factors, mainly licensure requirements. Stress related to teaching evaluation and test requirements added additional stress to the day-to-day expectations.

> Just the amount of stress and anxiety coming from wondering whether or not I'll be able to turn in my university licensure assessment on time, especially when you combine that with the fact that I also have my last test coming up for licensure on Tuesday. (9, W6)

Relatedness-Frustration

Fear of managing student behavior was another frustrating experience of student teachers. This fear typically centered around confronting misbehavior. Additionally, student teachers reflected on the need to manage behavior "better" and set goals for future challenging experiences, "I am bad at being upfront/confrontational/direct with students. The poster projects would likely have been on task if I had monitored students on workdays better" (11, W11).

Outside of the classroom, students described an internal struggle with balancing life in and out of the school setting. Many reflected about feeling guilty for leaving before their CE or prioritizing something that was not school related.

> "I had to leave early one night (around 5) to help my dad out on the family farm. I feel bad I had to leave before my cooperating educator] did, but I had to help my dad because it was something he couldn't do without me. I had everything ready for my class the next day but still felt guilty about having to leave and I'm unsure why." (6, W4)

Discussion

Our findings highlight how student teachers within an agriculture teacher preparation program discuss their psychological needs of autonomy, competency, and relatedness through the lens of self-determination theory (Ryan & Deci, 2017). The student teachers highlighted both triumphs and tribulations, representing needs-satisfying and needs-frustrating experiences in their guided reflective journals as they grappled with learning to teach. While the findings of this study are similar to prior research in SBAE related to student teacher concerns (Sorensen et al.,

2018), self-efficacy (Swan et al., 2011; Wolf et al., 2010), and the importance of relationships (Edgar et al., 2011; Jones et al., 2014), utilizing motivation as a lens provides a new perspective in understanding the experience of student teachers. While reflection entries explored a triumph or tribulation experience, they did not limit the experience to solely explore autonomy, competence or relatedness needs-support. Similar to previous research, needs-support from autonomy, competence, and relatedness occur simultaneously to increase motivation, internalization, and self-regulation (Deci & Ryan, 2008, Kaplan & Madjar, 2017).

Overall, the student teachers in this study reflected on many more needs-satisfying experiences that occurred when they were able to complete tasks or felt accomplished. The needs-frustrating experiences were often due to stress or feeling overwhelmed. Planning activities comprised most of the experiences students reflected on whether they were needs-satisfying or needs-frustrating. Regardless of the feeling, student teachers identified planning activities beyond direct instruction as time consuming. Feelings of accomplishment were accompanied by confidence in what they had prepared for during lesson planning. In contrast, feelings of stress when planning activities were accompanied with feelings of failure in the lesson and the stress to plan the next activity. Reflection of both successful and failed plans is critical for student teachers to internalize the complexities of teaching and learn to overcome the challenges they will face post student teaching (Brooks, 2000; Mezirow, 1991). Student teachers who reflected on a needs-frustrating experience often set attainable goals to change the process or outcome the next time they are faced with a similar challenge (Deci & Ryan, 2008).

As student teachers reflected on triumph experiences, the main autonomy-supporting experiences included learning more about their students and their interests. Additionally, student teachers recognized the impact of reflecting on their teaching to make changes to improve their instruction. As student teachers reflected, set goals, and internalized their experiences, they self-identified as teachers by recognizing growth in their own ability to teach through competency-supported experiences. Student teachers recognized their own efficacy through reflecting on changes made to their lesson plans and instruction, especially when they recognized themselves using previous knowledge and experiences. The support from their cooperating teachers, peers, and other agriculture teachers fulfilled their need of relatedness (Deci & Ryan, 2008). This was especially true as they became more open with their cooperating teacher and felt that connection. The relationship student teachers were building with their students also fed into their feelings of relatedness.

This study was unique in that we explored what experiences student teachers reflect on when their needs were not met. During tribulation-based reflections, feelings of stress and being overwhelmed consumed the student teachers. Most autonomy-based stressors were university requirements (deadlines, supervisor visits, licensure requirements, etc.) that were not part of their day-to-day teaching responsibilities (Kaplan & Madjar 2017). Similarly, the stress due to the unknown of meeting state licensure requirements provided frustrations related to competency with student teachers questioning if they would be successful. Low self-efficacy related to content knowledge also contributed to competency frustrating feelings. Student teachers were also fearful to confront student misbehavior and set consequences which fell under relatedness. These experiences left the student teachers feeling uncertain or fearful.

The findings of this study build upon the research on student teachers, especially around the idea of self-efficacy (Swan et al., 2011; Wolf et al., 2010), as it goes beyond their feelings of competence and/or concerns by discussing their challenges in terms of psychological needs being met or unmet. The findings showed the importance of reflective practices as participants could take a needs-frustrating experience to a needs-satisfying one through reflection. The reflection process is an autonomy supported event as they self-regulate and make sense of the experience. Utilizing best practices, like reflective journals, is not a nuanced strategy to support student teachers. However, rather than attributing frustrations and stressors to low efficacy of a novice teacher, we can support student teachers to reflect on their own psychological needs of autonomy, relatedness, and competence to support their own needs fulfillment through self-regulation, goal setting, and internalization practices as they tackle the complexities of learning how to teach.

Recommendations for Practice

We recommend teacher educators, cooperating educators, and university supervisors utilize SDT when supporting student teachers by recognizing successes and challenges through their autonomy, competency, and relatedness needs being either supported or frustrated. Additionally, we need to help student teachers understand their own psychological needs and how they relate to the learning process. To do this, we suggest conducting a mentorship training for university supervisors and mentor teachers that incorporates strategies for supporting student teachers' psychological needs. Further, prior to student teaching, guided reflective practices should be integrated into preservice teacher coursework and experiences. Lastly, we recommend seeking out mentor teachers who will support the student teacher through intentionally building rapport prior to the student teaching semester. Integrating motivational support strategies into various aspects of a SBAE teacher preparation program will further support teacher retention and self-regulation.

Recommendations for Future Research

In studying student teachers, exploring needs-support goes beyond studying the effects of efficacy in preservice preparation. Previous students have focused on task frustration and concerns of failure. We are proposing that teacher preparation researchers use motivation as lens to explore student teacher development that can offer unique insights into supporting student teachers as they learn to teach. Future research should be conducted using SDT and other educational motivational theories to provide a better understanding of how to prepare and support student teachers. Further, we recommend exploring psychological needs support and how student teachers transfer knowledge from their preservice coursework to their student teaching placement. Beyond the student teaching semester, we are interested in exploring longitudinal outcomes of supporting psychological needs in novice teachers. We encourage motivational researchers to explore guided reflective practices within early career mentorship programs. Lastly, we recommend exploring teacher educators' beliefs about student teacher motivation to understand what mechanisms are currently in place to support student teachers motivation.

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Identifying Agricultural Mechanics Training Deficits for Preservice Agricultural Education Teachers: Perceptions of Teacher Educators

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Abstract

Agricultural mechanics has become a common, yet highly technical component of modern school-based agricultural education (SBAE). Despite the prevalence of agricultural mechanics in secondary agriculture instruction, deficits in training have been prominent in the literature. To meet the workforce needs of agricultural industries, SBAE teachers must be adequately prepared with knowledge and skills to impart on their students. To prioritize agricultural mechanics competencies for preservice SBAE teachers, we used the ranked discrepancy model to examine SBAE teacher educators' perceptions of importance and level of preparation in 59 agricultural mechanics competencies. We found that all competencies in the study displayed some degree of training deficit. Our findings also indicated that the greatest training deficits were related to agricultural machinery and equipment and renewable energy, particularly in areas of recent technological advancement. Conversely, we observed the smallest training deficits in competencies related to metal fabrication, outdoor power equipment, and small engines. We recommend that SBAE teacher educators use these findings to better facilitate targeted professional development for agricultural mechanics. We also call for future needs assessments in agricultural mechanics to consider using the ranked discrepancy model.

Author Note

This manuscript is based on the dissertation completed by Granberry (2022).

Introduction

Agricultural mechanics has been defined as "the design, construction, maintenance, repair, management, and use of agricultural technology and mechanical systems" (Hancock et al., 2017, p. 4) and is a prominent content area within school-based agricultural education (SBAE). Considering that the most common form of SBAE laboratory is an agricultural mechanics facility, this prominence is to be expected (Shoulders & Myers, 2012). Under many different names, agricultural mechanics content has been present in SBAE in the U.S. since its inception (Twenter & Edwards, 2017). The importance placed on agricultural mechanics as a component of SBAE is in part due to the amount of time many teachers have dedicated to agricultural mechanics-related instruction, which has stayed consistently high over time (Hoerner & Beckham, 1990; McKim & Saucier, 2011; Saucier et al., 2014). Based on the amount of instructional time commonly devoted to agricultural mechanics in SBAE, it is conceivable that the largest set of technical skills deemed necessary for new SBAE teachers align with the agricultural mechanics content area (Albritton & Roberts, 2020).

Agricultural industries have grown and developed in technical complexity, as has the demand for employees familiar with agricultural mechanical and technical systems (Hancock et

al., 2017). Originally, SBAE instruction in agricultural mechanics was designed to train students in operating, maintaining, and repairing farm equipment that they were likely to encounter as farmers and ranchers (Twenter & Edwards, 2017). However, as agricultural production systems diversified, agricultural mechanics education adapted to include skillsets beyond production machinery, as it was anticipated that SBAE students would need a technical aptitude for both on and off-farm applications (Twenter & Edwards, 2017).

Agricultural mechanics at the secondary level also has post-secondary implications for students. Participation in an agricultural mechanics summer educational program has been shown to positively impact high school students' self-efficacy in agricultural mechanics skills and their consideration of teaching agricultural mechanics as a career (Gorter & Swan, 2018). Similarly, Rasty et al. (2017) concluded that agricultural mechanics training at the secondary level influenced SBAE teachers' perceptions of the importance of teaching agricultural mechanics skills. In a continuation of the work by Rasty et al. (2017), Mills et al. (2019) found statistically significant and positive relationships between secondary training and teacher competence in 53 of 54 agricultural mechanics competencies. Further, Wells et al. (2013) reported a statistically significant and positive relationship between Iowa preservice SBAE teachers' amount of agricultural mechanics training received at the secondary level and intentions to enroll in post-secondary agricultural mechanics coursework.

Preparation of Preservice Teachers in Agricultural Mechanics

Enrollment in agricultural mechanics courses in SBAE has traditionally trended high (Burris et al., 2005). Further, agricultural mechanics knowledge was noticeably present in a study designed to examine the content knowledge held by successful SBAE teachers (Roberts et al., 2007). Additionally, as reported by Albritton and Roberts (2020), over one-third of the skills perceived as necessary for new teachers in SBAE were related to agricultural mechanics. The necessity of these skills has not gone unnoticed by agricultural education undergraduates, as mentions of agricultural mechanics were common in early field experience reflections (Baker et al., 2017; Wells et al., 2018). Similarly, the *Standards for SBAE Teacher Preparation Programs* (American Association for Agricultural Education [AAAE], 2017) emphasized knowledge and skills related to agricultural equipment among the knowledge and performance indicators associated with *Technical Content Knowledge*, one of the six primary standards comprising the document. As such, training in agricultural mechanics has traditionally been an area of importance in SBAE teacher education.

A study by Breeding et al. (2018) found that winners of the National Association of Agricultural Educators' Outstanding Young Member award did not feel strongly prepared to teach agricultural mechanics through their SBAE teacher preparation programs. Similarly, Wells et al. (2021a) concluded that preservice teachers in several states were not adequately prepared to implement agricultural mechanics content. In reviewing the preparation of preservice SBAE teachers in agricultural mechanics, Hubert and Leising (2000) found that in the mid-1990s, an average of 6.7 agricultural mechanics course credits were required for certification among teacher preparation programs in the United States. A similar examination published five years later indicated that nearly 90% required multiple course credits in agricultural mechanics content, with an average requirement of 9.1 credits (Burris et al., 2005). Subsequent studies, however, have suggested that the number of required credits may have decreased as teacher preparation programs conform to shortened degree completion timelines (Byrd et al., 2015;

Johnson et al., 2012; McKim & Saucier, 2013). More recently, two studies confirmed reductions in the number of agricultural mechanics credit hours, with a reported national average of 5.8 required credit hours (Granberry et al., 2023; Trickett et al., 2023).

Beyond the influence of related coursework, researchers have also investigated preservice teachers' perceptions of agricultural mechanics. In a qualitative study of final-year preservice female teachers, Tummons et al. (2017) found that students held concerns about student safety, credibility, and skill acquisition. Similar findings of anxiety and concerns about technical knowledge have been noted among younger female agricultural education undergraduates (Granberry et al., 2022). Outside the bounds of gender, Hainline et al. (2018) described a case of preservice teachers in Texas with self-efficacy concerns stemming from a lack of knowledge, experience, and opportunity to teach agricultural mechanics content. These findings align with an observed lack of self-efficacy in agricultural mechanics skills among preservice teachers over time (Blackburn et al., 2015). Additionally, deficits in skills related to instruction in agricultural mechanics, like maintenance and repair of equipment and safe laboratory management, have been reported among preservice SBAE teachers (Saucier & McKim, 2011).

Despite these concerns, research has indicated that enrollment in agricultural mechanics courses at the post-secondary level positively impacts content knowledge and perceptions of teaching outcomes in agricultural mechanics (Blackburn et al., 2015; Leiby et al., 2013; Whitehair et al., 2020). Conversely, the need for professional development in agricultural mechanics has been sustained in the literature for many years, which aligns with McKim and Saucier's (2013) findings of negligible change over 20 years in perceptions of ability in 22 of 33 agricultural mechanics laboratory management competencies in a study of Missouri SBAE teachers. More recent studies have also described the breadth of SBAE teachers' agricultural mechanics training needs in Alabama (Clemons et al., 2018), Iowa (Smalley et al., 2019), Montana (Toft et al., 2021), Arkansas, Louisiana, Oklahoma, and Texas (Wells et al., 2021a), as well as on a national scale (Wells & Hainline, 2021).

Conceptual Framework

We grounded this study in human capital theory (HCT) (Goode, 1959). According to HCT, a knowledgeable and skilled workforce is critical in maintaining a productive society (Becker, 1993). A primary resource in developing human capital is an educational system that can effectively produce highly trained personnel to support developing industries (Goode, 1959). Today, students can anticipate career opportunities in agricultural mechanics-based career pathways in many facets of modern agricultural industries (Hancock et al., 2017). In agricultural engineering alone, the Bureau of Labor Statistics (2021) anticipated a 5% increase in job growth between 2020 and 2030.

To reflect the diversity of these career opportunities for secondary students, the Agricultural, Food, and Natural Resources (AFNR) Career Pathway Content Standards for Power, Structural, and Technical Systems (PSTS) displayed a wide range of competencies and skills divided into six primary areas of study: Power and Machine Mechanics, Agricultural Structures, Welding and Metalwork, Electrical Power and Processes, Environmental Systems, and Tool and Equipment Safety (Koel et al., 2013; National Council for Agricultural Education [NCAE], 2015). In this study, HCT supported the concept that SBAE teacher preparation in agricultural mechanic systems and technology must be sufficient to supply a skilled and knowledgeable workforce. This concept was also supported by Byrd et al. (2020), who found

that guided by a skilled instructor and dedicated curriculum, students in secondary agricultural mechanics courses displayed an aptitude for fabricating agricultural equipment according to industry-standard blueprints.

Technological Advancements in Agricultural Mechanics Education

The rapid growth of technology in agriculture necessitates education in agricultural mechanics to keep pace (Hancock et al., 2017). Precision agriculture, engineering, mechanization, and technological advancements are influential areas in the agricultural industry (Warren-English et al., 2019; Alston et al., 2018). Similarly, outdoor power equipment dealers recognize technology advancements as influential in their industry's future (Alston et al., 2018).

Computer Numerical Control (CNC) equipment and Computer-Aided Design (CAD) software have become prevalent in SBAE agricultural mechanics laboratories (Saucier & Langley, 2017). Interacting with CNC equipment provides experiential learning opportunities for students, aligning with industry careers (Rasty, 2020). STEM-centered professional development addresses SBAE teachers' needs in incorporating CNC technologies meaningfully (Saucier & Langley, 2017).

Renewable energy sources, including solar, wind, and biofuels, are emerging topics in agricultural mechanics education (Franklin, 2020). Agricultural mechanics instruction provides an ideal environment for delivering renewable energy education (Acker et al., 2008); however, teacher knowledge and training deficits hinder the implementation of renewable energy education (Paulsen et al., 2014). Professional development positively impacts teaching self-efficacy and outcome expectancy for renewable energy content, and SBAE teachers have expressed a desire for related training (Han & Martin, 2015; Paulsen et al., 2014).

Studies on SBAE teachers in Alabama and Iowa revealed a high demand for professional development to integrate current agricultural technology into the curriculum (Clemons et al., 2018; Smalley et al., 2019). Michigan SBAE teachers identified unmanned aerial vehicles and precision agriculture sensors as top emerging technologies requiring training (King et al., 2019). However, integration challenges persist, with limited content incorporation reported in Illinois and Alabama SBAE curricula (Heidenreich et al., 2020). This limited integration may be the result of teachers' tendency to acquire technology training through personal trial and error, often facing barriers like cost (Williams et al., 2014). When viewed through the lens of HCT, gaps in SBAE teacher training and education of emerging agriculture technologies may lead to deficits in a knowledgeable and skilled workforce.

Purpose and Objectives

The purpose of this study was to describe the agricultural mechanics training needs of preservice SBAE teachers, as perceived by SBAE teacher educators. This study is one component of a larger research effort on the preparation of preservice SBAE teachers in agricultural mechanics. This work aligns with the AAAE Research Values related to *increasing prosperity through innovation in AFNR systems* by examining training needs for SBAE teachers to aid in developing the future AFNR workforce (AAAE, 2023). The following three objectives guided our study:

1. Determine SBAE preservice teachers' agricultural mechanics training deficits as perceived by teacher educators.

2. Rank the largest agricultural mechanics training deficits for preservice SBAE teachers.
3. Rank the smallest agricultural mechanics training deficits for preservice SBAE teachers.

Methods

This descriptive study sought to examine the priority of agricultural mechanics competencies for preservice SBAE teachers based on the perceptions of teacher educators. We focused on a target population of one teacher educator from every post-secondary institution in the United States, offering four-year undergraduate degree programs designed to train SBAE teachers. The target population comprised institutions listed as AAAE members, with a frame of reference provided by Kleinjan and Marx (2018). A panel of teacher educators reviewed the list for frame errors, excluding any institutions that did not meet the study's criteria. Additionally, 11 institutions that were not on the AAAE list but met the inclusion criteria were added, resulting in a final target population of 98 institutions.

Dillman et al. (2014) posited that a census is appropriate in cases where the population is small and surveying everyone incurs negligible additional costs. Given the manageable size of the target population, we utilized online faculty directories to identify a representative for each institution and conducted a census via a Qualtrics survey using the tailored design method (Dillman et al., 2014). These representatives, confirmed by a panel of current SBAE teacher educators at Louisiana State University, were chosen based on their role as faculty members in the SBAE teacher preparation program and their involvement in courses related to agricultural mechanics topics or laboratory management. In cases in which we could not identify a representative meeting both criteria, we selected an SBAE teacher educator at the institution. If we did not find any agricultural education faculty, we instead chose the chair of the department housing the SBAE teacher preparation program to represent the institution. When data collection concluded, 77 participants provided data usable for analysis, comprising a response rate of 78.6%. To address non-response, we made multiple attempts to contact non-respondents. If no survey data could be collected, demographic information about non-responding institutions was collected from their respective websites to help us identify any noticeable trend in non-respondents. Based on the demographic data, we determined that this study may not adequately represent private colleges or universities with undergraduate enrollments below 3,000 students in the North Central AAAE region.

For this study, we used an updated version of an instrument by Burris et al. (2005), who provided respondents with a list of competencies in the following content areas (a) *Metal Fabrication*, (b) *Hand and Power Tools*, (c) *Project Planning and Materials Selection*, (d) *Electricity*, (e) *Concrete*, (f) *Plumbing*, (g) *Building Construction*, (h) *Ag Power* (renamed *Outdoor Power Equipment and Small Engines*), and (i) *Machinery and Equipment*. We retained the original instrument's competencies but reworded several for clarity. Additionally, we included new competencies where necessary to reflect modern technology in agricultural mechanics. We derived new competencies from the Power, Structural, and Technical System Pathway in the AFNR Standards from The NCAE (2015) and state standards available to the public. The inclusion of updated competencies also necessitated the creation of a new content area: *renewable energy*. The resulting instrument consisted of 59 competencies across the ten content areas.

We asked participants to rate their perception of each competency's importance on a five-point Likert-type scale, with one indicating the lowest level of importance and five indicating the highest. Further, we asked participants to indicate their perception of the level of preparation that preservice SBAE teachers in their programs received on those same competencies using a similar five-point Likert-type scale. Cronbach's (1951) alpha was used to calculate the *post hoc* reliability of the scales used to measure perceived levels of importance and preparation in agricultural mechanics competencies. Alpha values for scale items ranged from .83 to .96.

Ranked Discrepancy Model

We selected Narine and Harder's (2021) ranked discrepancy model (RDM) to assess teacher educators' perceptions of preservice teachers' agricultural mechanics training needs. Narine and Harder (2021) proposed the RDM as an alternative to the Borich (1980) needs assessment model, addressing issues of scale interpretation and comparability between studies.

The RDM is appropriate under specific conditions, including cross-sectional data gathered from a target population at a single point in time, paired ordinal scales for each variable, and a focus on assessing discrepancies between two identified conditions for each item, all of which align with the data collected for this study (Narine & Harder, 2021). Analyzing results using both the Borich model and the RDM, Narine and Harder (2021) found a very strong and positive correlation ($r = 0.98$) and minor differences in competency rankings.

The calculation of ranked discrepancy scores involved counting negative ranks (NR), positive ranks (PR), and tied ranks (TR) using Wilcoxon's signed rank test in IBM SPSS version 27 (Field, 2018; Narine & Harder, 2021). Negative ranks represented competencies perceived as more important than the preparation of preservice teachers, while positive ranks indicated the opposite. Tied ranks reflected equal perceptions of importance and preservice teachers' preparation in a competency.

After performing Wilcoxon's (1945) signed rank test, we transferred the SPSS output to a Microsoft Excel-based RDS calculator derived from Narine and Harder's (2021) instructions. We then weighted the rank percentages to produce the final RDS for each competency. Negative rank percentages were multiplied by -1, positive rank percentages by 1, and tied ranks by 0. The sum of weighted rank percentages yielded an RDS ranging from -100 to 100. Negative values indicated a need for training, while positive values suggested above-adequate preparation. In the case of competencies with equal RDS, we determined the rankings by the largest percentage of negative ranks, followed by mean average importance where necessary. We then reordered the list of competencies by RDS to identify the largest and smallest deficits.

Findings

For this investigation, we drew upon teacher educators' perceptions of competencies collected in our larger study to identify the agricultural mechanics training needs of preservice SBAE teachers using Narine and Harder's (2021) RDM. We present our findings below by the research objective they address.

Objective One: Determine SBAE preservice teachers' agricultural mechanics training deficits as perceived by teacher educators.

All agricultural mechanics competencies displayed negative ranks (NR), indicating that the perceived level of importance of the competency was greater than the perceived level of preparation that preservice teachers were receiving. The NR for all competencies ranged from 32.89% to 72.68% of respondents. Additionally, 36 of the 59 competencies had NR comprising over 50% of respondents. Conversely, 53 of the 59 competencies had some instances of positive ranks (PR), meaning that some respondents perceived that their students were better prepared for those competencies than their perceptions of importance necessitated. The highest PR percentage was 11.69% of respondents in *operating oxy-acetylene cutting equipment*. All competencies exhibited tied ranks (TR), indicating that respondents perceived their students to be adequately prepared based on the importance of the competency. The percentage of tied ranks ranged from a minimum of 25% of respondents on *servicing monitoring, sensing, and metering* devices to a maximum of 64.47% of respondents on *applying safety practices associated with outdoor power equipment*.

The real values for RDS were -100 to 100, with negative values indicating a need for training. Our findings revealed that all 59 agricultural mechanics competencies displayed a negative RDS, indicating at least some need for training. RDS values for all competencies ranged from -72.37 to -25.00.

Objective Two: Rank the largest agricultural mechanics training deficits for preservice SBAE teachers.

The competency group with the greatest number of individual competencies in the top quarter of the ranking was *machinery and equipment*, with five of its seven competencies indicating a high need for training in this area. *Renewable energy* followed closely, with four of its five competencies in the top 25%. *Concrete* had two of its four competencies near the top of the rankings, followed by metal fabrication, project planning and materials selection, plumbing, and building construction, with one competency each in the top 25%.

The five highest-ranked competencies in terms of greatest training needs were *service monitoring, sensing, and metering devices* (RDS = -72.37), *explain the use of electronic instrumentation* (RDS = -71.05), *use CNC cutting systems* (RDS = -68.42), *operate agricultural machinery and equipment* (RDS = -67.11), and *utilize CAD software* (RDS = -64.47). The sixth-ranked competency, *maintain and repair solar photovoltaic system components* (RDS = -64.47), exhibited an equal RDS and equal percentages of NR, PR, and TR. In this case, we used average perceived importance to establish the ranking. The competencies with the lowest RDS, indicating the greatest need for training, are ranked in Table 1 below.

Table 1

Largest Agricultural Mechanics Training Deficits for Preservice SBAE Teachers Identified by Teacher Educators (n = 77)

Competency	Ranks (%)				Rank
	NR	PR	TR	RDS	
Service monitoring, sensing, and metering devices	73.68	1.32	25.00	-72.37	1
Explain the use of electronic instrumentation	71.05	0.00	28.95	-71.05	2
Use computer numerical control (CNC) cutting systems	69.74	1.32	28.95	-68.42	3
Operate agricultural machinery and equipment	67.11	0.00	32.89	-67.11	4
Utilize computer-aided design (CAD) software	65.79	1.32	32.89	-64.47	5[a]
Maintain and repair solar photovoltaic system components	65.79	1.32	32.89	-64.47	6[a]
Install solar photovoltaic equipment	63.16	1.32	35.53	-61.84	7
Estimate materials (concrete)	63.64	2.60	33.77	-61.04	8
Explain the production of biofuels	63.51	2.70	33.78	-60.81	9
Explain the use of wind turbines for energy generation	63.16	2.63	34.21	-60.53	10
Explain the use of UAV/drones in ag production	64.47	5.26	30.26	-59.21	11
Construct forms and reinforcing structures	61.04	2.60	36.36	-58.44	12[a]
Install pipe and plumbing fixtures	59.74	1.30	38.96	-58.44	13[a]
Perform maintenance and repairs on agricultural machinery and equipment	57.89	0.00	42.11	-57.89	14
Plan cost-effective construction	60.00	2.67	37.33	-57.33	15[a]
Apply safety practices associated with agricultural machinery and equipment	57.33	0.00	42.67	-57.33	16[a]
Replace electric motors	58.44	1.30	40.26	-57.14	17
Apply safety practices associated with concrete	58.44	2.60	38.96	-55.84	18
Install framing, doors, windows, and roofing	57.89	2.63	39.47	-55.26	19[a]
Explain the basic principles of operation of agricultural power and machinery systems	55.26	0.00	44.74	-55.26	20[a]
Maintain water systems	57.14	2.60	40.26	-54.55	21
Place, finish, and cure concrete	57.89	3.95	38.16	-53.95	22
Estimate electrical loads and circuit needs	54.67	1.33	44.00	-53.33	23
Identify plumbing equipment	53.25	1.30	45.45	-51.95	24
Apply basic carpentry skills	55.26	3.95	40.79	-51.32	25[a]
Apply safety practices associated with renewable energy	53.95	2.63	43.42	-51.32	26[a]
Apply safety practices associated with plumbing	51.95	2.60	45.45	-49.35	27[a]
Develop working drawings	51.95	2.60	45.45	-49.35	28[a]
Interpret designs and sketches	52.00	2.67	45.33	-49.33	29
Troubleshoot problems with small gasoline engines	51.32	2.63	46.05	-48.68	30[a]
Identify building materials	48.68	0.00	51.32	-48.68	31[a]

Note: NR = Negative Ranks; PR = Positive Ranks; TR = Tied Ranks; RDS = Ranked Discrepancy Score; [a] Formula used to rank tied RDS scores.

Objective Three: Rank the smallest agricultural mechanics training deficits for preservice SBAE teachers.

The competency group with the most individual competencies in the bottom quarter of the ranking was *metal fabrication*, with four of its eight competencies, indicating a lesser need for training compared to other areas. *Outdoor power equipment and small engines* and *hand and portable power tools* each had three competencies near the bottom of the list, followed by *project planning and material selection* and *electricity,* with two competencies each. *Building construction* was the final competency group represented in the bottom 25% with one competency, *prepare a bill of materials* ranked 48th.

The five lowest-ranked competencies, indicating the least need for additional training, were *disassemble and reassemble small gasoline engines* (RDS = -25.00), *cut, file, drill, and shape metal* (RDS = -26.32), *operate oxy-acetylene equipment* (RDS = -29.87), *apply safety practices for using hand and portable power tools* (RDS = -31.17), and *perform basic electrical wiring skills* (RDS = -32.47). It is important to note that although these competencies represent the bottom of the ranking in terms of the need for training, all have a negative RDS, indicating some need for training overall. The competencies that comprise the bottom half of the list, indicating a lesser need for training when compared to the upper half, are ranked by ascending RDS in Table 2.

Table 2

Smallest Agricultural Mechanics Training Deficits for Preservice SBAE Teachers Identified by Teacher Educators (n = 77)

	Ranks (%)				
Competency	NR	PR	TR	RDS	Rank
Disassemble and reassemble small gasoline engines	32.89	7.89	59.21	-25.00	59
Cut, file, drill, and shape metal	36.84	10.53	52.63	-26.32	58
Operate oxy-acetylene equipment	41.56	11.69	46.75	-29.87	57
Apply safety practices for using hand and portable power tools	35.06	3.90	61.04	-31.17	56
Perform basic electrical wiring skills	35.06	2.60	62.34	-32.47	55
Apply safety practices associated with outdoor power equipment	34.21	1.32	64.47	-32.89	54[a]
Describe the principles of operation for internal combustion engines	38.16	5.26	56.58	-32.89	53[a]
Apply the safety practices associated with metal fabrication	37.66	2.60	59.74	-35.06	52
Use hand and portable power tools	42.86	6.49	50.65	-36.36	51
Operate electric arc welding equipment	45.45	7.79	46.75	-37.66	50
Apply safety practices associated with electricity	40.79	1.32	57.89	-39.47	49
Prepare a bill of materials	44.16	3.90	51.95	-40.26	48[a]
Use measuring and marking devices	45.45	5.19	49.35	-40.26	47[a]
Apply safety practices associated with building construction	42.11	1.32	56.58	-40.79	46[a]

Competency	Ranks (%)			RDS	Rank
	NR	PR	TR		
Demonstrate the layout process for project construction	44.74	3.95	51.32	-40.79	45[a]
Use land surveying equipment	52.63	10.53	36.84	-42.11	44
Operate plasma cutting equipment	49.35	6.49	44.16	-42.86	43[a]
Demonstrate the proper selection of paint and preservatives	50.65	7.79	41.56	-42.86	42[a]
Demonstrate procedures for reconditioning and sharpening common hand tools	51.95	9.09	38.96	-42.86	41[a]
Service and repair small gasoline engines	45.33	1.33	53.33	-44.00	40
Identify the basic principles of electrical wiring	45.45	1.30	53.25	-44.16	39[a]
Demonstrate out-of-position welding	51.95	7.79	40.26	-44.16	38[a]
Select wiring materials and supplies	48.00	1.33	50.67	-46.67	37
Identify types of metal	49.35	2.60	48.05	-46.75	36[a]
Estimate the materials cost for project construction	49.35	2.60	48.05	-46.75	35[a]
Select and use wood and metal fasteners	51.32	3.95	44.74	-47.37	34[a]
Diagnose power system conditions	53.95	6.58	39.47	-47.37	33[a]
Identify symbols used in agricultural wiring plans	49.35	1.30	49.35	-48.05	32

Note: NR = Negative Ranks; PR = Positive Ranks; TR = Tied Ranks; RDS = Ranked Discrepancy Score; [a] Formula used to rank tied RDS scores

Conclusions, Implications, and Discussion

The combination of the highly technical nature of agricultural mechanics (Albritton & Roberts, 2020) and the reduced credit hours for preservice teachers in the content area (Granberry et al., 2023) has created an evident issue. Preservice teachers have frequently expressed concerns regarding their self-efficacy to teach agricultural mechanics (Burris et al., 2010; Granberry et al., 2022; Hainline et al., 2018; Tummons et al., 2017). The findings of this study confirm that, based on faculty perceptions, preservice teachers need training in multiple content areas under the agricultural mechanics umbrella. Of the 59 competencies in the instrument, all competencies exhibited negative RDS, indicating a need for training in those areas. Additionally, none of the 59 competencies in this study had an average perception of importance greater than or equal to the average perceived level of preservice teacher preparation. These findings represent a broad need for agricultural mechanics training for preservice and early career SBAE teachers, of which many teacher educators are cognizant.

However, patterns begin to emerge when evaluating the specific needs based on the perceptions of SBAE teacher educators. The most evident deficit was present in the top 25% of ranked competencies. Nine of these 15 competencies were technology-based and represented innovations in *agricultural machinery and equipment*, *metal fabrication*, *project planning and materials selection*, and *renewable energy*.

These findings aligned with Wells et al. (2021b), who found Unmanned Aerial Vehicles and CNC equipment in the top 25% of in-service SBAE teachers' agricultural mechanics professional development needs. However, the current study utilized more technology-based competencies than those presented by Wells et al. (2021b). The number of technology-based

competencies ranking at the top of the list of competencies indicated that a greater percentage of faculty perceived these competencies to have greater importance than the level of preparation received by their preservice teachers.

In light of these findings, we question the cause of this discrepancy and its impact on new SBAE teachers as they begin their careers. Precision agriculture and agricultural technology, engineering, and mechanization have been identified as areas of growth that will likely be critical to the agricultural industry in the future (Warren-English et al., 2019). If preservice teachers are perceived as *poorly prepared* in agricultural mechanics technology, they must rely on educational experiences outside of their teacher preparation programs to gain the knowledge and skills necessary to include these technologies in their teaching. Smith et al. (2018) found that nearly half of SBAE teachers preferred to observe others using educational technologies before they were willing to adopt them. If the findings of Smith et al. (2018) were considered in an agricultural mechanics setting, a potentially detrimental outcome could emerge for agricultural mechanics technology in SBAE settings.

The findings related to renewable energy are troubling, considering that non-hydroelectric renewable energy sources were projected to be the fastest-growing forms of U.S. energy generation, and the domestic production and use of biofuels is expected to increase through 2050 (U.S. Energy Information Administration, 2021). Additionally, the Bureau of Labor Statistics (2021) indicated that wind turbine service technicians and solar photovoltaic installers ranked first and third as occupations with the highest projected growth by 2029. According to Hancock et al. (2017), this boom in renewable energy has also carried over to agricultural industries:

> Alternative means of electricity generation are growing to meet the energy demands of farming operations and to reduce costs. Several technologies, including alternative fuels, methane digesters, small-scale solar panels, wind power turbine generators, and biomass generation, are sources of renewable power for agricultural buildings. (p. 66)

Consequently, as energy production diversifies, the need for skilled workers in renewable energy systems increases (Bureau of Labor Statistics, 2021). Roberts and Ball's (2009) model for agriculture as a content and a context for teaching emphasized agricultural literacy and relevant skills as dual goals for SBAE. For renewable energy, industry demands and innovations in energy production justify renewable energy to be included in modern agricultural curricula as both a topic by which students should be generally familiar as a potential career. Therefore, SBAE holds a unique position in education at the intersection of knowledge and application relating to natural resources, making for an ideal environment to deliver renewable energy education, particularly in solar energy, wind energy, and biofuels (Acker et al., 2008; Franklin, 2020). This opportunity has been noticed, as the AFNR PSTS (NCAE, 2015) includes standards to develop students' academic and career success in renewable energy, and prominent secondary agricultural mechanics texts include units on renewable and alternative energies (Hancock et al., 2017; Koel et al., 2013).

The competencies with the smallest training deficits represented the *outdoor power equipment and small gasoline engines, metal fabrication, hand and portable power tools,* and *electricity* content areas. These competencies hold high average perceptions of importance in preservice teacher preparation and are present in the coursework of over 50% of institutions that require agricultural mechanics courses (Granberry et al., 2023; Trickett et al., 2023). While the

presence of these competencies near the bottom of the RDS rankings is promising, it is important to note that they all had negative RDS values, indicating a perception of some need for additional training.

The findings of this study also indicated that SBAE teacher educators were aware of the agricultural mechanics training needs of newly certified teachers from their programs. We recommend teacher educators use their knowledge of the needs of their students to facilitate professional development in the areas that they perceive a need for training. A potential outlet for impactful agricultural mechanics-based professional development may stem from industry partnerships with companies with a vested interest in SBAE students' skill development. Wells and Hainline (2021) made similar recommendations to include industry partners in curriculum validation, experiential learning, and teachers' professional development. One example of a successful industry partnership for professional development is the Briggs and Stratton (2021) Field School. The Briggs and Stratton Field School is a professional development opportunity for Career and Technical Education teachers to become trained in an industry-backed experiential learning curriculum in small gasoline engines. If similar professional development partnerships in other areas of agricultural mechanics can be formed, especially involving technology, the outcomes for SBAE teachers and students may be positively impacted. Similarly, the CASE AST and MSA curricula and associated professional developments may be an impactful avenue for increasing the STEM aspects present in agricultural mechanics education. Although Wells et al. (2021b) determined that the CASE MSA curriculum needed continued refinement, their findings and conclusions supported the need for SBAE teacher training in modern technology associated with agricultural mechanics.

Our final recommendation for research was based on the methodology and data analysis techniques we used in this study. We analyzed data by using Narine and Harder's (2021) RDM. Because the RDM is a novel method of analyzing paired-data needs assessments, more research is needed to determine its effectiveness across multiple agricultural and extension education topics. Narine and Harder (2021) reported a statistically significant, very strong, positive correlation ($r = 0.98$) between the Borich (1980) Model and the RDM when using both methods to analyze the same data set. With that finding in mind, the Borich Model is a widely utilized tool for SBAE teacher professional development needs assessments, though it is often challenging to implement. Therefore, further research on the RDM and an evaluation of the Borich Model is needed across a wide range of SBAE topics to determine the situational appropriateness of each research method and if one proves more effective.

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An Evaluation of Ohio Agricultural Education Students' Performance and User Experience in a Virtual Reality Machinery Safety Experience

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Abstract

Agriculture is one of the most hazardous industries in the United States for all workers, and even more so for young workers. In the U.S., legislation prescribes training for youth under the age of 16 working in hazardous situations in production agriculture. Virtual Reality (VR) technology has become an increasingly popular means of deploying training for various disciplines. The purpose of this study was to determine the feasibility of a VR curriculum to provide a realistic and positive user experience for students in tractor and machinery safety operation lessons. The VR curriculum developed for the study was based on the National Safe Tractor and Machinery Operation Program. Ohio Agricultural Education students' (n = 132) user experience data were analyzed and found students had a positive experience in the virtual reality training. Data recorded from a subset of 38 students resulted in poor scores during the precheck and driving course. The implications of these findings suggest VR can provide a supplemental training method for tractor and machinery programs.

Introduction and Literature Review

Agriculture is one of the most hazardous industries in the United States for all workers (U.S. Department of Labor, 2020). For young workers, the dangers of agricultural environments are even higher. According to the National Children's Center (2020), approximately 15 children die from an agricultural event per 100,000 full-time equivalent workers (FTE), with 25% of all deaths attributed to machinery (National Children's Center for Rural and Agricultural Health and Safety, 2019). Additionally, injuries in youth populations follow fatality rates where youth are 7.8 times more likely to be fatally injured on farms and ranches.

Youth working for hire, and those living on a family farm, have exposure to agricultural equipment. The Department of Labor's publication, *Child Labor Bulletin 102*, states that minors under the age of 12 can "be employed outside of school hours with parental consent on a farm where employees are exempt from the federal minimum wage provision" (U.S. Department of Labor Wage and Hour Division, 2016, p. 3). At age 16, there are no restrictions to youth employment on farms and ranches. To provide protection during these occurrences, it is important that educational resources be continuously developed and provided to young workers to improve their safety knowledge, enhance their skills, and overall increase their awareness for agricultural dangers; likewise, training resources directed towards agricultural educators, parents, and supervisors of young workers should be readily available to adult trainers (Jepsen, 2011).

Safety education has two purposes: it provides a method to train workers and other individuals to engage in self-protective behaviors; and it serves as the foundation for safeguards and supervision strategies (Donham & Thelin, 2016). Research shows that educators and students are unaware of basic farm safety information and where to find resources needed to stay informed. For example, of 24 agricultural educators surveyed, only 30% knew that the farm tractor was the

leading cause of occupational fatalities (May & Scofield, 2005). In another study of Iowa agriculture teachers, 52% indicated they were not knowledgeable about where to find agricultural safety and health resources and 60% did not believe they taught safety and health enough in class (Rudolphi & Retallick, 2015). Vincent et al. (2019) showed a significant difference in improved attitude, knowledge, and skills between the pre- and post-tests of high school students who participated in a cost-effective rollover protective structure curriculum. In safety education it is important to provide an engaging and interactive curriculum to improve students' safety knowledge and skills. The use of educational technology, such as virtual reality, could be a method to provide those engaging skills and knowledge.

Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) are common types of computer technology programs based on artificial environments where users interact through their sights, sounds, and actions (Virtual Reality Society, 2017). Virtual Reality uses a fully immersive environment and technology to engage the user in the experience. Augmented Reality is the least immersive of the three and uses technology such as smartphones to overlay an environment that can be interacted with through a smartphone. Mixed Reality is a mixture of the other realities; it allows the user to interact with accurate equipment in an immersive environment, such as a driving simulator.

These technologies are options for teachers who wish to incorporate experiential learning and give students access to real experiences they might have the opportunity to participate in otherwise. Johnson (2010, p. 22) stated, "AR has strong potential to provide both powerful contextual, on-site learning experiences and serendipitous exploration and discovery of the connected nature of information in the real world." Lamb and Etopio (2019) found that a virtual experience for preservice teachers promoted learning from modeled real-life situations for the transfer of theory into practice. In another study, students were immersed in a virtual learning environment before the start of an online literacy course; through their experience, they reported positive perceptions and valued the use of the virtual environment (Domingo & Bradley, 2018). Liarokapis et al. (2004) demonstrated that AR can take complicated mechanisms and difficult theories in higher education and make them accepted and understood by students. Positive experiences and applications have been reported in several educational settings, paving the way for VR to enter numerous disciplines as a training method.

Across many industries, such as medicine, pedestrian safety, construction, manufacturing, military training programs, and preservice teacher preparation, VR has been used as an effective form of training. In one study, experienced surgeons who had prior experience with VR training were much faster and used significantly less contrast fluid than the inexperienced group (Aggarwal et al., 2006). Another study on a VR training program used in the construction industry reported that workers who used the program showed a significant difference between pre- and post-tests in hazard identification and prevention (Sacks et al., 2013). Finally, the mining industry tested VR safety practices in attempts to reduce the number of equipment-related injuries; as a result, a variety of simulators are available commercially including dozers, draglines, haul trucks, shovels, and continuous miners (Tichon & Burgess-Limerick, 2011).

Agricultural machinery operation is yet another technical training program that VR could improve. One benefit of VR curricula is that it allows students to experience potentially hazardous and stressful situations in a safe, controlled environment. In this environment, students can learn the necessary skills needed to be successful with the real experience without the danger

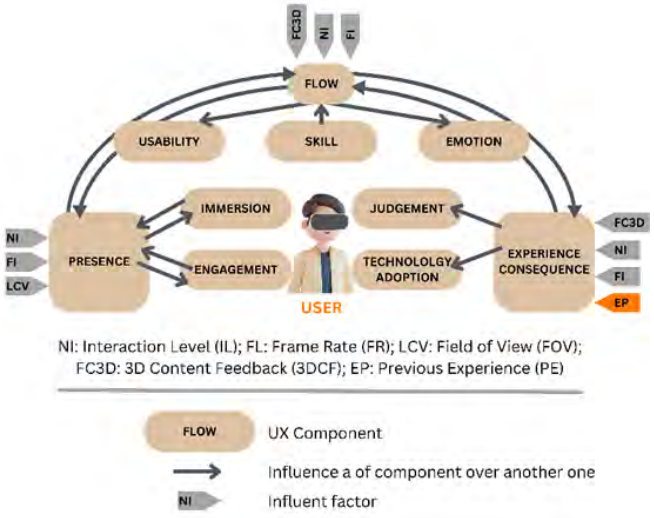
of attempting trial and error in a real experience. One safety education-based study showed 3D VR was more effective than a lecture-only delivery method and equally comparable to a lecture with a physical laboratory (Nakayama, 2014). Using VR curricula in agricultural machinery operation training could therefore be used as a safer method to teach these concepts without the risks of a physical laboratory setting.

Theoretical Framework

The User Experience (UX) model, developed by Tcha-Tokey et al. (2016), guided the design of this study. This model brings together ten independent components to create a personalized user experience with the technology (see Figure 1). These components include Presence, Immersion, Engagement, Flow, Usability, Skill, Emotion, Judgement, Technology Adoption, and Experience Consequence. Each component influences the other directly or indirectly to establish the User Experience.

Figure 1.

User Experience Framework (Tcha-Tokey et al., 2016)



Each component of the model can be further described. Presence is defined as the user's sense of being there in the virtual environment (VE) (Pallot et al., 2013). Engagement is the energy in action, or the connection between a person and their activity, consisting of a behavioral, emotional, and cognitive form. Immersion is defined as the "illusion;" that is, the virtual environment technology replaces the user's sensory stimuli with the virtual sensory stimuli (Witmer et al., 1998). Flow indicates a pleasant psychological state of sense of control, fun, and joy that the user feels when interacting with the VE (Heutte et al., 2010). Skill is the knowledge the user gains in mastering their activity in the virtual environment (Murphy et al., 1989). Emotion is the feelings of joy, pleasure, satisfaction, frustration, disappointment, and anxiety of the user in the VE (Pekrun et al., 2011). Usability describes the ease of learning, as well as the ease of using the VE (Brooke, 1996). Technology Adoption includes the actions and decisions taken by the user for future use, or intention to use, the VE (Venkatesh et al., 2003). Judgment is the user's overall perceptions (clarity, originality, practicality, etc.) of the experience in the VE

(Hassenzahl et al., 2003). Experience Consequence comprises the symptoms or "simulator sickness", stress, dizziness, headache the user can experience in the VE (Kennedy et al., 1993).

Purpose and Objectives

The overarching question of this study was, “Does virtual reality provide a realistic experience and supplemental option for skill-based education?” For this study, skill-based education is related to safe tractor and machinery operation. This aligns with AAAE core values such as advancing public knowledge of AFNR systems and promoting personal responsibility and safety in AFNR systems (AAAE, 2023). This study used the following objectives to help answer the question:

1. Describe the user experience (UX) of Ohio agricultural education students in the virtual reality program.

2. Describe program performance of Ohio agricultural education students enrolled in a tractor and machinery course, using VR as a supplemental learning tool.

3. Describe the difference in Ohio agricultural education students’ pass/fail rate between a traditional tractor safety training and a tractor safety program with VR.

Methods

VR Experience

This tractor safety simulation was designed at The Ohio State University using the software services of Victory Enterprise, Inc. The VR experience operates on the Oculus Quest/Quest 2 VR headsets, two hand controllers, and a USB-C cable for connections to a computer. It was based on the operating skills and driving course within the National Safe Tractor and Machinery Operation Program (NSTMOP). A content advisor and three Extension representatives with NSTMOP experience provided reviews during the development process. It was pilot tested with 15 College of Agriculture students enrolled at The Ohio State University.

Licensed agricultural education teachers are identified in the DOL legislation as qualified instructors to teach tractor and machinery safety. The NSTMOP curriculum is one of several curricula that teachers can use to teach tractor and machinery safety to qualify for the DOL certification. Teachers were instructed to teach their machinery curriculum and allow students to use the virtual experience for two weeks.

The VR experience was comprised of three areas: a safety content review, a skills test, and a driving course. The three areas were designed for the students to move freely between the skills and driving courses. The safety content review area was an unscored area of experience, available at any time. This component included a stationary tractor inside of a barn where users could interact with “hot spots” on the tractor to review safety content related to NSTMOP content or their classroom curriculum. The skills testing area was outside of the barn. Here, a large stationary tractor and hay baler were available for students to interact with the power take-off (PTO), hydraulic connections, and implement hitch. The driving course was at the center of the experience, between the review barn and the skills station. Here, users completed pre-operational checks, which were represented by questions from the specific pre-op check; if these checks were not completed, or completed inaccurately, students received penalty points. Once the pre-checks were completed, users had to safely mount the tractor, fasten the seatbelt, start the tractor, engage

the correct gear, and successfully drive the course. Points were accumulated if users brush, strike, or knock over an object or mount the tractor incorrectly. The scoring of this experience required students to finish with a score as close to zero as possible, meaning no penalty points.

Population and Sampling

Recruitment materials were sent to the entire base of 524 Ohio agricultural educators in 2021, seeking teachers who taught machinery operation and safety as a part of their curriculum. Twenty teachers qualified and responded with interest in the study. These teachers then recruited 132 students from their courses to participate in the VR experience.

A schedule was developed for deployment of VR hardware and application to the programs based on the order of sign-up, location in the state, and proximity to other participating schools. When a teacher received the resources, they were also given personal instructions for setting up the headset, which included locating the application within the headset and a tutorial of the experience. They also received a 40-minute video of these same instructions for later reference if needed. It was recommended in recruitment that teachers try out the VR program first, teach their machinery operation and safety curriculum next, and then recruit students to use the headset. The teachers were instructed to use the VR experiences as supplemental learning activity.

Students that participated in Objective 3 were recruited from a single school in two different class periods. All students were in an 8th grade level Principles of Agriculture course. The teacher was provided access to the AgSafety4U online course to provide students with tractor safety content comparable to the NSTMOP curriculum. The researcher randomly chose the class to use the VR experience. Upon completion of the online curriculum, students had one week to practice driving the certification course. The class that practiced with the VR experience had an additional week to practice with the experience before practicing on the real tractor. Finally, each class had one week to drive the certification course for pass/fail.

Instrumentation, Data Collection and Analysis

Data for Objective 1 was collected via survey after students completed all the tasks in the VR program. The 79-item instrument consisted of 10 constructs extracted from previously published surveys, using 10-point Likert scales, with ranges from Strongly Disagree (1) to Strongly Agree (10). Table 1 outlines the original questionnaires and their authors for each construct.

Table 1. *User Experience constructs by original authors and Cronbach alpha coefficients for original studies and tractor/machinery study*

Component	Current Study 2022	Pilot Study in Spring 2021	Tcha-Tokey et al. 2016	Original Questionnaire	Original Authors
Presence	.88	.92	0.75	0.88	Kennedy et al. 1993
Engagement	.85	.92	0.75		
Immersion	.85	.79	0.76	0.81	
Flow	.85	.89	0.82	0.84 – 0.86	Heutte et al. 2010
Usability	.39	.34	0.46	0.92	Lewis et al. 2009

Skill	.91	.97	0.82	0.95	Murphy et al. 1989
Emotion	.60	.53	0.71	0.78 – 0.93	Pekrun et al. 2011
Experience Consequence	.92	.92	0.90	0.71	Bailenson et al. 2006
Judgement	.93	.94	0.80	0.73 – 0.90	Hassenzahl et al. 2003
Technology Adoption	.90	.89	0.78	0.87 – 0.91	Venkatesh et al. 2003

The original instrument (Tcha-Tokey, 2016) was constructed and validated with 116 French participants ranging from 18 to 63 years old, all with careers in Information and Communications Technology or Computer Science. Table 1 also reports reliability coefficients from the original questionnaires, our pilot study, and our current study. Almost all constructs report acceptable alphas ranging from .85 to .93 (Devellis, 2003). Tcha-Tokey et al. (2016) reported a low alpha on the Usability construct, this could be attributed to the low question count (n = 3) of that construct. However, it was important to include this construct in the survey so that the usability of the headset and program could be assessed.

For our study, post-hoc reliability was used to test the reliability of each construct. Upon analysis, three constructs with low alphas were identified. Immersion originally reported an alpha of .32, but after removing two questions reliability was raised to .85. Two other constructs, Emotion ($\alpha = .60$) and Usability ($\alpha = .39$), were removed due to having a low number of questions. All other constructs reported high alphas ($\alpha > .8$) and were included in the summated User Experience score. Additional data collected for Objective 1 were analyzed using descriptive statistics.

Objective 1 sought to describe Ohio agricultural education students' scores on their perceptions of user experience. The UX survey recorded 132 responses from students, 41.66% ($n = 55$) of students provided a usable data sample. Each question was scored on a scale of Strongly Disagree (1) to Strongly Agree (10) and negatively worded questions were reverse coded to not negatively affect reliability.

Data for Objective 2 was collected after the student completed the program and was retrieved through the saved score files on the headset. Data included the final scores which consisted of how many times an object was lightly touched (1 pt. each), hit (2 pts. each), mounting or dismounting correctly (1 pt. each), and how many times a specific question was missed. Questions were about the oil, battery, coolant, fuel, tires, ROPS, hitch, and debris. For each question answered incorrectly or not answered at all, 1 point was added to their final score. Student performance data from Objective 2 was analyzed using descriptive statistics to describe the mean and standard deviation of their final score, questions missed, objects lightly touched, struck, and mounted or dismounted.

Data for Objective 3 was collected upon the students' completion of the program's driving course on the real tractor. Data was recorded as a pass/fail upon completion. A Chi-Square test was used to determine differences once it was determined that assumptions would not be met for a paired t-test.

Results and Discussion

Question mean scores for Objective 1 ranged from 4.90 to 8.00, with most scores ranging between 6.00 and 7.90; therefore, questions with a mean score above 7.90 were considered to be high, and questions with a mean score lower than 6.00 were considered to be low. Described below are the questions with the highest and lowest mean scores.

The Experience Consequence construct had the most questions with high averages, of which all questions were negatively coded (1 = 10 and 10 = 1). The question which gauged if students felt an increase in salivation during their experience had a mean score of 8.06 (*SD* = 2.67), with 68.10% (*n* = 90) of the students reporting experiencing a minor increase of salivation. The question which gauged if students experienced any symptoms of vertigo during the experience had a mean score of 8.09 (*SD* = 2.63) with 68.10% (*n* = 90) of the students reporting experiencing minor symptoms of vertigo.

The Engagement construct had the second-highest number of questions with a high score. The question which gauged students' involvement with the experience had a mean score of 8.08 (*SD* = 2.11) with 75.70% (*n* = 100) of the students reporting being involved in the virtual environment.

There were 4 questions with mean scores below 7, interpreted as the lowest scoring questions from the instrument. The Flow construct, with 11 items, had the highest number of questions with a low score. These questions included: students knew what to do at each step (*M* = 5.62, *SD* = 2.54), with 76.50% (*n* = 101) of the students neither agreeing nor disagreeing about what they should do at each step. The question which gauged if students felt like time sped up while they were in the experience had a mean score of 5.38 (*SD* = 2.83), with 75% (*n* = 99) of the students neither agreeing nor disagreeing that sped up. The question which gauged if students felt like they were losing sense of time had a mean score of 5.74 (*SD* = 3.06), with 74.20% (*n* = 98) of the students neither disagreeing nor agreeing that they felt a loss of time. The question which gauged if students felt the need to share emotions that they were feeling had a mean score of 5.30 (*SD* = 2.95), with 73.40% (*n* = 97) of the students neither agreeing nor disagreeing with the need to share those emotions.

The Usability construct had the second-highest number of low-scored items. The questions with the lowest scores were answered by students who felt there was too much inconsistency between the training resources and the virtual environment (*M* = 5.63, *SD* = 2.53). Many students also felt the Oculus headset and controllers were cumbersome to use (*M* =5.39, *SD* = 2.90).

The Immersion construct only had one question that was considered low. This item showed students reported a slightly below neutral level of involvement to the point they lost track of time (*M* =4.94, *SD* = 3.06). Table 2 shows the 41.60% (*n* = 55) of completed scores that make up the students' summated UX, rated on a scale of 1-10 for the whole experience, from Strongly Disagree (1) to Strongly Agree (10).

Table 2. *Ohio Agricultural Education Students User Experience (Summated) (n = 55)*

Construct	Number of items	*M*	*SD*	Range
Presence	12	7.12	1.59	1.92-9.25
Engagement	3	7.30	1.94	1.33-10.00

Immersion[a]	5	6.52	2.04	1.00-10.00
Flow	11	6.05	1.64	1.00-9.45
Emotion	3	7.53	1.86	3.00-10.00
Skill	3	7.18	2.34	2.33-10.00
Usability	3	6.10	1.82	2.33-10.00
Judgement	9	6.90	2.11	1.00-10.00
Experience Consequence	9	8.01	2.06	1.56-10.00
Technology Adoption	7	7.51	1.84	3.14-10.00
User Experience[b]	8	7.07	1.38	4.41-9.47

[a] The Immersion construct had two questions removed. [b] The Emotion and Usability construct was not included in the User Experience construct.

Students' reported user experience was a 7.07 (SD = 1.38) indicating a positive user experience. The three highest (Technology Adoption, Emotion, and Experience Consequence) and lowest (Flow, Usability, and Immersion) scoring constructs are reported below. Students reported they enjoyed learning with and using the headsets (M = 7.53, SD = 1.86). Students also agreed they would want to use this experience again and think that it would make learning more interesting (*M* = 7.51, SD = 1.84). In Experience Consequence, which is a negative construct, students reported minimal minor experiences such as eye strain, headache, nausea, and dizziness (*M* = 8.01, SD = 2.06). Students slightly agreed the experience felt immersive (*M* = 6.52, SD = 2.04). Students also slightly agreed about how well the experience flowed (*M* = 6.05, SD = 1.64). They also slightly agreed about the usability of the Oculus headset and the experience (*M* = 6.10, SD = 1.82).

Objective 2 sought to describe how Ohio agricultural education students performed in the virtual reality experience. Of the 132 students who participated in this study, 38 saved their performance data to the headset. Table 3 below reports the descriptive statistics of the 38 students' performance data.

Table 3. *Ohio Agricultural Education Students' Performance Scores (n = 38)*

Question	Frequency	Percent, %
Oil Question		
Correct	16	42.11
Incorrect	12	31.58
Not Answered	10	26.32
Fuel Question		
Correct	27	71.05
Incorrect	1	2.63
Not Answered	10	26.32

Battery Question		
Correct	23	60.53
Incorrect	5	13.16
Not Answered	10	26.32
Coolant Question		
Correct	27	71.05
Incorrect	1	2.63
Not Answered	10	26.32
Tire Question		
Correct	23	60.53
Incorrect	2	5.26
Not Answered	13	34.21
ROPS Question		
Correct	16	42.11
Incorrect	1	2.63
Not Answered	21	55.26
Hitch Question		
Answered	27	71.05
Not Answered	11	28.95
Checking for Debris		
Moved Debris	16	42.11
Did Not Move Debris	22	57.89
Mounting		
Used Handle	29	76.32
Did Not Use Handle	9	23.68
Dismounting		
Used Handle	28	73.68
Did Not Use Handle	10	26.32

	M	*SD*
Number of Light Touches on an Object	7.92	4.31
Number of Obstacles Hit	7.57	5.62
Total Points	24.55	14.82

The fuel, coolant, and hitching questions were the highest scoring questions with 71.05% (n = 27) answering correctly. The fuel question focused on what the letter on top of the fuel cap stood for; the coolant question focused on when coolant should be checked; and the hitching question asked if implements could be hitched to other areas of the machine. The oil and ROPS questions

were the lowest scoring questions with 42.11% (n = 16) answering correctly. The oil question focused on how often the oil should be checked; and the ROPS question focused on if the seatbelt should be used with the ROPS. Additionally, students were required to explore around the tractor and move a crate before they drove; only 42.11% (n = 16) of the students moved the debris, while the majority, 57.89% (n = 22), did not move the debris.

Students were evaluated for their use of a handrail when mounting and dismounting the tractor. In the VR program they could choose to select the handrail or tractor platform. When mounting the tractor 76.32% (n = 29) of students used the handrail and 23.68% (n = 9) did not use it. When dismounting, 73.68% (n = 28) used the handrail and 26.32% (n = 10) did not use it.

The driving course tracked the times a student lightly touched or struck an object. Students lightly touched obstacles an average of 7.92 (SD = 4.31) times and hit obstacles an average of 7.57 (SD = 5.62) times. On average, the students had a mean score of 24.55 (SD = 14.82) on the pre-check questions, mounting, driving, and dismounting the tractor in the driving course portion of the experience.

Objective 3 sought to describe the difference between the two groups of students participating in the program. A non-significant difference was found between the two groups. A total of 42 students in two classes completed the program and, of those students who completed the driving portion of the program, Group 1 did not use the VR intervention and had 85.70% (n = 18) pass rate with 14.30% (n = 3) students failing. Of the second group that used the VR intervention 85.70% (n = 18) passed and 14.30% (n = 3) failed. Table 4 outlines the results.

Table 4. *Ohio Agricultural Education Students' Passing Rates and Chi-Square*

Group	Frequency	Percent	Chi-Square	p
With no VR			.55	.45
Pass	18	85.70%		
Fail	3	14.30%		
Total	21	100%		
With VR			.55	.45
Pass	18	85.70%		
Fail	3	14.30%		
Total	21	100%		

Results of the chi-square test reported a non-significant (x^2 = .55, p > .5) score between students that passed and failed from both groups. Because both groups had the same number of students that failed the driving portion of the program, it can be concluded that there was no significant difference between the two groups' passing rates. Therefore, the research hypothesis was rejected.

Conclusions, Implications, and Recommendations

Students' User Experience from the VR Program.

Study participants had a mean score over neutral for every construct, concluding that the students' user experience was positive, acknowledging the removal of the two unreliable constructs. The results of our tractor simulation align with research reporting positive user experiences in educational settings (Dirin, 2020; Tcha-Tokey et al., 2017). Currently there have been several studies related to user experience and the use of VR experiences with students in

agricultural education courses at both the secondary and post-secondary level (Heibel et al., 2024; Pulley et al., 2024). In other areas of education, Dirin (2020) developed a mobile VR application and reported changes in students' perceptions of the new technology through their user experience. A foundational VR study of Tcha-Tokey et al. (2017) found that students showed a difference in pre- and post-test knowledge in an edutainment application while reporting a slightly positive experience. Acknowledging the removal of two construct measurements from the summated construct measurements in this study, our results imply that students had a positive user experience with the tractor and machinery VR program. The benefits of understanding students' user experiences will impact future work, targeting specific areas of concern that youth feel affects their learning experience.

Performance of Students in the VR Tractor Program

In this experience, students should have a score as close to zero as possible, meaning ultimate proficiency operating a tractor with minimum errors. However, the sub-set of students using the technology received a high number of points and were therefore labeled as poor performers. This poor performance included many questions not answered by the students, which could be attributed to them not reading or following the instructions correctly. This could also be associated with the context in which the teacher presented the experience to the students, especially when it was offered as a supplemental assignment to their existing tractor safety course. For these reasons, the research team believes the VR course was not presented with sufficient instructions for the students or taken seriously by the students beyond a gamified experience. This limitation could be addressed with future research around the task of implementing VR technology into existing curricula.

Differences Between a Traditional Tractor Training and a Tractor Training with VR

The passing rates of the two groups that completed the tractor operation program were evaluated and found that there was no significant difference between the two groups. It can be concluded that the VR intervention had no statistically significant effect over the traditional training. While research has shown that significant differences existed between writing groups and virtual reality classrooms (Liou & Chang, 2018; Yang et al., 2021), this study aligns with Stone et al. (2013) and Wells and Miller (2020) when they found no significant differences between traditional, full, and 50/50 VR welding groups. Since VR has shown positive differences between traditional training and VR training, it can be implied that other variables affected students' performance.

In other areas of education, Yang et al. (2021) found significant differences between experimental writing groups; the group trained in VR had significantly higher scores than the control group. Liou and Chang (2018) found that a virtual reality classroom showed better motivation, learning outcomes, and positive impacts on students learning scores. While VR has not shown significant differences between groups of students in agricultural education courses, it has shown differences between groups in other areas of education. This could be due to the experiential and hands-on nature of agricultural education and the desire of students to perform a real scenario; this is corroborated by two teachers who reported that some students would rather be doing the real activity instead of a VR version of it. Lack of structure and resources could also describe the absence of differences between our two groups. While there were no significant

differences found between the groups, it implies that the VR intervention is just as effective as the traditional training without the VR intervention.

The implications of these findings are important because it confirms the VR experience was capable of providing supplemental practice to the training. Therefore, the impact educational VR experiences could have on the domain for students and teachers would be beneficial for agricultural education and other areas. Based on previous research, it can be implied that internal and external factors, such as missed class days and weather delays, impeded students' performance in the VR experience in this current study. Additional evaluation is needed to more accurately assess factors affecting student performance and teachers' interest in using the VR program beyond an informal learning tool. How teachers present this experience may seem trivial, but this could have larger implications for other virtual experiences. Some of the performances could be attributed to students not taking the VR experience seriously. So, while students completed the program with differently, students did complete the program as intended. These findings have important implications for the broader domain of agricultural education. As different components of education move to virtual format, it will be important to address how these students perform and what factors are affecting their performance.

Currently, VR-integrated welding training has shown promise in creating a positive transfer of knowledge from the training to real-life activities (Stone et al., 2013). Wells and Miller (2020) found that of 101 university agricultural sciences students, the ones that participated in a 100% VR welding training held the highest mean score among the welding training groups. In other areas of education, McGovern et al. (2020) found VR helped students assess their presentation skills, and practice upgrading those skills. Yang et al. (2021) found that students in a VR-guided writing group had higher scores that those in a traditional setting. Buchanan (2004) found that first-year dental students learned faster and arrived at the same level of performance as students in their traditional labs. Syed et al. (2019) found that VR-based learning materials were effective in improving laboratory safety and confidence.

Additional studies to document user performance are needed before comparisons can be made between the tractor simulator user experience and other VR simulated environments. Getting a better score is not necessarily the goal of all students; it is possible other factors including personal goals, cognitive styles, and computer attitudes may affect performance instead (Lee et al., 2010; McGill & Klobas, 2009). It is also recommended that more work be done with teachers so they may become more familiar with VR technology; this will aid them as they work to integrate VR technology into their curricula.

The researchers acknowledge this new VR experience was not designed to replace the in-person driving component. This experience was developed to complement the in-person or remote learning format. As the novelty of VR training programs becomes more commonplace in the agricultural education classroom, there is potential for new vocational tools to enhance student performance. This study will begin to bridge the gap in literature for VR integration for agricultural application.

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To Those Concerned with Teacher Retention: A Collective Thought Experiment

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Abstract

This unique thought experiment invites the field of agricultural education to a critical dialogue on issues related to making teaching a career. Leveraging elicitation techniques, we introduce a series of nine letters on agriculture teacher retention. Written by agriculture teacher education faculty with expertise in teacher retention, these letters orient readers to the collective thought experiment by introducing the complex reality of engaging in the field via multifaceted viewpoints representative of perspectives we have encountered within teaching broadly and agricultural education specifically. Representing the broad range of perspectives on teacher retention, readers can expect to initially agree with components of some letters and disagree with others; however, readers should refrain from dismissing perspectives as this opposes the need to collectively understand the depth and diversity of perspectives on teacher retention in agricultural education. Understanding these diverse perspectives is critical to creating innovative, adoptable solutions to address the explicit and implicit challenges and opportunities embedded within these letters. To support engagement in the thought experiment, future publications include resources for reviewing the letters and contributing to the dialogue, with specific opportunities for individuals and groups to engage with intentionality.

This manuscript is based on a manuscript presented at the North Central Regional Conference of the American Association for Agricultural Education, Haddad et al., (September 2023)

Introduction

A recent publication in *Nature* noted the decline of disruptive science as researchers' foci narrow and opportunities for impact related to whole disciplines have subsequently diminished (Paper et al., 2023). This challenged us to seek new ways to use the existing structures of our discipline to engage in difficult conversations. While the current body of research related to the teaching career, in agricultural education specifically and education more broadly, was necessary to get to this thought experiment (Clemons & Lindner, 2019; DeLay & Washburn, 2013; Haddad et al., 2020; Hasselquist et al., 2017; Moser & McKim, 2020; Robinson & Edwards, 2012; Solomonson et al., 2018; Solomonson et al., 2021; Solomonson et al., 2022; Solomonson & Retallick, 2018), we recognized a need to engage with data differently. Our accumulated understanding promotes future discovery and invention (Paper et al., 2023). We must heed the call to step out of our "narrow slices" to promote future opportunities and innovation (Paper et al., 2023).

We needed to do something different with the data we already had as collecting new data was not leading to new solutions. We drew on exemplars whose writing has inspired new thinking toward solving the wicked problems of their discipline (Crenshaw, 1991; Delpit, 1988;

Friere, 1970). As we reflected on our own practice, the systems in which we work, and the challenges we heard from teachers, we drafted a letter to the profession. What began as an attempt to arrive at a succinct letter to the profession to address the structural and systemic challenges of teacher retention quickly morphed. The teacher retention issue is imbued with complex, sticky, and invisible system challenges. Where we diverge from Delpit's (1988) and other's examples is the power of this manuscript. Rather than sharing our own arguments or rebuttals, this manuscript shares perspectives as a collective thought experiment. This article is the instrument, and this experiment is just the beginning of continued efforts to engage solutions through collective thought (Sorensen, 1992), elicitation (Barton, 2015), and systems convening (Wenger-Trayner & Wenger-Trayner, 2021). What began as a thought experiment between two people is presented here as a thought experiment for the collective. We invite readers to explore these ideas, grapple with multiple perspectives and voices, and consider the underlying challenges informing the ideas conveyed.

Thought Experiment Methodology

Our thought experiment aligns with a philosophical approach to problems to derive novel solutions (Sorensen, 1992). In essence, rather than gathering new data, we repurposed data long overlooked and attempted new ways to use it. Our purpose is to engage readers in reflection on the problems generating the experiences conveyed in these letters. We invite readers to experiment with ideas and possibilities by reflecting on the structures inducing the conversation (Sorensen, 1992). By examining the ideas shared and moving these conversations from the hallways to the spotlight, we come face-to-face with an opportunity to render something more informative (Sorensen, 1992).

A common resistance to the thought experiment methodology lies in the scenarios comprising the experiment (Yiftach & Brown, 2022). While the following scenarios are derived from real conversations, they do not represent any individual member of the SBAE system. We captured representative conversations from those with whom we interact in our various roles in letterform around the common starting point, "To Those Concerned with Teacher Retention in SBAE." In addition, we paired our thought experiment with elicitation techniques from qualitative research (Barton, 2015). Elicitation techniques are a form of qualitative inquiry in which participants interact with written, visual, or verbal stimuli to encourage idea sharing. Elicitation techniques are especially useful when the phenomenon under investigation is tacit, taboo, or difficult to express (Barton, 2015). Employing elicitation approaches through the appendices was critical to allow readers to engage with potentially controversial and abstract ideas about the teaching profession. Employed this way, the elicitation techniques engaged through letters and appendices allow this to be a starting point for additional convening conversations (Wenger-Trayner & Wenger-Trayner, 2021).

What follows are samples of nine letters, from the perspectives of SBAE teachers, teacher educators, and educational researchers. These letters do not reflect our personal perspectives as authors in part or in whole. Rather, they reflect perspectives shared with us over our experience in Agricultural Education. The letters were drafted based on honest conversations with SBAE stakeholders, practicing, pre-service, and previous SBAE teachers, and the lived experience of the authors. Each draft letter was reviewed and revised by the author team to expand the themes of each letter and to include the broader context of SBAE. You will engage

with them to different degrees, depending on your own perspectives, and we encourage readers to lean into the difficult conversations around differing ideas. To support this engagement, the full manuscript includes appendices to support readers in processing, collecting conversations, and providing mechanisms to participate in the broader convening conversation. We piloted these appendices in a co-iterative effort with practicing teachers, teacher educators, and educational researchers.

We now invite you to participate in this thought experiment, and a collective conversation more broadly, about systemic challenges in SBAE. First, read and interact with the letters below, which illuminate various challenges in the SBAE system. Reflect on the letters and how you may best engage. Then contribute to the broader conversation, starting at our national conference, by sharing your perspectives, insights, and ideas about these challenges.

To Those Concerned with Teacher Retention

Letter 1:

To Those Concerned with Teacher Retention in SBAE:

Can we please talk about demand? I was recently struck by the presentation of our current teacher staffing situation: "We're not in a shortage, we just have high demand." As someone who researches workforce development in agricultural education, I chuckled the first time I heard this statement but grew frustrated as the conversation progressed. This frustration only grows knowing our profession's significant challenge in retaining early-career teachers. The same day I heard this framing, an SBAE teacher posted in a social media group about teaching their heart out but not being able to check off anything that is contributing to their stress. They shared how all the most stressful parts of teaching have nothing to do with actual teaching, and how the toughest part is the constant decision-making around what to do or not. The constant onslaught of opportunity and requisite to better engage is drowning teachers.

I continue to attend problem-solving sessions related to addressing teacher retention. In the same update touting demand over shortage, we listed several efforts to retain teachers to the profession. I've witnessed conversation after conversation focused on strategies for retention, but little helping us identify the actual problems. I am concerned about this for several reasons. First, generating strategies without first discussing what we know about the problem leads to a superficial conversation that does not provide real solutions. Second, I hear strategies we assume work or will work. Third, these strategies often add to the work we expect teachers to do (i.e., attend additional professional development). And finally, without understanding the underlying problems, we are, as one facilitator said, "only pitching water out of the boat."

While I have only just begun my journey as an educational researcher, I know "in demand" means much more than, "not enough to go around." Being sought after in much of the rest of the working world comes with pay incentives, continuing education opportunities, career scaffolding for success, and intensive onboarding and leadership programs, to name just a few. Being in demand comes with privileges not currently offered or afforded to teachers. Are we advocating for these? We advocate for Career and Technical Education programs but fall short in advocating for the teacher. Teachers cannot work their way into additional compensation; they

only work their way into more work. NAAE, AAAE, FFA, NASAE, and others, especially at the state level, are well positioned to provide immense support for teacher advocacy around issues of compensation reflective of demand, whether base salary, extended/coaching contracts, preparation time aligned with heightened teaching loads, opportunities for continuing education, or some combination.

I recently heard a panelist recognize the centrality of identifying "where [we] go when [we] need to recharge." Our current efforts attempt to be our teachers' recharge in addition to being a job and their "family." Moving forward, I intend, in my teaching and research, to leave room in this profession to recharge outside of it, and I would welcome the opportunity to talk with you about how we can advocate for more of the same. This will not be a fast change or a quick results program, but to truly advance sustainability, we must engage in the hard, slow changes in thought and process. We owe it to our teachers to do that challenging work. We must capitalize on the opportunities we have to come together to take advantage of each other's expertise to legitimately problem solve.

Sincerely, An Educational Researcher

Letter 2:

To Those Concerned with Teacher Retention in SBAE:

There are few things more predictable than a local coffee shop in a farming town. The constant chatter of forks, plates, spoons, and cups never interrupts the hum of good, somewhat honest conversations. The combination of eggs cooking, bread toasting, and coffee brewing creates a smell that is unquestioningly familiar. Somewhere, in one of these coffee shops, two old men who made a modest living farming and two old men who made a modest living teaching about farming sit together, swapping stories. There are few places I would rather sit than at this table, not because the conversation is new, but because the honor of that seat is earned.

There is a better truth told through these stories. That is, there is a nobility to sacrificing your time for the betterment of others – just as these farmers and teachers have done their whole lives. This nobility of sacrifice permeates agriculture. Is there anything more noble than asking for nothing in return after waking up early to work till sundown on a Saturday helping someone to provide food for others? In agriculture, there is something spiritual about waking up early, worn-down clothes, long hours, doing the hardest job, hard-earned back pain, and sacrificing family time. Farmers don't proudly proclaim they slept in, took a day off, went on vacation, or accepted money for being generous.

Do we in agricultural education strive to be those we laud, those who toil? Is it possible working long hours, ignoring our boundaries, and taking on more than we can achieve fulfills our need for noble sacrifice? We just might be telling these stories about our noble sacrifices to earn a spot at our own coffeeshop table of agricultural education. Sadly, this spot is not earned through margin. That is right, this seat is not earned by proclaiming you left work when the final bell rang, took the weekend off, or canceled a contest practice for time with family. For us, margin is weakness and sacrifices are noble.

If we change the conversation, do we change the outcome? Imagine a world in which earning a seat at the coffeeshop table of agricultural education requires margin, balance, and boundaries. You see, I can manage the reality of frustrating administration, underfunded budgets, misguided parents, endless papers to grade, administrative paperwork, immature students, poor salary, and all the rest in the name of noble sacrifice, but not for anything else. I *need* this to be about noble sacrifice; if you make it about margin, work-life balance, and boundaries, *I quit*.

Sincerely, An SBAE Teacher

Letter 3:

To Those Concerned with Teacher Retention in SBAE:

I recently saw a quote that stopped me in my scroll, "It's not about teachers remembering their why. It's about leaders helping to remove the barriers so that teachers can *access* their why" (Erika Garcia). This especially caught me as my "why" is as clear today as it was when I started teaching twelve years ago. I'm in this to share the importance of agriculture and support the next generation of innovators and global leaders. I'm in it for the farm kids.

But *why*? I can only speak as an early career teacher; while I have been in this profession for more than ten years, I only taught in the SBAE classroom for five. And those five were great. I was hired with the expectation to build my vision of the program. I had all the support I could handle, in part because I did not ask for much, and in part because everyone was enthusiastic about where we were headed. If I made a suggestion, we made it happen. We started a school garden, rebuilt an integrated SAE program, competed and held our own in several FFA contests, recruited community coaches, attended every leadership opportunity, showed up in our community, got the grants, and applied for a National Chapter Award. I served on school committees, coached basketball, and was active in state and regional events. I was a *good* FFA advisor and an aspiring-to-be-good classroom teacher.

Year 1: the best, most thriving year of my life. I was doing what I was made to do. Year 2: awesome, I could build on year one and put the mistakes in the rearview. I'll get a master's degree. Surely that will help. Year 3: Oh. Wait. What? We're having a baby? Oh no. I don't know what I'm doing at all. Strike that. I know what I should be doing, and I'm not even close to that. Oh crap. Please don't start recognizing me for it. Baby. Year 4: All. The. Recognition. Agri-Science Teacher of the Year. Academic Challenge Coach. Ideas Unlimited Winner. Co-Region Advisor. Adult FFA Board. Intern host. Placement host. Rockstar. Absolute rockstar. All with a baby in tow. Year 5: Region Advisor. Thesis defense. Early career teacher of the year. Resignation letter. Grad school search. Student teacher host. Husband relocated for work. Last banquet. Preparing to move. Goodbye. All In.

Even in five years, I recap my experience moving from how I was doing and what I was hoping to be to a list of accomplishments. Surely if I was doing more, I was more qualified, right? More qualified for what? For what was next. Wasn't it Theodore Roosevelt who said, "Far and away, the best prize that life has to offer is to work hard at work worth doing?" My dad still says farm kids are a farm's most valuable product. Their work ethic, determination, and connection to what is important is unmatched. The teacher I was was born out of demanding

work. I cockily told my hiring principal, “Lots of people will know more than me, but not many will outwork me.” My why is so entrenched in working hard for the love of work. It is against my fabric to work anything less. I cannot slowdown in this work worth doing.

Sincerely, An SBAE Teacher Educator

Letter 4:

To Those Concerned with Teacher Retention in SBAE:

I came into my first semester of college with the dream of being in a classroom. I wanted to teach and be a role model for minority students who wanted to pursue careers or had an interest in agriculture and its related sciences. I wanted to be someone they could look up to, but also provide the tools to support them. I was excited to get started with my classes and continue my involvement in FFA. My path was set, and I was ready to make the change I had always wanted to see. Unfortunately, that was not what happened.

The first few months of my first semester were smooth sailing, and I enjoyed my classes. I was doing my best to balance my time between classes and leadership involvement. Eventually, involvement started to consume more and more of my time. Grades slipped and I got reprimanded. That led to weekly meetings with team supervisors and grade submissions so they could keep track of me. While some of my peers were in violation of the code of conduct, they didn’t have to do any check-ins with team supervisors. The environment with my teammates grew toxic and I constantly felt unwelcomed. The isolation I felt led me to believe I could not talk to or trust anyone about what I was facing. Eventually, things got so bad I decided I couldn’t continue serving. I decided I was no longer going to put up with microaggressions and toxic behavior. I left FFA and focused on my studies in Agricultural Education, thinking I could jump into my studies without any problem.

Boy was I wrong. I felt so out of place in my classes. I became more aware of myself and how I never truly fit in. I was the only student who wanted to teach in an urban setting. I was the only person of color. I had little to no background in agriculture. Imposter syndrome became my best friend. For the rest of the semester, I questioned my self-worth and my ability to be a teacher. I was stuck in a loop of negative thoughts about my ability to teach and make an impact. Thoughts that I, a person of color, had no business trying to pursue a career in a predominately white industry. Thoughts that I didn’t belong. Thoughts that, because of the actions of a few, meant I constantly questioned who I could trust. Thoughts that meant I struggled alone. With those thoughts, I switched majors to put distance between myself and teaching agriculture. It was easier to run than to stick around. For months, I struggled to feel like I could make any sort of impact, so I quit trying. Why should I try to be a role model? Why should I try to make a difference? Why try? With that mentality, I decided to pursue a different major outside of agriculture. If I was going to make an impact for minority communities, I had to remove myself from a place I loved and find a different way. Little did I know that I would find my way back to agriculture.

My story is one of many that are ignored and forgotten. One of many where it felt like someone was just waiting for me to mess up. One of many where someone was looking for any

little mistake. One of many where my shortcomings were highlighted over my successes. Where what had always been done trumped what I needed to grow. One of many where student development came second to holding up a particular image. How is agriculture and agricultural education supposed to grow more when we don't create space for minorities and underrepresented communities? Where do we grow agricultural educators that look like me when historically, agriculture was used as a form of oppression for minoritized communities? How do upcoming changemakers see themselves as educators when there are so few who look like them to look up to? We can't erase history, but we can do more to make sure we shift the culture of agriculture, so my story doesn't become a repeated history that ultimately dooms our future.

Sincerely, A Student Concerned for SBAE

Letter 5:

To Those Concerned with Teacher Retention in SBAE,

I've seen this change in us and in our profession. We certainly don't demand the same from these adults; who are these graduates coming out, telling me during their student teaching experience they're not going to come to 6:30 AM practice or a 7:00 PM meeting? That's part of the job. They need to know that's part of the job. The job hasn't changed, but our teachers sure have. Our concern over burnout has made teachers weak. They're not ready to withstand the pressures of the classroom. They don't have what it takes to win. Understand me, of course I wouldn't say this out loud, but I'm frustrated. Has it really become old school to expect a hard day's work?

Part of the problem is schools don't get it, and we must advocate better. We must help schools understand the work it actually takes to be a successful ag teacher. I added it up. It takes 60-70 *more* hours to coach a state-winning CDE team than it does to coach a state-winning football team. 60-70 MORE. And don't get me started on national teams. That's what this profession is—more. More time, more community, more engagement because our students deserve more. We've got to teach incoming teachers to advocate for that. They must understand their value. Their worth. All the work they will put in to put that school's ag program on the map, because it's never just that one CDE team. It's seven of them. It's meetings and community events and fundraisers and advocacy. Every school board meeting. And for the kids? Every concert, performance, game, all of it. Why? Because we care.

Stepping up to the challenge of upholding our traditions of premier leadership, personal growth, and career success is an inspiring task. We need teachers who are up for that task and challenge. They need to understand there are dues to be paid. The first few years won't be easy. You'll have to teach that tough class. You'll have to plan six or seven preps in one plan period, and you'll have to do hard planning work. You'll have to spend a lot of time at school. You'll make a ton of mistakes. You'll flounder. It's a sink or swim deal, and we need to do a better job getting teachers to swim. We'll all swim a different stroke, but either way, you're getting pushed in the pool. Doggy paddle if you must, float if you have to, but stay in the pool. Reach out to the life raft of your mentor or another teacher in your region. We're all here for you until you can swim on your own. You'll get there. You put in the time and eventually you'll be good—it won't

be easy, but you'll get good. Survive that first round in the pool, and you're so much stronger for the next set of laps.

We need a change. We need to help these new teachers understand that once you've put in the work you can make it in this profession. It's a noble profession. Where else do so many kids become yours through the shared hard work, dedication, and passion for agriculture that fuels this profession? Nowhere. We need to help recruits understand that.

Sincerely, An SBAE Teacher

Letter 6:

To Those Concerned with Teacher Retention in SBAE:

You know what's crazy to me? That at 16 years in, I'm a dinosaur in Ag Ed. I'm one of the oldest three teachers in our region, and in the oldest 10-15% in our state. Do you know how many of my graduating class are still teaching? I think there may be two of us. Do you know who they're replaced with? Teachers without licenses. Teachers, who because there aren't enough to replace them, are retained whether they're effective or not. It's sad. What kid aspires to be like that placeholder? That pulse? Our retention issue has become our recruitment issue. The foundation of education is cracking underneath us. This isn't just an Ag Ed problem. Something big needs to change, and soon.

I look at myself being a sixteen-year-old dinosaur and can't help thinking of the real dinosaurs. The ones who were dinosaurs when I was in high school and were super dinosaurs when I started teaching. You know what I noticed about all those guys who come to mind? I won't pretend like my hair is as thick as it used to be, but all those guys are bald. The stress just gets to you when that's what you do all the time. So many of them were on their second marriage, because their first marriage was their job. But we hold up their programmatic success. Why? Because they coached winning teams. They were FFA teachers. Kids loved them. Kids chased them into the profession. And you know what happened to those kids? Those kids got so overwhelmed when they entered the classroom. The job was so much more than they ever thought because they didn't see the sacrifice. Those guys were always dinosaurs to us. They've always been old and stressed. We never saw how they got there. But when we see it happening to ourselves, we panic.

Teachers don't graduate prepared for that first year. NOTHING prepares you for that first year. Except it doesn't get easier. You just get clearer about what you want. I recently told my student teacher, "I don't care if you work to contract or not. If you're doing what you gotta do to get the work done, that's what I care about. If you get your work done, get out of here." But these kids coming out don't know what work needs to get done and what doesn't. They see a huge list of opportunities; contests, proficiency awards, classes to offer, professional development. Never mind the day-to-day of keeping a program going. How many of these kids really know how to inventory and manage their shop, greenhouse, or lab? They can't. It's just too much to get ready for. But they've got to know if they put in the time, do all the preps, establish the program, they get to back off. They get down to the one or two areas they really like to teach in. They don't have to prep as hard anymore. They just need to pay their dues.

But that's only kind of the point. When we're talking about teacher retention, we're setting examples for our students and our student teachers about what's okay. We're so good at piling more on. What *ever* comes off the plate? How do we decide what we're not going to do anymore? Something has to stop. We can't keep putting more on this cracking foundation. It can't support the weight it's already carrying. But I'll leave the solving and what to take off to people who know more about this than me. I'm just a sixteen-year-old dinosaur.

Sincerely, An SBAE Teacher

Letter 7:

To Those Concerned with Teacher Retention in SBAE:

To say my four-year teaching career has had ups and downs is a massive understatement. One month into my first teaching job I had a nervous breakdown and was medically required to resign. I thought it was just a tough school at first, but the worse it got, the more alone I felt. I felt like such a failure. I lost 20 pounds in three weeks, landed in the ER twice with panic attacks, and could hardly even get myself through the school door for all the stress and anxiety. I'm still only vaguely sure what happened; I got so overwhelmed and had to step out before my students suffered. I just wasn't ready. I wasn't ready for the challenges my students brought to class with them, wasn't ready to be so far from home, wasn't ready for the things that would be broken or stolen, wasn't ready to not get along with my co-teacher, and wasn't ready to have to steel myself emotionally every single day. I kept hearing, "It'll get better." "Hang in there." "Just get through this week." Honestly, that message is probably what got me to the point of mental and emotional collapse. If I could just hold on, just a little longer, surely things would get better. And if they didn't, I must've been a failure as a teacher.

I restarted as a substitute teacher by heading back to where I student taught. This was before COVID, but even then, schools were in desperate need of substitute teachers. I found districts I wanted to be in, and focused on doing the best I could with what I had on any given day. Some days that meant I had a lesson plan, some days it didn't. As I became more myself again, I must've been doing a pretty good job, because I was invited for longer and longer stints. I subbed in elementary classrooms, second language classrooms, even ag rooms. By taking things in small chunks, I was able to take some pressure off and focus on the mechanics of teaching rather than the enormity of the whole task.

I write this to you today, back in the ag classroom, but still struggling. Instance after instance in this profession pushes me past where I feel like I'm competent into questioning whether it's realistic to meet the needs of my students. I am so committed to giving my all to teaching, especially ag teaching, but I don't know how many times it can beat me up and I'll keep coming back for more. I know I can make a difference. I know I can be a great teacher and role model. I've seen myself do it. Is it too much to believe there's a place for me? I'm so worried about agriculture and content and passion for learning, but I witness firsthand how much bigger teaching is than that. In the first few weeks at one school, kids were sharing their stories and I just kept my game face, stayed sincere and loving, remained firm and mentoring when needed, but inside I was heartbroken. How could I teach and look that kid in the eye every day and pretend like anything I had to say would be worth anything to them from their needs? What a

rollercoaster. With all of that on top of the stress of teaching and classroom management paired with the anxiety and fear of living alone and away from home for the first time, I guess it really isn't out of line to crack so quickly.

At the end of the day, I'm writing to you because teaching is such big work. We need to stop turning our heads to the next person to do this big work for us; we, as teachers, have better opportunities to help because of our perspectives and connections. "Less need for charity and more of it when needed. In being happy myself and playing square with those whose happiness depends on me." It's bigger work than learning your content or learning pedagogy or even building rapport. It's work that you can never be truly prepared for. Even when you're doing it things blindside you with their sheer magnitude. Not the magnitude of not knowing something, but magnitude of what some kids come up against. The magnitude of all the things you can't unknow once you get to know your students. What am I missing to make that mentally and emotionally sustainable to stay in *that* for the long haul?

Sincerely, An SBAE Teacher

Letter 8:

To Those Concerned with Teacher Retention in SBAE:

I believe I have earned the right to talk about teacher retention. Being older than the rest of you, I have learned to be an agriculture teacher by being an agriculture teacher for many years. I have earned the respect of my fellow agriculture teachers and I live to serve this noble profession. Today, my advice – ripened with wisdom – is to follow the leadership of our FFA history. To create a system of retained agriculture teachers, we must encourage our fellow teachers to embark on the four-step path outlined in our FFA motto.

Step 1: Learning to Do--Teaching agriculture is a complex, demanding job requiring sacrifice, time, and effort. You simply cannot learn to be an agriculture teacher by talking about it; therefore, step one in being a retained agriculture is to learn the complexity of the job. I believe the only way to learn this is to work side-by-side with the most successful agriculture teachers in the state and observing them do the job for a sustained period (e.g., few months at minimum). During this time, it is critical to earn your agriculture teacher initiation by showing up, putting in the hours, and learning the nuggets of the trade.

Step 2: Doing to Learn--Once you have seen the job being done by someone who does the job well, you can step into the role of being a *new* agriculture teacher. Of course, during this time you will be learning what it is *really* like to be an agriculture teacher because you are doing it; that is right, it is now *your* program. But, potentially more important, *we* will learn if you can stick it out long enough to *really* be considered a *true* agriculture teacher. Trust us, we have seen many *new* agriculture teachers come and go – we need you to prove you will stick around for *your* students. There is nothing worse for students, and a community, than agriculture teacher turnover.

Step 3: Earning to Live--Only a few make it to this stage; so, congratulations if you are here. You have proven you won't bail on your students after a few years. Now, it is time to earn your livelihood as an agriculture teacher. As you can tell, teaching agriculture is not about

making lots of money. No, the currency we trade in are banners, plaques, and awards. Trust us, seeing your students jumping with unbridled joy because they won a contest is a far better reward than any fat paycheck. We look forward to seeing if you have what it takes to compete with us and realize the true joys of being an agriculture teacher.

Step 4: Living to Serve--You might expect this stage of becoming a retained agriculture teacher to be a cozy statement about serving students. It is not. When you get to this stage of the agriculture teaching ranks, your service is to the profession. You must uphold the tradition of excellence that is teaching agriculture. Ensure those who come after us learn to do, do to learn, earn to live, and live to serve as agriculture teachers. Without us, the profession is in jeopardy and our students will suffer. Thus, feel the weight of keeping the traditions of teaching agriculture alive, because it falls upon your shoulders now.

I still idolize those individuals who embarked on this path before me, and I am proud to say I have embarked on this path over the last 30 years. It was not easy, but it was worth it. To put it simply, the profession requires more people willing to take this journey - for our students, for our history, for ourselves.

Sincerely, An SBAE Teacher

Letter 9:

To Those Concerned with Teacher Retention in SBAE:

I've been questioning my career in SBAE since August. Yes. Since the very beginning of the school year. Do you know what the biggest problem is? I want to stay. I've been working with a mentor since August to figure out the true root of what's got me so over teaching, because this job works. I love my school. My mom is a teacher here too and I grew up here. I love this community and am teaching so this community has a program. I don't know if I'd teach anywhere else. I am in it because I'm in my community. I love learning, I love the kids, but I just don't know how I can keep going. I'm not sure what the way forward is for me here. I'm burned out. I'm emotionally drained. I'm stuck. As much as I'm all these things, I'm not sure I see myself doing anything else. This job works for my family. This job has a good retirement package and decent benefits. But this job takes so much. This job takes something from me every week. Sometimes it takes extra time with my kids. Sometimes it takes all the emotional capacity I have. Sometimes it takes my sanity. Often it takes more than I can give.

If I've learned anything over the last eight months of reflection on this career (almost a full school year, at this point), it's that there is so much suffering in silence. There are so few opportunities for teachers to voice and share legitimate concerns and work toward change, the bureaucracy itself is defeating and deflating. How do I know? I know because I thought I was just tired. With two little kids, I know the second shift well. I am in teacher mode at work and every waking minute outside of that is mom mode. But I'm not just tired. I'm overwhelmed and insanely busy with ten different preps over six class periods; seven of those are brand new this year.

Some of this is because I'm a mom. I've only recently stopped pumping during my planning period. It was just too much. I know it sounds like you're just sitting there, and should

be able to get a lot done, but that's not how it works. For those who haven't pumped during their planning period, it's like trying to read a book, while writing an essay on a different book. Put another way, it's like trying to weld and deliver a lesson on propagation at the same time.

I can already hear a few of you who have gotten this far: "So what have you *done* about all the frustration and struggle you're feeling?" Some of you have already dismissed me as a quiet quitter. But I'm still here. I'm writing this from my classroom. I'm in the fight. And that's the stupidest part of all. Why is staying in the classroom a fight at all? When did enjoying teaching become such idealistic nonsense?

For those wondering, "what do we do about teacher retention?" I'll say this: we need to empower teachers. I'm not really sure what to tell you at this point in the year. I'm over it. I'm committed. I'm looking for something better. I want to teach *here*; not anywhere else. It's not the actual teaching I'm concerned about not being able to do. How long can someone navigate politics, moving targets, drama, student issues, micromanaging, and the inability to do anything about it without losing their mind? I don't know how much longer I can.

Sincerely, An SBAE Teacher

Engaging the Collective

Thought experiments are well situated to identify and root out inconsistencies and challenge previous models toward improvement (Sorensen, 1992). Ours engages models (Sorensen, 1992) of how teachers, teacher educators, and educational researchers may discuss the profession, recognizing our capacity to generate these perspectives is limited by our own experience in the field. We challenge others to take a similar approach in using the structures of our discipline in new and creative ways to engage with big issues and to harness the full power of what we do. We encourage readers to pay attention to elements of our teaching, research, professional development, and preparation so we recognize the significance in convergence and divergence. We hope you lean into questions about what makes something the case beyond merely asking, "what is?" As you participate in the conversation, we encourage you to consider what events and structures may induce the experiences conveyed. We are entering a brainstorming phase of problem solving and we are excited to welcome you to it.

Our goal with this thought experiment goes beyond individual engagement to leverage systems convening (Wenger-Trayner & Wenger-Trayner, 2021). Systems convening involves intentionally bringing people together from different parts of a social landscape, such as SBAE, to address a problem collectively. Unlike isolated discussions, quick fixes, cynicism, or casual chats, convening unites people across the system to grasp the complexities behind current problems. It encourages them to reflect on transformative changes collaboratively. Convening doesn't seek a singular leader with a ten-step plan and measurable SMART goals. Instead, it's about fostering open, messy conversations across the system. It's a process that sheds light on underlying structures influencing our actions and acknowledges our shared responsibility. In essence, it's about accountability and courage, recognizing our role in shaping the present reality and promoting collective ownership (Wenger-Trayner & Wenger-Trayner, 2021).

This is only the beginning of the experiment, and we look to invite a much broader conversation than we could generate as authors alone. In this way, we encourage your response, not only to the points with which you resonate most but especially where you experienced conflict with your own approach to teaching and support in SBAE. We ask readers to challenge the structures making these letters the case, and welcome responses, in whatever form, back to the authors. For our part, we will be disseminating opportunities for feedback through our professional development, preservice and in-service networks, and research outlets. We look forward to continuing the conversation.

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Sowing Success: The Impact of Pedagogical Content Knowledge and Professional Development on the Turnover Intentions of SBAE Teachers

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Abstract

This study aimed to describe school-based agricultural education (SBAE) teachers' perceived Pedagogical Content Knowledge (PCK), individualized professional development needs, and turnover intentions by certification type. Moreover, this study aimed to explain the relationship between these variables and the turnover intentions of SBAE teachers. A series of survey questions were used to describe the sample of SBAE teachers, their PCK, professional development needs, and turnover intentions. Notably, regardless of certification type, participants displayed comparable levels of PCK, and there was a considerable overlap in their preferences for professional development topics. Despite the certification differences, both groups of teachers exhibited moderately low turnover intentions. Furthermore, the statistical analysis addressing the impact of PCK on turnover yielded insignificant results, suggesting that a myriad of factors play a role in influencing the turnover intentions of SBAE teachers.

Introduction and Need for the Study

The landscape of school-based agricultural education (SBAE) is undergoing rapid changes, marked by a significant increase in enrollment (Baker et al., 2013; Retallick & Martin, 2008; Velez et al., 2018). However, this surge in enrollment poses a considerable challenge in recruiting and retaining qualified teachers nationally. According to Eck et al. (2019), the SBAE profession is grappling with various challenges, including the training and recruitment of new SBAE teachers and the retention of current SBAE teachers. To compound this challenge, Cowan et al. (2016) found that fewer than 50% of traditionally certified (TC) pre-service teachers accepted teaching positions immediately after graduation. Adding to the complexity is the escalating issue of teacher turnover, as highlighted by Smith et al. (2022). Their study reported that in 2021, 674 SBAE teachers left the profession, with only 29% attributing their departure to retirement. As a result, the education sector is increasingly relying on individuals entering the classroom through alternative certification (AC) programs, as observed by Claflin et al. (2020).

While AC has partially filled the void within the SBAE profession, concerns have arisen regarding the effectiveness of AC teachers and their means of preparation. Critics have pointed to the perceived lack of pedagogical skills among AC teachers, accentuating the numerous challenges these teachers face compared to their TC counterparts (Bowling & Ball, 2018; Hoerst & Whittington, 2009; Porter, 2011; Roberts & Dyer, 2004; Stair et al., 2019; Touchstone, 2015).

As AC gains prominence as a potential solution to addressing teacher shortages, it becomes imperative to identify the differences in pedagogical content knowledge (PCK) between TC and AC teachers. Recognizing that all SBAE teachers enter the classroom with varying pedagogical skills emphasizes the importance of tailored intervention. Targeted intervention,

specifically professional development, can positively influence SBAE teachers' behaviors, enhancing their effectiveness in the classroom and contributing to teacher retention and student success. Understanding the connection between professional development, PCK, and teacher turnover becomes paramount for agricultural education programs' continued growth and success as we navigate teacher recruitment and retention challenges.

In response to the challenges the SBAE profession faces, this study focuses on probing the intricate connection between PCK and professional development and their potential impact on teacher turnover. The investigation highlights how tailored professional development, specifically addressing the developmental needs of both TC and AC SBAE teachers, can influence PCK and how this relationship impacts teacher turnover intentions. By emphasizing this relationship, the research sheds light on effective strategies that can enhance the pedagogical skills and overall effectiveness of SBAE teachers and potentially mitigate the challenges associated with teacher turnover.

Theoretical Framework

Teacher turnover within SBAE is a multifaceted challenge influenced by diverse factors. This theoretical framework builds upon key studies by Ingersoll et al. (2014), Blackburn et al. (2017), and Qin (2019), underscoring the pivotal role of human capital theory in grasping the motivations behind turnover among SBAE teachers. The literature emphasizes the substantial impact of teacher preparation programs on the human capital of pre-service SBAE teachers, shaping variables such as efficacy, motivation, and the ability to navigate the complexities of teaching (Ingersoll et al., 2014). Experiences during pre-service coursework and student teaching emerge as pivotal elements influencing the human capital of future SBAE educators. In contrast, in-service SBAE teachers develop their human capital through ongoing professional development and reflective practices, which are crucial for cultivating high-quality teaching skills and adapting to the evolving educational landscape.

Beyond general experiences, specific factors such as student teaching, pre-service coursework, and professional development opportunities significantly enhance self-efficacy among SBAE teachers (McKim & Velez, 2016). PCK is also recognized as a distinct form of human capital. Teachers with strong PCK exhibit high self-efficacy, contributing to their overall effectiveness (Ingersoll et al., 2014). Research consistently demonstrates that higher levels of self-efficacy correlate positively with greater career commitment (Ashton & Webb, 1986; Bandura, 1997; Knobloch & Whittington, 2003; McKim & Velez, 2015). In conclusion, this theoretical framework asserts that human capital development, encompassing teacher preparation programs, ongoing professional development, and the cultivation of PCK, plays a central and interconnected role in mitigating teacher turnover in SBAE.

Review of Literature

In the ever-evolving education profession, the intersection of PCK and professional development is a critical juncture influencing the teaching profession. This literature review delves into the intricate web connecting these two facets, shedding light on their collective impact on teachers' turnover intentions. As educators navigate the profession's challenges, the depth of their subject matter expertise, coupled with ongoing professional development opportunities, becomes pivotal. Understanding the relationship between PCK and professional

development offers insight into effective teaching practices and holds the key to comprehending the factors contributing to or mitigating teachers' turnover intentions.

Pedagogical Content Knowledge

Numerous pieces of literature have concluded that PCK is a professional knowledge base held by teachers that is defined as the knowledge of, the rationale behind, the planning for, and the art of teaching subject matter using specific methods for specific students to promote student learning (Carlson et al., 2015). While PCK is a newer topic in education, the theory proposed by Lee Shulman has seen many revisions in recent years. Shulman (1986) originally postulated that teachers possess more than content or pedagogical knowledge. He fused the two knowledge bases, creating the term pedagogical content knowledge, or PCK. Additionally, he identified categories of teacher knowledge essential for teachers to be successful and effective in the classroom: content, pedagogy, curriculum, learners and learning, contexts of schooling, and educational philosophies, goals, and objectives (Shulman, 1986 & 1987).

The foundation of PCK lies in a teacher's ability to convey knowledge to students in a way that guides them to develop a deeper understanding of the content (Morrison & Luttenegger, 2015). Moreover, effective teachers must be able to determine the needs of individual students, plan and evaluate instruction, utilize various teaching methods, appeal to student learning modalities, and demonstrate their knowledge of content, teaching, and the learning process (Rice & Kitchel, 2017). With an influx of novice teachers and retention issues plaguing the SBAE profession, it has become imperative to assess the pedagogical knowledge bases of SBAE teachers to determine where deficits lie in pedagogy and content knowledge, regardless of a teacher's prior experience or path to certification.

The majority of research on this topic has only focused on identifying a need for greater recruitment and retention efforts (e.g., Blackburn et al., 2017; Lawver & Torres, 2011), the current presence of AC teachers in agricultural education (e.g., Bowling & Ball, 2018), and the in-service needs among TC or AC teachers (e.g., Stair et al., 2019; Smalley & Smith, 2017). Due to a lack of research on PCK, specifically in agricultural education, there is a need to rely on close fields such as mathematics and sciences. While these fields indicate deficiencies in the PCK of their teachers, PCK research in agricultural education is needed to elucidate the complexity of the profession, how teaching in the SBAE classroom doesn't compare to other fields, and further establish the importance of developing teachers' professional knowledge (Phelps & Schilling, 2004).

Professional Development

Professional development opportunities empower teachers to refine their pedagogical skills and stay abreast of emerging educational trends and best practices. As the education landscape continues to evolve, teachers, including secondary agricultural educators, must engage in continuous learning to ensure that they are better prepared to meet the diverse needs of their students and tackle current and future complex problems.

However, the role of secondary agricultural educators extends beyond traditional classroom teaching. They are also tasked with facilitating students' Supervised Agricultural Experiences (SAE) and fostering leadership development through organizations like the National FFA Organization (Croom, 2008; Phipps et al., 2008). Therefore, professional development opportunities for these educators must go beyond content-focused training and include aspects related to experiential learning, leadership development, and community engagement.

Professional development plays a pivotal role in shaping the effectiveness and competence of educators in any field. In the context of agricultural education, it is imperative to tailor professional development efforts to meet the specific needs of teachers at different stages of their careers. As Antoniou and Kyriakides (2013) emphasized, teacher professional development should be closely aligned with the professional needs of teachers and their unique developmental stages.

Despite the growing recognition of the significance of career stage-based professional development, many efforts still need to be made to differentiate activities to suit the needs and experiences of teachers. Easterly and Myers (2019) and Figland et al. (2019) have cautioned against this one-size-fits-all approach to professional development, highlighting that it fails to acknowledge the challenges and requirements that arise as teachers progress through their careers.

To better understand the distinct needs of agricultural educators, it is crucial to recognize the various career stages they navigate. Fessler and Christensen (1992) proposed a non-linear model of teacher career stages consisting of eight phases: (1) pre-service, (2) induction, (3) competency building, (4) enthusiastic and growing, (5) career frustration, (6) career stability, (7) career wind-down, and (8) career exit. Each stage brings its own set of challenges, opportunities, and areas for growth. As teachers advance through these stages, their motivations, aspirations, and concerns undergo significant transformations.

Additionally, the differences in paths to certification can have implications for teachers' professional development needs. TC teachers typically undergo a comprehensive university-based teacher preparation program. This includes coursework in educational theory and methods and student-teaching experiences to apply their knowledge in real classrooms (Hawley et al., 1992). On the other hand, AC teachers may enter the classroom through non-traditional routes, such as occupational competency testing, professional experience, or completion of a baccalaureate degree in a specified content area (Ruhland & Bremer, 2003).

While AC programs offer an opportunity for individuals with substantial content knowledge to enter the teaching profession, they often lack the pedagogical training traditional teacher preparation programs possess (Wayman et al., 2003). Consequently, AC teachers may face unique challenges upon entering the classroom, leading to a lower retention rate when compared to their TC counterparts (Robinson & Edwards, 2012).

It is crucial to understand the professional development needs of SBAE teachers based on their certification type and current career stage to provide appropriate support and improve their effectiveness in the classroom. By identifying the specific needs of SBAE teachers by certification type and career stage, stakeholders can tailor professional development to address these needs, ultimately fostering teacher growth and retention (Darling-Hammond et al., 2017).

Purpose and Objectives

This study aimed to describe the PCK levels (of generalized agricultural topics) of SBAE teachers in the United States and determine their individualized professional development needs based on certification type. Additionally, this study sought to explain the relationship between PCK and turnover intentions of SBAE teachers. This research supports the first value statement outlined by the American Association for Agricultural Education. Specifically, this value statement addresses the need for "instruction to help individuals make informed decisions as AFNR consumers and to prepare them for skilled agricultural work" (AAAE, 2023, p. 6). This

research supports this value statement as it intends to advance public knowledge of various challenges facing SBAE teachers. The following research objectives guided this study:

1. Describe the sample of SBAE teachers by certification type.
2. Describe SBAE teachers' PCK, professional development needs, and turnover intentions by certification type.
3. Explain the relationship between PCK and turnover intentions among SBAE teachers by certification type.

Methodology

Participants

We investigated SBAE teachers nationwide who were actively instructing agricultural education courses during the 2023-2024 academic year. To be eligible, individuals needed official listing as SBAE teachers in their respective states' directories. We constructed a comprehensive participant list by gathering information from each state's agricultural education directory. We categorized SBAE teachers based on NAAE regions using a cluster sampling approach to ensure a fair and representative sample. Subsequently, we employed random sampling to choose states or groups of states within each NAAE region for survey distribution, extending invitations to all teachers within the selected states to encourage participation.

As of 2022, the total number of SBAE teachers in the United States was approximately 14,516 (Foster et al., 2023). Specific distribution figures for each NAAE region were identified in a detailed breakdown. Regarding sample size, I used Cochran's (1977) formula to calculate the target sample size. More specifically, a 95% confidence interval and a ± 5% margin of error required a target sample size of 385 respondents to ensure generalizability to this population. Therefore, I set 385 as the desired sample size for the study.

Once the number of survey recipients for each region was established, states were randomly selected using the NAAE region map, emphasizing proximity to each region's total teacher count. Contact information, including names and email addresses, was sourced from each state's Agriculture Teacher Directory, and efforts were made to survey all SBAE teachers within the selected states. The participant pool included teachers from the following states: Alaska (N = 5), Arizona (N = 112), Colorado (N = 163), Indiana (N = 355), Louisiana (N = 300), Montana (N = 127), Nebraska (N = 248), New Hampshire (N = 25), New Jersey (N = 64), New Mexico (N = 133), South Carolina (N = 163), Tennessee (N = 413), Utah (N = 175), and West Virginia (N = 110).

Data Collection

In October 2023, we administered the survey using the online survey program Qualtrics. This program enabled participants to complete the survey online and facilitated the collecting and downloading of data for analysis. Following principles from Dillman's (2007) Tailored Design Method, we made three contact points with the participants to elicit responses. Participants received their first contact through an email introducing them to the study and inviting them to participate. Approximately seven days after the first email, a follow-up email was sent as a reminder and an opportunity to thank the participants who completed the survey. The third and final email was sent seven additional days or two weeks after the first email,

serving as a final reminder and another opportunity to express thanks to participants. We collected a total of 470 usable responses.

Instrumentation

The instrument utilized consisted of four sections. The first section of the instrument consisted of eighteen items, adapted from Tonnessen (2021) and Rice & Kitchel (2015). Each statement was measured on a 5-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree." PCK levels were determined based on six distinct expertise areas, as Hill et al. (2008) outlined. The PCK construct encompassed the following facets: (1) Horizon Content Knowledge, (2) Common Content Knowledge, (3) Specialized Content Knowledge, (4) Knowledge of Content and Teaching, (5) Knowledge of Content and Students, and (6) Knowledge of Content and Curriculum. Each item was aligned to one of the six PCK areas defined by Hill et al. (2008). The six PCK area scores were then combined to create one PCK construct.

The second section of the instrument consisted of one open-ended question asking participants to identify professional development areas they felt were of the greatest need. For each group of teachers, responses were thematically coded into thirteen topics. The third section of the instrument consisted of twenty items adapted from Sorensen (2015). In their study, Sorensen (2015) assessed SBAE teachers' work and family domain characteristics, work-family conflict, and turnover intentions. Overall, I used most of the same questions on turnover intentions when developing the instrument for this research. Slight changes occurred to fit the instrument to the study parameter. These items comprised the turnover intentions construct and were measured on a 5-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree."

The final section consisted of questions about teacher demographics. The demographic section of the instrument elicited both personal and programmatic information and was developed by the researchers. The survey instrument was reviewed for content and face validity by a panel of faculty and graduate student experts familiar with research design, SBAE, and the topic areas. We conducted a pilot test with SBAE teachers in Delaware, Maryland, and Virginia to ensure reliability and validity. The PCK ($\alpha = .92$) and turnover intention constructs ($\alpha = .93$) exceeded the alpha of .70 recommended by Nunnally & Bernstein (1994); therefore, we proceeded with administering the instrument.

Data Analysis

The study categorized SBAE teachers into two groups: traditionally certified (via a four-year education program) and alternatively certified (e.g., obtained licensure through alternative routes, those who hadn't fulfilled the licensure requirements, or those who self-identified as having gained licensure through a different method). Descriptive statistics were used to describe the sample of SBAE teachers, including demographic information and their path to certification.

Moving to the second objective, descriptive statistics (means and standard deviations) were utilized to depict PCK levels, professional development needs, and turnover intentions among SBAE teachers. Next, an independent sample T-test was completed, comparing the PCK levels and turnover intentions of SBAE teachers by certification type.

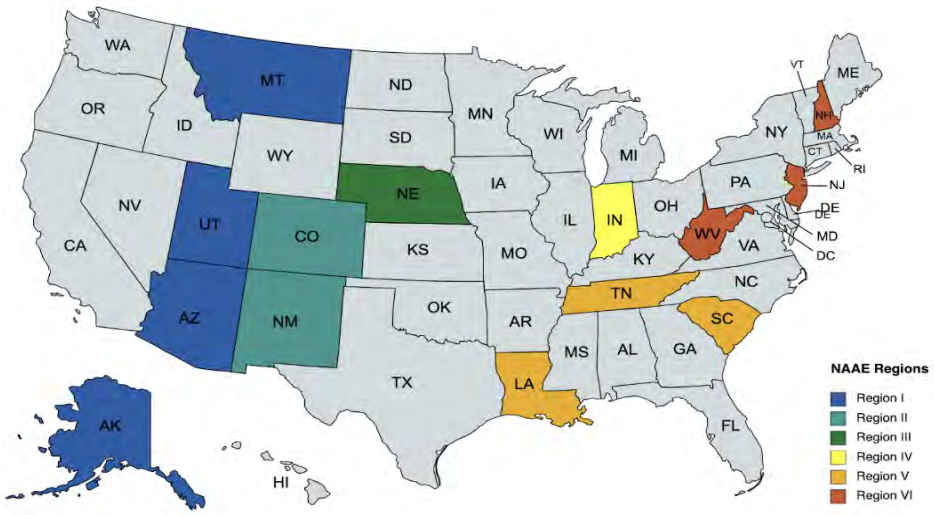
Finally, the third objective utilized an Ordinary Least Squares (OLS) regression analysis to explore the relationships between PCK and turnover intentions. The model identified turnover intentions as the dependent variable and PCK as the independent variable.

Results

Four hundred seventy individuals participated in this study, representing fourteen states (Figure 1).

Figure 1

Surveyed States by NAAE Region



Research Objective One:

Among the educators surveyed, 67.2% (n = 316) identified themselves as TC teachers, with 57.6% female and 42.4% male. TC teachers' ages ranged from 22 to 70 years (M = 38.46, SD = 12.65), and their teaching experience varied from 1 to 48 years (M = 15.01, SD = 10.71). The TC cohort represented fourteen states, with Nebraska, Indiana, Utah, and South Carolina having the highest participation rates across the surveyed educators. Regarding NAAE regions, 25.3% of TC teachers were from Region I (n = 80), 16.1% from Region II (n = 51), 18.0% from Region III (n = 57), 11.4% from Region IV (n = 36), 21.0% from Region V (n = 66), and the remaining 8.2% from Region VI (n = 26).

As for AC teachers, 32.8% (n = 154) identified as such, with 56.5% female, 42.8% male, and the remaining 0.7% identifying as non-binary. The age range for AC educators ranged from 23 to 65 years (M = 42.09, SD = 10.41), and their teaching experience spanned from 1 to 28 years (M = 10.10, SD = 7.55). The AC cohort represented fourteen states, with Tennessee, Colorado, and Utah having the highest participation rates. When examining NAAE regions, 22.7% of AC teachers were from Region I (n = 35), 23.4% from Region II (n = 36), 7.8% from Region III (n = 12), 8.45% from Region IV (n = 13), 29.2% from Region V (n = 45), and the

remaining 8.45% from Region VI (n = 13). Table 1 shows the number of TC and AC teachers by state.

Table 1

Surveyed States by Certification Type

State	TC		AC	
	f	%	*f*	%
Alaska	3	0.9	3	2.0
Arizona	19	6.0	9	5.8
Colorado	29	9.2	22	14.3
Indiana	36	11.4	13	8.4
Louisiana	16	5.1	14	9.1
Montana	27	8.5	8	5.2
Nebraska	57	18.0	12	7.8
New Hampshire	4	1.3	4	2.6
New Jersey	7	2.2	5	3.3
New Mexico	22	7.0	14	9.1
South Carolina	31	9.8	9	5.8
Tennessee	19	6.0	22	14.3
Utah	31	9.8	15	9.7
West Virginia	15	4.8	4	2.6

Note: Traditionally Certified (n = 316), Alternatively Certified (n = 154)

Research Objective Two:

The second research objective aimed to describe the PCK levels, professional development needs, and turnover intentions of SBAE teachers based on their certification type. To achieve this, first, participants responded to a series of statements corresponding to six PCK areas. Analysis of participant responses revealed that TC and AC teachers rated their PCK levels similarly. To consolidate the findings, we amalgamated the six PCK areas into a single PCK variable, as presented in Table 2. The PCK construct variable substantiates the previously mentioned results, indicating relatively close mean values. Furthermore, the constructed variable

exhibited a *p*-value of .339 and a medium to large effect size from Cohen's *d* post hoc analysis (*d* = 0.58).

Table 2

PCK of SBAE Teachers by Certification Type

	TC		AC				
Construct Variable	*M*	*SD*	*M*	*SD*	*t*	*p*-value	Cohen's *d*
Pedagogical Content Knowledge	4.16	0.61	4.21	0.53	-.959	.339	0.58

Note: For observed means, 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree
* $p < 0.05$

Moreover, we aimed to describe the professional development needs of both TC and AC teachers. TC teachers' primary professional development needs centered around Content-Specific Topics, FFA, Technology, Curriculum Development, and Time Management/Work-Life Balance. In contrast, AC teachers identified Curriculum Development, Content-Specific Topics, Technology, Classroom Management/Student Engagement, and FFA as their foremost areas of need. While both teacher groups expressed a need for professional development in similar areas, TC teachers gave greater priority to Content-Specific Topics, FFA, and Time Management/Work-Life Balance. Conversely, AC teachers emphasized Curriculum Development and Classroom Management/Student Engagement as their key focus areas, as outlined in Table 3.

Table 3

Professional Development Needs of TC and AC SBAE Teachers

Professional Development Area	TC			AC		
	Rank	*f*	%	*Rank*	*f*	%
Content-Specific Topics Ex. Ag Mechanics, Greenhouse Management, Aquaponics, etc.	1	71	21.7	2	18	17.1
FFA Ex. Degrees, CDEs, etc.	2	45	13.7	5	10	9.5

Technology Ex. Integrating technology in the classroom, virtual teaching	3	40	12.2	3	16	15.2
Curriculum Development	4	36	11.0	1	20	19.0
Time Management/Work-Life Balance	5	35	10.7	6	9	8.6
SAE & AET Ex. Navigating the AET website, managing student SAEs, etc.	6	32	9.8	7	7	6.7
Classroom Management/Student Engagement	7	29	8.8	4	13	12.4
Instructional Strategies	8	18	5.5	8	4	3.8
Retirement	9	8	2.4	12	0	0
Funding Ex. Writing grants, Permissible use of federal grants, etc.	10	5	1.5	10	2	1.9
Administration Ex. Teaching administration about the SBAE program, etc.	11	4	1.2	11	1	1.0
Supporting Students Ex. Special Education, Social-Emotional Learning, etc.	12	3	0.9	9	3	2.9
Work-Based/Project-Based Learning	13	2	0.6	10	2	1.9

Lastly, we sought to describe the turnover intentions of SBAE teachers based on their certification type. According to the results presented in Table 4, both TC and AC teachers expressed moderately low turnover intentions, with AC teachers ($M = 2.91$, $SD = 0.37$) having a slightly higher turnover intention than TC teachers ($M = 2.89$, $SD. = 0.38$). An examination of how TC and AC teachers assessed each statement within the turnover intentions construct revealed similar ratings for most items. The constructed variable exhibited a p-value of .642 and a small to medium effect size from Cohen's d post hoc analysis ($d = 0.38$).

Table 4

Turnover Intentions of SBAE Teachers by Certification Type

Construct Variable	TC		AC				
	M	*SD*	*M*	*SD*	*t*	*p*-value	Cohen's *d*
Turnover Intentions	2.89	0.38	2.91	0.37	-.465	.642	0.38

Note: For observed means, 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree
* $p < 0.05$

Research Objective Three:

For the third research objective, we sought to explain the relationship between PCK and turnover intentions among SBAE teachers, categorized by certification type, through a regression analysis. The analysis shows that PCK does not seem to have a meaningful impact on the turnover intentions of TC teachers. This is evidenced by a low R-squared value of 0.001, a non-significant *p*-value of 0.574, and a beta coefficient of 0.035. The corresponding *t*-value of 0.562 further suggests that the PCK's influence is not statistically significant among this group. In contrast, AC teachers show a marked difference. With an R-squared value of 0.073, the model suggests that PCK accounts for approximately 7.3% of the variance in turnover intentions. The beta coefficient of 0.269 is significant, evidenced by a *t*-value of 3.34 and a highly significant *p*-value of 0.001. This indicates that PCK significantly predicts turnover intentions for AC SBAE teachers. This data suggests that AC teachers may exhibit a stronger relationship between their PCK and their inclination to stay in or leave their teaching roles, highlighting the importance of PCK in their retention (Table 5).

Table 5

Influence of PCK on the Turnover Intentions of SBAE Teachers by Certification Type

Certification Type	R^2	*S.E.*	*F*	β	*t*	*p*
Traditionally Certified	.001	.387	.316	.035	.562	.574
Alternatively Certified	.073	.368	11.18	.269	3.34	.001

Conclusions and Recommendations

Our investigation examining the PCK of SBAE teachers by certification type revealed no statistically significant difference between TC and AC teachers. Although notable, the similarity in PCK means, and the medium effect size lacks statistical significance, suggesting a degree of

similarity in the PCK of SBAE teachers, irrespective of certification type. These findings refute the previous literature suggesting that AC teachers are less prepared than their TC counterparts and that AC preparation programs are deficient and less rigorous (Darling-Hammond et al., 2005; Watts, 1986). The findings of this research indicate that TC and AC teachers collectively possess similar PCK levels. Future research should explore the six PCK areas (Common Content Knowledge, Specialized Content Knowledge, Horizon Content Knowledge, Knowledge of Content and Students, Knowledge of Content and Teaching, and Knowledge of Content and Curriculum) to see how TC and AC teachers compare.

The PCK findings mentioned above coincide with the self-reported professional development needs of both groups of teachers. Specifically, both teacher cohorts stated they would likely benefit from similar professional development topics. While TC teachers placed greater emphasis on professional development related to FFA and AC teachers emphasized a greater need for professional development on curriculum development and classroom management/engagement, both groups of teachers collectively agreed that professional development on content-specific topics, technology, FFA, and curriculum development were top priorities. While other professional development areas were noted as possible areas for SBAE teacher development, the remaining factors had less than ten percent of the respondents indicating each topic as a potential need area. These findings support prior literature citing a need for professional development in content, curriculum development, teaching methods, student engagement, and FFA (Stair et al., 2019). Additionally, our findings are contrary to the previous work of Rocca and Washburn (2006), which suggested that AC teachers had more content expertise than TC teachers. Our findings indicate that TC and AC teachers are in great need of content-specific professional development, identifying this professional development area as a top need area.

Our investigation into the turnover intentions of SBAE teachers by certification type revealed closely aligned means, a non-significant *t*-value, and a small to medium Cohen's *d* effect size ($d = 0.38$). The moderately low turnover intention matches the findings of Sorensen et al. (2016) and Claflin et al. (2020), with no statistical difference between TC and AC teachers. This suggests that factors beyond certification type play a more influential role in understanding and mitigating turnover intentions among SBAE teachers.

Lastly, our third objective examined the influence of PCK on the turnover intentions of SBAE teachers by certification type. The findings from the analysis revealed a weak and statistically insignificant relationship, further emphasizing the complexity of factors that can contribute to the turnover intentions of SBAE teachers. Specifically, PCK only accounted for a 1% and 7% variance in turnover intentions among TC and AC teachers. Therefore, future research should explore other areas of human capital besides PCK, such as mentoring, to see how mentoring can influence teachers' turnover intentions. Additionally, future research should examine the various teacher career stages to see how teachers' turnover intentions vary by career stage and certification type. Finally, the researchers also recommend exploring other areas of capital (e.g., social, psychological, and structural) individually and collectively to determine their influence on the turnover intentions of SBAE teachers.

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Roots of Retention: Exploring Job Satisfaction, the Professional Identities, and Turnover Intentions of SBAE Teachers by Certification Type

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Abstract

This study explored the job satisfaction, professional identities, and turnover intentions of school-based agricultural education (SBAE) teachers by certification type. Additionally, this study aimed to explain the impact of job satisfaction and professional identity on the turnover intentions of SBAE teachers. A series of survey questions were used to describe the sample of SBAE teachers, their job satisfaction, professional identity, and turnover intentions. Notably, regardless of certification type, participants displayed comparable levels of job satisfaction and positive professional identities. Moreover, despite the certification differences, both groups of teachers exhibited moderately low turnover intentions. Lastly, the statistical analysis addressing the impact of job satisfaction and professional identity on the turnover intentions of SBAE teachers yielded statistically significant results, suggesting that both variables positively influence the turnover intentions of SBAE teachers.

Introduction and Need for the Study

School-based Agricultural Education (SBAE) continues to grapple with a chronic shortage of highly qualified agricultural educators, presenting a longstanding and multifaceted challenge (Eck & Edwards, 2019). Despite numerous contributing factors, finding a simple solution remains challenging, as illustrated by the 2022 National Supply and Demand statistics. The data revealed that 869 individuals exited the teaching profession (Foster et al., 2023). While retirement significantly contributed to their exodus, the number of educators leaving for reasons beyond retirement surpassed those retiring.

This shortage has created an immense need for recruitment and retention efforts, which, unfortunately, have not yielded the desired success (Sorensen et al., 2016). In 2022, 8.8% of teachers left the profession, marking a 2% increase from 2020. Concurrently, despite 864 students completing teacher preparation programs, 148 teaching positions remained vacant, the highest number since 2014 (Foster et al., 2023). The persistent challenges in meeting the demand for skilled agricultural educators underscore the urgency to delve deeper into the factors influencing attrition and the overall health of the SBAE profession.

According to the Research Values of the American Association for Agricultural Education, the value statement on "Advancing Public Knowledge of Agriculture, Food, and Natural Resources (AFNR) Systems, states a need to provide "instruction to help individuals make informed decisions as consumers and prepare them for skilled agricultural work" (AAAE, 2023, p. 6). Beyond the supply and demand dynamics, the profession contends with numerous issues, including burnout, job dissatisfaction, and the struggle to balance professional and personal life among SBAE teachers.

While abundant research exists on specific aspects such as job satisfaction, professional identities, and turnover intentions in SBAE, a critical gap remains in connecting these variables nationwide, particularly among traditionally certified (TC) and alternatively certified (AC) teachers. This study aimed to fill this void by examining each variable in depth and by certification type. The goal was to extract comprehensive information that provided a clearer understanding of the challenges within the profession, facilitate the development of strategies to mitigate attrition issues, and enhance support for both preservice and in-service SBAE teachers.

Theoretical Framework

This research is rooted in a combination of theories pertaining to job satisfaction, professional identity, and turnover intention. A recurring theme in agricultural education research has been the synthesis of job satisfaction, professional identity, and turnover intention theories. This synthesis has provided valuable insight into the satisfaction and commitment of SBAE teachers.

The amalgamation of Social Exchange Theory, the Job Characteristics Model, and Organizational Support Theory creates a comprehensive framework. Social Exchange Theory (Blau, 1964) emphasizes the significance of assessing costs and benefits in teacher-organization relationships, suggesting that turnover intentions can arise when perceived costs exceed benefits. The Job Characteristics Model (Hackman & Oldham, 1976) adds a psychological aspect, suggesting that factors like autonomy, task significance, and professional growth affect teacher satisfaction, motivation, and, consequently, turnover intentions.

Contributing to this synthesis, Organizational Support Theory (Eisenberger et al., 1986) emphasizes the role of perceived support from the organization in mitigating turnover intentions. Teachers who perceive support through adequate resources and responsive leadership are less likely to entertain thoughts of leaving. Burnout and job dissatisfaction, identified as precursors to turnover intentions (Maslach et al., 2001), accentuate the emotional and psychological toll that can lead teachers to consider leaving their profession.

This theoretical framework serves as a robust foundation for our research, as it combines and integrates various theories related to job satisfaction, professional identity, and turnover intention. By synthesizing these theories, we gain a comprehensive understanding of the factors influencing the satisfaction and commitment of SBAE teachers. This approach not only accounts for the importance of assessing costs and benefits in teacher-organization relationships but also recognizes the psychological dimensions and the critical role of organizational support in reducing turnover intentions. Additionally, it acknowledges the significance of addressing burnout and job dissatisfaction as key factors that can impact teachers' decisions to remain in their profession, enhancing the framework's robustness and relevance in our study.

Review of Literature

The exploration of job satisfaction, professional identities, and turnover intentions among SBAE teachers is a critical and complex area of study within the SBAE profession (Chenevey et al., 2008; Croom, 2003; Kitchel et al., 2012; Myers et al., 2005). Despite the acknowledged significance of these factors, the existing literature in agricultural education lacks a comprehensive examination of the interrelationships between job satisfaction, professional identities, and turnover intentions, particularly concerning teacher certification types.

Job Satisfaction

Job satisfaction is a critical component in agricultural education, influencing teacher retention and commitment. The factors contributing to teacher satisfaction are paramount for educators, administrators, and policymakers to develop effective strategies to support SBAE teachers and address the ongoing challenge of teacher shortages.

Extensive research delved into job satisfaction within agricultural education, yielding valuable insights. It appeared that SBAE teachers generally expressed a high degree of satisfaction with their chosen profession. This sentiment is corroborated by the findings of Tippens et al. (2013), who observed that an impressive three-quarters of SBAE teachers in Georgia felt valued and appreciated by their colleagues and school administration. This sense of appreciation could account for why many participants voiced their intention to remain in the profession until retirement. Regarding AC teachers, while literature in the SBAE field is somewhat limited, Troesch and Bauer (2017) shed light on the fact that second-career teachers, oftentimes AC teachers, exhibit higher levels of job satisfaction and displayed a more positive intent to remain in the profession when compared to their first-career counterparts. Nevertheless, it's worth noting that while AC teachers professed satisfaction with their careers, other research suggested that they may not be entirely content with their current job situations (Chenevey et al., 2008). Compensation, working conditions, employment-related considerations, and personal factors were cited as contributors to their job-related dissatisfaction (Tippens et al., 2013).

Unfortunately, the broader context revealed a concerning trend—a gradual decline in teacher job satisfaction over the past two decades (Toropova et al., 2020). This decline was accompanied by reports of heightened levels of stress, anxiety, and depression (Toropova et al., 2020). In addition to the factors previously mentioned, the literature also underscored the challenge that SBAE teachers encountered when they tried to strike a balance between their professional and personal lives (Chaney, 2007). This struggle was closely associated with feelings of strain and burnout. Furthermore, Flynt and Morton (2009) illuminated how personal life stressors served as catalysts for job dissatisfaction and motivated teachers to seek alternative employment opportunities outside the field. Given the rising number of SBAE teachers leaving the profession each year, as evidenced by the National Supply and Demand Data (Foster et al., 2023), it becomes imperative to thoroughly explore the dimensions of job satisfaction among SBAE teachers.

Professional Identity

The professional identities of SBAE teachers shed light on the distinct characteristics and experiences of educators who followed different pathways into the profession. TC teachers typically underwent formal teacher education programs that provided them with a solid foundation in pedagogical techniques and content knowledge (Whitford et al., 2017). This often included student teaching experiences and coursework in education theory and practice, fostering the development of a professional identity deeply rooted in their formal training (Whitford et al., 2017). Consequently, TC teachers often exhibit a strong professional identity as educators, marked by a solid grasp of instructional strategies, classroom management, and curriculum development (Gates et al., 2020).

On the other hand, AC teachers entered the profession through unconventional routes, frequently leveraging their prior career experiences (Whitford et al., 2017). Although they may lack formal education degrees, AC teachers bring valuable industry-specific knowledge and practical expertise to their roles (Whitford et al., 2017). Research suggests that AC teachers may initially face challenges in developing their professional identity due to their non-traditional entry pathway (Bowling & Ball, 2018; Claflin et al., 2023). However, their distinctive backgrounds and real-world experiences often culminate in a unique professional identity characterized by adaptability, practicality, and a focus on hands-on learning, setting them apart (Thomas & Mockler, 2018). Understanding the differences in professional identities between TC and AC teachers is essential for teacher preparation programs, recruitment, and retention.

Turnover Intentions

Research exploring the turnover intentions of TC and AC teachers offered valuable insights into the factors influencing educators' decisions to remain in or leave the profession. TC teachers often followed a conventional pathway, completing formal teacher education programs (Whitford et al., 2017). Additional studies suggested that they may have lower turnover intentions than their AC counterparts (Troesch & Bauer, 2017). The comprehensive training received during formal education programs may contribute to their commitment to the profession and reduce the likelihood of turnover (Corbell et al., 2010; Shu, 2022)

In contrast, AC teachers who enter the profession may exhibit different turnover patterns. These educators, although bringing valuable industry-specific expertise, faced unique challenges during their initial years of teaching (Hung & Smith, 2012). Despite that, Claflin et al. (2020) found that AC teachers reported low turnover intentions, with no significant statistical difference compared to TC teachers. This finding suggested that while their entry pathway differed, AC teachers demonstrated a strong commitment to their roles, debunking assumptions that non-traditional routes led to higher turnover intentions. Understanding the factors influencing turnover intentions among TC and AC teachers is crucial for developing effective retention strategies.

While the literature extensively discussed these individual variables, there is a dearth of comprehensive research examining their interrelationships, particularly related to teacher certification types. Our research addressed this gap by exploring the relationships among job satisfaction, professional identities, and turnover intentions, considering teacher certification type. Investigating the distinctive challenges TC and AC SBAE teachers face can provide insights into effective recruitment and retention strategies. Additionally, exploring the impact of teacher preparation programs on the development of professional identities and their subsequent influence on job satisfaction and turnover intentions will contribute to a more comprehensive understanding of the complex interplay within the SBAE profession.

Purpose and Objectives

This study explored a series of issues that challenged the field of Agricultural Education and Career & Technical Education for many years. We aimed to describe the levels of job satisfaction, professional identities, and turnover intentions of SBAE teachers by certification type. As a result, the following research objectives guided this study:

1. Describe the sample of SBAE teachers by certification type.
2. Describe the job satisfaction, professional identity, and turnover intentions of SBAE teachers by certification type.
3. Explain the relationship between job satisfaction, professional identity, and turnover intentions among SBAE teachers by certification type.

Methodology

Participants

Our study focused on SBAE teachers across the United States actively instructing agricultural education courses during the 2023-2024 academic year. Eligibility criteria required individuals to hold official listings as SBAE teachers in their respective states' directories. We compiled the participant roster by extracting information from each state's agricultural education directory. We used a cluster sampling method to categorize SBAE teachers based on National Association of Agricultural Education (NAAE) regions to ensure a fair and representative sample. Subsequently, we utilized random sampling to select states or groups of states within each NAAE region for survey distribution, extending invitations to all teachers within the chosen states to encourage participation.

As of 2022, the total number of SBAE teachers in the United States was approximately 14,516 (Foster et al., 2023). Specific distribution figures for each NAAE region were delineated in a detailed breakdown. Regarding sample size, I used Cochran's (1977) formula to calculate the target sample size. More specifically, a 95% confidence interval and a ± 5% margin of error required a target sample size of 385 respondents to ensure generalizability to this population. Therefore, I set 385 as the desired sample size for the study.

Once the number of survey recipients for each region was determined, states were randomly selected using an NAAE region map, with an emphasis on proximity to each region's total teacher count. Contact information, including names and email addresses, was sourced from each state's Agriculture Teacher Directory, and concerted efforts were made to survey all SBAE teachers within the selected states. The participant pool encompassed teachers from Alaska (n = 5), Arizona (n = 112), Colorado (n = 163), Indiana (n = 355), Louisiana (n = 300), Montana (n = 127), Nebraska (n = 248), New Hampshire (n = 25), New Jersey (n = 64), New Mexico (n = 133), South Carolina (n = 163), Tennessee (n = 413), Utah (n = 175), and West Virginia (n = 110).

Data Collection

In October 2023, we administered the survey through Qualtrics. The platform allowed participants to complete the survey online conveniently and facilitated the collection and downloading of data for subsequent analysis. Adhering to principles from Dillman's (2007) Tailored Design Method, we initiated three contact points with the participants to elicit responses. Participants received their first contact via an email introducing them to the study and inviting them to participate. Approximately seven days later, a follow-up email served as a reminder and an opportunity to thank those who had already completed the survey. The third and final email was sent seven additional days or two weeks after the initial contact, functioning as a final reminder and another opportunity to extend thanks to participants. In total, we collected 470 usable responses.

Instrumentation

The instrument consisted of four sections. The first section, adapted from Blackburn et al. (2017), comprised ten statements about job satisfaction. Statements such as "I am often bored with my job" and "I feel happier in my work than most other people" were sample items that comprised the job satisfaction construct. These items were measured using a 5-point Likert scale (1 = *Strongly Disagree*, 5 = *Strongly Agree*).

The second section, adapted from Starr et al. (2006), assessed participants' professional identities. Since the original instrument was tailored to physicians, we modified it, making it applicable to SBAE teachers. This construct consisted of thirteen statements, each measured on a 5-point Likert scale (1 = Strongly Disagree, 5 = *Strongly Agree*). Sample statements that comprised this construct included, "It is important for me to work in the teaching profession" and "I belong to a community of teachers."

Adapted from Sorensen (2015), the third section assessed the turnover intentions of SBAE teachers. This construct consisted of eight statements gauging turnover intentions. These items were measured using a 5-point Likert scale (1 = *Strongly Disagree*, 5 = *Strongly Agree*) and included statements such as, "If I could get another job different from being an agriculture teacher, I would take it" and "I plan to leave agriculture teaching before I am eligible to retire."

The final section consisted of questions about teacher demographics. The demographic section of the instrument elicited both personal and programmatic information. Questions on years of teaching and path to certification were also asked to address the first research objective and to decipher teachers' path to certification.

The survey instrument was reviewed for content and face validity by a panel of faculty and graduate student experts familiar with research design, SBAE, and the topic areas. We conducted a pilot test with SBAE teachers in Delaware, Maryland, and Virginia to ensure reliability and validity. The job satisfaction (α = .91), professional identity (α = .80), and turnover intention constructs (α = .93) exceeded the alpha of .70 recommended by Nunnally and Bernstein (1994); therefore, we proceeded with administering the instrument.

Data Analysis

The study categorized SBAE teachers into two groups: traditionally certified (via a four-year education program) and alternatively certified (e.g., obtained licensure through alternative routes, those who hadn't fulfilled the licensure requirements, or those who self-identified as having gained licensure through a different method). Before the analysis, I examined the statistical assumptions of the dataset to determine their suitability for conducting parametric analyses and regression modeling. To achieve this, an assessment was carried out, encompassing tests for multicollinearity and homoscedasticity. The analysis also included an examination of skewness, which assesses the symmetry of the data distribution to confirm its normality. Following these tests, the data was determined to adhere to the assumptions of statistical analysis, namely linearity, homogeneity, and independence.

For objectives one and two, descriptive statistics were used to describe the participant sample, including demographic information and their path to certification. Additionally descriptive statistics (means and standard deviations) were utilized to depict job satisfaction,

professional identities, and turnover intentions among SBAE teachers. An independent sample *t*-test was then completed, comparing the job satisfaction, professional identities and turnover intentions of SBAE teachers by certification type.

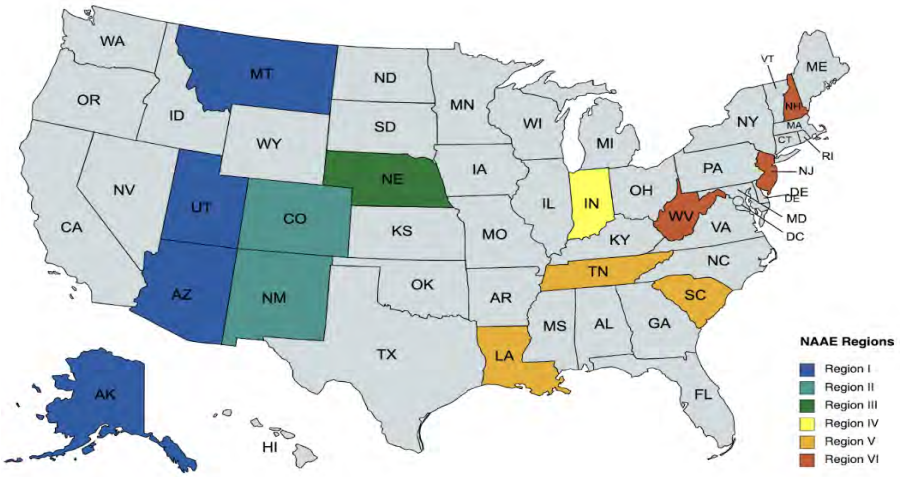
Finally, the third objective required an Ordinary Least Squares (OLS) regression analysis to explore the relationships between job satisfaction, professional identity, and turnover intentions. The model identified turnover intentions as the dependent variable and job satisfaction and professional identity as the independent variables.

Results

Four hundred seventy individuals participated in this study, representing fourteen states (Figure 1).

Figure 1

Surveyed States by NAAE Region



Research Objective One:

Among the educators surveyed, 67.2% (n = 316) identified themselves as TC teachers, with 57.6% female and 42.4% male. TC teachers' ages ranged from 22 to 70 years (M = 38.46, SD = 12.65), and their teaching experience varied from 1 to 48 years (M = 15.01, SD = 10.71). The TC cohort represented fourteen states, with Nebraska, Indiana, Utah, and South Carolina having the highest participation rates across the surveyed educators. Regarding NAAE regions, 25.3% of TC teachers were from Region I (n = 80), 16.1% from Region II (n = 51), 18.0% from Region III (n = 57), 11.4% from Region IV (n = 36), 21.0% from Region V (n = 66), and the remaining 8.2% from Region VI (n = 26).

As for AC teachers, 32.8% (n = 154) identified as such, with 56.5% female, 42.8% male, and the remaining 0.7% identifying as non-binary. The age range for AC educators ranged from 23 to 65 years (M = 42.09, SD = 10.41), and their teaching experience spanned from 1 to 28

years (M = 10.10, SD = 7.55). The AC cohort represented fourteen states, with Tennessee, Colorado, and Utah having the highest participation rates. When examining NAAE regions, 22.7% of AC teachers were from Region I (n = 35), 23.4% from Region II (n = 36), 7.8% from Region III (n = 12), 8.45% from Region IV (n = 13), 29.2% from Region V (n = 45), and the remaining 8.45% from Region VI (n = 13). Table 1 shows the number of TC and AC teachers by state.

Table 1

Surveyed States by Certification Type

State	TC		AC	
	f	%	*f*	%
Alaska	3	0.9	3	2.0
Arizona	19	6.0	9	5.8
Colorado	29	9.2	22	14.3
Indiana	36	11.4	13	8.4
Louisiana	16	5.1	14	9.1
Montana	27	8.5	8	5.2
Nebraska	57	18.0	12	7.8
New Hampshire	4	1.3	4	2.6
New Jersey	7	2.2	5	3.3
New Mexico	22	7.0	14	9.1
South Carolina	31	9.8	9	5.8
Tennessee	19	6.0	22	14.3
Utah	31	9.8	15	9.7
West Virginia	15	4.8	4	2.6

Note: Traditionally Certified (n = 316), Alternatively Certified (n = 154)

Research Objective Two:

The second research objective aimed to describe the job satisfaction, professional identities, and turnover intentions of SBAE teachers based on their certification type. Starting with job satisfaction, according to the results presented in Table 2, both TC and AC teachers

expressed similar levels of job satisfaction, with TC teachers (M = 2.73, SD = 0.27) having slightly higher job satisfaction levels than AC teachers (M = 2.72, SD = 0.27). Overall, both cohorts of teachers felt neutral or somewhat dissatisfied with their current jobs. The constructed variable exhibited a p-value of .821 and a small effect size from Cohen's post hoc analysis (d = 0.27).

Regarding professional identity, the findings presented in Table 2 indicate that both TC and AC teachers held positive evaluations of their professional identities. The findings suggest that TC teachers (M = 3.96, SD = 0.45) exhibited a slightly stronger connection to the SBAE teaching profession than AC teachers (M = 3.89, SD = 0.53). The constructed variable revealed a p-value of .192 and a medium effect size from Cohen's post hoc analysis (d = 0.48).

Lastly, we sought to describe the turnover intentions of SBAE teachers based on their certification type. Table 2 also presents both TC and AC teachers expressed moderately low turnover intentions, with AC teachers (M = 2.91, SD = 0.37) having a slightly higher turnover intention than TC teachers (M = 2.89, SD.= 0.38). The constructed variable exhibited a p-value of .642 and a small to medium effect size from Cohen's post hoc analysis (d = 0.38).

Table 2

Job Satisfaction, Professional Identities, and Turnover Intentions of SBAE Teachers by Certification Type

	TC		AC				
Construct Variable	*M*	*SD*	*M*	*SD*	*t*	*p*-value	Cohen's *d*
Job Satisfaction	2.73	0.27	2.72	0.27	.226	.821	0.27
Professional Identity	3.96	0.45	3.89	0.53	1.31	.192	0.48
Turnover Intentions	2.89	0.38	2.91	0.37	-.465	.642	0.38

Note: Construct variables scale, 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

* $p < 0.05$

Research Objective Three:

For the third research objective, we sought to explain the relationship between job satisfaction and professional identities on the turnover intentions of SBAE teachers, categorizing our findings by teachers' certification type. Beginning with the TC cohort, a regression analysis was executed to predict the impact of job satisfaction and professional identity on turnover intentions. The analysis indicated a small level of variance in the turnover intentions of teachers (R^2 = .035), suggesting that other factors might also play a significant role in the turnover intentions of teachers. The relationship between job satisfaction and turnover intentions was negative (β = -.100) but not statistically significant (p = .109). In contrast, professional identity

positively and significantly influenced turnover intentions (β = .143, p = .022), indicating that a stronger professional identity may be associated with low intentions to leave the profession.

A regression analysis was also executed for the AC teachers to predict the impact of job satisfaction and professional identity on turnover intentions. The model revealed a slightly stronger explanatory power for these teachers, as evidenced by the R^2 value of .058. Additionally, job satisfaction (β = .177, p = .039) and professional identity (β = .205, p = .017) had significant and positive relationships with turnover intentions. This indicates that for AC teachers, increases in job satisfaction and professional identity are associated with lower intentions to leave their current positions (Table 3).

Table 3

The Influence of Job Satisfaction and Professional Identity on the Turnover Intentions of SBAE Teachers by Certification Type

Certification Type	R^2	*S.E.*	*F*	β	*t*	*p*-value
Traditionally Certified	.035	.383	4.67	-.100 [a], .143[b]	-1.61[a], 2.30[b]	.109[a], .022[b]
Alternatively Certified	.058	.380	4.22	.177[a], .205[b]	.2.08[a], 2.41[b]	.039[a], .017[b]

Note: Professional Identity[a], Job Satisfaction[b]

Conclusions and Recommendations

The purpose of this study was to describe the job satisfaction, professional identities, and turnover intentions of SBAE teachers by certification type. Our objectives were achieved by collecting data from SBAE teachers in fourteen states. As a result, we have drawn four interrelated concepts to frame this study's findings and conclusions.

Shared Discontent: Declining Job Satisfaction Across the SBAE Profession

Our investigation examining the job satisfaction of SBAE teachers by certification type revealed no statistically significant difference between TC and AC teachers. Although notable, the similarity in job satisfaction means suggest a degree of similarity in the job satisfaction of SBAE teachers, regardless of their certification type. While there is limited research examining the satisfaction levels of SBAE teachers by certification type, the findings support previous literature suggesting that the satisfaction levels of SBAE teachers collectively are declining (Flynt & Morton, 2009; Sorensen et al., 2016; Tippens et al., 2013; Toropova et al., 2020). The findings of this research indicate that TC (M = 2.73, SD = 0.27) and AC (M = 2.72, SD = 0.27) teachers have similar levels of job satisfaction, with both cohorts of teachers not being overly satisfied with their jobs. The similar job satisfaction levels among TC and AC teachers suggest

that neither certification path is superior in fostering job satisfaction. Furthermore, the lack of variance between the two groups implies that other factors—such as the educational setting, administrative support, student interaction, and the teachers' enthusiasm for their profession—may influence job satisfaction more than the path to certification.

Finding Common Ground: How Both Traditionally and Alternatively Certified Teachers Thrive in the School-Based Agricultural Education Profession

Surprisingly, when examining the professional identities of SBAE teachers by certification type, our investigation found that both TC and AC teachers positively identify with the profession. The findings show a slightly higher average mean score for both cohorts of teachers for professional identity compared to job satisfaction. This suggests that, on average, both groups of teachers feel a moderate sense of alignment with their roles and professions. Moreover, the small to medium effect size indicates a slight trend where TC teachers might have a slightly stronger professional identity than their AC counterparts. While not statistically significant, this could likely be due to TC teachers having more opportunities to engage with and reflect on the profession (i.e., during their teacher preparation program, student teaching experience, etc.). While research examining the professional identities of SBAE teachers by certification type is limited, the findings of this study refute prior research in other disciplines, suggesting that AC teachers are less likely to identify with their jobs and more likely to leave them (Redding & Smith, 2016; Thomas & Mockler, 2018).

Regarding recommendations, prior research has suggested that mentorship, support, and real-world teaching experiences during preservice training positively influence teachers' professional identity development (Canrinus et al., 2011). Moreover, Kelsey (2006) reported that female teachers may encounter barriers in the CTE teaching profession, resulting in lower career commitment than their male counterparts. Future research should examine the professional identities of SBAE teachers by gender and how factors like mentoring have positively influenced their professional identities.

Stability in SBAE: The Unlikely Departure of Traditionally Certified and Alternatively Certified Teachers

Our investigation into the turnover intentions of SBAE teachers by certification type yielded interesting insights for the SBAE profession. Our analysis found a relatively similar pattern between TC and AC teachers, as evidenced by their mean scores. While yielding a non-significant *t*-value and a post hoc that indicated a small to medium effect size, both cohorts of teachers are less likely to leave the profession. This finding is interesting, especially when compared to the findings of the job satisfaction construct. Collectively, SBAE teachers are not very satisfied with their jobs but aren't as likely to leave their jobs. This finding aligns with previous research studies conducted by Sorensen et al. (2016) and Claflin et al. (2020), which also reported moderately low turnover intentions among SBAE teachers.

Regarding recommendations, future research should be geared towards identifying the factors that influence teachers' turnover intentions. Research should examine variables such as work environment, compensation, and career advancement opportunities to uncover additional determinants of turnover among SBAE teachers. Additionally, longitudinal research should track changes in the turnover intentions of SBAE teachers over an extended period. Doing so can

provide insight into how teachers' turnover intentions evolve throughout their careers and what factors may contribute to these fluctuations.

Predicting Turnover Intentions: The Role of Job Satisfaction and Professional Identity in SBAE Teacher Retention

Lastly, our investigation examined the impact of job satisfaction and professional identity on the turnover intentions of SBAE teachers by certification type. Based on the regression analysis, we found a positive relationship, suggesting that job satisfaction and professional identity impact the turnover intentions of SBAE teachers. When examining the TC cohort, based on the R^2 value, job satisfaction, and professional identity collectively explained 3.5% of the variance in turnover intentions. While relatively low, the model was statistically significant, with a *p*-value of .02. Moreover, the negative beta coefficient for job satisfaction (-.100) suggests an inverse relationship; as job satisfaction increases, the intention to leave the profession decreases. Professional identity also plays a role, indicating that a stronger professional identity is associated with a reduced likelihood of leaving. In short, the findings suggest that when TC teachers are satisfied and strongly identify with their jobs, they are less likely to leave.

Regarding the AC cohort, the findings were similar to the TC cohort but only more pronounced. More specifically, the R^2 value and the group's beta coefficients reinforced the trend seen with TC teachers. However, as eluded to, the relationship appears to be stronger for AC teachers, evidenced by their lower *p*-values. This suggests that increases in job satisfaction and professional identity are more strongly associated with reduced turnover intentions among AC teachers than their TC counterparts.

Based on the findings of this study, we can conclude that teacher retention continues to be an ongoing problem facing the SBAE profession, with a myriad of factors contributing to why a teacher chooses to leave the profession. While collectively, SBAE teachers are less satisfied with their jobs, they are able to identify with the profession and have moderately low turnover intention. While some models were statistically insignificant, the findings provide some insight. Moreover, our regression analysis showed us that many factors, not just job satisfaction and professional identity, explain why teachers leave the SBAE profession. As previously mentioned, future research should examine the factors that lead SBAE teachers to leave the profession and propose strategies to support the recruitment and retention of teachers in the SBAE profession.

Lastly, regarding recommendations for practice, higher education institutions and teacher preparation programs should consider mentorship programs that connect novice teachers with more experienced educators in the field. Secondly, institutions should work closely with SBAE stakeholders to develop strategies for recruiting and retaining teachers in the SBAE profession. This could include providing incentives, professional development opportunities, and addressing the specific concerns of both TC and AC teachers. Additionally, given the slight connection between job satisfaction and turnover intentions, teacher preparation programs should incorporate elements that enhance job satisfaction. This could include courses or workshops on classroom management, curriculum development, and strategies to improve teacher-student relationships. Finally, to strengthen professional identity among SBAE teachers, teacher preparation programs should provide opportunities for reflective practice, opportunities to engage with the profession, and collaborative learning experiences. Additionally, encouraging student teaching experiences that allow for deeper professional immersion may also be beneficial.

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Investigating Teacher Margin and Creativity in Michigan

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Abstract

Teacher creativity is essential to developing and delivering innovative learning opportunities, including hands-on experiences which are at the heart of school-based agricultural education (SBAE). A teacher's ability to develop and deliver innovative learning experiences may, however, be influenced by their margin. Teacher margin is defined as the difference between what a teacher has the capacity to do (i.e., power) and what they are tasked with doing (i.e., load) in their personal and professional roles. The potential relationship between creativity and margin is particularly salient in SBAE as consistent research has found agricultural educators experience a burdensome workload and reduced margin. As such, the current study employed a survey methodology to explore teacher creativity, margin, and the relationship between the two variables. Results from the study indicate agriculture teachers in Michigan perceived low levels of margin, indicating their required workload is near or exceeding their capabilities. Data also revealed agriculture teachers in Michigan perceive moderate levels of creativity. Furthermore, no statistically significant relationship was identified between margin and creativity. These findings suggest teachers maintain stable levels of creativity regardless of differences in margin. Findings are discussed using the Theory of Margin with recommendations for research and practice explored.

Introduction

School-based agricultural education (SBAE) teachers have myriad items on their workplace *to-do lists* alongside additional obligations at home (Sorensen et al., 2016). The professional load shouldered by SBAE teachers has contributed to their emotional exhaustion (Kitchel et al., 2012; Smith & Smalley, 2018), stress (Hainline et al., 2015; King et al., 2013), and tedious work-life balance (Sorensen et al., 2016; Sorensen & McKim, 2014). The COVID-19 pandemic likely exacerbated these issues, furthering concerns related to teacher success and professional retention (McKim & Sorensen, 2020; Shoulders et al., 2021). The central role of teacher workload within this system of challenges necessitates empirical research on teacher margin, defined as the difference between the holistic load (i.e., accumulation of work and life duties) and power (i.e., accumulated ability to achieve load) held by a teacher (Hiemstra, 1993; McClusky, 1963). Thus, the current study explored the margin of SBAE teachers in Michigan.

Qualitative findings regarding teacher margin suggest creativity may be stifled by a lack of margin (Marzolino et al., 2024). Creativity is a valued attribute among educators for a variety of reasons, including being an outlet for self-expression (Reilly et al., 2011), increasing student engagement (Radeljić et al., 2020; Reilly et al., 2011), and increasing student perceptions of educator effectiveness (Aschenbrener et al., 2010a, 2010b). Furthermore, fostering student creativity has long been encouraged (Reilly et al., 2011; Rinkevich, 2011) in part, because

creativity is valued by employers (Robinson, 2009). Given the importance of creativity, it is imperative to explore, develop, and sustain creativity among school-based agricultural education (SBAE) teachers. As such, this study also explored creativity among Michigan SBAE teachers.

Purpose and Research Questions

The lack of an established baseline for teacher margin and teacher creativity in SBAE limits current understanding. In addition to creating a baseline, it is important to explore differences in teacher margin and creativity by demographic variables to provide insights into how these variables are experienced across teachers within the profession. Finally, the relationship between margin and creativity suggested by Marzolino et al. (2024) necessitates an investigation into the relationship between these two variables. As such, the research questions for this study are:

1. What level of margin do SBAE teachers perceive?
2. How does margin differ by demographic variables?
3. What level of creativity do SBAE teachers perceive?
4. How does creativity differ by demographic variables?
5. How does margin relate to creativity?

Literature Review

There are two topics within the literature pertinent to this research study: (a) teacher margin, largely explored through load and power; and (b) teacher creativity.

Teacher Margin

The theory of margin is relatively new to SBAE; studies surrounding this theory are primarily in the fields of higher education and nursing (i.e., Biney, 2021; Stevenson, 1982). We argue broader applications of this theory may yet be realized. In fact, margin related to SBAE teacher professional development was explored by McKim and McKim (2023). They recommended tailoring professional development to support increased power and decreased load among teachers, suggesting this margin-based approach to professional development would maximize impact. The seminal research on SBAE teacher margin (McKim & McKim, 2023) highlights the importance of the concept within the system of agricultural education; however, this research did not provide empirical data on the levels of margin perceived by teachers. Thus, establishing a baseline for teacher margin is a critical next step.

While margin has not been studied by name, several strands of literature are related to teacher margin, including work-life balance, time management, stress management, and burnout. Beginning with work-life balance, the more balanced work and life are for teachers, the more equitably work and home loads can be accomplished, perhaps lending to a greater amount of overall margin. Studies show agriculture teachers can achieve only a moderate amount of work-life balance (Sorensen et al., 2016; Sorensen & McKim, 2014), and work-life balance and success are at odds when it comes to early career teachers as they have more unfamiliar elements of the job to explore and navigate (Traini et al., 2019). Further regarding early career teachers,

attitudes toward teaching fluctuate throughout the school year (Disberger et al., 2023; Moir, 1990) and may affect teacher margin.

The perception of having enough time has weight in teacher margin - better time management could lead to more power or a lessened load. McKibben et al. (2022) found slight, positive correlations between job satisfaction, recreation, working with SAEs outside of school, and salary. Other work on time management suggests SBAE teachers are spending uncompensated hours on job-related duties (Hainline et al., 2015; Sorensen et al., 2016; Torres et al., 2009). With hours spent working outside of the 40-hour work week, teacher margin may be impacted by having less time to recharge, relax, or destress.

Burnout occurs after periods of prolonged stress and manifests in the form of emotional exhaustion, depersonalization, and low personal achievement (Maslach, 1976). Operating with little margin is stressful, especially if that state persists over time (McClusky, 1963). Teachers who are experiencing burnout may suffer decreased self-efficacy and perceived effectiveness (Brouwers & Tomic, 2000). In SBAE, Newcomb et al. (1986) found 17-30% of SBAE teachers in Ohio were experiencing high levels of burnout; Croom (2003) found SBAE teachers in three southeast states were experiencing moderate emotional exhaustion, low depersonalization, and high personal achievement; Kitchel et al. (2012) reported similar findings for teachers in six different states; and Smith & Smalley (2018) reported mid-career teachers were experiencing moderate levels of emotional exhaustion, depersonalization, and personal achievement. The levels of burnout have varied over the years; after the onset of the COVID-19 pandemic, it is unclear the burnout levels among SBAE teachers. Research in broader education, however, paints a grim picture with the National Education Association reporting 67% of teachers identify burnout as a very serious concern (GBAO Strategies, 2022).

Teacher Creativity

There is a dearth of research exploring teacher creativity in secondary school classrooms, especially in the United States. Cayirdag found creative self-efficacy and teacher self-efficacy were linked to "creativity fostering teacher behaviors," (2017, p. 1969) suggesting more efficacious teachers promote student creativity. Research suggests there are two types of creativity, transformational creativity that shifts paradigms, and everyday creativity that allows people to solve problems (Reilly et al., 2011). Outlets for teacher creativity include "curriculum preparation, teaching methods, connection with students, shaping the environment, and reflection on practice" (Reilly et al., 2011, p. 254). However, Reilly et al. (2011) lament an overfocus on educational outcomes and attempting to teach *all* the content may stifle creativity. Conversely, others suggest teaching the required curriculum in unique and creative ways could circumvent this issue (Cayirdag, 2017).

Teacher creativity has positive benefits for students, including increased engagement (Reilly et al., 2011; Rinkevich, 2011) and reduced boredom (Radeljić et al., 2020). When students are more engaged, they will likely experience more success. Despite these potential bonuses, creativity may also be perceived as a negative by some teachers. Beghetto (2007, as cited in Rinkevich, 2011) noted some teachers regard creativity as an additional duty, adding to their workload. Some also suggest only teachers with an innate creative talent ought to be creative in the

classroom, an idea Rinkevich argues "needs squelched" (2011, p. 220) while students are in teacher preparation programs.

Within agricultural education, studies on creativity have been limited, especially scholarship at the secondary school level. Baker and Robinson (2016) examined originality, finding students receiving an experiential learning treatment scored higher in creativity. The findings of Baker and Robinson (2016) suggest SBAE teachers using experiential learning techniques help their students be more creative. Direct instruction, however, may still be selected by SBAE teachers because it is efficient and familiar, potentially reducing student creativity development within SBAE (Baker & Robinson, 2016).

Research at the postsecondary level suggests undergraduate students identify creative teaching behaviors in their instructors and rate creative instructors as more effective (Aschenbrener et al., 2010a). Additional research found postsecondary instructors were strong in elaboration as a creativity technique, but lacked the originality component of creativity (Aschenbrener et al., 2010b). Instructor self-perceptions of creativity were, however, not correlated to teaching experience or gender; conversely, data collected from students suggested a relationship between instructor creativity and teaching experience (Aschenbrener et al., 2010a, 2010b). Outside of instructor creativity, student creativity is also important. Research suggests postsecondary students lack creativity and innovation (Robinson, 2009). Also thought to be related to student creativity are student learning styles, as Friedel and Rudd (2006) reported a slight relationship between these two variables.

Theoretical Framework

The theoretical lens for this study is the Theory of Margin, initially conceptualized by McClusky (1963). The Theory of Margin states everyone has a load in life they must achieve, comprised of both external (i.e., familial and work duties) and internal (i.e., expectations for oneself) obligations. Additionally, all individuals have power to achieve that load, derived from "physical, social, mental, and economic abilities together with acquired skills which may contribute to the effective performance of life tasks" (McClusky, 1963, p. 16). The difference between power and load is margin. When margin is plentiful, McClusky (1963) posited individuals are not living up to their true potential because individuals could be learning new skills. When people have little to no margin, however, they become increasingly stressed and may approach the point of a breakdown (McClusky, 1963).

The Theory of Margin was explored by Stevenson (1982), who developed a scale to measure load, power, and margin. Subscales included self, family, religiosity/spirituality, body, extra-familial relationships, and environment (Stevenson, 1982, p. 223). The amount of power or load derived from various areas within those subscales could be quantified to measure the amount of margin one has in life. The margin construct utilized in the current study's instrument was informed by Stevenson's work.

Regarding creativity, the 4in1 construct of creativity, conceptualized by Kharkhurin (2014), is a theoretical tool which creates a broad definition for creativity. This construct suggests there are four dimensions of creativity: (a) novelty, (b) utility, (c) aesthetics, and (d) authenticity

(Kharkhurin, 2014). *Novelty* is the creation of something new, an original thought, process, solution, or idea. Through a teaching lens, this implies new or original takes on teaching content, integrating new topics into curriculum, or trying new classroom management techniques. *Utility* refers to a creative work being useful by making a meaningful contribution. In teaching, this could be operationalized as creativity yielding increased student engagement and learning retention. *Aesthetics* strives for creative work to incorporate beauty, also thought of as truth, and may be achieved by sharing important discoveries with fellow teachers or simply orchestrating something well. *Authenticity*, the final component, demands a creative work allows the creator to express themselves and their perceptions. For teachers, this entails being their authentic selves in the classroom. Kharkhurin's (2014) framework was modified and adapted to fit the context of this research. For this study, creativity is evaluated based on reported novelty, utility, aesthetic, and authenticity. The aesthetic value, as it is hardest to define in this context, was the least represented in the instrument's creativity construct.

Methods

An online, quantitative survey was used in this study exploring teacher margin and teacher creativity in Michigan.

Population and Response Rate

The survey was distributed via email to all Michigan SBAE teachers ($N = 150$) during the 2022-2023 school year. Responses were collected via Qualtrics during April and May 2023. Four reminder emails were sent to teachers during that time frame (Dillman, 2007). A total of 90 completed surveys were received for a response rate of 60.00%. Non-response bias was evaluated by comparing on-time respondents (n = 51) to late respondents (n = 39) for teacher margin and creativity. The lack of statistical significance (i.e., p-value = .919 [margin]; p-value = .852 [creativity]) between the groups suggests non-response bias was not an issue within this study.

Instrumentation

The survey was comprised of three sections. The first section included the margin construct, which contained nine questions (reported in Table 1). The second section included 14 questions measuring teacher creativity (reported in Table 3). The third section, demographics, elicited personal and programmatic information from respondents. Item-specific response options were created for each of the questions within the margin and creativity sections (Saris et al., 2010). Questions were randomized within survey blocks. A *post hoc* construct reliability analysis established the margin ($\alpha = .78$) and creativity ($\alpha = .83$) constructs were reliable.

Data Analysis

After being retrieved from Qualtrics, data were analyzed using the Statistical Package for the Social Sciences (SPSS). For research objective one, margin data were combined into a construct and individual item and construct means were calculated. For research objective two, a multiple linear regression was completed wherein margin was the dependent variable and selected

demographic variables served as the independent variables. For research objective three, creativity data were combined into a construct and individual item and construct means were calculated. For research objective four, a multiple linear regression was completed wherein creativity was the dependent variable and selected demographic variables served as the independent variables. For research objective five, the relationship between teacher margin and creativity was evaluated via a correlation analysis. The assumptions of multiple linear regression and correlation were checked and cleared prior to running each analysis.

Description of Respondents

Respondents averaged 10.70 years of teaching experience. Most respondents taught at a comprehensive public high school (f = 55; 61.11%). Additionally, two-thirds of respondents (f = 60) had completed a formal teacher education program. Females comprised the majority of respondents (f = 68; 75.56%).

Results

For research question one, overall teacher margin averaged 2.26 (SD = 0.53), with one being minimal margin and five being plentiful margin (see Table 1). Teachers reported the highest areas of margin as workload manageability (M = 2.90, SD = 0.97) and frequency of using support systems (M = 2.90, SD = 1.11). The lowest area of margin was availability of free time (M = 1.73, SD = 0.69).

Table 1

Margin Construct

Question	*M*	*SD*
How often are you able to effectively utilize your support systems?	2.90	1.11
Overall, how manageable would you consider your workload?	2.90	0.97
Overall, what is your level of stress? *	2.59	0.86
How often does your workload afford you the opportunity to practice your spirituality in the way you desire? †	2.57	0.91
Do you have space in your schedule to appropriately deal with life events?	2.14	0.86
How much mental space do you feel you have on any given school day?	1.92	0.66
How often do you have time in a school day to just sit and think?	1.84	0.68
How much energy do you have remaining after a school day?	1.81	0.81
How much free time versus scheduled time do you have during the week?	1.73	0.69
Margin Construct Score	2.26	0.53

Note. Response options differed for each item. *Reverse coded. †Not applicable option provided.

For research question two, a regression analysis was completed for teacher margin and selected demographic variables (see Table 2). The final model was not statistically significant (F-value =

1.36, *p*-value = .234), indicating the collection of independent variables were not significant predictors of teacher margin given the power available within our study.

Table 2

Regression of Teacher Margin and Demographics

	Dependent Variable: Teacher Margin					
Predictors	Zero-order correlation (*r*)	*p*-value (*r*)	*B*	*SEB*	β	*p*-value
Gender[a]	-.10	.348	-.08	.15	-.07	.581
Parent/Guardian Status[b]	.04	.745	-.02	.13	-.02	.858
Relationship Status[c]	.15	.165	.18	.13	.15	.217
Education Type[d]	.10	.367	.01	.13	.01	.968
School Type[e]	-.18	.109	.21	.14	.19	.121
Mid-Career Teacher	-.23	.036	-.27	.14	-.24	.056
Late Career Teacher	.15	.191	.06	.15	.05	.708

Note. $R = .34$, $R^2 = .12$, F-value = 1.36, p-value = .234. Indicator variables include: [a]Female = 1, [b]Parent/Guardian = 1; [c]In Relationship = 1; [d]Completed Teacher Preparation Program = 1; [e]Vocational/Career Center = 1.

For research question three, the mean teacher creativity score was 3.05 ($SD = 0.52$), with one being least creative and five being most creative (see Table 3). Teachers reported the highest amount of creativity via authenticity, reporting teaching agriculture is something they are passionate about ($M = 4.10$, $SD = 0.90$), whereas the lowest amount of creativity was reported for teaching using new practices ($M = 2.44$, $SD = 0.79$).

Table 3

Teacher Creativity Construct

Question	*M*	*SD*
To what extent would you say being an agricultural educator is one of your passions?	4.10	0.90
To what extent do you feel that you can be yourself as a teacher?	3.78	0.88
To what extent do you think your personality comes across when you are doing your job?	3.74	0.98
Thinking about premade curriculum or curriculum that others have shared with you, to what extent do you put your own unique twist on those lessons?	3.36	1.07
Do you look for new ways to deliver content to students?	3.14	1.11
Do you actively revise your curriculum to ensure it is having students think critically?	2.98	1.02
How often do you use your imagination to plan lessons?	2.88	1.01
To what extent do you think what you do in your classroom is creative?	2.85	0.78
To what extent do you think what you do in your classroom is innovative?	2.81	0.75
To what extent do your students think what you do in class is creative?	2.76	0.81
Thinking on a year to year basis, how often do you use the same lessons in your classroom?*†	2.68	0.90
Do you use the same methods when you teach?	2.55	0.78
How often do you create new curricular experiences for your classroom?	2.55	0.73
How many of your lessons contain practices you consider to be new?	2.44	0.79
Teacher Creativity Construct	3.05	0.52

Note. Response options differed for each item. *Reverse coded. †Not applicable option provided.

For research question four, a multiple linear regression including teacher creativity and selected demographic characteristics was completed (see Table 4). The collection of selected demographic variables was not statistically significant in modeling teacher creativity (F-value = 0.92; p-value = .494) given the power available in this study.

Table 4

Regression of Teacher Creativity and Selected Demographics

	Dependent Variable: Teacher Creativity					
Predictors	Zero Order Correlation I	*p*-vall(*r*)	*B*	*SEB*	β	*p*-value
Gender[a]	-.08	.467	-.08	.16	-.06	.622
Parent/Guardian Status[b]	.08	.454	.12	.13	.11	.368
Relationship Status[c]	-.09	.441	-.10	.15	-.08	.496
Teacher Preparation[d]	-.11	.324	-.25	.14	-.21	.083
School Type[e]	-.03	.766	-.04	.14	-.03	.803
Mid-Career Teacher	.04	.704	.15	.15	.13	.312
Late Career Teacher	.10	.370	.19	.16	.16	.221

Note. $R = .29$, $R^2 = .08$, F-value = 0.92, p-value = .494. Indicator variables include: [a]Female = 1, [b]Parent/Guardian = 1; [c]In Relationship = 1; [d]Completed Teacher Preparation Program = 1; [e]Vocational/Career Center = 1.

For research question five, a correlation was run to determine the relationship between teacher-perceived margin and creativity. The relationship between margin and creativity was not statistically significant (i.e., $r = .07$; p-value = .547) given the power available in this study.

Discussion, Recommendations, and Conclusions

Findings from research question one suggest teachers in Michigan perceived little margin ($M = 2.26$). These findings are particularly alarming considering the association between reduced margin and professional resilience (McClusky, 1963). Inherently, individuals seek systems which afford them margin to learn and grow (McKim & McKim, 2023); therefore, our findings indicating SBAE teachers in Michigan lack margin suggests teachers may leave the profession due to its preclusion of margin. Not only should stakeholders in Michigan be motivated to action based on these findings; disciplinary leaders in other states should be motivated to evaluate the margin perceived by SBAE educators in their state to bring awareness to this potential issue. Importantly, however, the timing of such evaluations should be considered. The data analyzed in the current research were collected in April and May, which contain some of busiest weeks in Michigan teachers' calendars. Thus, it is reasonable to assume margin might be higher at other points in the year. Therefore, it is recommended margin evaluations in Michigan, and elsewhere, be conducted multiple times throughout the school year to monitor the potential ebb and flow of margin among SBAE educators.

Shifting to research question two, findings demonstrate selected demographic variables have insignificant associations with margin among respondents. These findings suggest additional variables play a more substantive role in teacher margin for survey respondents. Future scholarship on teacher margin should consider the inclusion of specific workload characteristics (e.g., number of teaching preps, FFA contest involvement, class size, student participation in

supervised agricultural experiences) when modeling SBAE teacher margin. Further, modeling teacher margin amongst a larger sample could add statistical power to the analysis, affording a more discriminating look into this important variable.

Findings for research question three suggest, overall, teachers perceive moderate levels of creativity. The areas where teachers excelled in creativity were in the authenticity domain, feeling that their personality came across while doing their job, they could be themselves as teachers, and indicating that being an SBAE teacher was one of their passions. Areas where creativity scores were the lowest included the frequency of lessons with new practices, creating new curricular experiences, and using the same methods when teaching, all falling into the novelty domain. As such, helping teachers access new teaching methods, practices, or carve out time to create new curricular experiences may be valuable for increasing SBAE teacher creativity.

For research question four, none of the selected demographics were statistically significant predictors of creativity among respondents. These findings suggest no difference between career stages, gender, and creativity, reinforcing findings from Aschenbrener et al. (2010a, 2010b). Accordingly, we conclude other factors impact teacher creativity. Potential factors to be considered in future scholarship include teacher self-efficacy, personal creativity identity, value toward creativity, and workload characteristics (e.g., number of classes taught). Additional recommendations for research include scholarship which gathers student perceptions of teacher creativity to help evaluate learning benefits associated with classroom creativity.

For research objective five, there was no significant relationship between teacher margin and creativity. This ran counter to what was suggested by teachers in Marzolino et al. (2024). Despite their relatively low amounts of margin, teachers are still reporting moderate creativity. This could be a boon for the profession, as it seems no matter how little margin teachers have, they are still finding some sort of creative outlet. Alternatively, these findings may be explained by other variables being more accurate predictors of creativity. Future research is warranted to gain clarity on teacher creativity.

While this study provided important information on SBAE teacher margin and creativity, it does have limitations. First, the research was limited to a single state. Additionally, data were collected during some of the busiest weeks for Michigan SBAE teachers, which could have influenced responses. As such, our previous recommendation of longitudinal research on teacher margin and creativity throughout a school year is reinforced to better understand the interplay between program calendar, margin, and creativity.

Teachers in Michigan have a low amount of margin and a moderate level of creativity, suggesting that there is room for growth in both areas. While this study serves as a baseline for these variables in , the predictors of margin or creativity are still unclear. Expanding the survey to include a larger sample may be beneficial in bolstering statistical power and gaining a better understanding of these variables and their relationship. Ultimately, it’s important for teachers to have the margin required to stay within their chosen profession, just as it’s important for teachers to be creative and reap the benefits of creativity within their classroom.

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Sharing the Best Kept Secret: Describing Tennessee Residents' Familiarity with and Participation in Tennessee Extension Programs

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Abstract

This study was conducted as part of a larger data collection effort to inform the strategic plan of Tennessee Extension and enhance the reach and public value of Extension services. We collected data from adult residents across Tennessee to help us better understand who is and is not being reached by our programming. We also sought to direct future practice in Tennessee by examining how residents learned about Extension and what key barriers prevented participation in programming. More than half of the respondents indicated being at least slightly familiar with Tennessee Extension and its services, while roughly one-third were not at all familiar. Respondents not familiar with Extension were more likely to be in lower income brackets, have lower levels of education, and identify with a race other than white. Only one-third of the respondents who reported being at least slightly familiar with Tennessee Extension had actually participated in an Extension program. The primary barriers to participation included lack of knowledge that the programs existed or how to find key information about the programs. Data pertaining to how different audience groups first hear about Extension, whether in general or a specific program, revealed word of mouth from friends, family, or other colleagues as a highly likely source of information for Tennessee residents. The findings indicate the potential for Tennessee Extension to enhance its perceived public value through increased efforts to reach audiences in low socioeconomic groups through new methods of recruitment and ongoing program evaluation that reflects changing demographics and the broad range of needs of clientele Extension can serve.

Introduction

The mission of the U.S. Cooperative Extension System has been to translate and transfer evidence-based information and best practices across the program areas of agriculture and natural resources (ANR), youth development (4-H), family and consumer sciences (FCS), and community/economic development (CED). Extension has traditionally supported producers and communities in these programmatic areas through educational activities, such as on-farm visits, community classes, and field days, designed to address the identified needs of those clientele

groups (Coombs, 1976). Extension specialists, agents, and county offices have thus demonstrated a notable history of serving as a preeminent and direct source of information for their customer base (Al-Kaisi et al., 2015).

Despite a prominent history, Extension has experienced changes and challenges across the years, such as resource availability and competitive funding (Cochran et al., 2012; Harder et al., 2009; Narine et al., 2019), changing demographics of clientele and, subsequently, shifting programming needs (Campbell et al., 2023; Cochran et al., 2012; Henning et al., 2014; Narine et al., 2019), trends in informational pathways between the university and end-users (Al-Kaisi et al., 2015), and new technology use and incorporation (Campbell et al., 2023; Cochran et al., 2012; Diem et al., 2011). Leading Extension specialists have maintained that the role of Extension and its relevance depends upon its ability to adjust and respond to external and internal challenges (Harder et al., 2009). Among the most pervasive challenges has been decreased financial support for Extension across national, regional, and state levels. As state legislators are elected by a populous broader than Extension's traditional direct clientele (Kalambokidis, 2014), there is a considerable need for Extension to be able to measure its impact and demonstrate significant public value to maintain funding and public support (Franz, 2015; Kalambokidis, 2014).

Conceptual Framework

Boyle's (1981) program development model provides a systematic approach to the development of programs, the efficacy of the program, and the efficacy of the individuals or groups involved. Boyle (1981) suggested that there are three types of programs for which this method could provide a framework: developmental, institutional, and informational. In Extension, Boyle's (1981) model is not specific to any particular program, but the institution overall (Franz et al., 2015). Strategies aligning with this model include involving potential clientele and evaluating the needs of the communities targeted by the program, identifying and evaluating program priorities, identifying the method or design by which the program will be enacted, and utilizing promotion and outreach to determine the effectiveness of the program.

The use of Boyle's (1981) program development model in this review of an Extension program's reach and impact on its targeted community allows for improvements and modifications to be made in the interest of public value. Public value is measured in how a program or organization impacts those who are not its direct beneficiaries (Franz, 2015). Extension encounters obstacles that could be addressed by improving upon programs to establish their public value (Franz, 2015). Actions aligning with principles from Boyle's model improve upon Extension's engagement with the public value movement. In this study, we sought to inform best practices for enhancing public value in the future by first gaining a better understanding of who we are and are not reaching with our programming and services.

Purpose and Objectives

The purpose of this study was to identify strategies to enhance participation in Tennessee Extension programming among intended audiences, specifically factors that inhibit the first point of entry (or familiarity) with Extension and actual participation in programming. Essentially, we sought to establish who is and who is not being reached by Tennessee Extension programming, and barriers to participation. To do so, four research questions were developed:

1. Are Tennessee residents familiar with Tennessee Extension, and how did they first become familiar with Extension?
2. What sociodemographic factors explain barriers to residents' point of entry (i.e., familiarity) to Tennessee Extension?
3. Are residents participating in Tennessee Extension programs, and, if not, what factors hinder them from participating?
4. How did residents who have participated in an Extension program initially learn about the program?

Methods

Data Collection and Sample

We utilized Qualtrics services to obtain a non-probability opt-in sample of adult residents across Tennessee. Non-probability sampling is an approach commonly used to make population estimates when establishing a true sampling frame is not possible (Baker et al., 2013). We distributed a link to an online survey via Qualtrics recruitment panels, which included traditional, actively managed market research panels and social media platforms (Qualtrics, 2019). A total of 2,618 people across Qualtrics' panels received access to the online survey link. Parameters on the population frame included being a resident of Tennessee and being 18 years of age or older. We also set demographic quotas, including race, income, gender, education level, and regional location, to help obtain a sample reflective of the state population that spanned all three primary regions. Unfortunately, this data collection methodology is not without limitations, and issues of data quality can arise. As such, we embedded attention filters (e.g., "select strongly agree if you read this statement"), set minimum completion time requirements based on average times collected during the survey pilot, and included several open-ended questions to check for nonsense responses. Data collection resulted in 1,508 usable responses from Tennessee adult residents, comprising a response rate of 57.6%. Based on the rigor of the demographic quotas associated with the response panels, we deemed the response rate sufficient for this study.

Instrument

We developed the instrument used for data collection with the purpose of gathering data to inform the new Tennessee Extension Strategic Plan. We developed the instrument items in consultation with a panel of twenty Extension experts across the state who also served as team leads on the Extension Strategic Planning Committee. This panel of experts included county agents, county directors, regional directors, regional program leaders, the Assistant Dean of Tennessee Extension, and tenure-track faculty Extension specialists. The panel reviewed the instrument for face and content validity, particularly regarding readability, layout and style, clarity of wording, and accuracy of content (Colton & Covert, 2007). Two rounds of revisions were made to the print version of the survey, and a final round of revisions was made after the survey had been built into the online platform. We then conducted a pilot test with 50 respondents to ensure the accuracy of the survey flow and conduct preliminary analyses of any instrument scales. One survey item, which was not used for data analysis in the current study, was edited to correct a response scale error.

We used five sections of the larger instrument for primary data analyses in the current study. The first instrument item was set in place as a filter to direct respondents to the following

questions according to their responses. We asked respondents to indicate their familiarity with Tennessee Extension using a single item with a 5-point ordinal scale (1 = *not at all familiar;* 5 = *very familiar*). Respondents who indicated they were at least somewhat familiar with Tennessee Extension were directed down one survey pathway, while those who were not at all familiar were directed down a separate pathway. Respondents with at least some familiarity with Tennessee Extension were asked how they first became familiar (e.g., visited a county office, farm or home visit, etc.), and then asked if they had previously participated in an Extension program (1 = *yes;* 0 = *no*).

Respondents who had heard of Extension but had not participated in any programs were asked to indicate their level of agreement with 11 barriers to participation (e.g., "time prevents me from participating in Extension programs," and "I do not know where to find information about when and where programs are offered"). The items included in this section were selected based on a review of prior, relevant literature and expert input from the Extension Strategic Plan panel. Responses for barrier items were collected using a 5-point Likert-type scale: 1 = *strongly disagree;* 5 = *strongly agree*. Respondents who had participated in an Extension program were then asked to indicate the avenues through which they initially learned about the program(s) by checking all that apply from a list of commonly used Tennessee Extension recruitment methods. The check-all-that-apply approach was selected due to the possibility of respondents having seen programs advertised through more than one platform/method.

Lastly, all respondents were asked a series of demographic questions, including age, income bracket, race, ethnicity, regional location in the state, experience with agriculture, status as a parent or guardian, and education level.

Data Analysis

We analyzed all data using the SPSS version 28 software package. Data analyses for research question one consisted of descriptive statistics, including frequencies and percentages. For research question two, we employed the Kruskal-Wallis test to examine differences in familiarity with Extension based on select sociodemographic characteristics. Due to the ordinal nature of the response scale used to measure familiarity, we could not confidently assume equal distances between scale points (Fields, 2013). Initial data screening confirmed the dependent variable did not meet the normality assumption required for one-way ANOVA. As such, Kruskal-Wallis was selected as an appropriate alternative (Talbachnick & Fidell, 2013).

We calculated the effect size for Kruskal-Wallis tests using eta squared ($\eta^2 = X^2 / N\text{-}1$), with $\eta^2 < 0.01$ = negligible effect, $0.01 \leq \eta^2 < 0.06$ = small effect, $0.06 \leq \eta^2 < 0.14$ = medium effect, and $\eta^2 \geq 0.14$ = large effect. While this nonparametric test does not allow for inferences or examination of statistically significant differences between specific groups within the independent variable categories, non-probability samples do not fully allow for probability-based generalizations, thereby negating this method of examination. This information should provide insight for practical application for informing strategic planning and program recruitment practices by identifying where discrepancies in Tennessee Extension's reach exist based on sociodemographic considerations. Results for Kruskal-Wallis tests are presented in the results along with descriptive data for rankings for each level of the sociodemographic independent variables. Lastly, research questions three and four were both assessed using descriptive statistics, including means, standard deviations, frequencies, and percentages.

Results

Research Question One

Research question one involved describing respondents' familiarity with Tennessee Extension and how they first learned about it. Regarding their familiarity, 533 respondents (35.3%) reported being not familiar at all (i.e., never heard of it), 461 (30.6%) were slightly familiar, 256 (17%) were moderately familiar, 130 (8.6%) were very familiar, and 128 (8.5%) were extremely familiar. Those who were at least slightly familiar with Extension (n = 975) were then asked how they first became familiar with Tennessee Extension. More respondents (f = 549, 56.3%) reported hearing about Extension through friends, family, or other colleagues than any other item presented (see Table 1). Table 1 presents the frequency distribution of responses per item, as well as percentages based on both the number of respondents who indicated at least slight familiarity with Extension and the total number of respondents in the sample of this study.

Table 1

First point of entry for respondents who indicated at least slightly familiarity with Tennessee Extension (n = 975)

Source of first contact	*f*	% of those familiar with Extension (*n* = 975)	% of total sample (*n* = 1508)
From friends, family, or other colleagues	549	56.3	36.4
Participated in an educational program	130	13.3	8.6
Visited a county office	94	9.6	6.2
My child participated in a youth program through Extension	79	4.6	3.0
Participated in a field day	78	8.0	5.2
Farm or home visit from Extension	45	4.6	30

Research Question Two

Research question two explored how sociodemographic factors explain residents' familiarity with Tennessee Extension. In practice, this research question may help us identify barriers to point of entry and key audiences we are currently not reaching. Results from the Kruskal-Wallis tests revealed significant differences in the degree of familiarity with Tennessee Extension between different income bracket groups, $H(5) = 142.23$, $p<.001$, $\eta^2 = .094$ (see Table 2); level of educational attainment, $H(5) = 164.37$, $p = <.001$, $\eta^2 = .12$ (see Table 3); and race, $H(5) = 13.61$, $p = .02$, $\eta^2 = .009$ (see Table 4). No significant differences were observed between groups based on their rural-urban continuum codes, $H(8) = 3.77$, $p = .88$

Table 2

Kruskal-Wallis test rankings for familiarity with Extension based on income bracket

Income bracket	*N*	Mean rank
$24,999 or less	357	608.17
$25,000 to $49,999	417	691.48

$50,000 to $74,999	277	744.98
$150,000 to $249,999	104	1017.87
$250,000 or more	28	1004.57

Table 3

Kruskal Wallis test rankings for familiarity with Extension based on level of educational attainment

Educational attainment level	***N***	**Mean rank**
Less than 12th grade (did not graduate high school)	59	468.35
High school graduate (includes GED)	470	652.61
Some college, no degree	345	700.84
2-year college degree (Associates, Technical, etc.)	188	769.20
4-year college degree (Bachelor's, etc.)	275	865.90
Graduate or professional degree (Master's, Ph.D., etc.)	171	1046.25

Table 4

Kruskal-Wallis test rankings for familiarity with Extension based on race

Race	***N***	**Mean rank**
White	1245	766.83
Black	207	685.67
Asian	15	545.70
Native American or Alaskan Native	15	703.10
Mixed race	18	886.50
Other	6	574.17

Research Question Three

Research question three involved examining factors that may hinder residents' participation in Tennessee Extension programs. This research question arose in light of discrepancies between how many residents reported being aware of Extension and how many reported having actually utilized Extension's services. We sought to better understand what barriers outside of "not knowing Extension existed" kept targeted audiences from enrolling in our programs.

Of the 975 respondents who reported being at least slightly familiar with Tennessee Extension, 338 (34.7%) had participated in an Extension program; 637 (65.3%) of those familiar had not participated in a program. When those who had not participated in a Tennessee Extension program were asked to identify barriers that prevented them from doing so, respondents agreed most that they do not know where to find information about when and where programs are offered ($M = 3.46$; $SD = 1.02$), time prevents them from participating ($M = 3.30$; $SD = 1.03$), they did not know the programs existed ($M = 3.30$; $SD = 1.20$), and financial cost of programs prevents them from participating ($M = 3.24$; $SD = 1.09$). Lack of internet access ($M = 2.21$; $SD = 1.08$) and personal limitations ($M = 2.64$; $SD = 1.08$) were comparatively less of a hindrance than other barrier items.

Research Question Four

Lastly, research question four sought to uncover how residents who had participated in Tennessee Extension programs (n = 338) heard about those programs. This research question was established to help address the previously identified barrier of not knowing when/where programs were offered or that such programs existed. Compared to other methods listed, more respondents reported learning about the Extension program they participated in through word of mouth (f = 197) and the Tennessee Extension website (f = 157). Conversely, fewer respondents learned about their Extension programs via social media (f = 123) or other forms of advertisement (f = 111).

Conclusions

A key finding of this study is that more than half of the respondents (64.7%) indicated being at least slightly familiar with Tennessee Extension and its services, while roughly one-third (35.3%) were not at all familiar with Tennessee Extension and had not heard of it prior to completing the instrument. Further examination of who had and had not heard of Tennessee Extension revealed significant differences based on income, educational attainment level, and race. Respondents with lower income levels and lowest educational attainment ranked lower in their degree of familiarity with Extension. Respondents in racial groups other than "white" also ranked lower in their degree of familiarity with Tennessee Extension.

Of the 975 respondents who reported being at least slightly familiar with Tennessee Extension, only one-third (34.7%) had actually participated in an Extension program. The primary barriers to participation appeared to center on a lack of knowledge that the programs existed or how to find key information about the programs. An additional barrier included cost associated with the programs. Lastly, data pertaining to how different audience groups first hear about Extension, whether in general or a specific program, revealed word of mouth from friends, family, or other colleagues as a highly likely source of information for Tennessee residents.

Discussion and Recommendations

The findings of this study indicate the potential for Tennessee Extension to enhance its perceived public value through increased efforts to reach audiences in low socioeconomic groups. Respondents in this study who had lower income, lower educational attainment, and were not white demonstrated relatively less familiarity with Tennessee Extension. If Tennessee Extension is to enhance its perceived public value (Franz, 2015) there is a need to specifically direct marketing foci to the identified unreached groups. Such efforts are particularly necessary in light of consistent funding challenges Extension faces across county, regional, and state levels (Cochran et al., 2012; Harder et al., 2009; Narine et al., 2019). While we direct much focus toward urban rural differences, our findings suggest a need to reach those of lower socioeconomic statuses, regardless of rural or urban location. Targeted research is needed to better understand the informational pathways between Extension offices and targeted audiences. ANR audiences in Tennessee, such as participants in various Master Producer programs, are still statistically more likely to be homogenous in their demographic characteristics due to the current demographics of Tennessee producers. In other programming areas, however, Extension has observed changes in participant demographics and their programming needs (Campbell et al.,

2023; Cochran et al., 2012; Henning et al., 2014; Narine et al., 2019). Strategies included in strategic plans should reflect on such changes and needs and evaluate why information is not reaching emerging clientele with needs Extension has the capacity to address.

Regarding reporting the impact of programs held, additional recruitment is needed to help bridge the gap between the number of audience members who are familiar with Extension and the number who actually participate in programming. Findings from this study indicate lack of information as a key barrier to participation rate. Considering how many respondents reported having learned about Extension in general or specific programs via word of mouth, we recommend Extension programs capitalize on program participants as a key source for recruitment. For example, county offices may authorize entry into a raffle for program participants based on referrals. However, considering the challenges in reach associated with income, race, and educational attainment, this approach alone may not be sufficient. Rather, Extension offices may seek to offer free programming for these specific unreached audiences to first enhance familiarity with Extension and then offer referral-based or other incentives to enhance word-of-mouth recruitment. Further, county agents could include frequent program participants in the evaluation and recruitment process to help enhance the success of such efforts. This approach is consistent with Boyle's (1981) recommended strategy for involving potential clientele to evaluate the needs of the targeted audiences. Lastly, research on Extension reach and recruitment should continue to be conducted across state systems and published to help build a database of best practices.

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An Assessment of Clemson Cooperative Extension Agents' Perceptions of Work-Related Factors Leading to Burnout

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Turnover and employee burnout are problems the Cooperative Extension System is facing nationwide, and the Clemson System is no exception. Research within Extension has identified factors contributing to turnover and burnout; however, both remain an issue. To further investigate factors contributing to burnout, this pilot study was conducted with Clemson Extension agents using a burnout assessment that has not previously been used in Extension research. This study described Extension agents' perceptions of six work constructs that may lead to burnout to determine if there were any relationships between the constructs and demographic characteristics of Extension Agents. The work constructs studied were workload, control, community, reward, fairness, and values. Findings indicated that agents had an overall positive perception of the constructs, and the constructs studied were not contributors to burnout among Extension agents. There was also no correlation found between burnout risk and demographic characteristics. This study established reliability coefficients for the survey instrument used and identified future implications for the use of the instrument. Since there were no correlations in the data, it is recommended that future research be conducted using other factors of work to identify which do contribute to burnout.

Author Note: This manuscript is based on data published in the Proceedings of the Southern Region Conference of the American Association for Agricultural Education, Hwang et al., (2024).

Introduction, Purpose, and Objectives

Burnout is a condition that results from prolonged, chronic exposure to stress on the job that leads the individual to feelings of exhaustion, cynicism, and lack of achievement (Maslach & Leiter, 2016). The first workplace burnout study was done by Herbert Freudenberger in 1974, with the first study on burnout in Cooperative Extension agents completed by Christopher Igodan in 1984 (Freudenberger, 1974; Igodan, 1984). Since then, there have been numerous studies done within the Cooperative Extension System to discover causes of burnout with hopes of reducing turnover (Chandler, 2005; Harder et al., 2014; Harder et al., 2015; Igodan & Newcomb, 1986; Strong & Harder, 2009). Retaining long-term, high-quality employees is the goal for most organizations; however, in Cooperative Extension's case, it is a goal that needs to be met for financial and educational programming purposes (Harder et al., 2015).

In a 2005 study by G. D. Chandler, it was estimated that the cost of replacing an Extension agent ranges between $7,185 and $30,000 per agent, making the cost of turnover extremely high for the Cooperative Extension system. The cost of retaining Extension agents extends beyond financial implications. Losing Extension agents creates a loss of knowledge, experience, and

relationships while disrupting programming and increasing the strain on the remaining employees, including the agent's successor (Harder et al., 2015).

Research on Extension employee burnout dates to 1984, with many concluding that similar factors (i.e., low pay, lack of work-life balance, and long hours) contribute to burnout (Chandler, 2005; Harder et al., 2014; 2015; Igodan & Newcomb, 1986; Strong & Harder, 2009). Even with these factors established, high turnover rates remain, leading to the question of why burnout and high turnover are still issues within the Cooperative Extension system. In this study, six work constructs will be investigated as potential contributors to Extension employee burnout. The constructs are workload, control, reward, values, community, and fairness. This study's results will aim to provide Cooperative Extension employees with the knowledge needed to develop and implement effective measures to combat workplace burnout on the individual level.

Purpose and Objectives

The purpose of this research is to identify Clemson Cooperative Extension agents' perceptions regarding the six work constructs that lead to burnout and any relationships that may exist between those factors and demographic traits. Three research objectives guided this study:

1. Explain the demographic characteristics of Clemson Cooperative Extension agents.
2. Describe Clemson Cooperative Extension agents' perceptions of six work constructs (workload, control, reward, community, fairness, and values) that may lead to burnout; and
3. Determine relationships, if any, between the six work constructs leading to burnout and generational cohort affiliation of Clemson Cooperative Extension agents.

Theoretical Framework

The Motivation-Hygiene Theory (MHT) was created to fill a gap in the field of job attitudes and perceptions (Herzberg et al., 1959). The MHT explains that employee satisfaction is two-dimensional made of motivational, or intrinsic factors, and hygiene, or extrinsic factors (Herzberg et al., 1959). In the motivation to work study by Herzburg et al. (1959), hygiene factors were compared to medical hygiene because they act as a preventative, not a curative. Examples of hygiene factors are salary, supervision, administration, interpersonal working relationships, and physical working conditions (Gamble, 2014). If hygiene factors are not met, employees leave positions before there is an opportunity to develop motivational factors.

The second dimension is motivation, which explores things that make employees more productive, like recognition, professional development, the work itself, and achievement. In the MHT (Herzberg et al., 1959), emphasis is placed on motivational factors rather than hygiene factors, as motivational factors are more encouraging to employees. However, this conclusion was challenged in a 2014 study when it was found that factors that most motivated Extension professionals fell into the motivational and hygiene categories, suggesting that hygiene factors may play a bigger role in Extension employee job satisfaction (Harder et al., 2014).

In the context of this study, MHT was used to identify intrinsic and extrinsic work factors that contribute to employee burnout. Intrinsic factors include achievement, work itself, responsibility,

recognition, and advancement. Extrinsic factors include supervision, salary, policy and administration, interpersonal relationships, and working conditions. Identifying factors contributing to burnout will help serve the purpose of describing relationships, if any, between work constructs leading to burnout and generational cohort affiliation of Clemson Cooperative Extension agents.

Methods

To address the research objectives, a non-experimental design was developed using a modified version of the Breakthrough Burnout Prevention and Wellness assessment (Eby, 2021). Clemson Extension agents of all disciplines ($N = 132$) were invited to participate in the assessment. The survey was distributed using an anonymous Qualtrics link through an existing listserv that is owned and maintained by the Clemson Cooperative Extension Service (CCES). An initial email and three contact points were used to invite CCES agents to participate in the study. By survey completion, 90 completed responses were recorded for data analysis.

Participants were asked to complete several demographic questions at the beginning of the survey. Questions did not ask for any identifiable information but asked participants to identify their gender, race or ethnicity, generational cohort, and highest degree held. The Baby Boomer generation and Generation X were combined to create the "Born between 1946 and 1976" grouping. The Millennial generation and Generation Z were combined to create the "Born between 1977 and 2010" grouping. Participants were also asked for professional characteristics related to their jobs including level of service, program team affiliation, and years of service. The rest of the survey was divided into six sections, one for each work construct that contributes to burnout. Each section asked respondents to choose how they aligned with each statement in a Likert-type scale format that allowed participants to choose from the options of strongly disagree (1), somewhat disagree (2), somewhat agree (3), or strongly agree (4).

The data were analyzed using SPSS version 28. Frequencies and percentages were evaluated for research objective one. The second research objective employed descriptive statistics to indicate the central tendency or the center point of the scores (American Psychological Association, n.d.) to describe Clemson Extension agents' perceptions of the six work constructs (i.e., workload, control, reward, community, fairness, and values) that contribute to burnout, the mean scores for each question and construct were recorded.

Objective three was analyzed using a one-way analysis of variance (ANOVA) and a bivariate correlation in SPSS. For this objective, the null hypothesis was that there is no difference in the generational cohort means (i.e., born between 1946 and 1976 or born between 1977 and 2010) when compared to the means for each work construct. The alternative hypothesis is a difference in the mean scores for each work construct when compared to the generational cohort means.

Findings

To satisfy research objective one, participants were asked demographic questions related to their personal and professional characteristics. Of the 90 completed responses, there were more female respondents ($n = 49$, 54.4%) than male respondents ($n = 32$, 35.6%). Many respondents

identified as white or Caucasian (*n* = 74, 82.2%), with the second highest group being black or African American (*n* = 5, 5.6%) respondents. Most respondents identified themselves as being born between 1977 and 2010 (*n* = 53, 58.9%) and all respondents had some degree of higher education. Table 1 outlines the personal and professional characteristics of participants.

Table 1

Personal Characteristics of Participants (n = 90)

Characteristic		*f*	%
Gender	Male	32	35.6%
	Female	49	54.4%
	Prefer not to answer	9	10%
Race/Ethnicity	White/Caucasian	74	82.2%
	Black/African American	5	5.6%
	American Indian	3	3.3%
	Hispanic/Latinx	1	1.1%
	Asian	2	2.2%
	Native Hawaiian	1	1.1%
	Other/Multiple Ethnicities	4	4.4%
Generational Cohort	Born between 1946 - 1976	35	38.9%
	Born between 1977 - 2010	53	58.9%
	Prefer not to answer	2	2.2%
Highest Degree Held	Bachelors	29	32.2%
	Masters	49	54.4%
	Doctorate	8	8.9%
	Prefer not to answer	4	4.4%

The questions assigned to the professional characteristics were the level of service (county, regional, state, or prefer not to answer), program team affiliation, and years of service. Many responses came from agents who serve on the county level (*n* = 46, 51.1%), followed by 12 (13.3%) who serve on the regional level and 29 (32.2%) who serve on the state level. There were ten program teams represented across the 90 respondents. The program teams with the highest response frequency were 4-H Youth Development and Horticulture with 15 (16.7%) participants each. The years of service with Clemson Cooperative Extension of the respondents ranged from five or below to over 30 years or more. Table 2 provides the frequency and percentage of responses for each of the professional characteristics of participants.

Table 2

Professional Characteristics of Participants (n = 90)

Characteristic		*f*	%
Level of Service	County	46	51.1%
	Regional	12	13.3%
	State	29	32.2%
	Prefer not to answer	9	10%
Program Team	4-H	15	16.7%
	Horticulture	15	16.7%
	Rural Health	9	10%
	Agribusiness	7	7.8%
	Livestock and Forages	7	7.8%
	Food Systems and Safety	6	6.7%
	Forestry and Natural Resources	6	6.7%
	Other	5	5.6%
	Natural Resources - Water	4	4.4%
	Agronomy	3	3.3%
	EFNEP	1	1.1%
	Prefer not to answer	12	13.3%
Years of Service	≤ 5	37	41.1%
	6 - 10	17	18.9%
	11 - 15	6	6.7%
	16 - 20	10	11.1%
	21 - 25	6	6.7%
	26 - 30	3	3.3%
	> 30	3	3.3%
	Prefer not to answer	8	8.9%

For research objective two, the overall mean scores for each construct in the survey and work instrument were calculated along with an overall mean for the burnout work assessment. The mean scores for individual constructs ranged from $M = 2.82$ to $M = 3.48$ (See Table 3). The highest mean score was in the values construct with a score of $M = 3.48$ ($SD = 0.70$). The lowest mean score came from the workload construct with a score of $M = 2.82$ ($SD = 0.77$). Table 3 provides the mean and standard deviation for each of the constructs.

Table 3

Mean Scores for Burnout Assessment Work Constructs (n=90)

Construct	*M*	*SD*
Workload	2.823	0.773
Control	3.183	0.653
Reward	3.169	0.684
Community	3.377	0.642
Fairness	3.192	0.722

Values	3.476	0.699
Overall	3.204	0.723

Note: 1 = strongly disagree, 2 = somewhat disagree, 3 = somewhat agree, 4 = strongly agree

The survey instrument asked respondents to choose how they aligned with statements in each work construct using a 4-point Likert scale format. The lowest mean score was for question eight in the workload construct at $M = 1.80$ ($SD = 1.23$). The question asked participants how they aligned with the statement "I do not think about unfinished work after leaving for the day." The highest mean score was $M = 3.98$ ($SD = 0.21$) for questions four in the community construct and six in the reward construct. Question four in the community construct asked participants how they aligned with the statement "I treat people at work with care and respect," and the statement for question six in the values construct was "I make positive contributions to my organization." Table 4 provides the individual questions for each of the constructs along with the corresponding mean and standard deviation.

Table 4

Mean Scores for Burnout Assessment questions (n=90)

Construct	Question	*M*	*SD*
Workload	I have the capacity to keep up with my work and do so with excellence.	3.54	0.901
	I have the training necessary to excel at my job.	3.41	1.004
	I do not feel burned out from my work.	2.60	1.261
	I am able to finish my responsibilities without working overtime.	2.34	1.273
	I have time to plan and prioritize my work.	3.17	1.073
	I have time to work on my most important responsibilities.	3.41	0.970
	I do not take work home to complete on evenings, weekends, or vacations.	2.16	1.306
	I do not think about unfinished work after leaving for the day.	1.80	1.229
	I have the support and resources needed to perform my job with excellence.	2.90	1.255
	My work does not take precedence over my personal interests.	2.90	1.200
Control	I can handle the pace and my amount of work long-term.	3.37	1.054
	My work environment and tasks feel	2.98	1.161

	predictable.		
	I am equipped to meet the challenges of my work.	3.58	0.861
	I have clarity regarding expectations and priorities.	2.78	1.197
	Communication in my organization is effective, authentic, clear, and adequate.	2.22	1.216
	I feel positive about my job.	3.22	1.109
	I have influence within my team.	3.37	1.086
	I have control over where, when, and how I do my work.	3.19	1.160
	I have a proper work set up to perform my responsibilities.	3.62	0.869
	I have adequate decision-making influence over my work.	3.51	0.974
Reward	I feel inspired and take pride in my work.	3.74	0.787
	I make a significant contribution at work.	3.84	0.539
	I feel my effort is noticed and rewarded.	2.99	1.259
	My manager or team encourages and appreciates my work.	3.31	1.148
	I receive adequate health benefits to support myself and my family.	3.46	1.051
	I can save for the future rather than living paycheck to paycheck.	2.09	1.233
	My workplace invests in my professional growth.	3.19	1.160
	I feel appreciated for my contribution to my team or organization.	3.01	1.204
	I have sufficient time away from work and feel in control of my time off.	2.89	1.267
Community	I enjoy working with my manager and co-workers.	3.84	0.539
	The culture of my organization is positive.	2.91	1.269
	I do not get irritated easily by my work or co-workers.	3.22	1.079
	I treat people at work with care and respect.	3.98	0.211

	I feel comfortable sharing my concerns with my manager.	3.44	1.040
	I feel heard and that my voice counts with my manager and team.	3.07	1.243
	I feel psychologically safe at work.	3.54	0.973
	I trust my co-workers.	3.47	0.997
	My co-workers do not adversely affect my work.	3.44	0.973
	My team is free from conflict.	2.84	1.235
Fairness	I am fairly compensated relative to others in my organization and field.	2.34	1.300
	I have adequate opportunities to move upward in my organization.	2.30	1.276
	I feel respected regardless of my gender or sexual orientation.	3.30	1.166
	I have the same opportunities as people of other genders or orientations.	3.11	1.213
	I feel respected regardless of my spiritual orientation.	3.72	0.848
	I have the same opportunities as people of other spiritual orientations.	3.71	0.838
	I feel respected regardless of my ethnic identity.	3.64	0.852
	I have the same opportunities as people of other ethnicities.	3.41	1.037
	My organization wholeheartedly embraces diversity, equity, and inclusion.	3.49	0.986
	I can climb the ladder at work while keeping my integrity.	2.89	1.267
Values	My personal values align with the values of my organization.	3.41	1.069
	My organization’s mission, vision, and values are authentically lived out.	3.11	1.156
	My responsibilities align with my organization’s values.	3.52	0.951
	I am treated with respect at work.	3.57	0.925
	Team successes are acknowledged and shared by the entire team.	3.32	1.100

I make positive contribute to my organization.	3.98	0.211
I feel engaged in my role at work.	3.70	0.785
My organization's goals fit well with my career ambitions.	3.42	1.016
I am growing personally and professionally within my organization.	3.26	1.176

Note: 1 = strongly disagree, 2 = somewhat disagree, 3 = somewhat agree, 4 = strongly agree

For research objective three, the demographic of interest was generational cohort affiliation (i.e. born between 1946 and 1976 or born between 1977 and 2010) and burnout recognition. For this objective, the null hypothesis is that there is no difference in the generational cohort means when compared to the means for each work construct. The alternative hypothesis would be that there is a difference in the mean scores for each work construct when compared to the generational cohort means. A one-way ANOVA was performed to evaluate the relationship between the workload constructs and generational cohort affiliation. The descriptive statistics for the six work constructs leading to burnout by generational cohort are presented in Table 5.

Table 5

Descriptive Statistics for the six work constructs leading to burnout by generational cohort (n=88)

Variables		N	M	SD	Std. Error	90% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Workload	Born between 1946-1976	35	2.84	.80	.13672	2.6088	3.0712	1.40	4.00
	Born between 1977-2010	53	2.80	.74	.10231	2.6343	2.9770	1.30	4.00
	Total	88	2.81	.76	.08171	2.6835	2.9552	1.30	4.00
Control	Born between 1946-1976	35	3.21	.76	.12943	2.9926	3.4303	1.10	4.00
	Born between 1977-2010	53	3.18	.53	.07343	3.0638	3.3098	1.90	4.00
	Total	88	3.19	.63	.06743	3.0845	3.3087	1.10	4.00
Reward	Born between 1946-1976	35	3.28	.76	.12853	3.0716	3.5062	1.33	4.00
	Born between 1977-2010	53	3.10	.61	.08416	2.9681	3.2499	1.78	4.00
	Total	88	3.18	.67	.07215	3.0606	3.3005	1.33	4.00
Community	Born between 1946-1976	35	3.38	.61	.10474	3.2029	3.5571	1.80	4.00

	Born between 1977-2010	53	3.37	.66	.09095	3.2232	3.5278	1.40	4.00
	Total	88	3.37	.64	.06843	3.2635	3.4910	1.40	4.00
Fairness	Born between 1946-1976	35	3.38	.62	.10633	3.2088	3.5684	1.90	4.00
	Born between 1977-2010	53	3.07	.76	.10490	2.8960	3.2474	1.30	4.00
	Total	88	3.19	.72	.07743	3.0690	3.3265	1.30	4.00
Values	Born between 1946-1976	35	3.47	.71	.12157	3.2674	3.6786	1.33	4.00
	Born between 1977-2010	53	3.49	.67	.09209	3.3426	3.6511	1.67	4.00
	Total	88	3.48	.68	.07316	3.3657	3.6090	1.33	4.00

Note: Born between 1946-1976 = Baby Boomer and Generation X; Born between 1977-2010 = Millennial and Generation Z.

The ANOVA was only significant for the fairness work construct (F (1,86) = 4.16, $p < 0.05$). No statistically significant difference was found between generational cohort affiliation and the workload construct (F (1,86) = 0.04, $p = 0.84$), control construct (F (1,86) = 0.03, $p = 0.86$), reward construct (F (1,86) = 1.50, $p = 0.22$), community construct (F (1,86) = 0.01, $p = 0.97$), or values construct (F (1,86) = 0.02, $p = 0.87$) as demonstrated by the one-way ANOVA.

Table 6

Point-Biserial Correlation Findings for Generation and Work Constructs (n=88)

Construct	N	Mean[a]	SD	$r_{pt\ bis}$
Workload				
Born between 1946-1976	35	2.84	.80	
Born between 1977-2010	53	2.80	.74	-0.022
Control				
Born between 1946-1976	35	3.21	.76	
Born between 1977-2010	53	3.18	.53	-0.131
Reward				
Born between 1946-1976	35	3.28	.76	
Born between 1977-2010	53	3.10	.61	-0.019
Community				
Born between 1946-1976	35	3.38	.61	
Born between 1977-2010	53	3.37	.66	-0.003
Fairness				
Born between 1946-1976	35	3.38	.62	
Born between 1977-2010	53	3.07	.76	-0.215*
Values				
Born between 1946-1976	35	3.47	.71	

Born between 1977-2010	53	3.49	.67	0.017

Note: * significant at .05 level

Conclusions/Discussion/Implications/Recommendations

From the survey findings, it can be concluded that the personal characteristics of the average Clemson Extension agent is a white/Caucasian female born between 1977 and 2010 with some degree of higher education. Furthermore, Clemson Extension agents are primarily county employees with five or fewer years of service. The overall mean score for the Burnout Assessment was $M = 3.20$ ($SD = 0.72$). With an overall mean score above three, Clemson Extension agents are not experiencing burnout respective to the study's scope. However, the lowest mean score was in the workload construct with an average score of 2.82 for both groups of generational cohorts. When analyzing the mean scores by generational cohort, both had scores under 3 with the younger generations (Born between 1977-2010) scoring $M = 2.80$ ($SD = 0.74$) and the older generations (Born between 1946-1976) scoring $M = 2.84$ ($SD = 0.80$). There was no significant difference in perceptions of the workload construct when compared to the generational cohort, indicating negative perceptions of this construct regardless of generational cohort. The literature review established that the younger generations, i.e. Millennials and Generation Z, value a work-life balance more than Baby Boomers and Generation X (Chieh Lu & Gursoy, 2016). These findings challenge that ideal and bring to light that workload and a healthy work-life balance are important to employees of all ages.

Of the six constructs, fairness was the only to have a significant relationship to the generational cohort. A low significant negative correlation ($r = .215$, $p < .10$) was found between fairness and generational cohort. The 1977-2010 generational cohort group rated fairness slightly lower than the 1946-1976 generational cohort group. Meaning that the younger a Clemson Extension agent is, the lower their fairness score will be. This finding is consistent with previous studies that have established younger generations value fairness in the workplace and believe that emphasis should be placed on person's contributions in the workplace over other factors (Gaidhani et al., 2019). Kelly (2022) found that Millennials and Generation Z's highest priority when looking for employment was the fair treatment of employees across all genders and ethnicities. Millennials and Generation Z have also been cited as valuing organizations that emphasize diversity, equity, and inclusion (DEI) and take action to incorporate a more diverse workforce (Miller, 2021). Millennials and Generation Z are more ethnically and racially diverse than previous generations making up the workforce, with Generation Z being the most diverse (Schroth, 2019). It is possible that the push for DEI from the younger generations making up the workforce population stems from the diverse backgrounds they bring with them into the workplace.

Due to the overall positive perceptions by participants of five of the six work constructs investigated in this study, the findings of this study are inconsistent with previous literature (Chandler, 2005; Harder et al., 2014; Harder et al., 2015; Igodan & Newcomb, 1986; Strong & Harder, 2009) and leave the question of what is causing high turnover rates and burnout among Clemson Extension employees unanswered. It is recommended that further research be conducted to determine other factors that contribute to burnout within the Cooperative Extension System. Since the workload construct was the lowest mean score, it is recommended that this

construct is further investigated within the Cooperative Extension System. An extension of this study that could be beneficial would be to include a qualitative portion where agents are interviewed to gain insight into some of the Burnout Inventory questions.

There were negative feelings toward the workload construct regardless of generational cohort and the lowest mean score for an individual question came from this category. The lowest scoring question for the assessment asked agents if they thought about unfinished work after leaving for the day, with many reporting that they did and a mean score of $M = 1.80$ ($SD = 1.23$). Other low-scoring questions were related to being able to accomplish job responsibilities without having to work overtime or on weekends and holidays. Since the workload construct had the lowest mean score of $M = 2.82$ ($SD = 0.77$) and it has been previously established that feelings of a lack of work-life balance are negative motivators of Extension agents, it is recommended that Extension agents take precautions to protect their personal time through scheduling time off and sticking to set working hours (Chandler, 2005; Harder et al., 2014; Harder et al., 2015; Igodan & Newcomb, 1986; Strong & Harder, 2009). The Extension System may need to evaluate the work itself to see if it can be carried out in a way that allows employees more of a work-life balance. Recommended professional development opportunities for employees include managing work-related stress, the benefits of a work-life balance, and burnout prevention.

In a 2023 review from Business News Daily, Vemparala speculates that Millennials change jobs because they feel underpaid, agreeing with previous Extension retention studies. With more employees from Gen Z entering the workforce, Vemparala (2023) concludes that Gen Z did not have much time to establish roots in a career before the COVID-19 pandemic and accounted for 33% of people leaving their positions in 2020. Since Gen Z is not as connected or invested in the workplace, perhaps it is easier for them to leave positions to explore different careers and industries. Previous literature has determined there is a shift in what younger employees value in the workplace towards better work life balance, more flexible hours, and opportunities for advancement within the profession (Beutell & Wittig-Berman, 2008; Chieh Lu & Gursoy, 2016; De Maeyer & Schoenmakers, 2019; Gaidhani et al., 2019). This shift in workplace attitudes suggests that employees leaving jobs is not the fault of the employer or an inherently bad thing.

Goler and colleagues (2018) suggests that employers shift the focus to how employee work is designed and reported that employees chose to stay in their jobs because they found the work enjoyable and were developing skills to advance their careers. For these reasons, it is suggested that future research is conducted that is centered around the design of Extension work and development of employees who remain in the profession to determine the best ways to support continuing employees. Focus should be placed on work-life balance, career advancement, and the overall culture of Extension. Since this study is limited to one university's Extension system, replication of this work is imperative to determine factors related to burnout in Extension nationwide. Extension administration should consider the findings of this study as they work to provide opportunities for advancement within their system, while establishing a supportive culture with an emphasis on work-life balance. While this study focused on work related burnout in a university Extension system, the instrument should be considered a valuable tool to assess burnout in the workplace, which could provide benefits in the school-based agricultural education sector considering the reoccurring themes related to burnout in the literature (Hainline et al., 2015; Kitchel et al., 2012; Schmidt et al., 2022; Smith & Smalley, 2018).

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Identifying Urban Extension Leadership and Personnel Development Priorities Through the Lens of Adaptive Leadership: A Nationwide Modified Delphi Study

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The United States Cooperative Extension system has experienced significant societal shifts since its founding in 1914, including urbanization, and growing demographic diversity of clientele. These changes bring to question the future relevance of Extension, primarily in urban settings and how to prepare Extension personnel for future success. Urban audiences are known to have a generally low knowledge of Extension resources and adaptation may be needed to make Extension programs and services relevant to diverse urban audiences. Additionally, Extension positions across the United States is not steadily increasing, but the populations served by Extension programs are growing and evolving. In addition to traditional core competencies, additional skills are needed for the unique urban context. A critical examination of training and development procedures is needed so that the next generation of Extension professionals will be best positioned for success. The theory of Adaptive Leadership (Heifitz et al., 2009) was used to frame this study and offers an effective approach to thinking about the challenges facing organizations like Extension. Using the modified Delphi technique, the study identified the top 10 most important challenges, attitudes, skills, and knowledge areas for urban serving Extension professionals. This study may be helpful for informing current and future professional development for Extension personnel and the collective insight of the expert panelists provides insight for recruiting and training the future urban Extension workforce.

Introduction

Upon its founding through the Smith-Lever Act of 1914, the United States (U.S.) Cooperative Extension Service (CES) was created to diffuse "useful and practical" (Hildreth & Armbruster, 1981) information regarding agriculture and rural development and to foster change in American society to help communities thrive. While the mission of improving lives and helping communities thrive remains the same today, the populations the CES serves have changed. In 1914, more than 80% of the U.S population resided in rural communities, but today, more than 80% reside in urban areas, and forecasts predict that three in every four people globally will live in urban settings by 2050 (Fox, 2024). Today, the number of urban and suburban users of Extension programs outnumbers rural clientele (Rumenapp, 2017). This population shift from rural to urban has brought changes to the demographics of many communities the CES serves (Ruemenapp, 2017) and Extension professionals have, for some time, recognized the need to rethink approaches to working in urban settings (Christenson & Warner, 1985; Fehlis, 1992; Harriman & Daugherty, 1992; Krofta & Panshin,1989; Rasmussen, 1989). In 1968, a United States Department of Agriculture (USDA) committee recommended that Extension systems increase their commitment to urban areas and diversify the range of programming to better address the broad range of problems in the nation (Hains et al, 2021). A survey of state Extension administrators conducted in 1973 identified numerous barriers for Extension in urban areas including a lack of personnel equipped to address urban problems,

limited programming of relevance to urban audiences, the diversity of urban populations, a limited understanding of Extension in urban areas, and the challenge of prioritizing needs given the large volume of people in the urban settings and limited Extension resources (Paulson, 2019).

Preparing Extension Personnel for Urban Settings

The CES has weathered significant societal shifts since its founding, including increasing ethnic diversity, changes to the traditional family structure and more (De Guzman & Hatton, 2024, p. 7). These changes bring to question the future relevance of Extension and how to prepare Extension personnel for future success (De Guzman and Hatton, 2024, p. 8). Extension programs are intended to help people regardless of race, religion, disability, sexual orientation, or cultural dimension, yet, Extension has fallen short in effectively providing education to all populations (Fields & Nathaniel, 2015). McKee and Bruce (2019) suggested that there are missing segments of the population that should be participating in Extension programs but are not because of the lack of inclusivity of traditional approaches to Extension program delivery. Angima and Stokes (2019) suggested that Extension systems are leaving certain underserved populations behind because Extension personnel are not adequately aware of their needs and are poorly equipped to serve these less visible populations. Urban audiences are known to have a generally low knowledge of Extension resources (Fox, 2024). Adaptation may be needed to make Extension programs and services relevant to diverse urban audiences (Monk, 2024). Marshall et al. (2022) highlighted that the number of Extension positions across the United States is not steadily increasing, but the audiences demanding Extension programs are growing and evolving daily. Fox (2024) described the need for urban Extension professionals to possess all the traditional core competencies, but also to have additional skills needed for the unique urban context. As a result, a critical examination of training and development procedures must be undertaken so that the next generation of Extension professionals will reflect the changing population and be prepared to address the challenges they will face (Marshall et al., 2022). Hagerman et al. (2022) suggested that these changes have made it more difficult for newly hired Extension professionals to receive the support and guidance needed during the beginning stages When Extension professionals are hired, they are often hired for the technical training they possess in a specific subject matter, yet, there is an increasing acknowledgement that technical skills, even for technical positions, are insufficient for success and that proficiency in soft-skill areas like leadership is a necessary component for long-term success (Laker and Powell, 2011). of their careers. Understanding the complex challenges in urban settings is not enough to produce success. Extension professionals must develop the capacity to address complex problems (Andenoro et al., 2017).

With new hires in particular, their soft skills perhaps more than their hard skills are an important consideration (Cimatti, 2016). Stephenson (2011) asked county Extension professionals to think of their role not simply as providers of technical expertise but as social leaders and change agents in their communities. Seger and Hill (2016) suggested that the future Extension workforce must possess soft skills, be strong communicators, be proactive and quick to respond, and be creative and innovative. Critical evaluation of the professional development and leadership training of Extension professionals is needed to prepare urban serving Extension professionals for adaptive skills that go beyond teaching technical programs and equip them to

address future community needs head-on (Angima & Stokes, 2019). Adaptive leadership provides an effective framework for thinking about preparing Extension professionals to be these responsive, change-oriented, community leaders (Leuci, 2012).

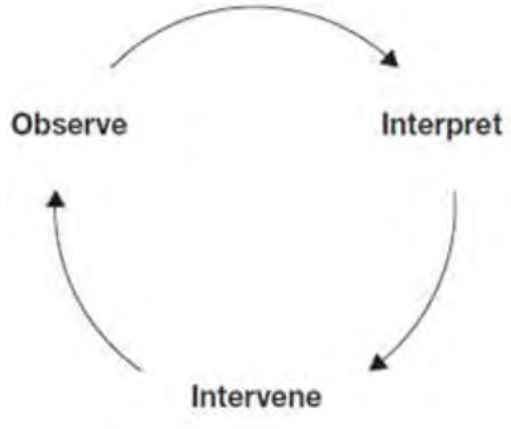
Conceptual Framework

The theory of *Adaptive Leadership* (Heifitz et al., 2009) was used to frame this study. Heifetz et al. (2009) originally developed the model of adaptive leadership within the context of business but acknowledged that the model could be applied to educational systems like the CES because the problems faced are complex and multi-faceted. Heifetz et al. (2009) contended that this model is process and follower-oriented, and situational in its approach to resolving these challenges. Adaptive leadership offers an effective approach to thinking about the complex challenges facing organizations like the U.S. CES and how county Extension professionals are being prepared to successfully address the needs of diverse urban audiences (Stephenson, 2011). Extension work is often interdisciplinary and involves addressing complex social, economic, and environmental issues with technical skillsets (Donaldson, 2024, p. 248). Yet, many of the biggest challenges facing Extension and its urban workforce are not technical problems, but problems that require strategically helping communities grapple with change (Stephenson, 2011). Stephenson (2011) challenged universities to view Extension and broader civic engagement efforts through the lens of adaptive leadership.

The model of adaptive leadership consists of three elements: observation, interpretation, and intervention (Heifitz et al, 2009). This continual process is designed to cycle through the three stages as the stages build on one another, as illustrated in Figure 1. As Extension professionals serve their communities, they can be equipped to utilize adaptive leadership (Stephenson, 2011) to (a) *observe* community challenges, (b) *interpret* community needs, and (c) *intervene* with appropriate support. Adaptive leadership can be used to guide thinking about how we prepare current and future Extension professionals for work in increasingly diverse and complex settings (Stephenson, 2011). In addition to the adaptive leadership process, Northouse (2021) described six behaviors associated with adaptive leaders. These behaviors include: (a) *getting on the balcony* – stepping back and finding a different perspective amid a challenge, (b) *identifying the adaptive challenge* **-** analyzing challenges and differentiating between technical and adaptive challenges, (c) *regulating distress* – recognizing the need for change but not becoming overwhelmed, monitoring and regulating stress, (d) *maintain disciplined attention – encouraging people to focus on the difficult work that needs to be done,* (e) *Give work back to the people* – being aware of and monitor one's impact on others and learning to shift problem-solving back to the people, and (f) *Protect leadership voices* – be cautious to listen and be open to ideas of people who may be on the fringe or marginalized.

Figure 1.

Conceptual Model of the Adaptive Leadership Process.



Purpose and Objectives

The purpose of this modified Delphi study was to achieve group consensus regarding the future challenges, and professional development needs of urban Extension professionals to guide leadership development priorities for Extension professionals working in urban settings. The two specific objectives were to identify the top ten *challenges* facing Extension in urban areas over the next 10 years and to identify the top competencies, identified under the headings of *attitudes, skills, and knowledge,* which are most important for the success of urban serving Extension professionals.

Methods

This study used the Delphi technique which is a well-established method for achieving convergence of opinion from experts in certain areas (Hsu & Sandford, 2007). Linstone and Turoff (1975) described the Delphi technique as a communication process structured to produce a detailed examination of a topic. The purpose of the Delphi technique is to gather responses from a group of experts and combine the responses into a useful understanding of the topic (Stitt–Gohdes & Crews, 2004). The Delphi process typically uses a series of questionnaires to collect data from a selected group of experts to build consensus around a topic (Dalkey & Helmer, 1963; Linstone & Turoff, 1975). The technique uses three rounds and begins with the initial round generating various responses by asking panelists to answer open-ended questions (Ludwig, 1997). In the second round, the expert panelists are asked to review the items generated in the first round and then rank the responses (Hsu & Sandford, 2007). In the third round, the responses converge, resulting in a more defined set of group responses to the initial questions (Dalkey et al., 1972). Dalkey (2002), concluded that a representative panel should include at least 13 members to ensure reliability within a 0.90 coefficient. However, there is not a standard regarding the ideal number of expert panelists for a Delphi study and the validity of the method is seen as dependent on the expertise of the participants and not on the number of participants (Ludwig & Starr, 2005).

Selection of Participants

This study used expert sampling methods (Dalkey & Helmer, 1963; Linstone & Turoff, 1975), with participants being identified through university Extension websites as administrators at the county, district, or statewide level with supervisory responsibility over urban serving professionals. We sought to conduct a nationwide census of all 1892 and 1890 land-grant institutions across the 50 states. Institutions in in Puerto Rico, Guam, The U.S. Virgin Islands, and the District of Columbia were not included. We identified at least two experts from every 1862 institution and at least one from every 1890 institution based on the identified criteria for inclusion in the study and this resulted in a list of 150 individuals who were initial contacts for participation in the Delphi Panel. After the initial round one request, some participants suggested other colleagues in their institution as experts on the topic that would be valuable perspectives for the panel. These additional contacts were then contacted for participation.

Study Design and Data Collection

This modified Delphi study consisted of three phases and was initiated through Qualtrics using the internal email distribution function. A message was sent to identified participants (n = 150) detailing the research process and expected time for participation. The entire study was conducted electronically as the expert panel was distributed across the United States. Each round was closed after 14 days (two weeks), and total data collection lasted 56 days (approximately two months). 14 panelists responded to all three rounds of the study which was sufficient for ensuring reliability (Dalkey, 2002), 13 panelists responded in only two rounds, 16 panelists responded in only one round of the study. All identified experts were allowed to participate in any round even if they had failed to participate in an earlier round. Prior to commencing this study, this research protocol was reviewed and approved by the Oklahoma State University Institutional Review Board.

Round One

The first round of the study consisted of four open-ended questions: (a) What will be the *most significant challenges* Extension professionals working in urban settings will face in the next 10 years? (b) What *attitudes* are most important for success as an Extension professional working in urban settings? (c) What *skills* are most important for success as an Extension professional working in urban settings? (d) What *knowledge* is most important for success as an Extension professional working in urban settings?

The definition of urban in the context of Extension programming is complex and may differ from state to state so participants were told to understand urban Extension as "*specific activities and initiatives intended to strategically reach people in cities and densely populated metropolitan areas served by Extension.*" Participants were provided with an open-ended text box to record responses to the four open-ended questions. 23 individuals (15.33%) completed round one of the study. After round one, these open-ended responses were coded by researchers to identify unique items. We attempted to limit heavily reducing responses, but we did combine responses into one item if they were determined to have the same meaning and we separated divisible responses into multiple single competencies as needed to prevent double barreling. This

resulted in 53 *challenges*, 46 *attitudes*, 42 *skills*, and 35 *knowledge* items identified for inclusion in round two.

Round Two

For round two, participants were asked to examine the *challenges, attitudes, skills,* and *knowledge* statements generated in round one. They were asked to rank all items on a six-point Likert-type scale from 1 (no importance) to 6 (highest importance). 29 individuals participated in round two (19.33%). A six-point scale has been used in other Delphi studies in the field of agricultural education (Ramsey & Edwards, 2011). Consensus for advancement from round two was set at 75% of participants ranking the item as high or highest importance or 5 or 6 on the Likert-type scale. The resulting items were considered eligible for round three of the Delphi. 21 Challenges, 35 attitudes, 22 skills, and 11 knowledge items reached a 75 percent or greater ranking at high or highest priority (5 or 6 on the Likert-type scale) in round two.

Consensus was defined as two-thirds or 75% agreement for high importance and highest importance on a six-point Likert-type scale with 1 representing *no importance*, 2 representing *very low importance*, 3 representing *low importance*, 4 representing *moderate importance*, 5 representing *high importance*, and 6 representing *highest importance*.

Round Three

For round three, participants were asked to take all the consensus statements from round two and select the top ten most important items from the list of challenges, knowledge, skills, and attitudes. Participants were asked to rank order their top 10 items for each by dragging the item into a rank order position in Qualtrics. 23 participants completed this final phase of the Delphi.

Results

Of the panelists who participated, 6 indicated they were male and 16 indicated female. Eight did not indicate a sex or selected the *prefer not to say* option. The reported ages ranged from 32 to 61 years with 15 participants selecting *prefer not to say* when asked to indicate their age. The median of the reported age was 54. Ten participants reported being 50 years or older and five reported being under 50. Regarding ethnicity or race, 17 of the panelists reported they were Caucasian, three Black and two Asian. Eight selected *prefer not to say*. 30 different states (Table 1) were represented by the participants, including 27 from 1862 institutions and 7 from 1890 institutions.

Table 1

List of states represented by participants in the Delphi panel.

State		
Alabama	Louisiana	Ohio
Arkansas	Maryland	Oklahoma

Connecticut	Michigan	South Carolina
Georgia	Mississippi	South Dakota
Hawaii	Missouri	Tennessee
Illinois	Nebraska	Texas
Indiana	New York	Washington
Iowa	New Mexico	West Virginia
Kansas	Nevada	Wisconsin
Kentucky	North Dakota	Utah

Data analysis following three rounds of data collection resulted in identifying key challenges facing urban Extension professionals in the next 10 years. Additionally, vital knowledge, skills, and attitudes for success in urban Extension settings were also identified. Round two (Table 2) revealed items that were considered high or highest priority at 75% consensus and round three (Table 3) narrowed these down to the top ten most significant challenges and the top ten most important knowledge, skills, and attitudes.

The top challenges for urban Extension in round two included *increasing state funding support for Extension*, *maintaining competitive salaries for Extension professionals*, *retainment of Extension professionals.* Some of the top attitudes identified in round two included *willingness to address the needs of diverse audiences*, *being inclusive*, *willingness to collaborate*, and *being a team player.* Top skills included *communication*, *customer service*, *decision making*, *relationship building*, *time management* and *work-life balance* and top knowledge areas identified include knowing *local needs*, *the context of the urban area*, *able to communicate the value of Extension to urban audiences* and *youth development*.

Table 2

Round Two Results of Delphi Study Conducted to Identify the Challenges, Attitudes, Skills, and Knowledge Needed for Success by Urban Extension Professionals.

	Challenges	% Ranked as High or Highest Priority
1.	Ability to be responsive to urban clientele	86.21
2.	Clientele lacking awareness of Extension	82.76
3.	Collaboration	85.71
4.	Connection with local government	79.31
5.	Cultural awareness for Extension professionals	82.76
6.	Community Nutrition Issues	82.75
7.	Diversity of clientele demographics	82.76
8.	Food Access	86.21
9.	Funding	86.21
10	High cost of living in urban areas	75.86
11	Increasing local funding support for Extension	89.65

12	Increasing state funding support for Extension	96.55
13	Increasing federal funding support for Extension	89.65
14.	Impact of staff turnover on building community relationships	79.31
15	Maintaining competitive salaries for Extension professionals	93.11
16	Marketing	82.76
17	Program relevance to urban clientele	79.31
18	Recruitment of Extension professionals to fill urban role	79.31
19	Retainment of Extension professionals	89.66
20	Staffing shortages	75.86
21.	Training Extension staff	86.21

	Attitudes	**% Ranked as High or Highest Priority**
1.	Adaptability	89.29
2.	Be inclusive	96.43
3.	Balancing quality over quantity for urban programming	75.00
4	Commitment to the community	85.72
5.	Community connector	75.00
6.	Desire to engage with others	92.59
7.	Empathy for others' experiences	78.58
8.	Flexibility	89.28
9.	Flexible approach to the work	89.29
10	Growth Mindset	78.56
11	Innovative	82.14
12	Keeping an open mind	85.71
13	Lifelong Learner	78.57
14	Non-judgmental	85.72
15	Openness to working with diverse communities	92.85
16	Out of the box thinking	89.29
17	Patience to address the needs of a diverse audience	82.14
18	Patience to address the needs of a diverse audience	85.72
19	Perseverance	85.71
20	Personal Drive	78.57
21	Positive Attitude	85.71
22	Resilience	85.71
23	Self-Starter	85.71
24	Service-minded	82.15
25	Strong desire to build relationships	92.86
26	Team player	96.42
27	Willingness to listen	89.28
28	Willingness to Pivot	85.72
29	Willingness to take risks	85.71
30	Willingness to try new ideas	89.29
31	Willingness to be creative	82.15
32.	Willingness to collaborate with other governmental agencies	82.14
33	Willingness to collaborate with other organizations	96.42

34	Willingness to collaborate with other service providers	96.42
35.	Willingness to address the needs of a diverse audience	100

	Skills	% Ranked as High or Highest Priority
1.	Ability to tell Extension's story	85.71
2.	Ability to reinvent current workshops and programs to make them more applicable to a particular group	75.00
3.	Ability to identify program needs across diverse groups	82.15
4.	Ability to network effectively with local elected officials to maintain and expand funding	82.14
5.	Communication	100.00
6.	Customer service	89.29
7.	Cultural competency	85.71
8.	Decision making	89.29
9.	Facilitating groups of community professionals to address local needs	85.72
10	Facilitation	75.00
11	Interpersonal communication	85.72
12	Organization	82.14
13	Problem solving	85.71
14	Professionalism	89.28
15	Project management	78.57
16	Program Evaluation	78.57
17	Relationship buildings	92.86
18	Team building	89.29
19	Time management	82.14
20	Volunteer development	75.00
21	Work-life balance	89.29
22.	Written communication	85.71

	Knowledge	% Ranked as High or Highest Priority
1.	Able to communicate the value of Extension to urban audiences	85.19
2.	Context of urban area	89.28
3.	Extension's role or "niche" within the community	77.78
4.	Food insecurity	80.77
5.	Horticulture Best practices	75.00
6.	Locally grown markets	76.93
7.	Local needs	96.30
8.	Major players in the community	81.48
9.	Potential funding agencies	77.77
10	Population demographics	75.00
11.	Youth development	85.19

Round three (Table 3) narrowed the results from round two down to the top ten most significant challenges and the top ten most important knowledge, skills, and attitudes for success in urban Extension. The top challenge identified for the next ten years was *funding*. The top attitude was

adaptability, the top skill was the *ability to identify needs from diverse groups* and top knowledge area was *the ability to communicate the value of Extension to urban audiences* and *knowing Extension's niche within the community*.

Table 3

The Top ten Challenges, Attitudes, Skills, and Knowledge areas identified by participants in Round Three of the Delphi Study.

	Challenges	**% Participant rank order in top 10**
1.	Funding	80
2.	High cost of living in urban areas	70
3.	Clientele lacking awareness of Extension	65
4.	Impact of staff turnover on building community relationships	65
5.	Ability to be responsive to the volume of urban clientele	55
6.	Maintaining competitive salaries for Extension professionals	55
7.	Programming of relevance to urban clientele	50
8.	Recruitment of Extension professionals to fill urban roles	50
9.	Retainment of Extension professionals	50
10.	Training Extension staff	45

	Attitudes	**% Participant rank order in top 10**
1.	Adaptability	65
2.	Openness to working with diverse communities	60
3.	Strong desire to build relationships	55
4.	Innovative	55
5.	Community connector	50
6.	Balancing quality over quantity for urban programming	45
7.	Be inclusive	45
8.	Commitment to the community	45
9.	Willingness to address the needs of a diverse audience	45
10.	Flexibility	40

	Skills	**% Participant rank order in top 10**
1.	Ability to identify program needs across diverse groups	71
2.	Communication	67
3.	Relationship buildings	67
4.	Facilitating groups of community professionals to address local needs	57
5.	Facilitation	48
6.	Interpersonal communication	48
7.	Professionalism	43
8.	Time management	43
9.	Volunteer development	43
10.	Work-life balance	43

	Knowledge	% Participant rank order in top 10
1.	Able to communicate the value of Extension to urban audiences	100
2.	Extension's role or "niche" within the community	100
3.	Local needs	95
4.	Major players in the community	95
5.	Potential funding agencies	95
6.	Youth Development	90
7.	Food insecurity	86
8.	Population demographics	86
9.	Context of the urban area	81
10.	Locally grown food/markets	71

Conclusions

This Delphi study was developed to better understand the emerging challenges facing urban Extension professionals and the knowledge, skills, and attitudes needed for success as an Extension professional working in an urban context. Participants were from Extension administrative positions at the county, regional, and state levels, and were from both 1862 and 1890 land-grant institutions widely distributed across the United States. Most panelists were over 50 years old and had more than 20 years of Extension work experience. All panelists were responsible for administrative leadership over Extension professionals working in urban settings.

Challenges

The first objective was to identify the top ten *challenges* facing Extension in urban areas over the next 10 years. The highest ranked challenge by participants was funding. This finding aligns with the literature, including the assertion by Brown (2006) that the traditional funding model of the Cooperative Extension System has been stretched to its limits by increasing demand without concurrent increases in funding and claims by De Guzman & Hatton (2024) and Harder, Lamm and Strong (2009) indicating funding as a major challenge impacting all aspects of Extension, particularly attempts to reach diverse populations.

Another key challenge identified was urban clientele lacking awareness of Extension. McKee and Bruce (2019) argued that some urban populations are not participating in Extension programs because of their lack of understanding of Extension or difficulty accessing its resources. Additionally, the ability to be responsive to the large volume of urban clientele and their diverse needs was identified as a top challenge. Paulson (2019) noted the sheer volume of clientele in an urban setting as a challenge and Angima and Stokes (2019) suggested that many Extension personnel are not adequately aware of needs and are poorly equipped to serve diverse urban clientele.

Attitudes, Skills, and Knowledge

Objective two was to identify the top competencies, under the headings of *attitudes, skills, and knowledge,* which are most important for the success of urban serving Extension

professionals. Adaptability was the top attitude, which reinforces the importance of adaptive leadership (Heifitz et al, 2009) in the training and development of urban Extension professionals and the call from Stephenson (2011) to utilize adaptive leadership as a lens for understanding Extension and broader university outreach.

The top skills included the ability to identify needs across diverse groups, and communication, which aligns with the theory of adaptive leadership which identifies (a) observing community challenges, and (b) interpreting community needs as key elements of adaptive leadership. These findings also support the assertion by Seger and Hill (2016) that the future Extension workforce must possess soft skills and be strong communicators, and the ideas of Fox (2024) who maintained that urban Extension professionals must possess all the traditional core competencies, but also to have additional skills for the unique urban context.

The top knowledge area was the ability to communicate the value of Extension to urban audiences. This supports the findings of Atiles (2011) that the engaged Extension professional should know about the origins and purpose of the land grant system including the history of Cooperative Extension. The finding is further strengthened by the suggestion of Fox (2024) that urban audiences are generally unaware of Extension's existence and the resources Extension provides.

Recommendations

Preparing future Extension professionals to successfully serve in urban settings is the responsibility of university Extension organizations and the CES is responsible for recruiting and retaining a high performing workforce well equipped to serve the needs of their communities (Donaldson, 2024, p. 246). Training to prepare Extension professionals to address the needs of diverse urban settings needs further development (Do & Zoumenou, 2024, p. 216).

The results of this study deepen the understanding of the *challenges* facing urban extension programming, and the *attitudes*, *skills*, and *knowledge* needed by urban Extension professionals. Studies that identify competencies are helpful for informing current and future professional development for Extension personnel (Donaldson 2024, p. 251) and the collective insight of the expert panelists in this study provides insight for strategic planning, capacity building, and targeted training initiatives for the future urban Extension workforce. Extension leadership and program and personnel development specialists may find the study results useful for understanding future challenges for the urban Extension workforce and for prioritizing training of urban serving Extension professionals. Future studies may look specifically at challenges, attitudes, skills, or knowledge areas identified in this study and what degree existing personal development is addressing these issues.

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Evaluating Land-Based Learning as a Pedagogical Approach

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Abstract

Founded on the principles of place-based education, land-based learning collaboratively engages learners and community members in a four-step process of identification, understanding, intervention, and evaluation to enhance the sustainability of community-based agricultural systems. While scholars have provided the philosophical foundation for land-based learning, there have been no quantitative evaluations of learners engaged in this innovative pedagogical approach. Therefore, the current study explored students from two high schools in Michigan's Upper Peninsula who participated in a land-based learning experience focused on increasing local food purchasing within their high school cafeterias. Using pre-experience and post-experience surveys, student learning gains in local food awareness, local food behaviors, and eight leadership factors were evaluated. Results from the research include statistically significant gains in local food awareness, local food behaviors, empowerment efficacy, and decision making when comparing post-experience data to pre-experience data. Findings contribute to the nascent body of literature suggesting land-based learning is an effective pedagogical tool for promoting student growth within agricultural education. Recommendations for expanding the use of land-based learning; increasing funding to support its implementation; and targeted scholarship to inform the growth of land-based learning are also explored.

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Introduction

Land-based learning is an innovative pedagogical approach structured to optimize the learning potential of place-based, interdisciplinary, and problem-centered instruction (Jennings et al., 2005; Palmer et al., 2023; Rodriguez, 2008; Simpson, 2014; Sobel, 2005; Webber, 2017). Students in a land-based learning experience engage in four phases: (a) *identification* of a local agricultural context and relevant community partners, (b) *understanding* the selected context and associated challenges, (c) implementation of an *intervention* to address identified challenges, and (d) *evaluation* of the intervention (McKim et al., 2019). The seminal work on land-based learning within agricultural education suggests it is a useful tool for increasing academic learning, leadership skills, sustainability awareness, and community resilience (McKim et al., 2019). As land-based learning shifts from concept to practice, research exploring the efficacy of this innovative approach is needed to justify expanded implementation. Therefore, the current study explores student learning gains in relation to participating in a land-based learning experience focused on local-food procurement in two Michigan Upper Peninsula (U.P.) high school cafeterias.

The primary aim of this research is to evaluate the efficacy of land-based learning; however, it is also important to introduce the need for the specific implementation of land-based learning being evaluated within this research. As introduced, this implementation of land-based learning positioned students to work with community members to increase local food purchasing within their school cafeterias. Focusing on local food systems was an intentional choice compelled by three motivating factors. First, the U.P. is a food insecure region, with an increasing rate of food insecurity already above the national average (Feeding America West Michigan, 2020). Second, the U.P. suffers from financial insecurity, with the median household income below the state average (US Census Bureau, 2020). And third, the U.P. lacks formalized school-based agricultural education programs. In combination, these factors detail a region in which actively engaging youth in food systems learning while addressing food insecurity and creating new markets for local producers was timely and relevant.

Purpose and Objectives

The purpose of this study is to evaluate the efficacy of land-based learning as a pedagogical approach within agricultural education. Results from this analysis will inform considerations for the expanded use of land-based learning within the discipline. To achieve this purpose, the following research objectives were developed: (a) compare the local food awareness of students before and after engagement in a land-based learning experience, (b) compare the local food behaviors identified by students before and after a land-based learning experience, and (c) compare the leadership abilities perceived by students before and after engagement in a land-based learning experience.

Literature Review

The literature base around land-based learning is still developing; however, review of existing research illuminates three salient themes: (a) philosophical antecedents of land-based learning, (b) potential impact of land-based learning, and (c) existing scholarship on land-based learning.

Philosophical Antecedents of Land-Based Learning

In the 1970s, environmental education emerged as a critical addition to the education landscape (Powers, 2004). However, a critique arose within environmental education regarding an overemphasis on global over local challenges (Smith, 2002; Sobel, 2004). Thus, place-based education emerged as an evolution of environmental education (Webber, 2017). As the name implies, place-based education seeks to harness the learning potential of an individual's sense of place (e.g., location ascribed meaning because of a connection to individual identity). Foregrounding places with meaning during a learning experience increases learner engagement and investment in the content (Cannatella, 2007). Place-based education is the foundation upon which land-based learning was designed. Land-based learning, however, expands place-based education by clarifying the role of the learner as an active leader in community betterment (McKim et al., 2019). Further, land-based learning details progression toward sustainability as the objective for student-led interventions. In their work, McKim et al. (2019) operationalize a community progressing toward sustainability as one seeking to achieve economic and environmental resilience alongside the promotion of social equity. Therein, land-based learning

is defined as “a pedagogical approach in which learners collaborate with community members to implement place-based interventions within [agriculture, food, and natural resources] to increase the sustainability of their community” (McKim et al., 2019, p. 175).

Potential Impact of Land-Based Learning

As introduced, scholarship in land-based learning suggests the outcomes of this pedagogical approach may include academic learning, leadership skills, sustainability awareness, and community resilience. The outcomes being investigated in the current study are sustainability awareness and leadership skills. Sustainability awareness refers to learners who gain an appreciation for the natural world alongside an active commitment to bettering the environment (Gruenewald, 2003; Sobel 1996). Existing implementations of place-based education suggest it is an effective approach for developing sustainability awareness (Jennings et al., 2005; Webber, 2017); therefore, it is reasonable to assume land-based learning would have a similar impact. Thus, the current study (i.e., investigating a land-based learning experience focused on local food systems) included evaluating the specific outcomes of local food awareness and local food behaviors.

In addition to sustainability awareness, land-based learning has the potential to increase leadership skills (McKim et al., 2019). Leadership is an umbrella concept comprising multiple attributes, including social responsibility, decision making, and collaboration. Scholarship suggests place-based learning opportunities can increase these leadership skills (Jennings et al., 2005; Palmer et al., 2023; Rodriguez, 2008; Simpson, 2014; Sobel, 2005; Webber, 2017). Thus, it is reasonable to evaluate land-based learning in relation to student gains within leadership skills like social responsibility, decision making, and collaboration.

Existing Scholarship on Land-Based Learning

Outside the philosophical primers on land-based learning, there is one empirical, published study evaluating the efficacy of this pedagogical approach (i.e., Palmer et al., 2023). In this qualitative case study, scholars found students engaged in land-based learning had a positive experience. Specific elements of the experience students noted as positive included being given agency to create consequential community change through land-based learning (Palmer et al., 2023). Additionally, participants noted land-based learning provided a context to implement and improve collaboration skills (Palmer et al., 2023). Finally, students identified land-based learning left a lasting impression on their perspectives, including a transformed view of their ability to create community change and a commitment to more active participation within the food system (Palmer et al., 2023). Findings from this case study provide support for continued utilization and evaluation of land-based learning. The current study heeds this call via a quantitative approach exploring complimentary outcomes.

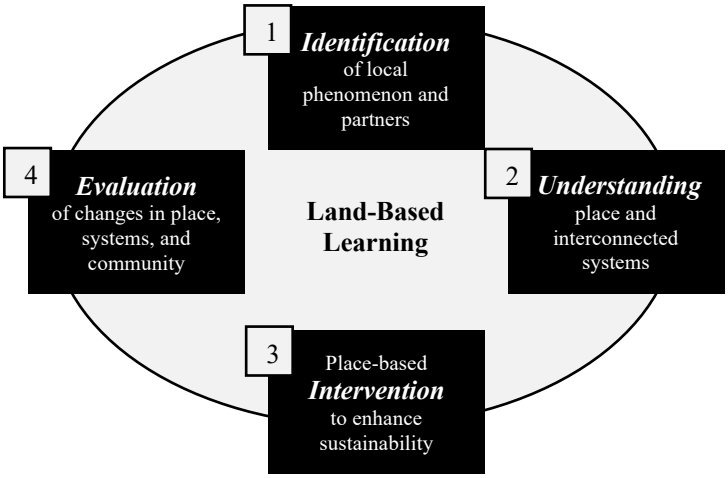
Theoretical Framework

The framework being evaluated through this research is land-based learning. Land-based learning scholars posit student learning gains and leadership development are likely outcomes of implementing this community-based and collaborative pedagogical approach (McKim et al.,

2019). The land-based learning framework provides a guide for how these community-based collaborations unfold (see Figure 1).

Figure 1

The Land-Based Learning Model (McKim et al., 2019).



First, students explore their community to *identify* a relevant phenomenon and partners. Seeking a community phenomenon (e.g., business, farm/ranch, recreation site) can be open or targeted based on the objectives of the learning experience. For example, in the application of land-based learning explored in the current study, students were directed to a local farmer pre-identified based on interest in selling their agricultural goods to the school cafeteria. After identification is *understanding* in which students seek to learn about the challenges and opportunities of the selected phenomenon. In the understanding stage, it is expected that learners will take field trips to the local phenomenon and the relevant community partners will engage as guest experts within the classroom. As mutual understanding grows, challenges faced by the local phenomenon will be discussed, leading to one challenge collaboratively selected by the students and community partners. Once the challenge is selected, the next stage of land-based learning is *intervention*. In this stage, students work with community members to gain a better understanding of the selected challenge, including the sustainability pros and cons of existing and innovative solutions to the challenge. This process leads students and community members to co-select and co-implement one intervention within the community phenomenon. The final stage of land-based learning is *evaluation* in which changes within the local phenomenon and interrelated systems are measured for evidence of social, ecological, and economic improvement, providing evidence of the intervention's efficacy.

Methods

The current analysis of land-based learning was completed using survey research methods. An online survey was used to collect data from students before and after participating in the land-based learning experience to provide insights into the efficacy of land-based learning as a pedagogical tool in agricultural education.

Study Context and Participants

This application of land-based learning took place within science classrooms at two high schools in Michigan's U.P. during the 2022-2023 school year. Funding to support this application of land-based learning was obtained through the United States Department of Agriculture (USDA) Food and Agriculture Service Learning Program. In total, participants engaged in land-based learning for an average of 20 class sessions. Participating teachers were provided a complete land-based learning curriculum, which included (a) four lessons building foundational food system understanding; (b) seven lessons building understanding of a local phenomenon (i.e., including selecting and proposing an intervention); (c) three lessons on grant writing associated with obtaining funding for their intervention, (d) five lessons for implementing and evaluating their intervention; and (e) one lesson devoted to exploring career opportunities within the food system. Importantly, teachers were given the flexibility to embed the 20 class sessions within additional coursework; therefore, completing the land-based learning was not done within 20 consecutive class sessions.

Students at both high schools engaged in land-based learning with the prescribed goal of increasing local food purchasing within their high school cafeteria. Students and community members worked collaboratively through the land-based learning process, including proposing their selected intervention via a mini-grant application reviewed by the project directors of the USDA grant. Students and community members at one high school proposed a hydroponic growing unit within the school to supply the cafeteria's salad bar. Students and community members at the other high school proposed a system to pipe heat from their school boiler room underground to a hoop house to extend the growing season and, thus, increase the capacity of the hoop house to supply the school cafeteria. Both proposals were accepted by the grant team and the student and community member teams implemented and evaluated their interventions with support from mini-grant funding. In both iterations of land-based learning, there were measurable increases in (a) local food purchased by the school cafeteria and (b) local food consumed by students within the cafeteria.

Population and Sample

The population for this study was high school students in the U.P. during the 2022-2023 school year. A sample was purposively selected that included students (n = 32) at two high schools in the U.P. enrolled in a science course. The students ranged from Freshmen to Senior status. The sample was selected because the two teachers in these classrooms had previously facilitated community-engaged, problem-based instruction (i.e., one previously facilitated land-based learning) and, thus, had familiarity with the approach. Of note, the two teachers taught within science as opposed to agriculture due to the absence of agricultural education programs in the U.P. However, both science teachers regularly incorporated agricultural concepts into their instruction (i.e., including one offering a course titled Agriculture and Natural Resources).

Data Collection and Instrumentation

Prior to data collection, the Michigan State University (MSU Institutional Review Board reviewed all data collection plans and approved the study (i.e., MSU STUDY00005187). As a

component of approval, parental consent was obtained for all students prior to their participation in the research. Data collection included two rounds, pre-experience and post-experience. Pre-experience data were collected before starting land-based learning via an online survey administered during a class session. Similarly, post-experience data were collected after the completion of land-based learning via an online survey administered during a class session.

The survey was identical for the pre-experience and post-experience administration. The survey included four sections. First, students were asked 10 research team-developed questions comprising the Local Food Awareness construct. Example questions within this construct included "I can answer questions others have about locally sourced food" and "I know where to look for locally sourced food." A complete list of Local Food Awareness questions can be found in table one, located within the findings. Second, students were asked seven research team-developed questions comprising the Local Food Behaviors construct. Example questions within this construct included "When buying food, I encourage my friends to purchase locally sourced items" and "In the future, I intend to purchase locally sources items." A complete list of Local Food Behaviors questions can be found in table three, located within the findings. The third section of the survey included the 40-question Individual Leadership Factors Inventory (ILFI) which includes eight constructs: (a) empowerment efficacy, (b) determination, (c) communication, (d) decision making, (e) integrity, (f) impact, (g) confidence, and (h) empathy. The ILFI has been used in existing leadership education scholarship as a robust and comprehensive measure of leadership abilities (Simonsen et al., 2013). Across the first three sections, items were measured from one (*Strongly Disagree*) to six (*Strongly Agree*). The final section of the survey included limited demographic information, including year in school, general leadership participation in school, and past experiences with local foods.

Data Analysis

Pre-experience and post-experience data were retrieved from Qualtrics and analyzed using the Statistical Package for the Social Sciences. First, the 10 constructs of interest within the study were analyzed for reliability, using pre-experience data, with analyses supporting the reliability of all constructs (i.e., Local Food Awareness [Cronbach's alpha = .84], Local Food Behaviors [Cronbach's alpha = .82], and eight leadership constructs [Cronbach's alphas ranged from .83 to .94]). Therefore, constructs were condensed for both pre-experience and post-experience data. To accomplish the research objectives, pre-experience data for each construct were compared with post-experience data using a paired-samples *t*-test, the recommended approach for a pre- and post-experience study design (Salkind, 2010). For these analyses, effect sizes thresholds were established as "small effect," Cohen's $d = .20$; "medium effect," Cohen's $d = .50$; and "large effect," Cohen's $d = .80$ (Cohen, 1988). Given the novelty of the Local Food Awareness and Local Food Behaviors constructs, results from individual items for these two constructs are also reported within the Findings.

Findings

The first research objective focused on comparing local food awareness before and after engagement in the land-based learning experience. First, a comparison of pre-experience and post-experience data from individual items are presented given the novelty of the Local Food

Awareness construct (see Table 1). This comparison highlights three dimensions of local food awareness in which participants experienced the largest gains: answering questions others have about locally sourced food (Δ = 1.73), considering where food is grown or processed (Δ = 1.59), and knowing where to learn more about locally sourced food (Δ = 1.43). Acknowledging two items are negatively worded, data from the Local Food Awareness construct suggest consistent gains in local food awareness when comparing post-experience to pre-experience responses.

Table 1

Individual Item Comparison for Local Food Awareness

	Pre-Experience		Post-Experience		
Item	Mean	Standard Deviation	Mean	Standard Deviation	Change (Δ)
I can answer questions others have about locally sourced food.	2.91	1.49	4.64	0.99	1.73
When purchasing food, I consider where the food was grown or processed.	2.91	1.49	4.50	1.39	1.59
I know where to look to learn more about locally sourced food.	3.69	1.42	5.12	0.99	1.43
I understand how locally sourced food goes from the farm to my plate.	4.00	1.46	5.19	0.75	1.19
I know the benefits of purchasing locally sourced food.	4.59	1.32	5.65	0.56	1.06
I know where to look for locally sourced food.	4.59	1.24	5.23	0.65	0.64
I find it easy to purchase locally sourced food.	3.88	1.13	4.50	1.14	0.62
I know people in my community who produce food.	4.19	1.58	4.46	1.48	0.27
I am unsure how to get locally sourced food.[1]	3.03	1.43	2.35	1.38	-0.68
Where my food comes from is not something I consider when buying food.[1]	3.94	1.37	3.19	1.39	-0.75

Note. Items measured from one (*Strongly Disagree*) to six (*Strongly Agree*). [1]Items reverse-coded in final construct, but not reversed in current table.

In addition to individual items, summated Local Food Awareness pre-experience and post-experience data were compared (see Table 2). These data indicate the average Local Food Awareness score was a 3.85 (*SD* = 0.94) prior to engaging in land-based learning but rose to 4.75 (*SD* = 0.68) after completion of the land-based learning experience. This change in awareness

was statistically significant (p-value < .001) with the Cohen's d (i.e., 1.10) suggesting participation in land-based learning had a "large" effect (Cohen, 1988) on participants' awareness of local food.

Table 2

Comparison of Local Food Awareness

	Pre-Experience		Post-Experience		*Paired-sample t-test value*	*p*-value	Cohen's *d* effect size
Construct	Mean	Standard Deviation	Mean	Standard Deviation			
Local Food Awareness	3.85	0.94	4.75	0.68	6.36	<.001	1.10

The second research objective focused on comparing local food behaviors before and after engagement in the land-based learning experience. Like the awareness construct, these data were first compared at the item level given the novelty of the Local Food Behaviors construct (see Table 3). Results from this comparison suggest consistently increased local food behaviors, after accounting for the one negatively worded item. The largest changes in reported behavior were observed within encouraging family to purchase locally sourced items when buying food (Δ = 1.03), not purchasing locally sourced items (Δ = -1.02), and encouraging family to purchase locally sourced items in the future (Δ = 0.84).

Table 3

Individual Item Comparison for Local Food Behaviors

	Pre-Experience		Post-Experience		
Item	Mean	Standard Deviation	Mean	Standard Deviation	Change (Δ)
When buying food, I encourage my family to purchase locally sourced items.	3.16	1.48	4.19	1.50	1.03
In the future, I intend on encouraging my family to purchase locally sourced items.	3.81	1.36	4.65	1.35	0.84
When buying food, I encourage my friends to purchase locally sourced items.	2.88	1.41	3.65	1.52	0.77
In the future, I intend on encouraging my friends to purchase locally sourced items.	3.84	1.27	4.46	1.33	0.62
In the future, I intend to purchase locally sourced items.	4.22	1.34	4.73	1.22	0.51
When buying food, I purchase locally sourced items.	3.53	1.27	4.00	1.36	0.47
I do not purchase locally sourced items.[1]	3.37	1.45	2.35	1.09	-1.02

Note. Items measured from one (*Strongly Disagree*) to six (*Strongly Agree*). [1]Item reverse-coded in final construct, but not reversed in current table.

Next, the summated Local Food Behaviors construct data from pre-experience and post-experience collections were compared (see Table 4). Findings from this analysis illustrate local food behaviors averaged 0.57 higher post-experience (M = 4.60; SD = 1.27) when compared to pre-experience (M = 4.03; SD = 1.28). The difference observed was statistically significant (p-value = .023); however, the effect of the land-based learning experience on behaviors associated with local food (Cohen's d = 0.45) was categorized as "small" (Cohen, 1988).

Table 4

Comparison of Local Food Behaviors

	Pre-Experience		Post-Experience		*Paired-sample t-test value*	*p*-value	Cohen's *d* effect size
Construct	Mean	Standard Deviation	Mean	Standard Deviation			
Local Food Behaviors	4.03	1.28	4.60	1.27	2.43	.023	0.45

The third, and final, research objective focused on comparing leadership factors before and after engagement in the land-based learning experience (see Table 5). A total of eight leadership factors were considered and all saw increases between pre-experience and post-experience data collection (Δ ranged from 0.05 to 0.64). Only two of those increases, however, were statistically significant, the change in empowerment efficacy (p-value = .014) and the change in decision making (p-value = .047). Using established effect size thresholds (Cohen, 1988), the change within empowerment efficacy was "medium," changes within six constructs were "small," and the change in integrity was "negligible."

Table 5

Comparison of Leadership Factors

	Pre-Experience		Post-Experience		*Paired-sample t-test value*	*p*-value	Cohen's *d* effect size
Construct	Mean	Standard Deviation	Mean	Standard Deviation			
Empowerment Efficacy	4.13	1.19	4.77	1.03	2.65	.014	0.58
Decision Making	4.56	0.95	4.97	0.76	2.09	.047	0.48
Empathy	4.79	0.58	5.09	0.74	1.90	.070	0.45
Impact	4.17	1.40	4.61	1.12	1.53	.140	0.35
Determination	4.76	0.96	5.01	0.77	1.43	.165	0.29
Confidence	4.57	1.00	4.84	1.14	1.44	.164	0.25
Communication	4.31	1.40	4.61	1.12	1.28	.214	0.24
Integrity	5.33	0.56	5.38	0.56	0.55	.587	0.09

Note. Items measured from one (*Strongly Disagree*) to six (*Strongly Agree*).

Discussion and Conclusions

Results from this study provide insights into the learning gains associated with student participation in land-based learning. However, some limitations with the current study should be considered before further discussion of the results. These limitations include the number of students and schools engaged in the land-based learning experience. Only 32 students completed the experience across two schools, representing a significant minority of the population of high school students in Michigan's Upper Peninsula. Expanded implementation and evaluation of land-based learning is required to extend insights into the efficacy of this approach. In addition to the limited number of participating students, it is noted one of the two participating teachers had previous engagement with land-based learning and that may have influenced the data observed. The authorship team notes that not all implementations of land-based learning will have teachers experienced in facilitating the process. Acknowledging these limitations, the data from this study provide an encouraging initial quantitative analysis of student experiences in land-based learning.

Findings from the current study support existing scholarship highlighting observable gains in sustainability awareness associated with student participation in place-based education (Jennings et al., 2005; Webber, 2017). The current study supports the utility of place-based learning and builds upon that foundation to suggest land-based learning is a viable mechanism to enhance local food awareness. This finding is particularly salient given the need to engage youth in food system learning to increase their motivation and preparation to address current and future socio-ecological challenges throughout the food system. Furthermore, observing increases in local food awareness through participation in land-based learning highlights the potential to adapt land-based learning to specific learning outcomes. The implementation of land-based learning evaluated in this study was structured around local food purchasing in school cafeterias to achieve specified learning objectives related to food systems. Finding significant gains within the Local Food Awareness construct suggests instructional facilitators can tailor land-based learning to local food contexts, but also advances land-based learning as potentially adaptable to other contexts (e.g., social justice, natural resource preservation).

In addition to increasing local food awareness, findings indicate engagement in land-based learning had a positive impact on student behaviors associated with local foods. These behaviors included purchasing local food themselves as well as encouraging others (e.g., friends, family) to purchase local foods now and in the future. These data suggest the impact of participant engagement in land-based learning extends beyond understanding and into the domain of action. Thus, land-based learning should be seen as a pedagogical tool with the potential to change behaviors. Further scholarship is needed to identify the permanence of these behavior changes, but initial results are encouraging.

The findings associated with local food awareness and behaviors are clearer than the findings associated with leadership development. Findings associated with leadership development provide cautious support for place-based education scholarship finding this pedagogical approach is a tool for increasing leadership skills (Jennings et al., 2005; Rodriguez, 2008; Simpson, 2014; Sobel, 2005; Webber, 2017). While the findings associated with leadership development are not overwhelmingly conclusive, it was noted that the two areas of leadership in

which statistically significant changes were observed (i.e., empowerment efficacy and decision making) are the two areas arguably most closely aligned to land-based learning. Empowerment efficacy is described as an individual's confidence in their abilities to empower others (Simonsen et al., 2013). Decision making is an individual's ability to engage in and effectively solve complex problems involving other people (Simonsen et al., 2013). We argue the land-based learning experience, involving collaborative decision making and implementation with community members, aligns with both empowerment efficacy and decision making. Thus, the nature of land-based learning may result in targeted leadership gains, like those observed in the current analysis.

Concluding that land-based learning results in targeted leadership development is supported by existing empirical work. Specifically, Palmer et al. (2023) found students noted decision making agency, collaboration, and consequential community change as positive elements of land-based learning. In combination, findings from the current study paired with existing scholarship (Palmer et al., 2023) imply facilitators of land-based learning can expect participants to develop leadership skills within targeted leadership factors like decision making, empowering others, and creating positive community change.

Recommendations

Synthesis of the findings and conclusions yield three salient recommendations for land-based learning, described below.

Expand Use of Land-Based Learning

The current study adds to the nascent body of philosophical and empirical research suggesting land-based learning is a valuable pedagogical tool within agricultural education. In the current study, growth in local food awareness, local food behaviors, empowerment efficacy, and decision making were identified, adding to the benefits expected from implementation of land-based learning. Based on these positive findings, we recommend increased implementation of land-based learning. Importantly, the onus of land-based learning implementation should not be shouldered by educators alone. Instead, we recommend agricultural education as a whole work in collaboration to support expanded land-based learning integration within the discipline. As examples of this systems-approach, we recommend teacher educators integrate land-based learning within their preservice teacher education coursework; professional development facilitators seize opportunities to increase awareness of, and efficacy in, land-based learning; and school administrators provide resources for teachers to engage in professional development and land-based learning experimentation. In addition to a broad recommendation for increasing land-based learning, we also recommend the agricultural education system continually highlight the potential flexibility of land-based learning to meet diverse educational outcomes.

Increase Funding for Land-Based Learning

In concert with expanding the use of land-based learning, there exists a need for funding to optimize land-based learning experiences. Land-based learning relies on active collaboration from students and community members, especially within the understanding phase of the

process. To facilitate this collaborative understanding, financial support is often needed to transport students to farms and to support farmers engaging within classrooms. In addition to funding supporting the understanding phase, funding is commonly needed within the intervention stage of land-based learning. Within intervention, students select and implement a change within the selected agricultural phenomenon (e.g., new infrastructure, revised production methods, innovative marketing) that commonly requires financial resources. One proven method to make these resources available is through mini-grant funding accessible to teams of students, teachers, and community members. This method adds to the learning experience by having teams collaborate to propose their intervention for financial support. However, this approach requires funding available to support mini-grants. Therefore, we recommend contributors to agricultural education (e.g., Department of Education staff, policymakers, grant administrators, university faculty) seek opportunities to provide targeted funding to support land-based learning.

Continue Evaluations of Land-Based Learning

Finalizing the tripartite of land-based learning advancement are recommendations to enhance and expand scholarly evaluations. Three areas of focus are needed to inform the growth of land-based learning. First, scholarship is needed which explores an expanded implementation of land-based learning. As an example, scholarship exploring a statewide effort to incorporate land-based learning within agricultural instruction would provide insights into the inputs required to initiate successful land-based learning on a broader scale. Second, research is needed exploring the adaptability of land-based learning to contexts beyond food systems. For example, case study evaluations of the impacts from land-based learning implemented to increase social justice or natural resource conservation would inform the versatility of land-based learning within educational contexts. Third, investigating approaches to teacher training within land-based learning is required to illuminate what model(s) effectively prepare preservice and inservice teachers to implement land-based learning. Determining the approach, timing, and structure of land-based learning professional development will inform continued implementation of this unique pedagogical approach.

In closing, results from this study support land-based learning as an exciting new initiative within agricultural education with the potential to create positive learning gains among students. Therefore, we encourage expanded use, additional resources, and continued evaluations to elevate the impact of land-based learning for the betterment of students, teachers, community members, and communities.

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Internationally Located Supervised Agricultural Experience Programs: An Exploration of Teaching Methods and Supervision

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Abstract

School-based agricultural education (SBAE) teachers near an international border face unique challenges and opportunities in overseeing Supervised Agricultural Experience (SAE) programs where students travel internationally to complete the requirements of SAE. Utilizing Bandura's Social Cognitive Theory within a developmental multicultural context offered a nuanced lens to explore the factors influencing teachers and students in this context. This qualitative case study of two teachers observes teachers' philosophies and strategies for international SAE supervision and the impact of culture and generational shifts on student engagement within agriculture. Findings reveal a lack of significant initiatives accommodating diverse student populations engaging in SAE programs in Mexico. Participants emphasized the importance of fostering connections with students and acknowledging the gap regarding agriculture among newer generations of students. Participants also highlight unique challenges in supervising international SAE programs, proposing alternative methods of supervision and community involvement. The importance of addressing language barriers and fostering a culture of inclusion is emphasized. Recommendations include promoting inclusivity, assessing comfort levels for on-site SAE visits in international countries, and ongoing teacher development for diverse cultural settings. Future research is urged to expand the literature based on SAE in diverse settings, contributing to a comprehensive understanding of its usage today.

Introduction

The National FFA Organization, established in 1928, has evolved to offer opportunities in agricultural education to students in all 50 states, and more recently, it expanded its charters to include Puerto Rico and the Virgin Islands (National FFA Organization, 2023). Similar programs and organizations have been developed in other countries, paralleling the National FFA Organization's model (Ishida, 2014). For instance, Ishida (2014) highlights the presence of an affiliated organization in Japan known as the Future Farmers of Japan (FFJ). Additionally, Taiwan and South Korea have established their own versions of youth leadership organizations in agriculture.

With an increasing emphasis on global engagement in agricultural education, students' interest in traveling abroad to explore diverse cultures and agricultural practices is growing (FFA New Horizons, 2017; Murphrey et al., 2016; Raczkoski et al., 2019; Rampold et al., 2018). In parallel, school-based agricultural education (SBAE) classrooms are witnessing shifts in student demographics (Helmer, 2020). In the United States (US), 13 states share borders with international countries (Beaver, 2006), leading to a rise in students with connections to these neighboring nations. Discussions on overcoming barriers to inclusion of students in SBAE programs, considering factors such as race, ethnicity, and various disabilities, have been

prominent in the field of agricultural education (LaVergne et al., 2012; Jordan et al., 2022; Wood et al., 2023).

While adaptations to common practices are actively addressed in two of the three circles of the agricultural education model to support students with diverse and unique backgrounds (classroom and FFA) (Phipps et al., 2008; National FFA Organization, 2023; Wood et al., 2023), it is essential to recognize that these approaches do not fully encompass the entire scope of SBAE. Supervised Agricultural Experience (SAE) programs are vital for students enrolled in an SBAE course, providing a means of applying classroom content in a real-world context (Retallick, 2010). Rubenstein and Thoron (2014) explored the development of individual student SAE programs, emphasizing that the goals for such programs should align with both authentic learning experiences and the individual's career growth. These goals should be personally tailored to the unique aspects of a student's specific SAE. This raises the question: How do students with diverse cultural backgrounds receive support for their Supervised Agricultural Experience programs?

Literature Review

Diversity, equity, and inclusion (DEI) have emerged as a pivotal consideration in the classroom today. Limited literature has explored the landscape of SBAE programs and other aspects of agricultural education, aiming to pinpoint interventions that counter mentalities of "in-group mentalities" (Austin et al., 2021). A notable division within the profession is highlighted by the research of Wood et al. (2023), with one faction acknowledging DEI issues in agricultural education, while the other group perceives no such problem of DEI in the context of SBAE. Despite this dichotomy, there is a widespread consensus among teachers participating in the research that fostering an environment where every child, irrespective of race, ethnicity, gender, sexual orientation, or other minority aspects, can derive benefits from SBAE, including participation in FFA and SAE (Wood et al., 2023).

However, the existing research in agricultural education underscores a significant challenge faced by educators- the recruitment, support, and retention of diverse youth with diverse backgrounds in SBAE programs (Murray et al., 2020). While there is a collective commitment to the overarching value of inclusivity in SBAE, the practical implementation of attracting and retaining a diverse student population is lacking (Austin et al., 2021). This highlights the imperative for educators to address these challenges, ensuring that agricultural education is accessible, applicable, and beneficial for students from all backgrounds.

SAE

The beginning of SAE programs dates to the early 20th century, with Rufus Stimson (1919) introducing the "project method" as a form of learning and applying classroom procedures on the school farm to the student's home farm. In more recent developments, Barrick et al. (2011) defined SAE as: "a planned and supervised program of experience-based learning activities that extend school-based instruction and enhance knowledge, skills, and awareness in agriculture and natural resources" (p.9). With a decline of SAE involvement in School-based Agricultural Education (SBAE) programs across the country (Dyer & Osborne, 1995; Retallick, 2010; Steele, 1997; Wilson & Moore, 2007), Rubenstein et al. (2016) explored the factors

present in an exemplary SAE program within urban schools and found that one of the major factors was student interest. Student interest was seen as a motivator for students to participate in an SAE program and help connect the relevance of the subject matter and students' daily lives (Rubenstein et al., 2016).

Furthermore, Rubenstein et al. (2016) revealed the vital role of engaged teachers in the success of SAE programs by using examples in instruction, developing a bond with their students, and being practical and hands-on with the students through multiple modes of supervision. With a decline in student participation in SAE across the country, recent literature highlights teachers' needs when helping students brainstorm, develop, implement, and supervise SAE programs. Moreover, for years, SBAE teachers have asserted that SAE is a crucial and integral aspect of students' engagement in agricultural education (Dyer & Osborne, 1995; Clark & Scanlon, 1996; Dyer & Osborne, 1996); recent literature suggests a shifting perspective among preservice teachers as they embark on their teaching journey (Moore et al., 2023; Hainline & Smalley, 2021).

Sweet Moore et al. (2023) conducted a comprehensive census study involving a cohort of preservice teachers, revealing a noteworthy decline in the perceived importance of "all students having an SAE with accurate record books" (p. 179), transitioning from *much importance* to *medium importance.* This trend aligns with the discoveries of Hainline and Smalley (2021), who investigated the self-perceived training needs of pre-service teachers in various aspects of agricultural education. In their study, SAE emerged as a notable area requiring attention, particularly in teaching record-keeping. This proceeds further into the lifespan of teachers' careers, with Roberts et al. (2020) noting that SAE implementation was one of the four axial codes that were a constant across cases of all career stages.

Additionally, a common theme amongst recent literature is the shift in modes of supervision and the teacher's role in that supervision (Linder et al., 2020; Rank & Retallick, 2017; Rubenstein et al., 2016; Rubenstein et al., 2014; Toombs et al., 2022). Previously, as explored in Smith and Rayfield (2016), agricultural educators used to do multiple home visits for each student at their family farm; however, as agricultural education has evolved with student SAE programs diversifying and class numbers increasing, in-person visits are not always feasible for every student from only the teacher. With the diversification and evolution of students entering agricultural education classrooms, unlike the latter generations, many will not pursue careers in production agriculture full-time (Croom, 2008). The implementation of SAE for All, as an initiative described by the National Council for Agricultural Education (2023), brought hopes of providing foundational career exploration and planning to diverse student needs and interests. However, a set curriculum and a modified interpretation through the evolution of SAE can still leave some teachers isolated to figure out how all students, regardless of background, can learn the skills from SAE programs directly related to their specific chosen careers (Smith & Rayfield, 2016).

Theoretical Framework

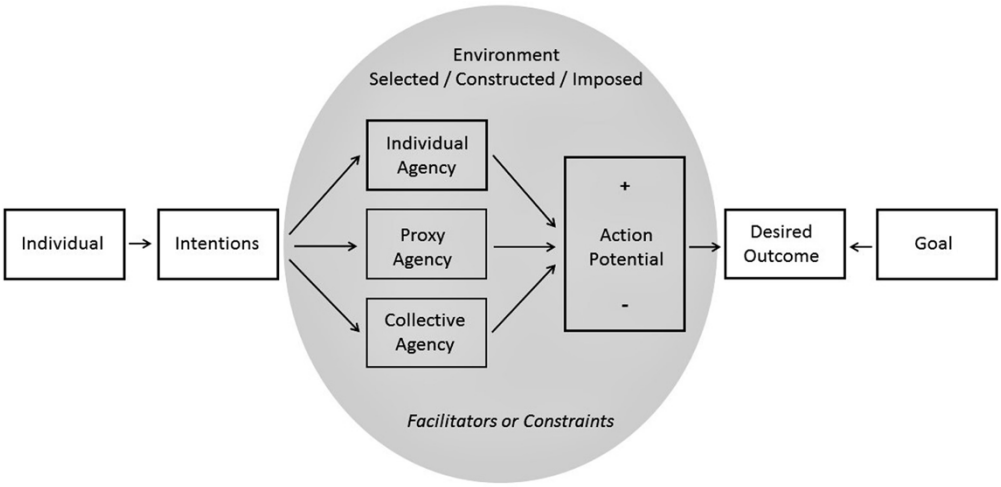
The theoretical framework draws inspiration from the rich diversity of multicultural environments. This diversity, shaped by cultural and religious differences, is recognized and celebrated within the framework of multiculturalism (Richeson & Nassbaum, 2003). In this

context, multiculturalism refers to acknowledging and celebrating individual differences, fostering an environment that embraces diverse cultural backgrounds. This study recognizes the inherent complexity of border communities, where cultural diversity is a prominent and defining characteristic.

To delve into the intricacies of human behavior, personal development, and the adaptive capacity of individuals within the multicultural context, the researchers utilized Bandura's Social Cognitive Theory (SCT) (2002). This theory serves as a lens through which the research aims to comprehend the dynamics within an SBAE program near an international border. Bandura's SCT highlights three modes of agency. Firstly, personal agency influences the individual's behaviors and decision-making processes. Secondly, proxy agency signifies the capacity of individuals to influence others to secure desired outcomes on their behalf. Finally, the collective agency emphasizes the joint contribution to the development and success of SAE programs in diverse cultural environments. Figure 1 below shows how these agency areas can act as facilitators or constraints for a potential action (behavior).

Figure 1

Bandura's Social Cognitive Theory Model



Note. Adapted from Bandura (2002)

In applying this theoretical framework to the study, researchers intended to identify, analyze, and understand the different modes of agency manifested within the SBAE teachers' roles, students' experiences, and the broader community dynamics near an international border. The study is intended to explore how these modes of agency act as either a facilitator or constraint in individuals navigating, adapting, accommodating, and contributing to the development and success of student SAE programs in diverse cultural environments. Furthermore, the choice of the multicultural context within the SCT points to investing in the dynamic of individuals who live or work in multicultural environments. It recognizes that personal development is an ongoing process. This approach allows for a deeper understanding of the intricate interplay

between individual behaviors, collective dynamics, and the multicultural context in which the study unfolds.

Purpose and Question

As the landscape of agricultural education continues to evolve, it is important to dive deeper into understanding how educators can effectively support and foster unique and individual cases of students with international connections in terms of their SAE. Support such as this can ensure that the benefits of SAE are accessible and meaningful for all students enrolled in agricultural education. This study thoroughly examined the factors influencing SBAE teachers working with students conducting SAE programs in an international country, seeking to unpack the challenges and opportunities that shape the experiences of educators in multicultural settings near borders. The central research question for this study was: What factors are present and affect SBAE teachers serving multicultural student populations near an international border regarding developing, implementing, and supervising SAE programs?

Methods

The researchers employed a multi-case study design, with each teacher within a community near the Mexico international border serving as an individual case (Yin, 2014). Following Yin's (2014) suggestion, the epistemological lens adopted a pragmatic approach. As explained by Crotty (2012), pragmatism involves the uncritical exploration of the practical applications of an idea or value. Looking through a pragmatic lens, the view of the world can vary depending on the individual experiencing it (Yazan, 2015).

SBAE teachers located within 50 miles of the Mexico border in Arizona were identified as potential participants for this study. Two teachers, each representing distinct cases, willingly agreed to partake in the research. Notably, neither participant is native to the towns where they teach/taught, emphasizing their unique perspective as educators in border communities. To maintain confidentiality, pseudonyms were assigned to conceal the participants' identities and any disclosed personal information.

The first case, represented by the pseudonym Alex, is a Caucasian female who has dedicated 15 years to teaching in a community near the Mexico international border. The town is characterized as a small, rural enclave with an open-enrollment school district. The high school where Alex teaches accommodates 90 students across grades 9-12 and holds a Title One classification, indicating a predominantly low-income demographic. The local industries encompass border patrol, county sheriffs, farming and ranching, a state prison, and local businesses. The community is demographically split, with 53.8% of residents identifying as Hispanic and/or Mexican; the remaining 46.1% identifying as White (non-Hispanic).

The second case, represented by the pseudonym Elliot, is a Caucasian male who previously taught in a Mexico border community for two years (2017-2019). This community, with an approximate population of 16,000, is semi-rural and located directly on the border of Mexico. The majority of residents, constituting 95%, are Hispanic and/or Mexican. The primary industries in this community include retail, education, and trade. Originally established as an operational hub for a copper smelter supporting mining operations, the city has since

transitioned, with agriculture playing a limited role, primarily in the form of a few large cattle ranchers in the surrounding area. Notably, most of the community engages in cross-border living and commuting between the US and Mexico.

Participants underwent a comprehensive data collection process involving a 60-minute semi-structured interview via Zoom, a program visit. They provided SAE lesson materials and a description of their program's community for textual analysis. This multifaceted approach to data collection aimed to capture the nuanced aspects of their experiences and practices in their SBAE program. Data was analyzed using deductive and inductive approaches (Creswell, 2013). Cross-compared categories were condensed into five overarching themes, forming the basis for the findings.

Triangulation was achieved through multiple data points to enhance the trustworthiness of the research. Additionally, member checking and conducting peer debriefing were integral components of the research methodology to enable a rich and detailed description of the data (Creswell, 2013). Recognizing the potential influence of researcher bias, the research team took proactive measures by transparently disclosing their positionality. Importantly, all three researchers, having backgrounds as former SBAE teachers, believe that SAE is an integral part of the agricultural education model. Notably, all three researchers, drawing from their backgrounds as former SBAE teachers, share a common conviction regarding the significance of SAE as an integral component within the agricultural education model. Two of the three researchers live, or previously lived, in a state that borders an international country. One researcher completed student teaching experience at a program within 30 minutes of the Mexico border. Due to the nature of a case study design with only two participants, the data collected is only generalizable to the two cases and participants within the study.

Results

Teacher SAE Philosophy

Both cases were actively engaged in SBAE classes in high school, complemented by personal SAE programs that provided them with essential prior knowledge when embarking on their first SBAE-focused university courses. Alex highlighted the robust foundation gained in SAE from their high school agriculture experience, which had three teachers in the program with various strengths in SAE. This exposure to multiple teaching styles and expertise enriched with their understanding of SAE principles contributed to Alex's gaining more of a comprehensive knowledge base upon entering university.

Moreover, both participants obtained traditional teaching certificates through a university teacher preparation program in Arizona. University classes focused on SAE programs allowed them to build upon the knowledge acquired during their high school experiences. Elliot described the university course, stating, "[The university] did do a class focused on FFA and CTSO and SAEs... It was more like a general broad area, but it was more like the intro to the philosophy of what an SAE should be." Alex shared a similar sentiment: "[university] did a really good job of educating us about how important SAE is just right along with FFA and classroom." The university experience broadened their perspective on SAE and reinforced its importance in the larger agricultural education context.

The student teaching experience emerged as a pivotal factor for both individuals in furthering their understanding of SAE programs. Elliot elaborated on the student-teacher experience: "I also got to learn the accountability piece, so my cooperating teacher is very big on accountability. And I got to learn a lot of lessons from her on what does monitoring students look like." Alex also underscored the importance of accountability and the impact of supervision for student SAE programs. "He [cooperating teacher] played such a huge role in helping those kids, so he stayed on me about going through those SAE visits... It was just very effective and encouraging to those kids." This hands-on experience during student teaching enhanced Elliot's knowledge of SAE implementation and provided valuable insights into effective mentoring and supervision techniques.

Through a combination of formal instruction and practical application, both individuals developed a philosophy that places high value on SAE as an integral component of the overall agricultural education program. Elliot expressed, "I'm a big believer in the total program… I think SAE projects are probably some of the most valuable pieces." The philosophy that considers SAE an integral component of the overall agricultural education program enabled these teachers to maintain an open-minded approach to students interested in conducting their SAE programs across international borders. This holistic view, shaped by their diverse educational experiences, further solidified their commitment to fostering well-rounded agricultural education that extends beyond traditional boundaries.

International SAE Opportunities

Teaching near the Mexico international border exposed both cases to a sizable population of culturally diverse students. Elliot spoke to their expectations regarding the diversity within their classroom, stating,

> These kids deserve just as much of an opportunity as anyone else. So, as an ag teacher, I knew the deal when I moved into a border community. I didn't know to what extent how many students lived in Mexico but went to school in America. That was definitely new to me. But I knew that if I am their ag teacher then I'm their ag teacher.

Participants emphasized that students implementing an SAE program in an Mexico should have the same expectations as every other student. Alex expanded on this, stating, "There's no difference if there is a [program] in Mexico versus America. It's exactly the same; I don't know why we'd treat it differently." Participants shared their approaches to teaching SAE to students, emphasizing consistency in the introduction and selection of programs. They stressed treating these programs like any other student's SAE program located off school premises. Elliot highlighted that every student, including international students, must do an SAE contract and plan through the AET. "A student wants to use that as an excuse, knowing that they cross the line every day, and it is going to be a little bit harder for [teacher] to hold me accountable." Elliot identified this as a major difference between students with programs based internationally and those in the US, with the potential for students to use the distance of their project as an excuse for accountability, leading to increased apathy.

Language emerged as a barrier for some students in this context. Elliot expressed passion for ensuring that students whose first language is Spanish do not use language as an excuse.

However, they also acknowledged that "[bilingual] students seem a lot more comfortable sometimes, by saying things and even listening to things than they do writing things." While record-keeping, especially writing, is a crucial aspect of SAE completion for all students, Elliot explained the potential barrier it poses for students seeking involvement in award recognition programs. "Award systems and structures in ag education is very written based... If this kid was on a star tour, they would nail it out of the park [explaining], but they never got there because the application is very written based." When recognizing this, Elliot emphasized the need for innovative approaches to accommodate diverse linguistic abilities, ensuring that language doesn't hinder students from fully participating in and benefiting from SAE programs through award recognition.

Supervision

Participants said that SAE programs located in Mexico pose unique supervision challenges. Safety, particularly when visiting an international country, emerged as a common concern among participants. Elliot mentioned that while they did cross the border into the neighboring city with a trusted community member, they hesitated to travel farther. Notably, the administration of both participants lacked specific protocols or requirements for overseeing student SAE programs in general, especially those crossing international borders. Alex highlighted the safety concerns, stating that all in-person SAE visits in the area "became unsafe, so I requested that another individual go with me, and of course, nobody wants to take that much time."

Both cases identified alternative methods of supervision. Elliot suggested, "I would recommend this to a teacher who wasn't comfortable with that… There is nothing wrong with [students] filming their project and showing it to you in class." Alex, dealing with smaller classes of 10 to 12 students, primarily relies on class time for supervision, stating, "Biweekly for sure, we have time to update record books and show me to hold them accountable." Additionally, both participants acknowledged seeking assistance from community members or parents for supervising student SAE programs, emphasizing the importance of communication. These alternative approaches provided both participants with solutions for overseeing SAE programs, catering to the unique needs of both students and educators.

Community and Culture

The participants in this research were originally from somewhere other than the border communities where they taught. Purposeful actions were taken to establish relationships with the community within the first year. These efforts include engaging in advisory councils, attending community and school board meetings, and actively seeking volunteer opportunities within the community. Alex said, "Attending games is even important; this gives a lot of opportunity to talk to parents and show students you care." Both participant's efforts to immerse themselves in the community underscored the importance of educators' dedication to connecting with students and their families, fostering a sense of community and trust.

Throughout the data, significant attention was given to the culture of the towns where each teacher worked. When discussing the creation of contracts with students and their parents, Alex mentioned, "They tell the truth, but honestly, I wish it was this way everywhere, but we do

it off their word." Elliot delved further into the impact of culture on students' engagement with their SAE program, stating, "The family culture in a border community is so strong... These students live with their parents but also with aunts, uncles, and almost always grandparents. They are all involved in the agriculture [on the family farm]." Elliot spoke further about recognizing the significance of aligning their approaches with the local values and cultural dynamics of their teaching community.

Generational Shift

Both teachers identified a generational shift. The increased use of technology contributed to alternative methods of supervision, which was viewed positively. However, both teachers observed a gap among current students connecting agriculture to their personal lives. Alex reflected, saying, "I don't know why that's so different now. I don't remember having to define agriculture as much in the past as I do now." Elliot echoed this sentiment, discussing the shift in the focus of agriculture classes, stating, "There are less and less farm fields, more and more houses, we're definitely on the [agriculture] literacy train." They compared being an SBAE teacher to being a "salesperson" for agriculture. Both participants highlighted the evolving nature of agricultural education and how they have had to adapt their approaches to resonate with changing student perspectives and experiences.

The growth of towns and the changes in this generation of students significantly impact their choices in SAE programs. Alex noted, "But now our kids who used to work on the farms, or their parents worked on the farms or own the farms, those are going away." Students have distanced themselves further from direct involvement with agriculture. In Elliot's classes, students feel confused by the term Supervised Agricultural Experiences, so they have rebranded it as an "ag project" to eliminate any intimidation caused by the name. This aims to address students' disconnection from agriculture or their lack of awareness of their connection to the agricultural industry. Elliot's awareness of these shifts reflects a proactive effort to bridge the gap and maintain relevance in student teaching methods.

Conclusion/Recommendations

Based on the themes identified through data analysis, the researchers have reached the following conclusions from this study. Due to the nature of a case study, these findings, conclusions, and recommendations are only generalizable to the participants within this study. Following these conclusions and subsequent discussions, the researchers propose practical implications derived from the findings. Departing from the conventional approach, where students primarily engage in SAE programs within their domestic borders, this study recommends extending SAE initiatives internationally to account for the diverse cultural backgrounds present in classrooms. However, thdiversie study reveals a need for major initiatives with specific accommodations for these students, highlighting an overarching emphasis on maintaining uniform expectations like those for students involved in domestic SAE programs.

The underlying philosophy of teachers that positions SAE as a pivotal and integral component of the agricultural education model influences teachers and resonates with students, fostering a deeper understanding of the importance of SAE programs. This philosophical stance

finds support in SAE literature, particularly the work of Dyer and Osborne (1995), which asserts that teachers' attitudes and perspectives towards SAE significantly impact student participation. Despite variations in funding allocated for teachers' compensation for additional work related to SAE, educators need to invest time in overseeing individual students' SAE programs to promote success and growth. A study by Friedel and Anderson (2023) revealed a lower mean frequency of teachers dedicating time to SAE within their SBAE programs compared to the other two components of the agricultural education model. This disparity negatively affected overall student engagement in SAE. Teachers need to cultivate a positive outlook and allocate sufficient time to ensure the success of SAE programs for all SBAE teachers, regardless of student demographics.

Encouraging students to develop SAE programs aligned with their personal interests serves as a crucial predictor of their sustained engagement in the program over time. This notion aligns with the insights of Rubenstein and Thoron (2015), emphasizing a student-centered approach to SAE programs and underscoring the necessity for tailored programs that cater to the unique needs of each student. This principle should be universally applied, recognizing and accommodating students from diverse backgrounds, whether they hail from another state or country or possess differing perspectives. Ensuring that students have a genuine interest and investment in the development of their SAE program is paramount. Barajas et al. (2020) reinforce this perspective by shedding light on the tendency of diverse students, particularly Latinx English language learners (ELL), to isolate themselves in their study due to self-categorization as "different." Creating opportunities for planning, developing, engaging, and celebrating various aspects of students' cultures becomes exceedingly crucial in breaking down these barriers and fostering a more inclusive environment. This inclusive approach promotes active participation and contributes to a sense of belonging among students, irrespective of their culture or linguistic background.

Teachers implementing SAE programs should explore alternative methods of supervision, mainly if venturing across the international border for in-person SAE visits is outside their comfort zone. Rubenstein et al. (2018) emphasize the foundational role of in-class supervision in ensuring the success of SAEs. To facilitate this, teachers must establish clear expectations regarding how SAE will be integrated into the classroom and outline the specific components students should incorporate into their record-keeping. It is crucial for teachers to proactively address and mitigate apathy, ensuring a consistent and engaging approach to SAE across all students. These expectations should be standardized across all students to prevent apathy, a common challenge highlighted in various studies, such as the work of De Lay and Swan (2014).

An effective strategy for alleviating apathy among students is for teachers to establish connections and demonstrate genuine care for each student. This approach aligns with Korte and Simonsen's (2018) recommendations for novice teachers. By fostering these connections, educators gain insights into their students' cultural backgrounds, contributing to the development of a more inclusive classroom culture, as observed in the work of Barajas et al. (2020). Moreover, building connections aids teachers in understanding the personal ties students may have to agriculture beyond the classroom setting.

Educators must adapt their approaches to engage and guide the evolving student demographic effectively. The literature (Burrows et al., 2020; Martin, 2016; Powell et al., 2008)

underscores the widening knowledge gap among newer generations of students regarding the fundamental understanding of agriculture and food systems, despite these being integral components of contemporary society. Recognizing and bridging this gap is pivotal for educators seeking to connect the relevance of agriculture to their lives. Bird and Rice (2021) additionally highlight the impact of a generational shift on students' ability to meet classroom expectations.

Researchers recommend that SBAE teachers overseeing internationally based SAE programs or other diverse SAE programs focus on cultivating community relationships and fostering an inclusive SAE culture. This involves investing time to build strong connections with community members and organizations and providing essential student support systems. Simultaneously, educators are encouraged to assess their comfort levels with on-site visits and explore alternative, technology-driven supervision approaches, ensuring adaptability to unique circumstances.

For university teacher educators, ongoing development of teacher philosophies regarding SAE and thorough preparation for diverse cultural environments is crucial. Reflecting on the evolving landscape of agricultural education, teacher preparation programs should provide future educators with the necessary tools for effective immersion into varied cultural contexts. A holistic approach like this enhances the effectiveness of SAE programs for students and educators. It contributes to a more comprehensive understanding of the role of agriculture in diverse societal settings. Additionally, the researchers strongly recommend that further research be conducted, particularly in states that border international countries, to establish a more extensive literature base on the current usage and impact of SAE in diverse settings, contributing valuable insights to the ongoing discourse on the relevance and adaptability of SAE in evolving agricultural education.

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Exploring the Factors That Impact Positive Youth Development in Rural, Low SES High Schools

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Abstract

This research explored what students and school staff in rural, low socioeconomic (SES) high schools perceive as factors that strengthen and inhibit the positive youth development (PYD) attributes of students' confidence, competence, character, connection, and compassion. A collective case study was conducted in four rural high schools, two in Kansas and two in West Virginia. Fieldwork at each school involved semi-structured focus group interviews with students and school staff, observations, and document collection. It was discovered that students and school staff perceive that a student's lack of understanding and acceptance of others, a challenging and disruptive home life, and the pressure to perform academically can be significant inhibitors of all five PYD attributes in rural, low-SES high schools. Providing diverse opportunities for student engagement and hands-on and engaging courses, such as Career Technical Education (CTE) combined with adult intentionality, modeling, and encouragement, emerged from the study as perceived factors that strengthen all five attributes of PYD. The recommendations section of this paper provides thoughts and suggestions on strengthening the PYD of students attending rural, low-SES high schools.

Introduction

There has been an increased focus in many schools and school systems on the social-emotional health and PYD of students. PYD has historically been applied in three different but related ways: referring to the developmental process of youth, a set of principles and a philosophy centered around focusing on youth assets instead of deficits, and the practices of programs, organizations, and initiatives that deliver on the principles of youth development in fostering a healthy growth and development process for youth (Hamilton et al., 2004). Social-emotional learning (SEL) is closely linked to positive youth development theory as both are focused on capitalizing on the internal strengths of the individual and leveraging the ecological assets available to the student to help them thrive, as well as fostering resiliency through supports and opportunities (Office of Safe and Drug-Free Schools, 2007; Osher et al., 2014; Romer & Hansen, 2021).

Schools play a critical role in academic and social-emotional youth development (Berkowitz & Bier, 2004; Osher et al., 2014;). Within a school, students receive support from individuals, such as teachers and coaches. They also benefit from programs and services, such as social-emotional interventions and after-school programming. A growing number of students experiencing mental health issues, accompanied by the increase in risky behaviors during adolescence, has drawn much attention from parents, policymakers, and public education teachers and administrators (Romer & Hansen, 2021; Zablotsky & Terlizza, 2019). However, there is a growing interest in PYD as an approach to promoting overall robust health and well-being in youth because not only does it encourage developmental growth and success into

adulthood, but research has shown that PYD interventions can also improve student mental health and reduce participation in risky behaviors (Lerner & Lerner, 2013).

Learning how to promote youth development positively can provide insights into how to facilitate developmental success for all students, including those living in rural communities and poverty. Research indicates that rural students, especially those experiencing poverty, are more likely to have mental health issues compared to urban students in poverty (Gale et al., 2019; Lenardson et al., 2010; Slama, 2004). This study is relevant and important to School-based Agricultural Education (SBAE) programs and FFA chapters. According to Lisa Barger of the National FFA Organization (personal communication, July 13, 2023), 60% of active FFA chapters in 2021-22 were in rural communities, and 20% were in town locales.

Purpose and Research Questions

The purpose of this case study was to explore the perceptions of students and school staff in rural, low-SES high schools regarding the PYD of students. The study sought to answer the following research questions:

1. What factors do students and school staff believe contribute to lower levels of PYD?
2. What factors do students and school staff believe contribute to higher levels of PYD?

Theoretical Framework

A national study of over 7,000 4-H members indicated that youth who thrive during adolescence and have smooth transitions into adulthood share similar attributes and outlooks (Lerner & Lerner, 2013). These similar characteristics are summarized as the Five Cs of PYD: competence, confidence, connection, character, and compassion (Geldhof et al., 2014). For these five Cs of PYD to be nurtured in youth, they must have access to developmental assets – positive people, activities, resources, and institutions that promote strong and sustained growth and development (Lerner, 2007). The Five Cs of PYD served as the framework for this study.

In the Five Cs framework, Lerner (2007) described competence as the ability to act effectively within various environments: school, society, and work. It is about what an individual can do, not how or what they feel. Confidence is about youth believing in themselves and achieving their goals through their actions. Lerner (2007) suggested that where competence and confidence are individual, connection is about the importance and impact of others. Character is linked to three attributes: a moral compass, consistent and reliable morality, and respect for others (Lerner, 2007). Compassion is showing concern about the lives of others through words and actions and developing a sense of social justice, empathy, and sympathy (Lerner, 2007).

Methods

Collective case study methods were utilized to explore the factors impacting PYD by closely examining four similar schools or cases so each could provide insight into the issues facing students attending rural, low-SES high schools (Creswell & Poth, 2018). The four sites were selected to seek in-depth understandings of each school while "embracing a constant-comparative perspective that allows for the emergence of broader insights, or themes" (Johnson et al., 2011, p. 9). This approach provided an opportunity for cross-case comparisons where

similarities and differences could be highlighted, and it offered greater generalizability of findings compared to a single case study with only one school (Johnson & Christensen, 2008).

Triangulation was utilized by collecting data from multiple sources: semi-structured focus interviews with students and school staff, collecting and analyzing school and community documents and information, and observations. This data triangulation makes it more likely that the findings can be trusted and addresses problems with construct validity in the research design (Hays, 2004; Yin, 2018). Dependability was established by providing a rich description of the study methodology and maintaining an audit trail of the data collection and analysis process (Lincoln & Guba, 1985).

Reflexivity Statement

The subject of positive youth development is personal to me, as my entire career in SBAE and CTE has been dedicated to developing and providing PYD opportunities to students. Therefore, I constantly checked this bias through reflection and journaling as I researched schools with SBAE and additional CTE programs.

Case Selection and Profile of Participants

The most defining characteristic of case study research involves delimiting the object of study (Merriam, 2009). This study was bounded by time and place (Creswell & Poth, 2018), as the study was delimited to four rural, low-SES high schools in Kansas and West Virginia during the spring semester of the 2020-21 school year and involved only the students attending and adults working in and with those schools. Each case in the study was carefully and purposively selected so that individual cases would predict similar results, a literal replication (Yin, 2018).

In the initial research stage, I sought to identify 10 schools in Kansas and 10 in West Virginia to create a pool of schools from which the four case study schools could be selected. The following three criteria were used to select the ten schools in each state: the highest percentage of students qualifying for free and reduced lunch in their respective states, located in a school district classified as either rural or town using the National Center for Education Statistics (NCES) urban-centric local classification system (Provasnik et al., 2007), and offered SBAE. The initial phase of the case study involved having sophomores and juniors of each school complete the PYD Questionnaire Short Version (Geldhof et al., 2014). The survey results were used to assist in the selection of cases. The four schools for the collective case study were then selected based on three significant factors: the quantitative survey results, the level of survey participation, and phone conversations with school administrators about PYD.

Across all four cases, the student focus groups comprised 24 females and 11 males. One freshman, 13 sophomores, 18 juniors, and three seniors participated in the interviews. Some students were active in their school, including student organizations and extracurricular activities, while some did not participate in anything or very little. Twenty of the students were White. Twenty-one (13 female and eight male) school staff participated in adult focus group interviews across all four cases. This group consisted of all four principals, four counselors, five teachers, two coaches, one assistant principal, and five social-emotional support staff.

Data Collection and Analysis

After each focus group interview, I captured initial thoughts and notes in my field notebook. I saved the audio file from each interview on a secure university-provided computer and cloud-based storage for backup. The audio files from each school were listened to for the first time to become familiar with the data, correct any mistakes in the generated transcripts, and assign pseudonyms to each participant. The transcripts for each school were read and reviewed a second time, and open coding was conducted with notes and memos written about emerging ideas (Hays, 2004; Miles et al., 2014). Student and adult transcript coding were kept in the same Microsoft Excel© file but on different spreadsheets. As the transcripts were read and reviewed a third time, each research question was taken one at a time, and axial coding was conducted to organize the developing data into categories of codes (Creswell & Poth, 2018).

The code category column in the spreadsheet was sorted, and common code categories across all four schools were organized to see if codes were common across all four cases. Student and school staff coding was done separately and then compared and combined. Once the codes were determined to be consistent across the four schools and between students and school staff, transcripts were read a fourth time, and the audio files were listened to again as categories of codes were organized into themes (Creswell & Poth, 2018). At this point in the data analysis, observation notes and school and community documents were analyzed and used to substantiate existing codes and themes and to provide more details about specific areas not discussed in depth during interviews. For example, students shared very little about the poverty they experience, yet the information collected confirmed the challenges many students and families face because of poverty.

Limitations

This study was delimited to the focus group interview responses of students and adults and documents analyzed from two rural, low SES high schools in Kansas and two in West Virginia. Even though it was made clear to the participants that this was a non-COVID-19 study, the subject of the pandemic did come up at various points during the focus group interviews. It is impossible to know the extent of the pandemic's impact on the responses of students and adults. However, great care was taken to clarify various statements and to separate comments directly or indirectly connected to the COVID-19 pandemic. Another limitation of this study was the reliance on each school principal in selecting the participants for each focus group. I provided each principal with the criteria for focus group selection in hopes that the participants would all feel comfortable sharing. However, conducting one-on-one interviews would have been ideal.

Findings

Research Question One

The first research question focused on discovering what students and school staff perceive as factors contributing to lower levels of PYD. The emerging themes included challenging and disruptive student home life, a lack of student understanding and acceptance of others, and pressure to perform academically. Table 1 summarizes the first research question's

significant themes and code categories. The third column indicates which PYD attributes the code categories were linked to in the data.

Table 1

Summary of Themes, Code Categories, and PYD Attribute

Theme	Code Categories	PYD Attribute
Challenging and Disruptive Student Home Life	Family Structure	Confidence
	Poverty	Confidence
	Lack of Moral Teaching	Character
Lack of Student Understanding and Acceptance of Others	Disconnect with Transfer Students (Outsiders)	Character & Connection
	Intolerance of Student Difference	Character & Connection
	Lack of Empathy for Mental Health Issues	Compassion
Pressure to Perform Academically	Difficult Subjects	Competence & Confidence
	Focus on Grades	Confidence

Challenging and Disruptive Student Home Life

The aspects of a student's home life that emerged from the data as negatively impacting PYD included family structure, poverty, and lack of moral teaching. Mark linked the lack of confidence in an individual to the student's family structure, "Confidence goes back to parents. A lot of kids will not come to school confident. It is easy for me and you to be confident because we have two parents who taught us to be that way." Mark went on to share, "I don't know the percentage rates, but I remember a teacher last year said something about the percentage of kids who do not even have parents from like drugs and stuff. You know that's got to take a huge toll." Carl said, "Our county has the second highest rate of kids living with grandparents." Community documents indicated that in the four communities represented in this study, the percentage of children living in single-parent households exceeded the state average (U.S. Census Bureau, n.d.).

Poverty was part of the bounding of this case study, but poverty also emerged in the discussion about student confidence. Mr. Lance said, "A lot of that comes from home environment, too. They don't have the confidence from their parents or people in the household living in a poor environment or just poverty in general." Data collected from community documents revealed that all four communities had higher poverty rates than the state average and an average median family income of $27,500 lower than their respective state averages.

Several adults shared how home life impacts student character. Mrs. Flinn shared, “I think depending on their home life, some of their morality is a little skewed.” Mrs. Miller said, “The only character-building skills or respect that they learn are things they are taught here. And once you meet and talk with some of these parents, that's really obvious.” Based on observations at each school, from bulletin board materials to classroom and advisory protocols, it was apparent that each school in the study prioritized character education.

Student Lack of Understanding and Acceptance

A recurring theme with students and school staff across the PYD discussions was the lack of student understanding and acceptance of others. Based on the sharing, many students in small, rural high schools struggle to accept people who are different or considered outsiders and link this to the PYD attributes of character, connection, and compassion. The data suggested that students attending rural, low-SES high schools struggle most to accept transfer students, students who are considered different, and students with mental health issues.

Several students and adults shared how challenging it can be for a new student in a rural high school. Mr. Bliss said, “I think where we run into some disconnect is with the kids that transfer in. There are some that are considered outsiders and maybe not given a chance, especially if they are a little bit different.” Arlee shared her experience of moving from a large urban school to a small rural school, "I was called out because I'm from the city. I was told I was like a dying puppy and just kicked under a porch and died.” Kim said, "Yeah, we have a really hard time accepting new people.”

Many students attending rural high schools struggle to treat students of different races and backgrounds with respect and dignity. Roger shared, “I've heard so many instances where students of color have been, like, not physically harmed for being the color they are, but verbally, said to their face.” Kim, a multiracial student, shared, "I moved here in my sixth-grade year, so I've been here for five years. But I wouldn't necessarily say that I've been completely accepted into this atmosphere because I'm just so different cultural norms-wise.” Three of the four schools in this study lacked a diverse student body, with a student population averaging 96% White students (Kansas Dept. of Education, 2021; West Virginia Dept. of Education, 2021).

Students and adults shared how students have compassion for one another because they share many of the same difficult life experiences. However, it was revealed that there can be less compassion and understanding when it comes to students struggling with mental health issues. Mrs. Starcher said, “Coming from a rural community, when it comes to mental health, there are people who are empathetic, and then there are some who are not.” Shawna shared, “Like if you are out of class, and like at the social worker’s office, the kids will be like, oh, what's up with her family and all that.” Samantha said, “I personally struggle with mental health. I don't know that I would be completely comfortable opening up and saying, I struggle with this.”

Pressure to Perform Academically

Many students linked lower confidence and competence with the pressure to perform academically. Several students linked their confidence and competence to their success or lack of

success in specific school subjects. Jerry said, “I would say there's some confidence, but it depends on what they're doing. If it's like a test, there is low confidence." Andrew was more specific with his comments, "It depends on the class you are in, too. Well, I'm very confident in math. Math is my best subject, but in English, I just lose it all.” Erika shared, “AP Biology started with, we have a big list on the whiteboard you need to know. And so, everything since day one has been stressed about passing this test, and I hate it!”

For many students, their grades on assessments and report cards can significantly affect their confidence. Erica shared, “I got my first ‘B’ freshman year because I didn't want to change my shoes for gym, and that's the first ‘B’ I've ever gotten in my life, so it was like a big thing.” Riley shared, “For like me, my sister, I feel like she gets good grades, doesn’t even have to try. And so, I feel pressure to be like her, but I feel like I have to work harder than her.” Roger added, “Checking your grades every day is not a mentally healthy thing.” Each of the four schools provided some form of after-school tutoring and mentoring for all students.

Research Question Two

The second research question focused on discovering what students and school staff perceive as factors contributing to higher levels of PYD. The emerging themes included student opportunities, adult intentionality, and engaging classes. Table 2 provides a summary of the significant themes and code categories. The third column indicates which PYD attributes the code categories were linked to in the data.

Table 2

Summary of Themes, Code Categories, and PYD Attribute

Theme	Code Category	PYD Attribute
Student Opportunities	Student Voice	Competence & Connection
	Intra-curricular and Extracurricular Activities	Confidence, Competence, Connection, & Character
	Service Learning	Connection, Compassion, & Character
Adult Intentionality	Encouraging Words	Confidence
	Providing Opportunities	Confidence, Competence, & Connection
	Modeling	Character & Compassion
Engaging Classes	Career Technical Education (CTE)	Confidence & Competence
	Fine Arts	Competence

Student Opportunities

It was clear that when schools provide students with opportunities to become engaged and involved, PYD is strengthened. The data from the focus group interview transcripts indicated that students and school staff believe that when students are provided space to use their voice, access to school-based intra-curricular and extracurricular activities, and opportunities to give back through service-learning, the most significant gains are made in PYD.

Students indicated that competence and connection are strengthened when schools provide a platform for their voices to be heard. Betty shared, "You can even take the ideas that you have...I like this, this, and this, and the teachers here will help you try to put it together. They want school to be like, adapted to you." Students also linked the concept of student voice to a greater sense of connection. Ashley shared, “They always do surveys before they change something or do something different. So, they see what the students like first, to make sure they're not going to step on any toes before they change something.”

When schools provide diverse opportunities for student engagement through extracurricular and intra-curricular activities, they create a culture where all students can succeed and strengthen their confidence, competence, character, and connection. Kim shared the following about extracurricular activities, “Normally, in a bigger school, you could do maybe three; here, you can do as many as you want. I feel because we get to do all those different activities, you get confidence and know you can do something.” Arlee said, “Connection also has a lot to do with what you do with your time, so the kids in sports have really strong connections with each other.” Ashley shared, “Clubs try to help us build character and teach us right and wrong. They help with confidence and give you a sense of belonging.”

Each rural school focused on providing students with service-learning opportunities, and students and school staff indicated its impact on connection, character, and compassion. Amy shared, “Special Olympics brought a lot of us together when we would all hang out with our kids. It even brought the teachers together, the ones that did the games and stuff.” Mrs. Nestor said, “Compassion, character, and connection, I think, all get attributed to our service-learning that we implemented about three years ago.”

Adult Intentionality

The intentionality of adults in each school emerged as an overwhelming theme when asking students and school staff about strengthening all five attributes of PYD. Specific examples of this intentionality included sharing encouraging words, creating and providing opportunities, and modeling positive behaviors and attitudes. Students truly treasure the words of affirmation and encouragement from the adults at their school. Jan shared the following about her teacher, "If he can tell that you're not doing good on an exam, he will tell you that you're brilliant and that you got this, that you just need to work on some things." Sometimes, the written word can be just as powerful, as Riley shared, "Even a little comment on a test or something that said, ‘Good Job!’ That builds my confidence.”

In addition to these affirming words, the school's adults prioritized creating and providing students with school-based opportunities to gain and build confidence, competence, and connection. One of the school principals, Mr. Hinkle, shared, "We want 100% of our kids involved in some activity. That is one of the big things we are trying to do. We are trying to get them all involved, so hopefully, the academic piece comes up." Mary said, “At our age, we are still trying to figure out what our skills are, what we like to do. There is something here for everyone so you can figure out what you're good at and what you enjoy.” Observations at each school confirmed that these rural high schools provide numerous and diverse student opportunities.

Discussions about student character focused on the adults in the school being intentional about providing students with opportunities to build character and addressing character development in the SEL curriculum. Students shared how they witnessed the adults in their school prioritize student character. Mark shared how his school principal sets the tone for character, “I think, for the most part, we have good character here because our principal, he's big on that.” Students shared how they look to the adults in their school to model strong character. Riley said, "So, we also have good men here. Like the football coach will take those who don't have much character and put them with somebody who does have a lot of character.”

Mrs. Nester said, "I feel teachers model compassion with each other. We are a family." When teachers model compassion, students notice. Referring to when students are having a bad day, Sarah shared, "Sometimes, teachers will let you put your head down on the desk for a few minutes to calm down. Most teachers will pull you out of class and talk to you. I feel overall; some teachers do show compassion." Ashley shared, “All of our teachers are very compassionate about their students. If they are going through something, they're going to help them through it.”

Engaging Classes

Although some academic classes were associated with low confidence and competence, students and school staff agreed that engaging classrooms, specifically courses in CTE and fine arts, strengthen student competence and confidence. One of the school principals, Mr. Wilson, realized the importance of hands-on classes and commented, “We do not have enough avenues for our kids to express their competence; we need more hands-on programs."

Kristen explained why CTE classes are effective, "They work with you until you are good at it." Sarah said, "I feel like it gives a student more experience and a higher level of knowing how to figure something out." Several students mentioned the impact CTE courses have on student confidence. Roger shared, “Those classes do something well. There's something different about the CTE teachers that I like.” Mr. Bliss touched on these curricular opportunities' impact on student competence, "I think it goes back to opportunities. I think that in all areas, our pathways, our academics, CTE classes, some of the clubs, and FBLA activities, we build competence."

Classes in fine arts, such as Theater, Choir, and Band, also emerged from the data as necessary for building student competence and confidence. Shawna shared the importance of her Theater class, "I'm dyslexic. I don't like reading in general. Last year, I had two lines, and I was

freaking out the whole time. But this year, I knew I could do that, so now I'm in a pretty big part." Erika shared a unique perspective, "I think I'm one of the few people who don't have a fun class. I never leave the academic building. Some people have Choir or Band or, like, a lot of the boys are in Welding or Carpentry."

Implications, Conclusions, & Recommendations

The findings from this research align with and add to the growing literature on positive youth development (PYD). However, this study is unique as it examined PYD in the context of rural, low-SES high schools and provided students and school staff a voice to share their thoughts on what contributes to higher and lower levels of PYD among students in their high schools. Therefore, in addition to the findings of this research supporting and enhancing the existing information contained in the components of the Five Cs framework (Geldhof et al., 2014; Lerner, 2007; Lerner et al., 2000) that informed this study, they also provide additional information on how PYD is impacted in rural, low-SES high schools.

Competence

The findings in this study concerning competence aligned with prior research, indicating that competence is linked with what one can do, specifically academically, socially, athletically, and vocationally (Geldhof et al., 2014; Lerner, 2007). Students and school staff attributed higher student competence to school-based opportunities, like sports and clubs, and hands-on and engaging classes, such as courses in fine arts and CTE. Lower student competence was connected to academic courses, such as math.

A unique aspect of student competence that emerged from the study, not readily found in the Five Cs literature, was the positive impact providing students opportunities to use their voice has on competence.

Confidence

The findings of this study are supported by confidence research that indicates youth experience confidence levels differently in different situations or classes (Lerner, 2007). Students in this study attributed lower confidence levels to certain academic classes and a focus on academic performance. In contrast to these classes, CTE courses emerged from the study as classes that can build confidence. Student opportunities, such as clubs and sports, also emerged from the study as potential contributors to higher confidence.

When adults in high schools create and promote these student opportunities, a culture where confidence can grow and develop is provided. Additionally, confidence is enhanced when adults encourage students to keep trying academically and get involved and connected at the school. The research on supporting and nurturing youth confidence indicates the importance of positive and sustaining adult relationships (Lerner, 2007). The research also indicates that youth must be directed to activities where they can use their strengths and talents (Office of Safe and Drug-Free Schools, 2007).

A unique theme emerged from the data related to each school's rural, low-SES environment. Student home life was attributed to lower confidence levels due to the unstable family structure and poverty. When working in rural, low-SES schools, these factors are critical for staff to remember since many students will already be entering the school doors with low confidence and a sense of fatalism (Slama, 2004).

Connection

The findings of this study align with student connection research, which indicates that youth connection in the school setting is focused on mutual relationships that students build with friends, teachers, coaches, and mentors (Lerner, 2007). The connection students feel in their school is primarily impacted by the intentionality of the adults working there. Students shared how teachers are intentional in the classroom to make sure all students are engaged and intermingling with one another. Students shared how they realize their school tries to provide diverse opportunities so all students can find their place of belonging.

The results indicated that rural schools struggle to ensure that all students feel connected. It was clear from the results that if a student is different or has recently moved into the community, they sometimes struggle connecting to other students. Rural research indicates that rural citizens typically distrust outsiders (Slama, 2004).

Character

The findings of this study are supported by character research that identifies personal values, social conscience, values diversity, and conduct morality as part of the character construct (Geldhof et al., 2014). Lower student character was attributed to a lack of moral teaching at home and a lack of understanding and acceptance of others. These factors again indicate some challenges facing students attending rural, low-SES schools.

Factors contributing to a strong character identified by students and adults align with and add to the existing literature on promoting character in youth. School-based opportunities, service-learning, and adult modeling of good character were factors that emerged. These findings are supported by the character education research that indicates character education in schools can take on many forms – service-learning, social-emotional learning, and prevention programs (Berkowitz & Bier, 2004). Clubs emerged as one type of opportunity that can build character, and these findings align with research that discovered a student's feeling of connectedness to the school environment enhances the impact of character education programs (Berkowitz & Bier, 2004).

Compassion

The findings of this study are supported by student compassion research that suggests that compassion is about showing concern for the lives of others with words and actions (Lerner, 2007). An important finding in this research was a connection between student compassion and a rural, low-SES school environment. Students and adults shared how many students experiencing similar traumatic events have developed empathy for others. It was also shared, however, that

students in rural, low SES schools can sometimes lack compassion for students who transfer to the school, are different, or who struggle openly with mental health issues.

Another important and unique finding in this study was the impact modeling of compassion by adults in schools has on students. Many students gave specific examples of how they witnessed adults show empathy and sympathy.

Recommendations for Practice

An important implication for practice that emerged from this study is the power of the words, actions, and examples of adults who work in schools. Schools and school staff must be intentional in the decisions they make when it comes to connecting students with opportunities in which they will find, grow, and nurture their strengths and talents. Adults must work to assist all school youth in discovering and developing their assets and not focusing on their deficits. School leaders in this study shared how they are working diligently to add as many school-based opportunities as possible so 100% of their students can connect with caring adults and peers, find a place in the school to connect and feel accepted, and develop confidence and competence.

Rural schools must work to help students become more accepting of people who are different than they are through increasing and improving inclusion and diversity efforts. Rural students must be exposed to students from different backgrounds, races, and belief systems. Students in the study struggled to accept outsiders and people who were different. Students who transferred into the rural schools in this study or considered themselves different found connecting with students in their schools challenging. Rural, low-SES schools must address the impact of the challenging and disruptive home life of many students on their sense of confidence, competence, connection, character, and compassion. Home life emerged in discussions about almost all five PYD constructs; however, students and adults discussed how home life impacts student confidence and character the most.

Hands-on learning classes are critical to students' competence, confidence, and connection. CTE courses emerged from the study as playing an essential role in rural schools in connecting students to their future careers, building confidence and competence, enhancing a sense of belonging, and providing an engaging environment for students to learn by doing. Schools should provide a diverse offering of CTE programs so students can find their passion, gain new skills, and have an opportunity to make higher wages in their future careers.

The information gained from this study is valuable to stakeholders involved with Agricultural Education. With an increasing number of students experiencing trauma away from school, especially in rural areas, and with the most significant percentage of FFA chapters located in rural and town locales, teacher educators need to include information in teacher preparation that informs future teachers about trauma-informed teaching, student mental health, and how to build and develop the five attributes of PYD among students.

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Global Citizenship: Change in Agricultural Teacher Candidates from a High Impact Experience

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Abstract

Global citizenship is critical to the development of a globally-ready 21st century workforce in food, fiber, and natural resources. Global citizenship comprises social responsibility, global competency and global civic engagement. Educators, along with their knowledge, skills and dispositions, are fundamental factors to the development of global citizenship in students. Two cohorts of pre-service agricultural teacher candidates across two years from two different agricultural teacher education institutions from different parts of the US were presented the opportunity to participate in a high impact experience through a program lasting a full academic year. We utilized an accepted Global Citizenship Scale modified for the agricultural context and collected data in a pre-post format. Both cohorts of pre-service agricultural teacher candidates increased their global citizenship overall and across all three domains from pre to post assessment. Recommendations include continuing domestic global learning opportunities for teachers to gain necessary global knowledge and skills and further research on differences in gains from domestic to international experiences.

Introduction

Through the last three decades agricultural trade and diffusion of innovation have become increasingly dependent on international and multinational collaboration (Boix-Mansilla & Jackson, 2011). Experts believe that as agriculture becomes more globally connected, the need for more globally competent workers will continue to increase (Boix-Mansilla & Jackson, 2011, Goecker, et al, 2010). A major component of working in a global setting is the importance of establishing a perspective as not just a citizen of one specific country or region, but as a global citizen (Guo-Brennan, 2014, Reimers, 2009, Zhao, 2009). Global citizenship brings a normative environment where people can better connect with the multicultural groups around them, working both inside and outside of their ingroup (Reysen & Katzarska-Miller, 2013). The result of global citizenship is a mindset in which individuals prioritize awareness and caring and embrace cultural diversity while promoting social justice and sustainability with a sense of responsibility to act (Reysen & Katzarska-Miller, 2013).

The characteristics of a global citizen include social responsibility, global competence, and global civic engagement (Morais & Ogden, 2011). Social responsibility can be characterized by a respect for diverse opinions, the ability to assess social issues, awareness of injustice and inequality around the world, and a commitment to addressing local and global issues of concern as measured. Outside their environment, global competence allows one the ability to demonstrate intercultural communication skills successfully in encounters; while leveraging knowledge through interacting, communicating, and working effectively (Morais & Ogden, 2010). Global civic engagement is defined as involvement in civic organizations by engaging in or contributing

to volunteer work or assistance in global civic organizations, having a political voice but constructing their global civic voice through their knowledge and experiences in the public domain, and through their global civic activism by engaging in purposeful local behaviors that advance a global agenda (Morais & Ogden, 2010).

Many educational leaders suggest that developing global citizenship should begin in early years as students learn about social skills in a school setting (Asia Society, 2018). While this may be an important goal, it is one many educators feel less prepared to tackle (Asia Society, 2018, Heinert & Roberts, 2016, Guo-Brennan, 2014). According to a UNESCO survey in 2021, one in four teachers globally do not feel prepared to teach their students about global citizenship. Educators across all disciplines play an important role in developing students with the skills necessary to work and live in the increasingly global workforce and society (Asia Society, 2018). Teachers who are prepared to provide global education to their students increase the likelihood of students being capable in a global workforce (Cheng & Huang, 2023). Universities in the United States and abroad are challenged with training future leaders and professionals to be active global citizens once they enter their careers to meet demands of global citizens who are prepared to work in their ever-changing communities (Tichnor-Wagner, et al., 2016, Heinert & Roberts, 2016). As they enter the profession, pre-service teachers will need to be prepared to provide global competence education to their students (Ramos, et al., 2021).

As universities work to develop programming that is suited to produce a well-rounded and prepared workforce, many universities have embraced the concept of additional learning activities to extend knowledge, expand opportunity, and curate skills in students beyond content knowledge (Kuh, 2008). High impact experiences (HIEs) are a broad category of experiential learning opportunities that involve practical skills appliance through avenues outside of traditional classroom settings (Kuh, 2008). The benefits of participation in HIEs are well-noted in the literature. Researchers found correlations between participation in HIEs and several success indicators including an increase in student satisfaction with their educational experience (Miller, et al., 2015), increased academic achievement (Kuh, 2008), and increased earning potential at early career stages (Wolniak & Engberg, 2019). Many of the advantages to students from participation in HIEs come in the form of gains in self-efficacy, resiliency, and other noncognitive skills (Kuh, et al., 2013). Giving students the opportunity to develop skills outside of traditional learning settings is paramount to developing student success in careers (Khine & Areepattamannil, 2016). Participating in high impact experiences has the potential to assist students in becoming "effective agents for their own lifelong learning and personal development" (Chickering, 1994). Students who participate in HIEs are more likely to develop higher levels of social literacy than their classmates who do not participate in HIEs. (Riehle & Weiner, 2013). Students who exhibit social literacy are familiar with and have the ability to work effectively with people of other cultures and languages (Crosby, 2019). Participation in learning outside of the classroom has an increased impact for students who come from underrepresented populations (O'Donnell, et al., 2015; Hill & Karlin, 2019). Affluent young adults are more likely to travel, seek opportunities away from home, and participate in activities that are related to experiencing other cultures, people, and places compared to those who come from lower socio-economic backgrounds (Wofford, 2022). The benefits of providing opportunities for cultural expansion are even more important for students who are from rural areas and those who are from economically disadvantaged background tp actively experience a broadening of their horizons through non-formal avenues (Wagner, 2010).

Agricultural educators are tasked with educating secondary students about the agricultural challenges in their home communities and on the global front (Heinert & Roberts, 2016, Zeichner, 2010). The need to incorporate global agricultural concepts into curriculum creates a need for agricultural education graduates who enter the profession to be prepared with the necessary skill and knowledge to facilitate secondary student learning on a global scale (Longview Foundation, 2008, Guo-Brennan, 2014). Agricultural educators entering the classroom have a better chance of providing their students with global citizenship if they are globally competent and exposed to multiculturalism (Asia Society 2018, Heinert & Roberts, 2016). Many in-service agricultural educators do not feel capable of incorporating global content such as the United Nations Sustainable Development Goals (UNSDGs) into their classrooms and they note a desire for training in this field of study (Letot, 2023). Many pre-service agricultural educators have opportunities to take courses in international agriculture and participate in international study abroad opportunities at various universities (Byker & Putnam, 2019), but few programs exist to explicitly prepare pre-service teachers to teach lessons that are globally-based and focused on helping students develop global citizenship (Wagner, 2010).

For both in-service and pre-service teachers there is a need to develop and promote professional development of the components of global citizenship to ensure educators are competent to teach globalized curricula (Heinert, Conner & Robert, 2013). Existing research highlights how beliefs impact the implementation of curriculum (Hurst, 2015). For students to attain global competency and citizenship, it is important for teachers to appreciate the relevance of global perspectives of the subject matter that they are teaching (Magato, 2017).

At Penn State University the Global Teach Ag Network strives to bridge these gaps for both pre-service and in-service agriculture, food, and natural resource educators across the world. In conjunction with the larger program, pre-service educator students from two institutions had the opportunity to participate in a year-long global learning experience. The Global Orientation to Agricultural Learning (GOALs) allowed globally competent educators to work toward objectives specifically designed to help increase pre-service teachers' global citizenship through year-long professional development. An important component of GOALs is instruction specifically designed to help improve the global citizenship of pre-service agricultural teacher candidates through HIE practices.

Purpose and Objectives

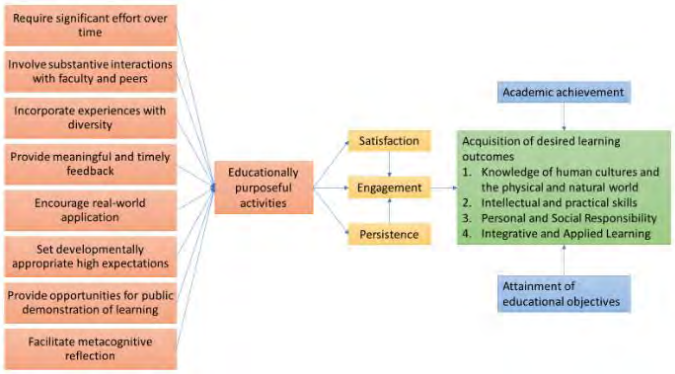
The goal of this portion of a larger study was to examine differences in global citizenship from beginning of program, to program completion for pre-service teachers engaged in the first two cohorts of GOALs. There were three research objectives (RO) for this portion of the study.
RO1: Describe the initial global citizenship of pre-service teacher candidates engaged in a year-long domestic experiential learning cohort surrounding global agricultural education.
RO2: Describe the post-experience global citizenship of pre-service teachers engaged in a year-long domestic experiential learning cohort surrounding global agricultural education.
RO3: Examine differences in global citizenship of pre-service teachers engaged in a year-long domestic experiential learning cohort surrounding global agricultural education before and after the immersion.

Conceptual Framework

We founded this study on a theoretical model for HIE involvement as proposed by Buck (2020). Buck (2020) proposed that the components of HIEs can impact student satisfaction, engagement, and persistence which can contribute to student acquisition of the essential skills as outlined by the American Association of Colleges and Universities (AAC&U). This interaction is shown in Figure 1.

Figure 1

Conceptual framework for the Interaction of HIE to AAC&U desired learning outcomes (Buck, 2020)



Building purposeful educational activities allows students to grow and develop through HIEs. Wolf-Wendel, et al. (2009) noted that while many post-secondary institutions claim to implement HIEs for students, few are following the full recommendations as set forth by Kuh (2008). We designed this study to allow us to examine the impact of a HIE that intentionally incorporated all eight of the components on student personal development including their knowledge of human cultures and the physical and natural world, intellectual and practical skills, personal and social responsibility, and integrative and applied learning.

To describe the educational outcomes of this program, we employed a modified version of the global competence structure (Morais & Ogden, 2010). Due to our context specific focus on agriculture, we modified the construct of "global civic engagement" to "global agriculture engagement" which provided a more tailored reflection on the role of agriculture in a global context. The resulting conceptual model includes the theory of planned behavior as the output of were integrated for the final conceptual model. The resulting conceptual model of educational outcomes is shown in Figure 2.

Figure 2

Identified Educational Outcomes Based on the Global Citizenship Model Adapted from Morais and Ogden (2010)

Methods

This study was conducted as a descriptive survey. Researchers note that survey research is in order when the objectives require respondents to share personal thoughts, beliefs, or attitudes toward a subject and their viewpoints can be self-identified (Creswell, 2012).

Population

The population of this study was a census of all participants who completed the GOALs for the 2021-22 and 2022-23 cohorts ($N = 29$). Participation in the program was open for students with sophomore or junior standing at the time of participation, and preference was given to students who indicated a strong desire to pursue a career as an agricultural educator. Participants were selected based on an application process that considered their desire to examine international agriculture, their commitment to program components, and their desire to use knowledge to help future students. It is important to note that the original population over two years was intended as $N = 32$ participants, but three participants did not complete the spring immersion, one due to a failure to meet GPA requirements, and two due to a change in enrollment status. Data are included for only those students who completed the entire program. Subject characteristics are included in Table 1.

Among the respondents, 13.8 ($N = 4$) percent were nineteen years of age, 48.3 ($N = 14$) percent were 20 years of age, 34.5 ($N = 10$) percent were twenty-one years of age, and 3.4 ($N = 1$) percent were twenty-two years of age. Seventy-five point nine percent ($N = 22$) of the participants identified as female, whereas 24.1 ($N = 7$) percent identified as male. The breakdown of students based on their institution was almost evenly split, with 51.7 ($N = 15$) percent of participants from Penn State and 48.3 ($N = 14$) percent of participants from University of Idaho. Most of the respondents (N = 25, 86.2%) indicated agricultural education as their academic major. The remaining participants (N = 4, 13.8%) identified their academic major as "other". When examined further, these students indicated animal science or pre veterinary medicine as their major. In examining respondent background, 58.6 ($N = 17$) percent identified coming from a rural hometown, 24.1 ($N = 7$) percent identified a suburban hometown and 17.2 ($N = 5$) percent identified as coming from an urban hometown.

Table 1
Agricultural Teacher Candidates in the Study (N = 29)

	Cohort 1 (21-22)		Cohort 2 (22-23)		Overall	
Demographic Variables	*f*	%	*f*	%	*f*	%
Age						
19	2	16.7	2	11.8	4	13.8
20	6	50.0	8	47.1	14	48.3
21	4	33.3	6	35.3	10	34.5
22	--	--	1	8.3	1	3.4
Gender						
Male	2	16.7	5	29.4	7	24.1
Female	10	83.3	12	70.6	22	75.9
Program						
Penn State University	7	58.3	8	47.1	15	51.7
University of Idaho	5	41.7	9	52.9	14	48.3
Major						
Agricultural Education	10	83.3	15	88.2	25	86.2
Other	2	16.7	2	11.8	4	13.8
Hometown Classification						
Rural	8	66.7	9	52.9	17	58.6
Suburban	2	16.7	5	29.4	7	24.1
Urban	2	16.7	3	17.6	5	17.2

Description of High Impact Education Practice

During the year-long experience, participants engaged with industry professionals, policymakers, and other educators from around the globe. The complete experience included two semesters of instruction along with two domestic immersions designed to help stimulate global competence and citizenship- one in the fall and one in the spring. Since the inception of GOALs in 2021, two undergraduate cohorts have completed the program. The first domestic immersion each year included student participation in the World Food Prize Borlaug Dialogues. The fall course was designed for the participants to begin to inventory their global citizenship to create lessons for future students in food security and global citizenship. The spring course preceded the spring immersion and second domestic immersion allowed participants to travel across the country to domestic agricultural education programs in secondary schools to teach week-long global citizenship and food security units to high school students.

Instrumentation

The instrument used in this study is a modified version of the Global Citizenship Scale (Morais & Ogden, 2011). The first section of the instrument had demographic questions including names and information on previous international experiences. The second section of the instrument included 25 Likert-type questions and had respondents share their attitudes toward global citizenship statements. Example statements for each of the domains is shown in Table 2.

Table 2
Example statements in each global citizenship domain

Domain	Example Statement
Social Responsibility	*"I think that people around the world get the rewards and punishments they deserve."*
Global Competence	*"I know several ways in which I can make a difference on some of this world's most worrisome problems."*
Global Agricultural Engagement*	*"Over the next 6 months, I will educate others about global agriculture and how it impacts us locally."*

*Note: * modified global civic engagement*

Respondents rated their level of agreement on a scale from 1 (strongly disagree) to 5 (strongly agree). Items were designed to measure respondent attitudes of social responsibility, global competence, and global agricultural engagement.

Reliability for the Global Citizenship Scale was previously established by Morias and Ogden (2010) in distributions with adult populations, yielding a Cronbach's of alpha $\alpha = .92$ for the entire instrument and Cronbach's alpha levels from $\alpha = .89$ to $\alpha = .94$ for the embedded constructs. Previous distributions in adolescent populations yielded Cronbach's alpha levels from $\alpha = .76$ to $\alpha = .88$. In this study, we calculated a post hoc measure of reliability and found Cronbach's alpha of $\alpha = .89$ across all distributions, and levels ranging from $\alpha = .79$ to $\alpha = .92$ for individual constructs across the four distributions. We employed an added reliability measure by calculating a Spearman-Brown split-half reliability coefficient to represent the internal consistency between the first and second half of the modified scale. The calculation revealed a Spearman-Brown coefficient of .91. Both measures indicated the overall reliability of item intercorrelation on the scale.

Data Collection

Data were collected in a pre-post structure for the first two cohorts of the program with a total of four data collection points. The instrument was embedded within the learning management system for the course and respondents were assigned completion prior to the first course session in the fall and at the final course session in the spring. This cross-sectional distribution allowed data collection prior to exposure of any course components for the fall distribution and following all course components for the spring semester. The course assignment included a link to an online Qualtrics survey. Students who did not complete the instrument prior to the first class session were asked to complete the session before they entered the class.

Data Analysis

Data were downloaded from the Qualtrics system and formatted for analysis using Microsoft Excel, then analyzed using IBM SPSS v 23. Analysis included determining descriptive information for demographic factors and scores on specific constructs and overall, on the global citizenship scale. To determine differences from pretest to posttest, paired samples *t*-tests were conducted. Cohen's *d* was chosen as the effect size calculation to complement the paired samples *t*-test (Cohen, 1977).

Findings

Examining the initial global citizenship score of respondents allowed us to gather a baseline attitude in students prior to their participation in the program. Respondents across both cohorts indicated a mean global citizenship score of M = 3.02(SD = 0.23). For constructs within the global citizenship scale, respondents reported scores of M = 2.56(SD = 0.40) for social responsibility, M = 3.06(SD = 0.23) for global competence, and M = 3.47(SD = 0.56) for global agricultural engagement. Results for pretests are shown for both cohorts in Table 3.

Table 3

Global Citizenship Scale Pretest Scores by Cohort

	Cohort 1 (n = 12)				Cohort 2 (n = 17)				Overall (N = 29)			
	M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max
Social Responsibility	2.53	0.36	2.14	3.29	2.57	0.47	2.00	3.28	2.55	0.41	2.00	3.29
Global Competence	3.25	0.39	2.67	4.17	3.04	0.24	2.75	3.42	3.14	0.33	2.67	4.17
Global Ag Engagement	3.54	0.45	2.83	4.50	3.42	0.59	2.83	4.50	3.48	0.52	2.83	4.50
Overall	3.12	0.24	2.76	3.52	3.00	0.24	2.64	3.52	3.05	0.24	2.64	3.52

Following the completion of HIE components each year, respondents across both cohorts completed the Global Citizenship scale as a posttest their mean score on global citizenship was M = 4.11(SD = 0.36). For constructs within the global citizenship scale, respondents reported scores of M = 4.01(SD = 0.43) for social responsibility, M = 4.11(SD = 0.48) for global competence, and M = 4.23(SD = 0.44) for global agricultural engagement. Posttest results are shown in Table 4.

Table 4

Global Citizenship Scale Posttest Scores by Cohort

	Cohort 1 (n = 12)				Cohort 2 (n = 17)				Overall (N = 29)			
	M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max
Social Responsibility	4.26	0.19	4.00	4.57	3.83	0.46	2.71	4.57	4.01	0.43	2.71	4.57
Global Competence	4.54	0.20	4.33	4.92	3.81	0.38	2.67	4.25	4.11	0.48	2.67	4.92
Global Ag Engagement	4.53	0.27	4.00	5.00	4.02	0.42	2.83	4.50	4.23	0.44	2.83	5.00
Overall	4.46	0.16	4.20	4.76	3.87	0.23	3.32	4.24	4.11	0.36	3.32	4.76

We conducted a paired samples *t*-test to examine differences in global citizenship scores between the pretest and posttest distributions. We found that the global citizenship scores for participants were significantly higher at the end of the program ($M = 4.11$, $SD = 0.36$) than at the beginning of the program ($M = 4.11$, $SD = 0.36$) ($t(28) = -15.02$, $p = 001$). Scores were also higher for each of the constructs within the global citizenship scale including higher scores at the posttest for social responsibility ($t(28) = -13.84$, $p = 001$), global competence ($t(28) = -11.21$, $p = 001$), and global agricultural engagement ($t(28) = -6.05$, $p = 001$). Results of the paired samples *t*-test are shown in Table 5.

Table 5

Paired Samples t-Test for Difference in Global Citizenship from Pretest to Posttest

	t	df	Sig. (2-tailed)	Cohen's d
Social Responsibility	-13.84	28	<.001	0.56
Global Competence	-11.21	28	<.001	0.51
Global Ag Engagement	-6.05	28	<.001	0.68
Overall	-15.02	28	<.001	0.39

Conclusions, Implications and Recommendations

Based on the results from this study, pre-service agricultural teacher candidates from two different cohorts representing two different agricultural teacher education programs located in different parts of the US benefited from high impact experiences related to global citizenship. The program's intentionally designed high impact experiences allowed for pre-service agricultural teacher candidates to develop their overall global citizenship as well as across all three domains of global citizenship: social responsibility, global competency and global agriculture engagement.

Educators with higher global citizenship have an increased capacity to help increase the global citizenship of their students (Arnett-Hartwick, 2016). Teachers are at the forefront of bringing global awareness and perspectives into the classroom (Tichnor-Wagner, et al., 2016). Purposefully providing opportunity for development of global citizenship through agricultural teacher education programs better equips future teachers with the knowledge, skills and dispositions needed to develop a globally ready future workforce and talent pipeline in food, fiber, and natural resources (Wagner, 2010).

As we operate in resource constrained environments to deliver our teacher education programs, it is worthwhile to note that gains in global citizenship with these cohorts of teacher candidates in this program were achieved without international travel. This suggests that while the literature (Fisher et. al. 2023; Sobkowiak, 2019) indicates that study abroad improves global competency, study abroad should not be viewed as the only avenue to providing these learning outcomes to students and perhaps there are other cost-effective measures to develop similar knowledge, skills and dispositions.

Recommendations for Future Practice

Higher education professionals, in particular, university agricultural teacher educators, should explore introducing concepts of global citizenship integrated into courses to provide instructional context. To advance global citizenship development, high impact experiences should be designed to take into consideration learning opportunities around social responsibility, global competency and global agricultural engagement. Data suggests that particular attention should be paid to the domain of social responsibility with opportunities for engagement and reflection on activities in that area. In addition, US agricultural teacher education programs should seek out opportunities for collaboration and joint agricultural teacher education learning experiences to allow for teacher candidates to grow and develop their teacher identity, including global citizenship, with the benefit of exposure to diverse perspectives and backgrounds.

Recommendations for Future Research

Future research should be conducted exploring how the addition of international experiences influences global citizenship gains as compared to domestic global learning experiences. While international experiences are enjoyable, often, contextually relevant global international experiences in agricultural education are not offered often, and when offered they can be costly and not accessible to all teacher candidates during the teacher preparation programs. This raises the question of equity in providing opportunities to gain these global learning outcomes for all teacher candidates including those from economically disadvantaged populations.

In addition to comparing domestic to international experiences, there is an impact and opportunity to develop global citizenship through engagement in digital and virtual environments. Finally, opportunities should be sought to explore the impact on teacher identity and sense of belonging to the profession around collaborative high impact experiences with agricultural teacher candidates from diverse institutions with diverse backgrounds and lived experiences. This presents a vehicle and opportunity to develop capacity for not only working on and with multicultural teams, but also in helping have efficacy to working with students with differences in social identities to optimize educational outcomes.

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Advancing Professional Development Among Secondary Agricultural Education Teachers in Uganda

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Abstract

In 2020, Uganda's Ministry of Education and Sports took a significant step by implementing a Competence-Based Curriculum (CBC) for lower secondary education, aiming to equip students with practical skills for the 21st century. However, past research has revealed a critical issue: Ugandan secondary agricultural education teachers lack the necessary pedagogical skills to implement this curriculum successfully. Furthermore, they seldom participate in Continuous Professional Development (CPD) activities during their teaching career. This mixed-methods study, involving 52 participants, aimed to address this issue by identifying the CPD activities these teachers engage in, assessing their perceptions of available CPD activities in Uganda, determining their professional needs, and recommending strategies for providing high-quality CPD training. Most participants, 88% of whom were male with a bachelor's degree in agricultural education and had an average of 3.7 years of teaching experience, attended 3-4 CPD trainings in an academic year. They expressed the need for CPD training, particularly in subject content areas, preferably conducted in-person, infused with hands-on training, and conducted before the start of each academic term. We recommend operationalizing the CPD Framework and decentralizing CPD training to elevate the professional quality of agricultural education teachers and consequently enhance students' academic outcomes.

Introduction

Over the years, the Ugandan government, through the Ministry of Education and Sports (MoES), has implemented numerous educational policies and programs. Notably, such programs include Universal Primary Education (UPE), Universal Post-Primary Education and Training (UPPET) policy, and the Higher Education Students' Financing Board (HESFB). These policies were geared toward providing free primary education to every child, increasing accessibility to basic education through the construction of primary and secondary schools at every sub-county, and providing a student loan program for higher education for students from low-income family backgrounds (MoES, n.d.; Mubangizi, 2020; Obiero, 2020). However, these policy changes and programs have not yielded tangible results apart from slightly increasing the number of primary and secondary school graduates (TISSA, 2013, p. 16). Today, the education system is criticized for failing to adequately prepare learners with the skills needed to be employable. For too long, Ugandans have lamented the lack of employable skills and the poor quality of graduates concerning work deliverables and intrapersonal and interpersonal skills. Many blame this on the theoretical nature of Uganda's secondary education system, which has failed to effectively facilitate a smooth "School to Work Transition" (Mubangizi, 2020, p. 4). The system is also criticized for providing a poor-quality education, having poor school infrastructure, low-quality teachers, high rates of student attrition, and contributing to the high levels of unemployment in the country (Nakabugo et al., 2014; TISSA, 2013).

To combat this, MoES and the National Curriculum Development Center (NCDC) introduced a competence-based curriculum loosely called the new lower secondary school curriculum in January 2020 (NCDC, 2019a; Chemonges, 2020; Nakabugo et al., 2014). According to the NCDC 2019 press release, the new curriculum is aimed at:

> Promotion of effective learning and acquisition of skills, reduction of subject and content overload, addressing the needs of all students and laying a foundation for improved pedagogy and assessment procedures, addressing the social and economic needs of the country, provision of flexibility to absorb emerging fields of knowledge in the areas of Science and Technology, addressing the 21st-century skills required in the world of work, and lastly, addressing issues of wastage with regard to utilization of resources (teachers, school facilities/space, and instructional materials) to ensure efficiency (NCDC, 2019a, p. 2).

With 21 subjects on its menu, all designed to provide practical and meaningful education to students, implementation of this competence-based curriculum mainly targets providing learners with the needed 21st-century practical skills or those skills needed in the world of work (Chemonges, 2020; NCDC, 2019a). Many Ugandans believe that the new lower secondary school curriculum is the magic bullet to all education challenges at the secondary school level. To date, the competence-based curriculum has been praised for subject and content reduction and for emphasizing a practical-based education. MoES and its regional and international stakeholders believe that this new policy is the right step in the right direction.

However, there are concerns and questions about the skills of secondary school teachers in Uganda. Past research about Ugandan teacher issues indicates that many secondary school teachers receive poor pre-service teacher training at teacher preparation colleges and receive little to no in-service training during their teaching careers (Nakabugo et al., 2014; TISSA 2013; Mulkeen et al., 2007). Consequently, these teachers have inadequate teaching or pedagogical skills (Okiror et al., 2017; Nakabugo et al., 2014; TISSA, 2013), affecting their teaching quality and students' academic outcomes. The low teacher standards and teaching competencies are attributed to a "lack of teacher-education specific national minimum standards and competence framework" that would harmonize and ensure quality teacher education and training in Uganda (Ministry of Education & Sports MoES, 2019b). If the new curriculum is implemented without retraining and continuously training teachers, there are fears that the education sector, especially secondary education, will obtain the same poor learning outcomes (Chemonges, 2020).

Literature Review

Across the globe, teachers are considered the engine and centerpiece of an education system (Datnow & Castellano, 2000). Education officials, politicians, and policymakers understand that teachers determine and define what should be taught, how it should be taught, and how learning should be assessed (Basheka et al., 2017). Because of their central role and importance in education, governments and partner stakeholders invest considerable resources in pre-service and in-service training of their teaching workforce (Sims et al., 2022). Each country has agencies or organizations responsible for pre-service and in-service teacher training, and these set the agenda for teacher training, identify gaps in teacher programs, devise solutions, and allocate resources to teacher training colleges/universities.

In Uganda, such teacher training mandates have majorly been coordinated by Kyambogo University through the National Teacher Colleges (NTCs) for secondary school teachers and Primary Teacher Colleges (PTCs) for primary school teachers (Ministry of Education & Sports [MoES], 2019b). However, with the liberalization of education in Uganda, over 25 public and private universities currently offer education degrees to pre-service teachers, a development that has led to an increased number of trained teachers but has compromised the quality of teacher education received at these universities due to the absence of a Quality Assurance Framework in teacher education (MoES, 2019b). This has led to significant competency gaps among secondary school teachers, which include a lack of skills in the use of educational technologies, low pedagogical skills, low content and subject knowledge, and little to no counseling and career guidance skills (Malunda, 2019; MoES, 2019b, 2018, 2016; Nakabugo et al., 2014, TISSA, 2013).

Currently, this six-year education system with four years of ordinary level (O-level) and two years of advanced level (A-level) structure is challenged by quality issues and attainment of low academic outcomes. For instance, over 50% of students who tested for the Uganda Certificate of Education (UCE), which is a national examination for transiting to the Upper secondary level (high school), failed their examinations and repeated senior four (S4) classes the following academic year (MoES, 2017a). Focusing on secondary agricultural education in Uganda paints a blurrier picture. As highlighted by Uganda National Examinations Board [UNEB] 2022, 198,055 out of 345,444 (57.3%) students registered for the agriculture education national examination at the Uganda Certificate of Education (UCE) level, indicating an increase in uptake and enrolment in agricultural education by schools and students respectively. However, most of these candidates scored the minimum grade attainable at this level of education. UNEB officials attribute this to weaknesses in handling practical tests, making and recording observations, drawing conclusions, poor mathematical skills, and poor interpretation of test results (UNEB, 2022). Okiror et al. (2017) apportion this situation to secondary agriculture education teachers' failure to engage students well enough for skills acquisition due to their lecture teaching methods, which hinders active and experiential learning in classrooms.

To address these critical teacher issues in secondary school education, the Ministry of Education and Sports (MoES) and its partner agencies have developed several policy frameworks, including the Harmonized Framework for Initial Teacher Training, a Competency Profile for Secondary School Teachers, the Continuous Professional Development Framework, a National Teacher Policy, and the Competency Profile for Teacher Educators in Higher Institutions. Additionally, the government of Uganda introduced the new lower secondary school curriculum framework at the beginning of 2020 (National Curriculum Development Centre [NCDC], 2019a; Chemonges, 2020). This curriculum focuses on offering students a comprehensive education that meets the needs of the 21st-century workplace ecosystem, recognizes diverse academic aspirations, addresses three learning domains, and focuses on the education of citizens who can utilize Uganda's resources to transform their communities and country at large (NCDC, 2019a). With changes, mainly in classroom instruction, the introduction of project-based learning and criteria-based assessment, and the increased demand for a highly skilled teacher workforce to implement the new lower secondary school curriculum, this study was conducted to identify the available in-service teacher training opportunities in Uganda and teachers' perspectives about these CPD training programs. Well-

planned and implemented CPD programs become the surest way of bridging pedagogical gaps among teachers created by initial poor pre-service teacher training and serve as the primary route of providing in-service agricultural educators with vital skills required for delivering quality agricultural education in the new lower secondary school curriculum (Nakabugo et al., 2014; TISSA, 2013).

Theoretical Framework

This study utilized two theoretical frameworks, the Adult Learning Theory by Knowles (1980) and Roger's Diffusion of Innovation Theory (2003). With CPD being the ongoing process of enhancing teachers' knowledge, skills, and competencies necessary for effective teaching practice and making them experts in their subject, MoES and her partners must equip all secondary teachers with the new techniques of instruction and learning strategies to effectively teach this Competency-Based Curriculum (Okiror et al., 2017; Nakabugo et al., 2014; TISSA, 2013; Maclellan, 2004). However, as Njenga (2022) explained, teacher CPD is a complex learning activity influenced by a complex set of interacting personal, institutional, and contextual factors. Thus, using a twofold theoretical framework is an appropriate strategy "for understanding the multiple aims, diverse content and learning methods that characterize teacher CPD" (Njenga, 2022, p. 7). The Adult Learning Theory (Knowles, 1980) views teacher CPD as a self-directed and goal-oriented activity, while the diffusion of innovation theory situates teacher CPD in Uganda as an innovation or new educational practice that requires agricultural educators to adopt the new CPD ideas through the innovation-decision process (Njenga, 2022; Rogers, 2003).

As highlighted in the Knowles (1980) Adult Learning Theory, an adult learner finds specific situations or needs concerning their teaching profession that call for adjustment or change, and these needs act as motivators of their adult education or adoption of professional development (Cannon et al., 2012; Knowles, 1980). With this notion, adult learners are expected to be more motivated to learn to address their perceived professional needs (Cannon et al., 2012). Such perceived professional needs have been highlighted in previous studies in Uganda to include instructional strategies, subject content knowledge, classroom management, project-based learning, student motivation, counseling, and career guidance (Malunda, 2019; MoES, 2016; Nakabugo et al., 2014).

According to Rogers' Diffusion of Innovations Theory (2003), adopting ideas or innovations, such as participation in CPD programs in any population or social system, such as education, usually begins with a few innovators (Rogers, 2003). This small population is closely followed by early adopters, followed by an earlier majority and later majority, and lastly, followed by the laggards. The contemporary situation of CPD attainment among agricultural educators fits into the five categories proposed by the Diffusion of Innovation Theory. This is because peer-to-peer interactions and communities of practices are vital in knowledge transfer and, in this case, important in influencing other teachers to take part in CPD programs (Okiror et al., 2017). Therefore, using the Adult Learning and Diffusion of Innovation theories provided the tools to indicate how, why, and how fast CPD programs in Uganda achieve or fail to achieve their intended goals.

Purpose of the study

The purpose of this study was to identify existing CPD activities attended by secondary agricultural education teachers in Uganda and explore their subsequent perceptions of these programs. With Uganda's shift from a knowledge-based curriculum to a competency-based curriculum, it is essential to assess teacher's professional needs and to investigate the landscape of CPD activities attended by secondary agricultural education teachers. Understanding the CPD activities available to these teachers and their perceptions of these programs is crucial for enhancing professional development initiatives tailored to the unique needs of agricultural educators. Therefore, recommendations from this study will guide the implementation of successful CPD programs for secondary agricultural education teachers in Uganda. As such, three research objectives guided this study:

1. Profile the educational backgrounds of Ugandan secondary agricultural education teachers.
2. Identify the kind of CPD activities Ugandan secondary agricultural education teachers participate in.
3. Assess the perceptions of Ugandan secondary agricultural education teachers towards the available CPD programs.

Methodology

A concurrent mixed methods case study research design was utilized to conduct a comprehensive study of a complex problem in a short time using quantitative and qualitative protocols and involving teacher participants with varied demographics or backgrounds (Creswell 2009, 2012, 2019; Creswell & Creswell, 2018). As such, quantitative data was collected first, and qualitative data was collected after the quantitative data was analyzed. This study involved 71 secondary agricultural education teachers purposively selected from the agricultural teachers that are part of the Agriculture Educators WhatsApp group, a professional learning community (PLC) for secondary agricultural education teachers and other agricultural educators in Uganda. Research participants taught at either the ordinary or advanced level or at both levels of secondary education in schools located in Uganda's urban, peri-urban, and rural areas, representing all four main regions of the country.

To achieve the purpose of this study, a survey that included a Professional Development questionnaire and three open interview questions was administered to participants via an online Qualtrics survey platform and WhatsApp messaging application. Quantitative data was collected using a survey with three sections. Section I focused on pedagogical competency and captured data on teachers' pedagogical skills. Section II explored a professional development needs assessment and captured data on the perceived importance of CPD, the perceived level of pedagogical skills, and current gaps among agricultural educators in Uganda. Section III recorded personal biodata and captured data on teachers' educational backgrounds. A 5-point Likert Scale was used to measure the required statistics and obtain the quantitative data needed using scales such as far below average, somewhat average, average, somewhat above average, and far above average (Wade, 2006).

For qualitative data, 15 selected teachers representing the three identified levels of highest education responded to three questions during a semi-structured interview conducted via WhatsApp social media platform. During the interviews, data on challenges and barriers affecting CPD programs, participant opinions on CPD program improvement, suggestions for new CPD program areas, suggestions for personal teacher professional growth, and suggestions on what MoES/Universities/Schools can do to provide CPD training for in-service teachers were collected. Collected datasets were separately analyzed and later integrated to develop a complete view of the collected datasets following the *QUAN* → *qual* paradigm design (Morse, 2010). As such, quantitative data was analyzed using the online Qualtrics program and Microsoft Excel software to derive descriptive statistics calculating percentages, means, standard deviations, and inferential analyses of participants' responses to the survey. For qualitative data, content and thematic analyses of recorded interview responses were done to create themes on CPD programs in Uganda. This helped identify emerging patterns from participants' responses and grouped them into words, concepts, and themes (Columbia Public Health, n.d.).

Lastly, while conducting this study, the research team experienced limitations such as scanty literature and research relating to the continued professional development of teachers, mainly agricultural teachers in Sub-Saharan Africa, as most of the available studies focused on teachers teaching at the primary school level (Nakabugo et al., 2014). As such, the researcher relied on generalized research findings or literature on secondary school teachers in Uganda and from the rest of the world while developing the literature review section of this study. Finally, it was costly to physically collect data in Uganda from participants spanning the country in two months. Although the study had an online survey, being physically in Uganda during the data collection process was deemed essential to boost participation.

Results

Objective one sought to profile the educational backgrounds of Ugandan secondary agricultural education teachers. This study involved 71 teachers, of which 52 finished responses were used in data analysis. Results indicated that most participants were male (n=46, 88.0%) with either a diploma, a bachelor's degree, or a master's degree in agricultural education. Participants taught in agricultural education programs located in urban (n=12), peri-urban (n=23) and rural (n=17) areas across the country. Most teachers with a diploma taught agricultural education at O-level (n=19, 45%) and in rural schools (n=9, 45%). Teachers with a bachelor's degree mainly taught agricultural education at A-level (n=20, 65%) and in peri-urban schools (n=13, 52%), while all participants with a master's degree taught agricultural education at A-level (n=7). Lastly, half the number of female participants held a bachelor's degree in agricultural education and taught in rural schools (n=3).

Table 1

Summary of Participant Demographics (n=52)

Category	*n*	*%*
Gender		
Male	46.0	88.5
Female	6.0	11.5

Category	*n*	%
Teacher's Highest Level of Education		
Diploma	20.0	38.5
Bachelor's degree	25.0	48.0
Master's degree	7.0	13.5
Ph.D.	0.0	0.0
Teacher's highest level of Education in Agricultural Education (*n=38)*		
Diploma	13.0	34.0
Bachelor's degree	21.0	55.0
Master's degree	4.0	11.0
Years of teaching		
less than 1 year	1.0	1.0
1 to 2 years	6.0	12.0
3 to 5 years	16.0	31.0
6 to 10 years	15.0	29.0
More than 10 years	14.0	27.0
School Location by Area		
Urban ($5{,}000^{+}$ people/km^2)	12.0	23.0
Peri-urban ($2{,}000 – 4{,}999^{+}$ people/km^2)	23.0	44.0
Rural (<2,000 people/km^2)	17.0	33.0
School Location by Region		
Central Region	36.0	69.0
Eastern Region	5.0	10.0
Northern region	9.0	17.0
Western Region	2.0	4.0

Research objective two sought to identify the type of CPD activities that Ugandan secondary agriculture education teachers participated in. This objective also collected data on whether schools provided CPD to their teachers and the number of CPD events a respondent participated in during an academic year. Seventeen key CPD training areas were presented to participants, and they were asked to indicate their interest in attaining CPD in such areas. A Likert scale with five choices was provided in the survey. Response categories included not interested (1), slightly interested (2), moderately interested (3), very interested (4), and extremely interested (5). Most participants (n=38, 73%) indicated their schools offered CPD training, with many attending at least one CPD training a year (n=51, 98%). Additionally, most diploma holders (65%) attended 1-2 trainings, 56% of bachelor's degree holders attended 3-4 trainings, and 50% of master's degree holders attended more than five trainings in an academic year. Furthermore, results indicated that the mean ranks of all secondary agricultural teachers' interest in the 17 listed CPD training areas ranged from the lowest mean of 4.00 (curriculum mapping) to the highest mean of 4.38 (subject content areas). The lowest standard deviations (SD=0.65) occurred within the project development area, and the highest standard deviations (SD=0.99) occurred in the DIT courses, assessment, and certification for senior three students area (see Table 2). Results also showed that teachers with different levels of education expressed varying mean interest in attending the listed CPD training areas with the performance of one-factor ANOVA analysis at p<.05 level and a Post Hoc analysis

showing a statistically significant difference in mean interest towards attending CPD training between teachers with different levels of higher education (see Tables 3 and 4).

Table 2

Summary of Teachers' Interest in identified CPD areas by level of highest education

			Mean Scores		
Area of CPD training Interest	*M* (*n*=52)	*SD* (*n*=52)	Dip (*n*=20)	Deg (*n*=25)	Mas (*n*=7)
New lower Secondary curriculum	4.31	0.77	4.35	4.24	4.43
21st Century Skills	4.31	0.67	4.20	4.36	4.43
Competence-based Learning	4.37	0.71	4.30	4.32	4.71
Best teaching Practices	4.33	0.70	4.25	4.40	4.29
Development of Activities of Integration and their rubrics	4.23	0.87	4.35	4.12	4.29
Student Experiential learning opportunities	4.25	0.68	4.20	4.24	4.43
Classroom Management	4.33	0.70	4.05	4.56	4.29
Collaborative Teaching	4.27	0.76	4.00	4.36	4.71
Curriculum Mapping	4.00	0.98	3.70	4.08	4.57
Project Development	4.37	0.65	4.20	4.52	4.29
Establishment of an Agriculture Club like YoFFA in your school	4.23	0.87	4.10	4.24	4.57
Formative and Summative Assessment	4.21	0.93	4.00	4.40	4.14
Student leadership development	4.17	0.89	4.00	4.20	4.57
Personal Management (time, stress, Work life balance, career development, etc.)	4.37	0.79	4.25	4.56	4.00
Educational Technology and Integrated Instruction	4.35	0.78	4.05	4.56	4.43
Subject Content Areas (Animal Science, Agronomy, Tools, etc.)	4.38	0.88	4.20	4.52	4.43
DIT courses, assessment, and certification for senior three students	4.21	0.99	4.05	4.28	4.43

Note. Interest Scale*:* 1 = not interested, 2 = slightly interested, 3 = moderately interested, 4 = very interested, and 5 = extremely interested. Dip = Diploma, Deg = Degree, and Mas = Masters.

Table 3

One-factor ANOVA Analysis of teachers' mean interests on listed CPD training by level of education

Sources	*df*	*SS*	*MS*	*F*	*P* value
Between groups	2	0.736	0.368	12.860	<.001
Within groups	48	1.373	0.029		
Total	50	2.109	0.042		

Table 4

Post Hoc Analysis of teacher's mean interests on listed CPD training by level of education

Group	*M*	*n*	*SS*	*df*	q-crit
Diploma	4.132	17	0.430		
Bachelor's degree	4.351	17	0.386		
Master's degree	4.412	17	0.558		
		51	1.373	48	3.420

Note. n represents the listed areas of interest in CPD training in Uganda.

Objective three sought to analyze the perceptions of Ugandan secondary agricultural education teachers toward the available CPD programs. Respondents answered five questions about the quality of CPD programs and their ability to apply the acquired knowledge in their classrooms and professional careers. A Likert scale with five response options ranging from strongly disagree (1) to strongly agree (5) was utilized. Participants indicated mean ranks for the quality of available CPD training ranging from 4.25 (*attended training was high quality and met my expectations*) to 4.38 (*attended training helped me to help my students in the classroom better*). The lowest standard deviation (*SD*=1.10) occurred within *attended training that was of high quality and met my expectations*, and the highest standard deviation (*SD*=1.33) occurred in *the training content relevant to my teaching roles perspective* (see Table 5).

Table 5

Summary of teachers' perceived quality of available CPD training

Question	*M*	*SD*
The attended trainings were of high quality and met my expectations.	4.25	1.10
Training content is relevant to my teaching roles.	4.28	1.33
The attended trainings have helped me do my teaching job better.	4.29	1.26
The attended training helped me to help my students in the classroom better.	4.38	1.18
The attended trainings have helped me prepare for career advancement.	4.35	1.19

The ANOVA analysis and subsequent post hoc analyses were performed on the group mean scores in relation to participants' highest level of education. ANOVA results indicated a significant difference at $p<.05$ in mean scores among the three educational levels [F (2,12) = 22.30, $p<.001$]. Similarly, the post hoc analysis revealed a statistically significant difference among mean scores.

Analysis of Teacher Interviews

Qualitative data was collected to identify challenges or barriers affecting teachers' accessibility to CPD programs, to profile teachers' perceptions of available CPD programs, and to identify suggestions for improvement of CPD programs in relation to quality and accessibility. Fifteen selected teachers, with five individuals representing each identified

highest level of teacher education, participated in the semi-structured virtual interviews. Respondents answered three questions: Is professional development important to you as a teacher, and why? What challenges do you have accessing professional development in Uganda? What can be done to make professional development worthwhile? Qualitative data was analyzed, and emerging themes were recorded. This process identified ten broad themes and 73 subthemes (see Table 6).

Table 6

Summary of identified themes and subthemes from teacher interviews

Questions	Themes
Is professional development important to you as a teacher, and why?	*Skill development*: Effective learner engagement, effective pedagogy, staying professionally abreast, problem-solving skills, classroom management, curriculum interpretation, lesson plan development, and motivation for service. *Self-development*: Career growth, competence, confidence, credibility, commitment, and life-long learning. *Transferable benefits*: Educational technology, employment, promotion, and networking opportunities.
What challenges do you have accessing professional development in Uganda	*Accessibility*: No national CPD program, long distances, lack of continuity, inadequate skilled human resources, lack of online CPD programs, lack of training info, and few training programs. *Administrative and financial constraints* include low teacher pay, lack of funding, higher education costs, lack of financial support, no paid leave days, and a lack of scholarship opportunities. *Technological constraints*: Lack of computers, no clear CPD goals, high internet costs, unreliable internet service, computer illiteracy, and poor teacher attitude toward CPD activities. *Time constraints*: Long travel distances, conflicting schedules during academic terms, and poor scheduling of CPD activities.
What can be done to make professional development worthwhile?	*Institutionalization of CPD programs*: Mandatory CPD requirements, sensitization, decentralization, and scheduling CPD during school breaks. *Attitude of importance for teachers and school leaders*: Financial support, early communication, merit-based promotions, school-based CPD, better teacher pay, and close monitoring. *Personal initiatives*: Self-ownership of CPD, embracing digital literacy, attaining advanced education, and utilizing the Internet for professional development.

For question one, all respondents, regardless of their highest level of education, mentioned that continuous professional development was personally meaningful to them. They gave reasons that were summarized into three broad themes and 20 subthemes. The

identified themes included skills development (pedagogical and professional skills), self-development (personal growth), and transferable benefits. For question two, respondents outlined challenges hindering them from accessing professional development activities. Respondents mentioned personal and structural challenges at the school administrative level and some at the national level. The identified challenges were organized into four themes and 26 subthemes. The themes included accessibility, administrative and financial constraints, personal and technological constraints, and time constraints. For question three, respondents highlighted strategies at individual, school, and national levels that can be implemented to make the acquisition of professional development among Ugandan secondary agricultural education teachers successful. The identified solutions for implementing a successful CPD program in Uganda were organized into three themes: institutionalization of CPD programs, administrative support, and personal initiatives.

Conclusions, Implications, and Recommendations

This study aimed to identify existing CPD activities attended by secondary agricultural education teachers in Uganda. The average respondent was a male teacher with a bachelor's degree in agricultural education, had 3.7 years of teaching experience, and taught at either the O-level or A-level in rural, peri-urban, and urban schools in Central Uganda. Diploma holder participants primarily taught at the O-level and in rural schools, teachers with a bachelor's degree mainly taught at the A-level and in peri-urban schools, and master's degree holders mainly taught at the A-level, and none of them taught in a rural school. Based on participant demographics, it can be concluded that more female agriculture education teachers need to be trained and recruited in schools across Uganda. According to Banks (2008), this representation will create female teacher role models, positively impact students' academic performance and personal development, and assist in breaking barriers and stereotypes that seem to exist among Ugandan communities. Additionally, the low average years of teaching experience and relatively high number of teachers with a diploma indicate the need to provide CPD for agricultural educators. As Okiror et al. (2017) and TISSA (2013) noted, providing CPD will enhance the professional capacity of these teachers to deliver the new curriculum and help bridge the professional skills gap between teachers with different levels of education.

Furthermore, most teachers indicated participating in at least one CPD training in an academic year, mainly offered by their schools. On average, participants ranked attending CPD training on subject content areas such as crop science, animal science, farm tools, etc., the highest, followed by training on competence-based learning, project development, and personal management. Additionally, teachers with different education levels had varying preferences and interests for attending the listed 17 CPD training areas. These differences in preference for the listed CPD training areas indicate that teachers with different levels of education have different CPD needs. Because of this, organizers of CPD training workshops or activities need to conduct needs assessments for their target agricultural education teachers to identify their actual CPD needs instead of offering generalized training. This conclusion aligns with Okiror et al.'s (2017) findings, which found that teachers with a diploma had a higher need for teaching and delivery of hands-on agricultural learning activities than bachelor's and master's degree holders. It is also supported by Ezati et al.'s (2014) recommendation for adopting the cascade model of CPD training, where training is more concerned with identifying and satisfying teachers' content and

pedagogical knowledge needs and provides a platform where teachers professionally learn through communities of practice.

Participants also indicated mixed feelings about the quality of available CPD training in Uganda. For instance, during quantitative data analysis, teachers with a bachelor's degree highlighted that available CPD programs are of low quality. In contrast, those with a master's degree and diploma viewed the available CPD programs as of high quality. However, during teacher interviews, regardless of the level of education, teachers seemed to agree that available CPD programs are of "poor quality." With this finding and in consistency with past studies (Nakabugo et al., 2014; TISSA, 2013), we can conclude that most of the available CPD training in Uganda are ad hoc and broad-based programs in the form of workshops and seminars, mainly organized at the beginning of the school year or the beginning of each academic term. Past studies in Uganda show that such programs have little effect on teachers' professional skills and suggest that effective CPD programs should be subject-matter specific, continually conducted over several days, and must consider individual teacher professional needs (Arinaitwe et al., 2019; Nakabugo et al., 2014).

Based on the earlier conclusions, we recommend several strategies for providing quality CPD training to secondary agricultural education teachers in Uganda. To begin with, there is an urgent need to operationalize the CPD Framework and the National Teacher Policy in Uganda. As outlined by MoES (2018, 2017b), this will provide a clear structure for organizing and managing CPD so that it contributes to improvements in teaching and leadership quality and professionalizes the teaching profession to levels comparable with other professions. We also recommend that organizers of CPD training consider teachers' preferences to promote uptake and attendance of organized CPD training activities across the country. As Knowles (1980) noted, adult learners, including in-service teachers, view continuous professional development activities as self-directed and goal-oriented. Therefore, organizers of CPD training must understand teachers' preferences regarding what, when, how, and where the training should be conducted. Past research indicates that this is important in diffusing teacher CPD in Uganda, which is currently an innovation or a new educational practice (Njenga, 2022; Rogers, 2003).

Lastly, we recommend that schools implement content-specific school-based CPD activities and allocate funds to facilitate provision for their secondary agricultural education teachers. Undertaking such specific CPD training in the form of workshops and seminars on specified topics leads to professional improvement among teachers (Okiror et al., 2017). Budget allocations will ensure regular and relevant CPD training opportunities in various formats: in-person workshops, online courses, virtual webinars, and collaborative learning experiences with other teachers across Uganda and the globe. It is also essential that school leaders empower their directors of studies or deputies in charge of academics to conduct in-class teacher observations, conduct surveys to assess teacher needs, and recommend needs-based professional development for their teachers.

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Middle School Agricultural Education Teachers' Implementation of Agriscience Fair

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Abstract

One of the tools middle school SBAE teachers can use to deliver the total program is research-based SAEs, for which students can receive recognition through the FFA Agriscience Fair. This study examined how middle school SBAE teachers implemented the Agriscience Fair award into their programs. This study built on previous literature in this area, but with a specific focus on middle school programs. Using a qualitative case study, seven teachers that had various levels of use with Agriscience Fair were interviewed. Teachers were categorized into their levels of use for this innovation and spanned across multiple levels. Major themes from the interviews emerged that found the Agriscience Fair award area was a tool that teachers used to help strengthen their program by enriching the program offering and providing hands-on learning for students. Themes of teachers learning to figure out the complex rules of the competition to be successful as well as using relationships to help students be successful emerged. Recommendations were made to make the award area more intuitive, especially for teachers who are newer to the implementation including providing examples of manuscripts and presentation materials, providing lesson planning resources, and professional development.

Author Note

This manuscript is based on data published in the Proceedings of the Southern AAAE Research Conference, Ford et al., (2024).

Introduction and Theoretical Framework

Teachers use a complex process of curricular decision-making to determine the ideal blend of learning experiences to provide to students. These decisions are often based on learning contexts, beliefs about students, beliefs about teaching and learning, expectations for students and success, and self-efficacy (Ruppar et al., 2015). In school-based agricultural education (SBAE), these decisions are typically mediated by balancing program delivery through classroom/laboratory instruction, student participation in the National FFA Organization, and Supervised Agricultural Experiences (SAEs) (Croom, 2008). The proliferation of middle school programs since the 1980s has raised questions about how these programs should be delivered to middle school students (Frick, 1993). In 1985, 22% of all secondary instructors taught at least one section of a middle school course in agriculture (Phipps & Osborne, 1988). In 2020, there were 442 teachers teaching exclusively middle school and 107,856 students in middle school agricultural education classes, which has nearly doubled since 1994 (Jones et al., 2020; Rossetti & McCaslin, 1994).

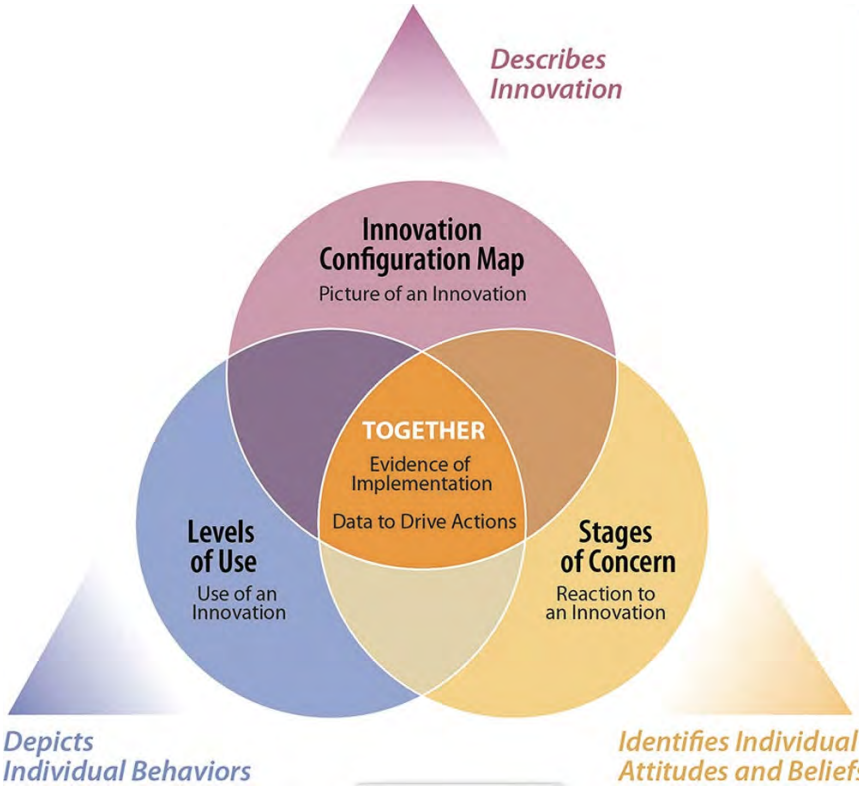
Research-based SAEs have been a tool used by SBAE teachers to provide an accessible option for students to engage in SAEs (Thiel & Marx, 2021). Research-based SAEs also provide

an opportunity for the application of scientific principles that promote meaningful learning for students (Thoron et al., 2011). The FFA Agriscience Fair began as the Agriscience Student Recognition Program in 1988 (National FFA History, n.d.) and provides student recognition for outstanding research-based SAEs (National FFA Organization, n.d.). According to Jones et al. (2020), middle school Agriscience Fair participation has been an avenue for FFA participation for middle school students. In 2023, 363 students competed in the Agriscience Fair at the national level and the Agriscience Fair award program has the largest number of middle school members at the national level (M. Young, Personal communication, September 13, 2023). Despite this involvement, little has been done to examine if middle school teachers implement research-based projects into their programs or how the FFA Agriscience Fair is structured for middle school participants. Further investigation into this could determine if middle school participation in the Agriscience Fair is intracurricular or if it simply serves as a competition added on. Further, examining strategies for teachers who are implementing Agriscience Fair could provide insight for other teachers. Conversely, exploring the challenges and barriers will provide an opportunity to recommend improvements to the award area and create resources for middle school teachers and students.

The Concerns-Based Adoption Model (CBAM) was used as the conceptual framework for this study. CBAM examines the process of change in education, specifically how individuals negotiate the decision-making process for implementing new techniques with their students (Hall, 1974). CBAM explores three diagnostic dimensions which examine the interplay between the individual behaviors, attitudes and beliefs of individuals, and the nature of the innovation (see Figure 1).The focus of this inquiry was to create an innovation configuration map to explore how middle school teachers implement the Agriscience Fair process and to explore how the Agriscience Fair could be adjusted to make the adoption more streamlined. According to Hall et al. (1975), there are eight levels of use related to implementing a practice ranging from nonuse to renewal. For this study, we focused on teachers ranging from mechanical use, or who are still learning the system to teachers in the renewal phase, or teachers who thoroughly implemented the practice and are seeking new ways to imbed the innovation in creative ways.

Figure 1

Three Diagnostic Dimensions of the Concerns-Based Adoption Model



Note. Adapted from "CBAM: The Concerns-Based Adoption Model" from American Institute for Research (December 8, 2015).

Purpose and Objectives

The purpose of this study was to examine the decision-making process of middle school teachers implementing the FFA Agriscience Fair into their program. The case study approach was used to examine middle school teachers across levels of use in implementing FFA Agriscience Fair. The research was guided by the following research question: How do middle school teachers implement the Agriscience Fair into their program?

Methods

This qualitative research study sought to understand middle school teachers' experiences with the Agriscience Fair. The study was approved through the institutional review boards at both research institutions involved in the project. Invited participants (see Table 1) were chosen to maintain representation of the various FFA regions and with varying levels of observed success in the awards structure of Agriscience Fair. We worked with both National FFA staff as well as State FFA staff in areas with middle school engagement in Agriscience Fair to identify teachers to interview. We sought nomination of individuals at varying levels including those who have had success at the state or national level as well as those who were in the earlier phases of implementing Agriscience Fair. Participants were given pseudonyms and are presented below with additional information about their experience with the Agriscience Fair. Because the goal was to understand implementation of the innovation from teachers with varying levels of

experience, a diverse panel of teachers with a range of experience and understanding of Agriscience Fair was sought.

Table 1

Description of the participants experience with Agriscience Fair

Participant Pseudonym	Experience with Agriscience Fair	Region
Gabriella	4 years, some success but learning from co-teacher	Western
Samantha	8 years, some success at the state and local level	Western
Katie	4 years, extremely successful with several national winners each year	Central
Hannah	4 years, success at national level but limited classroom integration	Southern
Riley	9 years, had success on the state level and a few top 10 at national level	Western
Carly	12 years, track record of success at the national level and high levels of classroom integration	Southern
Emily	10 years, 3 years with middle school, national winners and all students implementing in the classroom	Eastern

Semi-structured interviews (see Table 2) were conducted between October 2022 and June 2023. Some interviews were conducted in person during the National FFA Convention while others were conducted via Zoom, but two members of the research team were present for each interview. All interviews were audio or audio/video recorded to allow for transcription in addition to researcher notes to ensure dependability (Lincoln & Guba, 1985). Transcripts were sent to participants to ensure accuracy of the data collected and allow another opportunity for teachers to review their input and retract any statements they did not want included in the research.

Table 2

Overview of semi-structured interview guide

Category of Question	Prompting Questions
Introductory Grand Tour Questions	Tell us a little about your experience with the Agriscience Fair. Why are you drawn to the Agriscience Fair? How does it help you meet the goals of your classroom or total ag. ed. Program?
Classroom Implementation	How do you implement it in your classroom? Tell us a little about the type of instruction you implement in your classroom to teach agriscience content to students. How does Agriscience Fair help students understand the scientific process? How does Agriscience Fair help students learn the scientific process as it is

	applied to agriculture and natural resources?
Agriscience Fair as competition	Why do you choose to enter your students into the Agriscience Fair competition? What is it about the Agriscience Fair competition that helps meet your program goals? How well do middle school students deal with the aspects of success and failure that comes with competition?
Age level appropriateness	Based on your experience teaching middle school students- How would you assess their ability to understand the scientific process to solve agricultural problems? How would you assess their ability to come up with project ideas? How would you assess their ability to implement rigorous scientific methods to conduct an experiment? How do you assess their writing ability? Are your students competent enough to complete the written portion of Agriscience Fair? How would you assess their ability to analyze data to make practical recommendations?
Rules and Process appropriateness	What aspects of the manuscript process work well for you and your students? What aspects of the manuscript process are challenging for you and your students? What changes would you like to see to the manuscript process? (Follow up specifically about the review of literature and methods section) What aspects of the interview process work well for you and your students? What aspects of the interview process are challenging for you and your students? What changes would you like to see to the interview process?
Questions for highly successful programs	Your students have experienced a level of success in ASF, what do you attribute that to? What advice would you give to other teachers considering getting their students involved in the Agriscience Fair? Would you like to see any changes to the program at the state or national level? What recommendations would you make to national FFA or your state superintendent?
Questions for moderately successful programs	What are your goals for your students regarding the agriscience competition at the state and national level in the future? Would you like to see any changes to the program at the state or national level that help you meet those goals?

All research team members have experience teaching agriculture at the high school level with one team member also having middle school experience. All team members also have

experience managing, scoring, judging and/or coordinating state or national Agriscience Fair competitions.

The researchers originally coded individually, re-reading all transcripts, and using open coding to allow participant voice to emerge (Creswell, 2012). After this first round coding, we met to share observations, to triangulate, and to discuss possible constructed themes and clarify the terminology. After this round, we had another round of coding where the team looked for clear supporting quotes for the constructed themes as well as to identify any recurring items that were not represented in the first round of constructed themes. This constant comparative analysis through multiple step coding allowed us to transform the raw data into themes representative of participants (Glaser & Strauss, 1967). Themes are presented here using thick, rich descriptions to ensure trustworthiness (Creswell, 2012).

Results

The initial data analysis consisted of determining the level of use from each participant. After the transcription, we met to discuss the level of use of the participants. The level of use for the participants was described in Table 3.

Table 3

Participant level of use of the Agriscience Fair

Participant Pseudonym	Level of Use
Gabriella	Routine use
Samantha	Routine use
Katie	Refinement
Hannah	Refinement
Riley	Integration
Carly	Integration
Emily	Renewal

Three themes were constructed as a result of the open coding process. These themes were: Agriscience Fair is a tool to help strengthen the total program, these teachers are learning to *play the game,* and teachers are using relationships to help their students have success in Agriscience Fair.

Theme 1: Agriscience Fair was a tool to help strengthen the total program

The teachers in this study see Agriscience Fair as a valuable tool to enrich their programmatic offerings and provide hands-on experiences for students. Teachers use specific aspects of Agriscience Fair to enhance what they are already doing in their program and to provide unique opportunities for students to apply what they are learning to authentic scenarios as well to build concrete skills related to the scientific method and data reporting process.

Agriscience Fair is a tool for Gabriella to combat preconceptions of her program saying, “we're just kind of still trying to change the mindset of people who knew what [the program] was

before, or who went through the program before, and we want them to see that it is a rigorous program." Riley introduced "Agriscience [Fair] as a way to engage our middle school students in some FFA competitions and be able to take them to nationals, and then to also just add some validity to our program, as far as science standards." Riley also stated they "brought Agriscience Fair in because… we wanted to be able to have a project we could show to our administration that these are the things our students are doing". Similarly, Agriscience Fair was a way to "beef up the curriculum" for Carly, who went on to note the standards do not take an entire year for her students, so Agriscience Fair was a way to enhance the course by embedding it and making it "a culminating project." Agriscience Fair is used to teach students using all parts of the three-component model. According to Hannah, "I'm calling [Agriscience Fair] the SAE Projects." Carly stated they were a class requirement, but students could receive recognition through FFA. Oftentimes, teaching in the classroom involves only one component of the agricultural education three component model, but middle school teachers are able to strengthen their program by teaching all three using the Agriscience Fair in their classrooms.

Teachers noted that embedding Agriscience Fair into their classes allows students to build valuable life skills like communication, data analysis, interview skills, time management, and writing skills. Katie shared her belief that Agriscience Fair is not only a good fit in her classes, but also that it is an attainable task for all her students, saying, "We have kids of all levels. Some other schools in our area or our state will say that [Agriscience Fair] only for honors kids...No, this can be literally everybody from your special needs kids to whoever it may be." While discussing her desired outcomes for students, Carly remarked "What's more valuable is that they learn, in my opinion, to communicate well, and to present themselves well." In relation to data analysis for middle school Agriscience Fair, Emily mentioned how it was important "to make sure my students were the ones who were doing the work and not doing a statistical analysis." She continued to share how she had to bridge the knowledge gap for her students because, "it was never something that was part of our content in our schools. So, they weren't learning it, even in math class, to do data analysis to that level." By increasing inclusivity, embedding Agriscience Fair into classes, and addressing the knowledge gaps in students, teachers are strengthening the total program.

Agriscience Fair is a tool that can be used to build and sharpen interview skills in students. Carly stated the importance of interviews in Agriscience Fair, "I really find value in the interview process. I think there is more life skill in simply understanding the scientific method, and then just the presentation and the communication skills that come with an interview." Emily explained how her students do not only interview as a part of the Agriscience Fair, saying "we incorporate interviews with people in industry into our agriscience project, so they did an interview with the Commissioner of Agriculture". Strengthening students' skills and understanding of the scientific method, presentation skills, and effective communication help to strengthen the total program.

The manuscript is a large portion of the Agriscience Fair and requires technical writing to complete. Oftentimes, middle school students are not learning the writing skills necessary in their other classes, so it should be taught in the SBAE classroom. Emily stated "Science teachers come to me frequently, and they're like, 'We love having your kids in class because they already understand what a lab report is, how to read it, how to do it. They know the language.'" While the writing requirement is a challenge, Emily also mentions "I would not want to see the

expectation lower, because I have found that students can get to that expectation". Despite the challenges of having students write a manuscript, the teachers seem to believe it was a valuable part of the process and additive to help them strengthen their program. The participants did not indicate specific strategies used to scaffold this but did note using the award as a motivation for writing and budgeting enough time for students to work.

SBAE teachers have also found unique ways to build in Agriscience Fair opportunities at school. Hannah has worked to utilize her three-acre space, sharing how she has "identified seven components within my very small ag area" where students can complete their Agriscience Fair research. Katie's approach was similar in how "we do all of our research in-house. These are all authentic projects we have...We literally have seventy-five buckets around my classroom, the biology teacher's room. We have grow lights." Utilizing resources available is an important part of the total program, as some programs have more than others. Because of these unique resources, completing in-house projects can create uncommon opportunities for projects.

Multiple teachers noted how success breeds success and encouraged continued participation in Agriscience Fair in their programs. Emily said, "after you have success once, it's a motivator for others to get there, because...they realize that it's attainable." Carly shared, "Our students that did it in eighth grade with me, and then they, honestly, we laugh, we say, 'to get a taste for blood,' and they've been to nationals, and they want it again." As programs find success, they find recognition from administrators and community members that can strengthen the total program.

Theme 2: These teachers are learning to *play the game*

Teachers often find themselves not only guiding students in research and writing for Agriscience Fair, but also learning to *play the game* effectively. *The game* refers to the written and unwritten rules and best practices that will help their students realize success in the state and national Agriscience Fair award program. Teachers in this study identified making the Agriscience Fair project the students' own, creating timelines for implementation, creating and borrowing resources for students, and being proficient in both technical writing and teaching technical writing as components needed to *play the game*.

Middle school SBAE teachers provide support to their students to make their Agriscience Fair project their own. Emily said "they like this project better than what they do in science class, because it's a topic that they chose. It's their interest." Because students can begin Agriscience Fair projects in 6th grade, middle school students can find themselves with multiple unique projects during this time. Carly has her students reflect on their previous SAE projects "and then try to find a way to do something useful or related for their Agriscience [Fair research] to make it a little more tangible for them to grasp hold of." When students have ownership and interest in their project, and use them to build upon each other, students are able to work toward realizing the success in the Agriscience Fair award program.

Another method teachers have found useful to their success in implementing Agriscience Fair is to break down the project components and have their students follow a pre-planned timeline for project completion. Samantha explained how she has set "dates and times that [students] have to submit to me certain things...that's how I chunk it as I go." Emily described a

similar approach where she has learned to “start early and break it into sections,” cautioning to "not start a month before and hand those kids this expectation of writing a twenty-page lab report and be like ‘alright pal, see you in fifteen days,’ because it's not going to happen.” By structuring the project and establishing pre-planned due dates for items, teachers are developing time management and organization skills in their students.

Creating or borrowing resources was also important to the teachers participating in this research study. To support students when coming up with projects, Samantha shared how at a previous national competition she “took a picture of each of the display boards, and then created a PowerPoint presentation. That then, was my lead in. ‘Hey, this is what guys are doing. This is what kids your age are doing.’” Riley also collected resources, saying “We've also accumulated resources from other teachers on projects and we share those lists with [students].” Gabriella referenced how she felt capable of incorporating Agriscience Fair after attending a workshop led by another SBAE teacher who “did a good job with [Agriscience Fair]...and gave us, like all of her materials and her timeline, and how she implemented it in her classroom.” By sharing resources, teachers are able to utilize quality materials that other teachers have created.

Another component is how technical writing is one of the most prevalent parts of Agriscience Fair, so the teachers have learned to become proficient in training their students in this area. Of her previous experiences with Agriscience Fair, Emily said she learned “the level of requirements that would be there as far as using a scientific vocabulary,” and she made “sure my kids went into the contest knowing what the controls were with the independent variables, the dependent variables.” Technical writing requires a much different style compared to creative writing students are used to, so when teachers ensure students can use the scientific vocabulary they are setting their students up for success as they advance into secondary school and beyond.

Theme 3: Teachers are using relationships to help their students have success in Agriscience Fair

Building an Agriscience Fair project involves more than just experiments and displays. Teachers and students must also cultivate relationships. Teachers recognize the value of connections with others involved in building a successful Agriscience Fair project. Support from teachers, school members, and others in the community, the journey from a parent’s role to a teacher’s, and the existence of a science fair culture at a school all contribute to engagement, collaboration, and growth of students.

Community connections are important to the teachers because they provide support and encouragement for students. Hannah shared how she worked “to get those students who are really interested in [Agriscience Fair] connected in and getting them their resources to support them, because there’s a lot of support out there. The students just have to be connected.” A connection Katie was able to make for her students was with the state Department of Agriculture after they received a grant that aligned with the students’ Agriscience Fair research. She shared how “they asked for [the student] data. And so, you had these two eighth grade students that were sharing actual data to the [State] Department of Agriculture.” Students who participated in this project built valuable relationships with both the Department of Agriculture and community members that have interest in the area of the project.

Some teachers have experience with Agriscience Fair as a parent and teacher. Hannah said “My experience started as a mom...my oldest son was required to do a science fair project for his honors science class, and so the teacher – seventh grade teacher at the time [was] like, 'Let's find something different’” which led to a conversation with the FFA advisor encouraging them to submit the project to the state Agriscience Fair competition. Encouraging cross-curricular connections builds important relationships for future Agriscience Fair collaboration.

Relationships with other teachers in their school or state were identified as important to the success of Agriscience Fair in their programs. Katie explained how she has a “Biology teacher that helps me,” continuing to share that they help with "a lot of things agriscience.” Katie mentioned that they “try to integrate English teachers because I really believe in cross-curricular [relationships]”. Riley has used English teachers in her school to edit manuscripts. Katie shared that she has served as a source of knowledge for other teachers in her state because she has “given a lot of presentations in our state, and so I think it's important for every state to have a couple of people that they've done it. They get it.” When discussing barriers, Samantha said that she “was able to reach out to another advisor" for help with the application process.

Schools that already have a culture of science literacy usually promote a culture where students are allowed to experiment, hands-on learning, and critical thinking (McKenzie, 2023). In reference to the school culture, Emily stated “we were what was considered a new tech school. So, everything in our school had to be project or problem based,” which allowed Agriscience Fair to easily align with the culture of the school. Katie realized her school’s “Science Department had done a little bit of research with the Intel [International Science and Engineering Fair] program, so they were already going to science fairs, and then I'm like well, ‘[student] could do that through FFA too. Let's try and double dip.’”

Conclusions, Implications & Recommendations

This study investigated how middle school SBAE teachers implement Agriscience Fair in their programs. There was consensus between the participants that Agriscience Fair added value to their programs and agriscience research had been incorporated in their classes. We found that the participants in this study were choosing to utilize Agriscience Fair in their programs to increase validity and strengthen the total program through either an embedded class requirement, SAE expectation, or stand-alone FFA activity. Participants indicated that they were continuing to use Agriscience Fair because of their increased understanding of the award program which improved their ability to teach students about research. Many of the participants also credited relationships with other teachers, FFA advisors and community members to their continued success and implementation of Agriscience Fair in their programs.

We recommend that middle school SBAE teachers look to incorporate Agriscience Fair into their programs, specifically as an in-class assignment. In alignment with Thiel and Marx’s (2021) study, Agriscience Fair is an opportunity to impact all three components of SBAE with one activity. Agriscience Fair accomplishes this through in-class research, skill attainment through SAE, and FFA involvement through participation in state or national Agriscience Fair competitions.

The National FFA Organization has already created lesson plans and resources for teachers to implement Agriscience Fair projects in their classrooms (National FFA Organization, n.d.). While these lesson plans are a great resource, they are geared towards high school students. Instead of asking middle school teachers to modify or create resources, pre-made lessons should be created to incorporate Agriscience Fair into middle school classrooms and made available through the same National FFA platform. Participants told us they were building or borrowing resources to learn how to implement Agriscience Fair into their programs. By having middle school specific resources and lessons available through National FFA, teachers could more easily and equitably implement Agriscience Fair into all programs despite their prior experience, or lack thereof, with research. These lessons should include a focus on the scientific method and technical writing. Participants told us that students are most likely not learning strong research or technical writing skills in other classes and it is up to the SBAE teacher to bridge this gap. For the teachers incorporating Agriscience Fair in their classes, those at schools with semester or year-long classes have had an easier time incorporating Agriscience Fair in their curriculum. Another key component to include in the pre-made lessons are timelines for implementation of various lengths ranging from six weeks to year-long to accommodate the unique structure of middle school schedules.

Multiple teachers were exposed to Agriscience Fair through the work of professional development and information shared by other teachers. Currently, the National FFA Guidelines outline a different set of manuscript guidelines for middle school division participants. To increase the proliferation of Agriscience Fair among this rapidly growing group of SBAE programs, states should offer workshops specifically directed toward middle school teachers to build self-efficacy to allow focused discussion on the middle school guidelines and suggestions for incorporating Agriscience Fair into their programs. Teacher educators can support this effort by leading these professional development opportunities as well as exposing pre-service teachers to agriscience research and Agriscience Fair in their coursework.

To increase participation, sponsors and organizations supporting Agriscience Fair could consider offering SAE grants specific for Agriscience Fair studies. This funding and support could increase both interest in Agriscience Fair as well as the understanding that research is a viable SAE option for students.

Teachers cited materials being offered by others as both one of the ways they got started in the research program but also as a resource they would want. Stakeholders from state and national level Agriscience Fairs could consider providing middle-school appropriate examples of high-quality manuscripts and presentation materials to allow teachers and students to more clearly see the desired end goal for the project. This modeling could increase not only the quantity of projects, but also quality. Middle school agriculture teachers should also connect with others in their school, other middle school ag teachers, and community members. Perhaps National FFA could offer a guide to help lead conversations with these potential Agriscience Fair partners.

There are limitations in this study. First, qualitative studies are not generalizable beyond the participants. Second, this study does not include participants operating at the levels of use below routine use of CBAM. Insight from participants in nonuse, orientation, and preparation would garner insight into how neophytes to this innovation consider the adoption. Additionally,

those who are in the mechanical use phase or who have tried Agriscience Fair and opted to not continue would be additive.

We recommend teachers continue to use Agriscience Fair in the middle school classroom. We want to develop an innovation configuration map, which is a key part of the CBAM process, for the implementation of Agriscience Fair for middle school programs. This map is beginning to crystallize as a result of this study, but development is an iterative process. The components of the innovation configuration map provide key components for ideal implementation. Based on this study, the initial components for implementation are (a) using Agriscience Fair to strengthen the total agricultural education programs (b) using strategies to scaffold the agriscience research SAE process, and (c) using relationships in the school and community to support students. Future studies could provide clarity in developing this tool to guide adoption. We see best practices for implementing Agriscience Fair as a classroom component as an effective practice for middle school teachers, especially teachers who successfully scaffold the workload of the research process, particularly the manuscript, for students. Improved resources related to Agriscience Fair including providing examples of manuscripts and presentation materials, as well as tools to embed agriscience instruction into the classroom would be helpful for teachers.

Recommendations for Future Research

We offer the following recommendations for future research. To better clarify the innovation configuration map, future research could increase the sample size to identify teacher behaviors of each step of the CBAM process. How the CBAM model varies across regions of states or states with a higher or lower focus on SBAE could also be examined. There is also value in investigating teachers' stages of concern related to adoption of Agriscience Fair. CBAM has seven stages of concern, ranging from unaware to renewal (Hall, 1974). Understanding where teachers fall within the stages of concern can inform the professional development needs of teachers and identify promising practices for complete adoption of Agriscience Fair into SBAE programs. Future studies related to CBAM should include all aspects of Agriscience Fair, from supporting student projects to the application and presentation components as there can be varied areas of concern based on the Agriscience Fair component.

We also recommend future research connecting to other Agriscience Fair stakeholders. Current industry needs of the agriscience research industry could illuminate any missing components of the Agriscience Fair process. If the outcomes of Agriscience Fair and research SAEs are skill development and career exploration it is important to know what skills are being valued in agriscience research careers. Research into the student perspective of Agriscience Fair could be extremely beneficial in the proliferation of agriscience research in SBAE programs. Understanding what supports helped guide students and areas of challenge can inform how teachers implement Agriscience Fair in their programs.

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Incubating Education: The Lived Experiences of Middle School Science Teachers When Piloting a 4-H Science Enrichment Curriculum to Promote Agricultural Literacy

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Abstract

This study aimed to address a deficiency in agricultural literacy among the U.S. population by providing a novel curricular resource that teachers could use to integrate agriculture into their middle school science curriculum. Using a phenomenological approach, we examined the lived experiences of Louisiana middle school science teachers who piloted a 4-H science enrichment curriculum while instructing their students on an agricultural-based topic of embryology, which required them to incubate and hatch chicken eggs in their classrooms. Key findings emerged through three themes regarding the stages that the teachers experienced during the curriculum pilot, ranging from incubator preparation and egg placement to chick placement and growth. The curriculum emerged as a catalyst for highlighting the relevance of agriculture, fostering community, positively impacting teachers' agricultural literacy and knowledge growth, and emphasizing the importance of connecting agricultural literacy curriculum resources to the Next Generation Science Standards (NGSS) to promote curriculum adoption among core subject teachers. Moving forward, we call for future quantitative assessments of teachers' agricultural literacy and investigations into how such curricular resources impact students.

Introduction and Review of Literature

Most U.S. citizens are at least four generations removed from an agriculture-based lifestyle. For example, in 2016, a mere 1.5% of the U.S. population was employed in the agricultural sector, with low expectations for an increase in agricultural engagement in the coming years (Bureau of Labor Statistics [BLS], 2017). With the necessity to feed over 9 billion people by 2050, ensuring that the general population is agriculturally *literate* has emerged as a critical need to address this issue. The term agricultural literacy emerged around 1985 after apprehensions had developed related to challenges facing U.S. agriculture and education, including urbanization coupled with the modernization of agriculture, as well as conflicting expectations about the role of schools (National Research Council [NRC], 1988, p. v). As a call to action on these issues, the NRC (1988) created the Committee on Agricultural Education and Secondary Schools to offer recommendations related to goals for agricultural instruction and policy changes at all levels of agricultural education in secondary schools.

This committee published a report titled *Understanding Agriculture: New Directions for Education* (NRC, 1988). This influential report emphasized the significance of agriculture as a subject that should be taught to a broader range of students beyond those pursuing careers in agriculture or vocational agricultural studies (NRC, 1988). The report challenged the notion that agricultural education should be limited to a small percentage of students, highlighting the importance of agricultural knowledge for all individuals. The NRC (1988) defined an

agriculturally literate person as one with knowledge of the food and fiber system, including its significance as it applies to history, economics, social, and environmental significance.

A minimum level of understanding about agriculture, food, and food production is needed for citizens to make logical decisions about agricultural policies and issues (Russell et al., 1990). Uninformed and agriculturally illiterate U.S. citizens elect lawmakers who mediate regulations, policies, and controls surrounding how producers generate our food and fiber goods (Hamlin, 1962). With the necessity to feed over 9 billion people by 2050, ensuring that the general population is agriculturally literate has emerged as a critical need to address this issue. Due to a secure and abundant food supply and expansive, modern agricultural industry, however, most people do not understand the U.S. food system or its impact (Powers & Roberts, 2022).

Historically, the development of agricultural knowledge and familiarity was home-based, allowing for organic knowledge and understanding to transpire. Additional exposure to agriculture for students occurred through schooling, attributable to an agriculturally enriched curriculum that implemented relevant references to an everyday lifestyle (Van Scotter, 1991; True, 1929). Globally, 55% of the population resides in urban areas. In North America, however, this statistic trends higher with over 80% of the population living in an urbanized area (United Nations, 2018). Such urbanization has brought a shift in culture and agricultural traditions. As rural communities continue to decline, people are removed from the source linking people to the land and, consequently, their primary source of food and fiber resources. Less foundational agricultural knowledge is gained at a young age, propagating deficiencies in understanding of the food and fiber system. Because of this lack of foundational knowledge, often, people are not proficient enough to make informed decisions regarding issues involving agriculture (Kovar & Ball, 2013) and natural resources (National Research Council [NRC], 1988). The need for educated consumer decision-making related to agriculture is vital for society to prosper. However, future decisions affecting the U.S. food and fiber system often lie in the hands of voting adults (Pense & Leising, 2004; NRC, 1988).

Students entering college who have experienced a dedicated agricultural curriculum have been found to be more agriculturally literate than those who had no prior exposure (Dale et al., 2017; Powell et al., 2008). Nevertheless, not every student has access to enrolling in agricultural education courses or youth organizations such as FFA and 4-H. For agricultural literacy to reach all students, intercurricular relationships between agriculture and general educators should occur more frequently. However, because core subject teachers struggle and often lack the basic knowledge and skills needed to integrate agriculture into their curriculum (Balschweid et al., 1997), the *Louisiana 4-H Embryology Curriculum* was created. This curricular resource provided agricultural literacy integration ideas that were designed to emphasize student learning while also reducing teachers' instructional planning time. In particular, the curriculum provided materials to middle school science teachers who largely did not have a basic understanding of agricultural concepts. As such, the curriculum had the potential to develop not only the agricultural literacy of students but also of the teachers who piloted the curriculum.

Science teachers are often evaluated for effective teaching based on students' end-of-instruction test scores (Marzono, 2003). When using this form of evaluation, a teacher is forced to teach the basic content that students are tested on to be evaluated as effective (Marzono, 2003). To do so,

following the Next Generation Science Standards (NGSS) is essential, as most standardized testing revolves around said standards. It is important to note that the curriculum piloted in this study met all NGSS science standards. And, therefore, our intent was that teachers who used the curriculum may have been likelier to incorporate agriculture into their science courses because it was clearly linked to the standards they used.

Theoretical Framework

Bandura's (1986, 2001) social cognitive theory served as the theoretical lens we used to interpret science teachers' lived experiences when piloting the *Louisiana 4-H Embryology Curriculum.* Individuals "function as contributors to their own motivation, behavior, and development within a network of reciprocally interacting influences" (Bandura, 2001, p. 169). As such, social cognitive theory (SCT) employs a concept known as reciprocal determinism, which can be explained as the dynamic interaction of an individual's learned experiences, environmental context, and behavior. Coupling reciprocal determination with behavioral capabilities, or a person's ability to perform a behavior using their knowledge and skills, observational learning, and self-efficacy, are the cornerstones of SCT (Bandura, 1986). Therefore, SCT provides opportunities for social support through instilling expectations and self-efficacy while also using observational learning and other reinforcements to understand behavioral changes.

In this study, we used SCT to analyze how participants' personal factors, behaviors, and external environment influenced their lived experiences when piloting the curriculum. For example, the teachers begin teaching a curriculum with a specific level of knowledge in both biological science and agricultural sciences, some with vast knowledge, some with a more minute level. With the student-led curriculum format advanced in the curriculum under investigation, teachers observed how students learned and asked questions about the topics and how they related to life sciences and their everyday lives. A teacher's ability to perform (behavioral capability), i.e., answer students' questions, could impact how much information an individual seeks out, to support their teaching of the curriculum. Therefore, this study explored whether such lived experiences encouraged the teachers to become more agriculturally literate while also increasing their self-efficacy to incorporate agriculture into their middle school science curriculum.

Background of the Study

The creation of the *Louisiana 4-H Embryology Curriculum* originated from a need for supplementary embryology education materials for middle school science teachers. Local teacher partners were enlisted in the curriculum development process to ensure alignment with the Next Generation Science Standard (NGSS) and practical usability in mainstream classrooms. After the curriculum development process, we finalized and published all lessons and resources.
The six individuals were eighth-grade science teachers who expressed interest in piloting the curriculum. These teachers collaborated closely with local and state 4-H officials and were willing to provide feedback after integrating the supplemental science curriculum into their teaching. A two-day professional development training session was conducted to prepare pilot teachers for curriculum implementation. Ongoing support was provided, including access to a state 4-H animal science specialist, assistance from local county extension agents, and a collaborative Microsoft Teams community of learning channel. As a final step, curriculum

binders, teaching supplies, incubators, and meetings with local 4-H agents were offered to ensure the successful implementation of the unit in the hands of pilot teachers. The curriculum was designed to last 21 days, i.e., the average length of time needed for chicken eggs to hatch. The curriculum had eight focus areas: (1) embryology, (2) heart comparisons, (3) lung comparison, (4) homologous structures, (5) beak evolution, (6) natural selection, (7) mutations, and (8) cladograms.

Purpose and Research Question

The purpose of this study was to describe the lived experiences of science teachers who piloted an immersive, agricultural-based 4-H science curriculum. In particular, our goal was to better understand the growth in agricultural literacy they experienced as a result of teaching the aforementioned content to eighth-grade students. To accomplish this purpose, one research question guided the investigation: What was the essence of middle school science teachers' lived experiences during a pilot of the *Louisiana 4-H Embryology Curriculum*?

Methodology

Given the shared nature of the phenomenon under investigation, we employed a phenomenological approach. A phenomenological study "describes the common meaning for several individuals" surrounding a lived experience. Fundamentally, phenomenology "reduces individual experiences with a phenomenon to a description of the universal essences" (Creswell & Poth, 2018, p. 75). In particular, we used a transcendental phenomenology, which allows researchers to understand a phenomenon at a deeper level through the process delineated by Moustakas (1994). This method advocates approaching research with unbiased perspectives, "in which everything is perceived freshly as if for the first time" (Moustakas, 1994, p. 34), striving to provide a rich description of participants' experiences while minimizing the researcher's influence. To move a phenomenological "study into action," Moustakas (1994) offered a structured approach that provides "a systematic way of accomplishing something orderly and disciplined, with care and rigor" (p. 104).

Transcendental phenomenological studies rely on *epoché,* which encourages researchers to use self-reflexivity to understand how their basis, experiences, and perspectives may influence their interpretations. Therefore, we believed providing readers with an understanding of our background was essential. The lead researcher's educational journey led her to earn a bachelor's and master's degree in animal science and a Ph.D. in agricultural and extension education. The other researchers were faculty in agricultural and extension education at Louisiana State University. As such, we meticulously bracketed our experiences to give readers an interpretation that was as bias-free as possible.

Polkinghorne (1989) recommended that the number of participants in a phenomenological study should ideally fall within the range of five to 25 individuals who have directly encountered the phenomenon under investigation. In line with this recommendation, in this study, we collected data from six teachers (n = 6), who taught middle school science. Table 1 provides the relevant personal and professional characteristics of each participant.

Table 1

Participants' Personal and Professional Characteristics

Participant	Gender	Age	Race	Years of Teaching Experience	Agricultural Experience?	[a]Self-Perceived Level of Agricultural Literacy
Teacher #1	Female	39	White	10	Yes	7.0
Teacher #2	Female	60	White	23	Yes	7.0
Teacher #3	Female	32	African American	10	No	3.0
Teacher #4	Female	56	White	33	No	3.0
Teacher #5	Female	34	White	2	No	3.0
Teacher #6	Female	46	African American	9	No	3.0

Note. [a]Before the curriculum pilot, each participant was asked to verbally rank their self-perceived level of agricultural literacy on a scale from 0 to 10.

After Institutional Review Board (IRB) approval, multiple rounds of interviews were conducted and recorded with each participant using Microsoft Teams. During interviews, we applied Moustakas' (1994) guidelines of data collection by concentrating on what participants experienced when teaching the embryology curriculum and how the experience influenced their agricultural literacy growth. This was accomplished using probing open-ended questions as appropriate to develop rich context. We also collected multiple other sources of data to triangulate our findings. These sources of data included persistent observations of teachers during the curriculum pilot, field notes meticulously recorded during our observations, teacher interactions within a Microsoft Teams community of learning, and written feedback from teachers regarding their use and recommendations for modifications to the curriculum. This multifaceted approach to data collection enriched the study's depth and comprehensiveness, enabling a holistic exploration of the phenomenon.

All data sources were analyzed using horizontalization coding techniques in which we highlighted significant statements provided by the participants to develop an understanding of the lived experience (Moustakas, 1994). This process resulted in the emergence of 160 horizons during the initial round of analysis. After identifying horizons, "nonrepetitive, nonoverlapping constituents" were reduced into 12 clusters of meaning (Moustakas, 1994, p. 112). The clusters of meaning were then used to develop textual descriptions of *what* was experienced and structural descriptions depicting *how* the participants experienced the phenomenon. The textual and structural descriptions were then synthesized into the *essence* of the phenomenon narrated through three overarching themes (Clark et al., 2014; Creswell & Poth, 2018; Moustakas, 1994).

In this investigation, we also embedded Tracy's (2010) standards of qualitative quality into each phase. As Tracy (2010) explained, "credible reports are those that readers feel trustworthy enough to act on and make decisions in line with" (pp. 6–7). Credibility in this investigation was established by ensuring that our "research [was] marked by thick description, concrete detail, explanation of tactic (non-textural) knowledge, showing rather than telling, triangulation or crystallization, multivocality, and member reflections" (Tracy, 2010, p. 4). In the current investigation, these elements were thoughtfully addressed and incorporated during the data collection and analysis procedures. Moreover, multivocality was promoted by establishing a community of learning and collaboration with participants using Microsoft Teams. This approach facilitated ongoing communication, support, and the active solicitation of feedback, fostering "intense collaboration with participants" (Tracy, 2010, p. 8). As such, member reflections played a vital role in triangulating our findings and qualitative quality. These reflections were used to share and engage in a constructive dialogue with participants regarding the study's findings. This process also provided opportunities for "questions, critique, feedback, and affirmation, ultimately contributing to transparency" in our reporting (Tracy, 2010, p. 8)**.**

Findings

As a result of our analysis, three themes emerged that describe the phenomenon's essence: although the middle school science teachers experienced challenges, they ultimately achieved personal growth through agricultural literacy development as they piloted the *Louisiana 4-H Embryology Curriculum*. We provide insight into these themes to provide a holistic understanding of the participants' lived experiences, regarding what they experienced (textural) and how (structural) they experienced the phenomenon.

Theme #1: Incubation: Observational Learning

Observational learning, as described in Bandura's (1986, 2001) social cognitive theory, was crucial to consider regarding how the teachers perceived the effectiveness of the curriculum in their classrooms and its impact on their students. The teachers reported persistently observing their students' enthusiasm and the relevance of the lessons as the most significant outcomes, overshadowing situational or logistical challenges. These challenges included adopting new learning styles, such as student-led discussions and inquiry-based instruction. For example, Teacher #2 explained it "took a little while to train [the students] too on the new curricular approach." There were also occasional class interruptions and lesson issues, especially when they taught a lesson on mutations. Teacher #3 mentioned that the "mutations lesson just didn't flow, and it was hard for the students and me to grasp." Despite these challenges, the teachers explained that the students eventually comprehended the activities by the end of the lesson. Meanwhile, Teacher #1 emphasized the need for students to become accustomed to this style of learning and teaching. She explained it "took a little while to train them to this style of learning and teaching," and "they need to become used to that type of questioning."

The teachers' experiences during the incubation phase revealed numerous other insights. In particular, time constraints were noted, as in the case of Teacher #2, who faced a block schedule, leading to an accelerated pace of teaching the content. Other logistical challenges also arose, as explained by Teacher #5, whose chickens "started hatching on a Sunday at my house, so they

were a little sad they missed the first chicken." Nevertheless, Teacher #5 explained that she live-streamed the event on Facebook "so most students got to see it." Teacher #6, on the other hand, encountered the unusual circumstance of none of their eggs being fertilized, resulting in a "disappointment for the kids and us," but she adapted by videoing a second hatching and sharing it with students and parents virtually. Students' maturity also emerged as a critical point of discussion, regarding the appropriateness of allowing students to be exposed to topics related to disease, death, and sexual reproduction. Teacher #2 explained: "I did not crack them open [to show development]. My formal observation [from a school administrator] was the day we started, he came in and said, "You're going to like to abort them? You are killing them?" I said alright, I'm not going to do it then." Teacher #2 mentioned she thought her students "would have been grossed out a little...because by eighth grade, they haven't seen enough exposure…yet. They were ready for it by the time we reached the end; they wanted to see the inside." Teacher #4 shared similar sentiments, stating: "I found some of the articles were over their heads and technical." Meanwhile, other teachers underestimated the students understanding. As an illustration, Teacher #5 expressed that she "was a little nervous about dead chickens, but [her students] did really well with the ones that didn't hatch."

Throughout the curriculum pilot, the teachers were encouraged to customize, change, edit, and give thorough feedback directly to the state 4-H animal science specialist and in the Microsoft Teams community to share positive and negative experiences. The flexibility and adjustment in the curriculum were well received. The teachers who utilized the community of practice shared challenges with supplies, such as issues with the balloons for lesson two, as expressed by Teachers #2 and #3, edits made to lessons, incubator humidity issues, start dates and hatch dates, and general troubleshooting challenges. Teacher 4 reported: "One activity on the mutations didn't feel clear, so we tweaked it to what we thought it should be." In contrast, Teacher #3 expressed, "I have absolutely no background, so when I saw myself getting stuck, I revamped some of the worksheets, and then even after revamping them, I felt like the kids still struggled sometimes." During this time, our personal observations supported a few of the challenges expressed by the teachers. Challenges such as classroom interruptions are a constant for teachers that, in some instances, result in the loss of up to 20 minutes of teaching time. We also observed the excitement of learning experienced by the students and teachers.

Despite these challenges, it was evident that the unit was exciting for students and highly appreciated by teachers, mainly due to its ability to keep students engaged. Students relished the hands-on experience and the learning aspects of the curriculum. Teacher #3 reported, "the best thing for this unit was having the chickens." Teacher #2 echoed the point, saying it was "beneficial for kids to see growth in real-time and having to check on the eggs." In essence, the engagement and experiential nature of the curriculum enhanced the learning of the teachers and students. Teacher #2 stated: "the kids absolutely loved it and wanted to know [what was next]."

Theme 2: Hatching – Student Outcomes and the Development of Community

A collective experience among teachers was the sense of community that emerged during the hatching of chicks. During their interviews, each teacher emphasized that the entire school became involved in the captivating journey of watching the eggs and celebrating hatch day. Teacher #3 vividly described that "students were excited to show parents and ask them questions

about if chickens and other animals that hatched eggs were related" during scheduled hatch days, which often coincided with open houses throughout the school year. Teacher #3 likened the atmosphere to "being in a delivery room," emphasizing the palpable excitement and involvement. Moreover, this communal nature extended beyond the classroom walls. As Teacher #1 reflected, "you could walk around the building, and there were teachers all over the building who had it [the hatching] up live streaming behind them while teaching. There was a collective scream when the first chick hatched. It was like the entire county was watching." Teacher #4 concurred, noting that it felt like "a campus-wide activity by the time it ended." The shared experience of hatching brought the school community together unexpectedly. In considering how teachers perceived the relevance of integrating an agricultural-based curriculum, it was critical to draw from their own words: Teacher #3 articulated, "As a teacher, if we can expose the kids to relevant content like agriculture, it is better for all of humanity." Teacher #2 emphasized the importance of relevance, stating, "a phenomenon should be relevant like this one," and noted that "kids connect with things that are relevant to us, and I saw the concepts become concrete." Teacher #1 reiterated the lasting impact, explaining that "even after being done with the chicken, we still referred back to it as an anchoring phenomenon."

Teacher #2 observed notable development in civic engagement among her students as they discussed how diets affect their well-being. These discussions led to the initiation of a petition related to cafeteria food changes. Her students engaged in conversations about the nutritional content of their meals, leading to a conversation with the cafeteria nutritionist. This highlighted the ripple effect of the curriculum's relevance, extending beyond the classroom into their lives as consumers. The pilot program underscored the power of a relevant agricultural curriculum in unearthing valuable insights about the individuals in both classrooms and communities. Teacher #3 discovered that one student had substantial knowledge about chickens, with their father working in the animal science department at a local university. This individual even made a special guest appearance in the classroom, bringing live rabbits and chickens. Teacher #2 was pleasantly surprised by her students' wealth of personal experiences, such as having chickens at home or their grandparents' houses. In Teacher #1's words, "[t]hose students with a more Ag-type background get an opportunity to shine in a classroom setting where they usually would not. They've become experts, and so it is quite interesting to watch them come alive."

Although challenges arose in the process of placing hatched chicks, teachers were encouraged to maintain close communication with their local 4-H agents. Many teachers, however, took delight in sharing how their communities rallied to support the program and assist in finding homes for the chicks – a notion that aligned with Bandura's (1986) emphasis on the environment in SCT to foster learning. Without exception, every teacher mentioned that community members readily volunteered to provide homes for the chicks after the curriculum was completed, further solidifying the collaborative spirit fostered by this agricultural experience.

Theme 3: Chick Placement – Self-Efficacy and Personal Growth

Embracing this agricultural curriculum appeared to catalyze significant progress in enhancing agricultural literacy among students and teachers. Throughout this process, the teachers' growth in self-efficacy to teach agricultural content was evident – a key component of Bandura's (1986, 2001) SCT. For example, Teacher #1 reflected, "I never really thought a whole lot about

sustainability to feed world populations until this [curriculum],” and openly admitted that it had changed how she approached grocery shopping. Teacher #3 echoed this shift, stating, “I've had thoughts like, ‘I'm buying this big pack of chicken. Just think about the chickens that had to die for this pack of chicken.’ But it hasn’t detoured me or encouraged me in any way.” However, Teacher #2 found a direct connection to their personal life, explaining, "[the knowledge acquired through this curriculum] does affect [my personal life] because it rolls over. I have three grandsons interested in it because I talk about it so much.” Meanwhile, Teacher #3 reported that engaging with animals throughout this curriculum brought enlightenment, though not necessarily direct changes in their decision-making. Teacher #4 echoed a similar sentiment, remarking, "I think it made me more aware of that circle of life." On the other hand, Teacher #3 expressed a newfound "thirst for agricultural knowledge” and revealed her exploratory side by investigating aspects of agriculture, like the Brahma chicken, and sharing these discoveries with their students. It should be noted that all teachers reported that the alignment of the curriculum to the NGSS made the curriculum more appealing and encouraged them to continue to use such in the future.

As a result of the piloting the curriculum, the teachers also reported aspects of personal and professional growth. Case in point, Teacher #1 emphasized that she perceived she had an enhanced understanding of the journey from food production to consumption. A notable shift in mindset was evident by Teacher #3, who mentioned, "I'm shifting...I'm trying to shift myself into making this relevant to the students.” Teacher #6 acknowledged how this experience opened her and her students’ eyes to the significance of agriculture. Meanwhile, Teacher #4 underscored the influence of a shift in their teaching philosophy by which she now felt compelled to feature agricultural concepts in the classroom more frequently. However, for Teacher #3, piloting the curriculum did not significantly alter her perspective. Nevertheless, the curriculum’s experiential nature brought enlightenment and a yearning for knowledge. Teacher #2 found that teaching agriculture directly impacted her personal life, such as encouraging her grandson to join 4-H and to learn more about poultry production. The teachers’ interviews concluded by inquiring about whether they would be interested in teaching more science concepts using agriculture as a context for learning. The teachers’ responses were overwhelmingly positive, with Teacher #3 expressing, “I feel that I definitely would be willing to try out [more curriculum],” and Teacher #2 adding, “The students already asked me what the next unit [about agriculture] was.” Teacher #4 echoed these sentiments: “It was a great experience, and I hope I will be able to do it again.” The response from the teachers indicated a strong willingness and enthusiasm to continue integrating agriculture-based curricula into their teaching practices.

These lived experiences shed light on the transformative power of an immersive agriculture-based science curriculum on the perspectives and practices of middle school science teachers. These teachers, who embarked on this journey, embraced the curriculum openly, discovering that agriculture’s relevance transcended the classroom. In our observations in the field, we also noted that we perceived the teachers’ mindset had begun to shift by which they found value in making agriculture relevant in the classroom. We noted in the field that we perceived the teachers had recognized the importance of bridging the gap between agriculture and science education as they strived to connect the curriculum to their students’ lives. This shift in mindset also translated to a more profound commitment to infuse an agricultural perspective into their teaching philosophy. These findings underscored the curriculum's potential to initiate a critical change and inspire profound enthusiasm, curiosity, and growth in the self-efficacy of teachers and students.

Conclusions

This study aimed to address a deficiency in agricultural literacy among the U.S. population by providing a novel curricular resource that teachers could use to integrate agriculture into their middle school science curriculum. The curriculum aligned with the NGSS, making it compatible with evaluation criteria based on students' test scores. The study demonstrated how teachers, through their experiences with implementing a science-focused agricultural curriculum, came to realize the relevance of agriculture. It encouraged educators to incorporate relevant agricultural-based learning opportunities that can enhance students' engagement and understanding. The study's findings also emphasized the power of the agricultural context in shaping teachers' perceptions of the subject's significance. This finding aligned with Vallera and Bodzin (2016) and Spielmaker and Leising (2013), who emphasized the potential of agriculture to serve as a bridge between educational topics, specifically science. For example, the teachers in this study stimulated their students' conceptual understanding by connecting science with agriculture, encouraging active engagement with the subject matter and its application in the real world.

Findings from this study also revealed that the science-focused agricultural curriculum helped promote community. For example, hatching chicks became a shared experience involving students, teachers, parents, and school communities. Little research has been done in the context of 4-H youth development regarding how an agricultural-based curriculum can help develop a sense of community. Nevertheless, it has been suggested that integrating agriculture into elementary and junior high curricula could facilitate student learning through experiential, community-based, and authentic or applied learning in real-life situations (Knobloch et al., 2007). This is an area in which more research is needed.

The participating teachers exhibited a heightened level of agricultural awareness after teaching the curriculum. They broadened their knowledge and began connecting their choices to real-world implications, particularly regarding food and sustainability. The teachers also developed mindfulness about the implications of their decisions on the environment and food production. Teaching the curriculum also appeared to deepen the teachers' understanding and interest in agriculture. This notion appeared to enrich their subject knowledge and improve their ability to convey these concepts to their students. Previous research has found that teachers often have a positive attitude toward agriculture and learning as well as participating in agricultural training (Anderson et al., 2014; Balschweid et al., 1997; Bellah & Dyer, 2007; Harris & Birkenholz, 1996). However, examining the impact of teaching an agricultural curriculum on the agricultural literacy development of teachers appears to be inadequate. The findings highlighted that professional development for teachers through the use of curricula and training, in some instances, enhanced their knowledge, confidence, and enthusiasm for implementing unfamiliar content and new pedagogies. This, in turn, positively impacted their teaching practices. In particular, the teachers expressed a willingness to teach more agriculture-related curriculum when it met their teaching standards, and they were trained to use the necessary resources.

The findings of this investigation also suggested that using an agricultural curriculum could lead to the development of civic engagement among students. Using relevant examples in the agricultural curriculum encouraged students to consider broader issues like dietary choices and cafeteria menus, inspiring civic engagement and advocacy. Although little research has been

completed on this concept, Clark et al. (2013) found that undergraduate students who participated in a civic agriculture minor were prepared to critically examine the complex challenges facing agricultural systems from an interdisciplinary perspective while simultaneously building community. Further, Obach and Tobin (2013) also advanced that "civic agriculture may prove to be a particularly important avenue toward renewed community engagement simply because food is necessary to life" (p. 320).

The study's findings stressed the critical role that educational standards play in teachers' curriculum selection decisions. Aligning curricula with established educational standards is vital for teachers with low self-reported agricultural literacy willingness to implement agriculture curricula in the general science classroom. It is essential for agricultural-based curriculum developers to consider teaching standards as a fundamental aspect of their curriculum development process. This aligned with other research that has found that teachers can effectively meet educational standards by integrating agricultural content into science lessons while providing students with a deeper understanding of agricultural and scientific principles (Spielmaker & Leising, 2013). However, curriculum reviews are necessary to ensure the relevance and fit of agricultural topics and activities (Knobloch & Ball, 2013).

Discussion, Implications, and Recommendations

The call for integrating agricultural-based science content into middle school education underscores the need for collaborative efforts among advocacy groups, educational institutions, and policymakers (NRC, 1988). It is crucial to go beyond the current status of agricultural topics as supplementary materials and strive for their inclusion in core curricula. Proactive engagement from the agricultural industry with curriculum developers, textbook authors, and standardized testing bodies is essential to ensure that agricultural concepts become integral components of educational choices. Recognizing the relevance of agriculture in fostering civic engagement and critical thinking creates unique opportunities for introducing agricultural literacy into general education. As future generations will influence agricultural regulations, it is paramount to provide students and teachers with the tools to think critically about their food, fiber, and shelter choices (Pense & Leising, 2004). This approach adds personal value and holds significant implications for the broader community. The agricultural-based curricula piloted in this study offered a rare opportunity to promote community and career awareness. By providing a platform for students who may not traditionally excel in the classroom, the agricultural curricula allowed them to showcase their knowledge and contribute meaningfully to the educational journeys of their peers. This approach is pivotal in elevating agriculture as a prestigious and viable career path, making it appealing to diverse individuals. Ultimately, this shift in educational focus can contribute to a more inclusive and empowered community with a broader appreciation for the significance of agriculture in our daily lives.

A key implication from this study was that using an agricultural curriculum in the core classes, such as science, can develop the agricultural literacy of teachers and students. Since 1988, the industry has actively sought pathways to incorporate agriculture into the classroom (NRC, 1988). However, thirty-five years later, the same challenge persists. Therefore, one must question the tactics and approaches used to facilitate such practices. Findings from this study should be used to stoke discussion about the development of student knowledge and understanding of

agriculture. Because the agricultural literacy movement still faces similar hurdles three decades later. Perhaps a shift in focus to teachers' and administrators' knowledge of agriculture and its impact could be a more appropriate focus (Harris & Birkenholz, 1996; Mabie & Baker, 1994; Russell et al., 1990). It is clear that agricultural content is exciting for teachers and students in both urban and rural areas. In today's society, with a new generation of leaders, students, and community stakeholders, the traditional approach to incorporating agriculture in the classroom is no longer a viable option. With change ahead, a need has remained for content and curriculum that meets the needs and structure of general education classrooms, including training, resources, relevance, and development around standards and testing. An intentional shift in the outlook on agricultural literacy development is necessary. Exploring the impact of agricultural curriculum incorporation into general education environments could illuminate new ways to inspire change in teachers and leaders in education.

Considering the findings of this study, several recommendations emerged for future research, practice, and theory regarding the integration of agricultural literacy into general education settings. Regarding future research, there is a need to quantitatively evaluate the impact of incorporating an agricultural curriculum on the agricultural literacy of general education science teachers. Additionally, further exploration is needed to understand the implications of implementing an agricultural science-focused curriculum on the development of community in the general education landscape. Another possible avenue for future research involves investigating the effects of utilizing relevant agricultural curricula on students' and teachers' civic development and engagement. Lastly, an in-depth examination of the impact of agricultural curriculum on teacher retention and job satisfaction is warranted from the findings of this study. We recommend advocating for educational institutions to integrate agricultural literacy into teacher preparation programs for future practice. Comprehensive training programs for teachers should be developed to provide general education teachers with in-depth knowledge about agriculture, its significance, and its impact on society (Anderson et al., 2014; Ray, 2021). Such practice could ensure that prospective educators are adequately prepared to teach agricultural concepts. Moreover, promoting the development of an agricultural curriculum aligned with educational standards is crucial. Further, creating professional development opportunities that enhance teachers' agricultural knowledge and instructional skills is also necessary to support the fidelity of the curriculum's implementation. Concerning theory-building, a need emerged to explore the influence of SCT principles on educational strategies, specifically in the context of agricultural curriculum development and implementation in general education settings. By focusing on reciprocal determinism, an understanding of the interplay between personal, environmental, and behavioral factors could be attained (Bandura, 1986, 2001; LaMorte, 2019; Main, 2023). Research has found success in using SCT to implement cross-discipline content, such as physical activity, in the general education classroom (Hivner et al., 2019). As such, this exploration has the potential to contribute to developing more effective educational approaches in integrating agricultural concepts in general education classrooms.

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Self-Regulated Learning in Middle School Agricultural Education: Teachers' Perspectives on Facilitating Quality Student Learning for Supervised Agricultural Experiences

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Abstract

Supervised agricultural experiences (SAE) have been a core tenet of school-based agricultural education. Despite this, limited evidence has existed regarding the best practices associated with facilitating quality student learning for SAEs at the middle school level. In response, we used self-regulated learning as a lens to examine this deficiency. Leaders of agricultural education from states with the highest middle school agricultural education enrollment and FFA membership nominated exemplary teachers to participate in this study. The qualitative data was analyzed and interpreted through four themes: (1) an eye toward the future, (2) competition as a method of instruction, (3) goal-driven learning outcomes, and (4) accountability for student learning. The findings illustrated how the exemplary teachers navigated various contextual and structural challenges to facilitate high-quality learning for middle school students through SAEs. Documenting these practices was a vital step to reimagining SAEs for middle school agricultural education programs. This knowledge could also be used to reposition agricultural education to create a more developmentally appropriate framework that guides the facilitation of learning for middle school SAEs. In the future, research should seek to establish indicators of high-quality SAE programs at the middle school level.

Introduction and Review of Literature

Since its early foundation, project-based learning (PBL) has been a core tenet of school-based agricultural education (SBAE). For example, Rufus Stimson, an early leader of SBAE, introduced the home project method for SBAE students to complete agricultural improvement projects at their farms to gain more profound knowledge of the agricultural industry (Stimson, 1919). The home project method eventually evolved into what has become known as supervised agricultural experiences (SAEs) in SBAE and was likely the first component of agricultural education's comprehensive, three-circle model (Croom, 2008). SBAE was formalized after the adoption of The Smith-Hughes Act (1917). However, participation in SBAE programs was limited to males aged 14 years or older. It was not until years later that middle school agricultural education programs emerged. Agricultural education courses were first reported for 8th Grade students in Virginia in 1926 (Rossetti & McCaslin, 1994). Over time, middle school agricultural education programs continued to emerge across the U.S., including 7th Grade programs in Vermont in 1930 and 6th Grade programs in Mississippi in 1974 (Rossetti & McCaslin, 1994).

Further, the National FFA Organization experienced a major demographic shift in 1988 when FFA membership was granted to middle school students (National FFA Organization, 2022). The

adoption of middle school agricultural programs and membership in the National FFA Organization created a need for a middle school agricultural education curriculum, middle school FFA award programs, and middle school SAEs. One recent initiative that has provided a guiding framework for this practice was *SAE for All* (The National Council for Agricultural Education, 2017). The goal of *SAE for All* was 100% engagement in SAEs for all students – from middle to high school (The National Council for Agricultural Education, 2012). Many students, especially at the middle school level, begin with a Foundational SAE. Foundational SAEs provide an entry point for students by which they can (a) explore careers, (b) gain critical employability skills, (c) engage in personal financial management, (d) research the importance of workplace safety, and (e) enhance their agricultural literacy (The National Council for Agricultural Education, 2017). Eventually, as students advance in SBAE, they can engage in Immersion SAEs to "enrich their agricultural education" (The National Council for Agricultural Education, 2017, p. 5)

Historically, Immersion SAEs have been rooted in placement projects by which students have been employed in the agricultural industry, or entrepreneurial projects, that allow them to own an agricultural enterprise (Phipps et al., 2008). However, Immersion SAE programs have expanded to include (a) research, by which students employ the scientific method to solve a problem, (b) school-based enterprise, an SAE program that allows students to utilize school facilities to create agricultural businesses, and (c) service-learning, a project-based learning experience that promotes students to develop a self-directed, agriculturally-themed service project tied to curriculum-based standards (The National Council for Agricultural Education, 2017).

SBAE teachers have agreed that SAE programs were a vital component of agricultural education's comprehensive three-circle model; however, implementation of quality SAE programs has been reported to be lacking (Lewis et al., 2012; Wilson & Moore, 2007). For example, Lewis et al. (2012) reported that many SBAE students were unaware of the major SAE categories. Further, some previous research (Retallick, 2010; Wilson & Moore, 2007) has suggested that SBAE teachers experienced challenges regarding integrating SAEs into their programs due to (a) lack of rewards, (b) barriers to successful integration, and (c) inconsistencies across student dynamics. Retallick (2010) also suggested that an incongruence existed between the theory of SAE programs and the practices teachers used to incorporate SAEs into their programs. To this point, the National Council of Agricultural Education (2015) argued that supervision by teachers and other adult mentors was essential to SAE program quality. Teachers have been found to positively influence students' engagement, leading to greater student confidence and ability to develop and implement their SAE programs (Rubenstein et al., 2016). To develop exemplary SAE programs, teachers must provide clear student expectations (Rubenstein & Thoron, 2015). Further, when teachers have mandated SAE as a graded component, students were driven to be more successful (Bryant et al., 2022). Lewis et al. (2012) also suggested that assigning a grade value to an SAE program increased student participation.

SAE programs have become a required educational experience of SBAE (The National Council for Agricultural Education, 2015). Through SAEs, students develop critical employment skills that can be applied to various careers in the agricultural industry. Further, The National Council for Agricultural Education (2015) has maintained that "exploration of career interests, requirements, and opportunities within a chosen career pathway in AFNR is a key component of quality SAE" (p. 4). These quality factors, however, may not be appropriate for students at the

middle school level. As an illustration, many middle school students have only begun exploring career options but have not established firm career goals (Roberts, 2003). As such, Roberts (2003) suggested that middle school students pursue foundational-type SAE programs that focus on career exploration and agricultural literacy. Despite this, limited empirical evidence that supports such a claim has been reported. Consequently, one question has persisted: Is the modern structure and philosophy guiding SAEs relevant to middle school agricultural education?

Theoretical Framework

The theory of self-regulated learning (Zimmerman, 1998, 2008) emerged as the most appropriate lens during data analysis and theme negotiation to interpret the findings of this investigation. Through this lens, learning is depicted as a three-phase cycle – (1) forethought, (2) performance, and (3) self-reflection – that individuals use to understand and adapt their environment to achieve a desired learning outcome (Zimmerman, 1998, 2008). Forethought refers to "influential processes and beliefs that precede efforts to learn and set the stage for such learning" (Zimmerman, 1998, p. 2). Zimmerman (2008) delineated forethought into two categories (1) task analysis and (2) self-motivation beliefs. Task analysis includes critical duties such as goal setting in which individuals create a strategy to enhance their learning – an undertaking heavily influenced by their motivational beliefs. As such, in this phase, learners assign value to a task or skill, assess their outcome expectations of the achievement envisioned, and evaluate their self-efficacy to perform the new skill. These motivational beliefs reflect students' commitment to achieving a goal and influence their success in the second phase of the cycle: performance. The three categories of performance include: (1) attention focusing, (2) self-instruction, and (3) self-monitoring to help learners focus on a task to achieve a goal. Finally, in the self-reflection phase, self-regulated learners employ self-evaluation techniques to assess their learning and outcome attainment and analyze strategies they employ to meet their goals through self-assessment (Zimmerman, 2008). Limited research has been published regarding self-regulated learning in SBAE. However, McKendree and Washburn (2017) examined agricultural education teachers' awareness and perceptions of self-regulation strategies as learners as well as how those teachers fostered self-regulated learning in their students. In the current investigation, self-regulated learning emerged as a useful theory to help interpret the findings, emerge themes, and assign meaning to the beliefs espoused by middle school agricultural education teachers. Framing our interpretation of the emergent findings through self-regulated learning, therefore, appeared to provide insight into their effective teaching and learning strategies and to establish a greater educational value to SAEs for their middle school students.

Purpose of the Study

This study's purpose was twofold: (1) explain how middle school agricultural education teachers have successfully facilitated student learning through SAE programs, and (2) describe best practices for SAE programs at the middle school level. The research question for this study was: What SAE delivery and supervision approaches have been utilized by middle school agricultural education teachers to facilitate student learning?

Methodology

This study used an interpretive qualitative design to facilitate data collection and analysis (Merriam, 2009). Interpretive designs seek to describe how individuals construct knowledge as they make sense of their social world (Merriam, 2009). Therefore, this investigation was framed from a constructionism epistemological perspective (Koro-Ljungberg et al., 2009). Through the worldview of constructionism, meaning emerges as an individual interacts with their social environment (Crotty, 1998). Through this framing, we made sense of how exemplary middle school teachers facilitated quality student learning through SAEs. However, during this process, we recognized that our lived experiences influenced the interpretation of the findings (Merriam, 2009). As such, it was critical to address our personal biases and subjectivity.

Each investigator previously served as an agricultural education instructor. During the lead researcher's career as a middle school teacher, he incorporated SAE programming using a variety of methods, largely through the introduction of middle school students to agriscience research SAE projects. The philosophy behind this was twofold: (1) to introduce middle school students to FFA and SAE, including all aspects of research and data management, and (2) to establish a project developed around individual student interest that motivated students as they advanced through the agricultural education program. Because of these experiences, he became interested in middle school agricultural education programs and expanding opportunities for this population. Therefore, a bias that each of us brought to the study was that we perceived that SAEs were positive learning experiences for middle school students. As such, we attempted to mitigate such biases whenever possible.

We implemented a combination of purposeful and snowball sampling procedures to select participants for this study, which allowed us to access whether participants met the requirement of being a middle school teacher who facilitated exemplary SAE programs (Creswell & Poth, 2018). To achieve this, we selected the seven states with the highest middle school student enrollment and FFA membership: (1) Georgia, (2) Florida, (3) Virginia, (4) Missouri, (5) Delaware, (6) Oklahoma, and (7) Wisconsin (Jones et al., 2020). We contacted the state leaders of agricultural education from these seven states and asked them to nominate middle school agricultural education teachers who they considered to be exemplary regarding the facilitation of middle school student learning through SAEs. Despite multiple communication attempts, the teachers from Florida who were nominated by state leaders failed to respond. Further, the Missouri state leaders of agricultural education reported that middle school students were not granted FFA membership; therefore, they could not provide quality recommendations because they had no data on middle school SAEs. As a result, Florida and Missouri were omitted from the study. The two middle school agricultural education teachers from the list of nominees from each respective state leader received a personal email with information about the study, along with participant consent. Each participant agreed to participate (see Table 1).

Table 1

Participants' Personal and Professional Characteristics

Participant	State	Years Teaching	Middle School Grades Taught	Certification
1	DE	16	6-8	Traditionally Certified

Participant	State	Years Teaching	Middle School Grades Taught	Certification
2	DE	4	6-8	Traditionally Certified
3	GA	4	6-8	Traditionally Certified
4	GA	14	6-8	Traditionally Certified
5	OK	13	8	Traditionally Certified
6	OK	10	8	Traditionally Certified
7	VA	2	6-8	Traditionally Certified
8	VA	35	6-8	Traditionally Certified
9	WI	1	8	Traditionally Certified
10	WI	28	6-8	Alternatively Certified

After obtaining Institutional Review Board (IRB) approval, semi-structured interviews were conducted with 10 participants. The interview questions were developed based on the purpose of the study. Interviews were conducted using Zoom, a virtual meeting platform. The platform provided video, audio, and transcription files upon completion of the interview, all of which were saved in password-protected software. The transcription was reviewed for accuracy against the original audio files. To triangulate the findings of this investigation, the participants also provided documentation of the policies and practices they used to facilitate SAEs in their programs. These documents included SAE: (a) information sheets, (b) rubrics, (c) assignments and relevant activities.

Saldaña (2021) described coding as "a word of short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (p. 5). He further explained that the coding process allows a researcher to attribute meaning to data sources for analytic processes to make sense of participants' experiences. For this study, we employed two methods of first-cycle coding: (1) in vivo coding, which utilizes words or phrases from the participants' lexicon that allowed me to draw connections from the participants' language throughout each transcript, and (2) values coding that allows a researcher to consider a participants' values, beliefs, and attitudes about a particular topic (Saldaña, 2021). Values coding was employed to understand participants' beliefs regarding SAE programs and why they incorporate such into their middle school agricultural education programs. After reducing the first-cycle codes, axial coding was employed to categorize the first-cycle codes based on similarities. Through peer negotiation, themes were consolidated, resulting in four final themes. Emerging themes through peer negotiations allowed us to construct meaningful categories based on participant responses (Saldaña, 2021). During the negotiation phase, self-regulated learning emerged as the most appropriate lens to interpret the study's findings because it allowed us to authentically represent participants' values while also staying true to the theory (Zimmerman, 1998, 2008)

Lincoln and Guba (1985) outlined four standards of trustworthiness that we employed in this study: (1) confirmability, (2) dependability, (3) transferability, and (4) credibility. Confirmability refers to a researcher's explicitness regarding their decisions, biases, and other influences that can affect the study. We upheld confirmability by (a) providing a reflexivity statement, (b) a complete description of procedures for data collection, and (c) connections between conclusions and data. To uphold dependability, which refers to the degree to which the investigation was conducted consistently over time, we developed straightforward research questions and collected data across appropriate settings. The third standard, credibility, refers to the context in which data were collected. As such, we employed credibility by triangulating data across multiple sources, identifying uncertainties, and ensuring the data provided by participants made sense in the study's context. The fourth standard, transferability, indicates how the study's findings fit within other contexts. To ensure the findings in this study were transferable, we (a) fully described the participants to ensure accurate comparisons, (b) clearly described how participants were selected, and (c) linked the data to emerging theories.

Findings

After a thorough analysis of the data provided by the exemplary middle school teachers, four themes emerged: (1) an eye toward the future, where the teachers in this investigation incorporated goal setting through SAE as a learning tool to propel students to their next steps; (2) competition as a method of instruction, in which teachers used a competitive environment to motivate students to engage in high-quality learning experiences; (3) goal-driven learning outcomes, a theme by which teachers noticed student and school growth through participation in SAEs; (4) accountability for student learning, where teachers discussed checkpoints and benchmarks to encourage success in student goal achievement. Ultimately, these findings illustrated how exemplary teachers navigated various contextual and structural challenges to facilitate learning for middle school students through SAEs.

Theme # 1: An Eye Toward the Future

Through the lens of self-regulated learning theory, having students assign value to learning tasks can enhance their understanding of concepts. When students value their learning tasks, they are more committed to their learning goals (Zimmerman, 2008). Therefore, to enhance students' motivation to achieve a goal, educators can help their students understand how a learning task directly impacts their lives. The middle school agricultural education teachers in this investigation understood the importance of helping their students find value in their learning through SAEs. To achieve this, participants reported using long-term planning, often multiple years into the future, as a motivational approach to encourage their students to engage in high-quality, sustained learning and prepare them for life in the real world. For example, Participant #3 expressed: "We talk about SMART goals [in class] along with an assignment to come up with five SAE ideas [the students could incorporate as an SAE program]. Further, Participants #1, #2, #7, and #10 also indicated that most of their middle school students' SAEs were "foundational" to help prepare them for deeper learning in high school agricultural education and their future careers. On this point, Participant #1 shared that they "align[ed] their expectations [to prepare students for] high school" and to "…give my 8th graders an idea of what they're in for [in high

school].” Case in point, Participant #2 shared: “if [students] have a haying operation at home, I tell them about the opportunities at the high school where [students] can run a haying operation through the school.” The middle school teachers also explained that as students progressed to high school, they intended to increase the rigor and scope of their learning through SAEs to ensure they could successfully address complex issues and problems. For example, Participant #3 facilitated school-based agricultural mechanics SAE projects in their middle school program. They stated: “[Students] can only build a birdhouse for an ag mechanics project in the 6th grade [in my program]. I expect a bit more out of a 7th grader than a 6th grader, because [a student] has a little bit more experience in terms of woodworking. I want to see more.” To pace students appropriately, each of the teachers described using a scaffolding approach to student learning in SAEs by which their students initially acquired basic awareness of content in agriculture to provide them with the foundational knowledge and skills needed to engage with more issues and problems more intimately later in their academic careers. Further, the middle school teachers described how they kept expectations similar for all students at this level while also providing information about Immersion SAEs so that they could expand their projects in the future.

Regarding career development, multiple participants reported incorporating an agricultural career unit into their curriculum to raise students’ awareness about potential SAEs and possible career pathways. Participant #9 reported that such activities helped “match students with something that they already do” to explore potential future careers so that they could expand on their interests and begin brainstorming about SAEs in the future. These activities required students to discover average salaries, educational and training requirements, and work-related tasks – key learning milestones associated with Foundational SAEs. Participant #10 noted that students “have to get on some sort of path” and that teachers are “preparing them for future careers.” Participant #10 continued: whether students are completing a “career research project” or working on a “project at home,” they should be doing innovative projects based on their interests. Consequently, by helping students understand what they could achieve in the future through their SAEs, the middle school agricultural education teachers in this study appeared to gain student buy-in and set the stage for more impactful learning opportunities later in their students’ academic careers.

Theme #2: Competition as a Method of Instruction

After obtaining student buy-in, the middle school agricultural education teachers stressed the importance of using competition as a method of instruction to encourage students to achieve their goals. Goal setting has been advanced as an important aspect of the self-regulated learner (Zimmerman, 2008). As such, students should learn about setting challenging yet attainable goals to achieve quality learning outcomes. Through the lens of self-regulated learning theory, goals and external awards for achievement can enhance students’ self-efficacy on a given topic (Zimmerman, 2008). In the current investigation, the middle school agricultural teachers appeared to capitalize on the sentiment of self-regulated learning by using competition as a method of instruction to facilitate quality learning for their students engaged in SAEs. Case in point, every participant in this study mentioned the deep-rooted connection between SAE programs, FFA proficiency awards, and FFA membership degrees. When introducing the concept of SAEs to their students, multiple teachers reported using the National FFA Proficiency Award Program categories to set the context and establish the purpose and function of quality SAEs. On this point, Participant #9 explained: “I start out with the broad category of the

proficiency or SAE area, break it down, [and explain] what [the students] can do. What proficiency area do they belong in?" Although the teachers used awards as motivation for completing successful SAE programs, Participant #8 expressed a concern that there were "no achievement [awards]" for middle school FFA members at the national FFA level for SAE programs, except for the National FFA Agriscience Fair program. However, Participants #1, #2, #3, and #4 reported that their states have begun recognizing high-quality SAE programs for middle school students. Participant #3 noted: "In Georgia, we do a record-book competition, which is similar to a proficiency competition. It's just oversimplified to a great degree." Similarly, Participants #1 and #2 discussed the development of a State FFA Star Award for middle school SAE programs. In addition, Participants #6, #7, #8, and #9 incorporated a recognition program at the local level to celebrate middle school SAEs.

Additionally, some teachers used their school facilities to foster a competitive environment to facilitate quality student learning through SAEs. For instance, animal science laboratories and the use of "show teams" was mentioned by Participants #4, #5, and #6. When asked how SAEs were introduced into their program, Participant #5 reported: "the big [SAE program] in Oklahoma is showing livestock." Participant #5 continued: "I'm in charge of the swine program here at [School District], and we split the other [species]. My teaching partners are in charge of sheep and goats." The teachers also voiced how the competitive nature and financial awards received through livestock shows influenced students' engagement with livestock-based SAE projects. On this point, Participant #4 reported: "[The students] actually get a lot of money. I just distributed $1,200, or something like that, [to the students] just by submitting [livestock] fair projects for free." The middle agricultural education teachers in this investigation also reported using competition guidelines as a learning tool to have their students complete agricultural mechanics projects and submit them for competitive events. As a result of this competition-driven instructional approach, the participants reported that their students' passion for expanding their knowledge grew as their SAEs expanded.

Theme #3: Goal-Driven Learning Outcomes

As a result of middle school teachers' use of competition as an instructional approach to facilitate quality student learning in SAEs, they voiced multiple positive learning outcomes for their students. The participants largely attributed these outcomes to using goal setting and competition to motivate students to engage in learning experiences more profoundly through SAEs. Learning outcomes derived from goals have been shown to help self-regulated learners develop competence in key subject areas (Zimmerman, 1998). Although the overarching goal of the students' SAEs, as articulated by the teachers in this study, was to obtain quality learning through achievement-based goals, multiple participants suggested that they also sought to "develop good people" (Participant #4, #6, and #9) through crucial learning experiences in SAEs. The teachers reported that they observed this outcome by witnessing their students' academic and personal growth throughout their SAE projects.

Although most teachers reported that their middle school students' SAEs occurred in class, Participants #2, #4, and #6 perceived that the students began to see greater "connection[s] to agriculture" and a "connection to the real world" through SAE projects. To illustrate, Participant #6 shared that students have taken the knowledge learned from agriscience research SAE

projects and incorporated such into other SAE projects. These connections appeared to increase students' commitment to their SAE because it was "based on student interest," as expressed by Participants #3, #6, #9, and #10. As students continued to learn through their SAEs, the middle school teachers noticed that students' "pride" for their work and "ownership" increased (Participants #7 and #9). Consequently, Participant #3 and Participant #10 noticed that the students would often begin "talking about" their SAEs with peers, and a sense of community would grow in the agricultural education classroom and school. When discussing how student SAEs were showcased, Participant #3 reported: "I hang the [SAE] posters in the hallway, and our teachers, as they come by during transition [periods], they're like, 'How are you putting these [SAE posters] up every day? It seems like every day I see a different [SAE poster].' That kind of has a positive effect on the school. The [students] rally behind each other." In addition, Participant #6 mentioned that school administrators and core-content classes noticed growth among students who participated in agriscience research projects.

Multiple middle school teachers reflected on current and former students whose middle school SAE programs launched their future careers. Case in point, Participant #8 explained that because of the "exploration" component of their SAEs at the middle school level, their former student found a passion for something "unique" that they enjoyed and built into a business. Participant #10 provided an example of a student with a learning disability who overcame communication issues while building a relationship with their teacher through their SAE program. The participant noted that the student "barely talk[ed] at school," and the student's speech therapist told the teacher, "[the student] doesn't have a problem when talking to you. I mean, I've been talking to him for a while, but get [the student] talking about chickens and gardens, and [the student] just takes off." Therefore, the teachers witnessed how SAE programs changed students' lives and saw SAE as an investment into their future. To accomplish this, the middle school teachers expressed that accountability through documentation, grading, and SAE supervision was essential to successful learning through SAEs.

Theme #4: Accountability for Student Learning

Zimmerman (1998) argued that the self-reflective process was essential to self-regulated learning because it allowed students to assess if they achieve their goals, master the required content, and adjust their strategies for proper goal attainment. The middle school agricultural education teachers in this investigation reported a variety of methods for monitoring student performance in SAEs to hold their students accountable for learning. To support this notion, Participant #6 provided a grading rubric they used to monitor students' progress, learning expectations, and project requirements for research-based SAEs which were initiated through participation in the Agriscience Fair. To ensure learning rigor and maintain high-quality SAE projects, the middle school agricultural education teachers employed various record-keeping approaches to encourage students to acquire essential data management and analysis skills. However, the delivery of record-keeping looked different for each participant.

Participants #1, #2, #5, #6, #7, #8, #9, and #10 utilized The Agricultural Experience Tracker (AET) as a data management system, while Participants #3 and #4 reported using SAE record books that aligned with their state's criteria for awards. Data management and analysis often occurred on "AET Fridays," when class time was provided to allow students time to update their

SAE records (Participant #5). Participant #6 incorporated "SAE Work Nights," which allowed students to work on their agriscience research records after school hours. Further, middle school students were held accountable for their SAEs as a graded component of their agricultural education course. Participants #1, #6, #7, #8, #9, and #10 indicated that SAEs were a graded component of their agricultural curriculum. Further, Participants #1, #7, #9, and #10 facilitated learning through exploratory career research projects in which students researched a career, created a presentation, and logged documentation of this experience into their appropriate data management system. Participants #7, #9, and #10 required documentation of SAEs through student submitted photographs. Zimmerman (1998) noted that learners evaluate their performance with feedback. Therefore, teachers should periodically assess students' progress and provide feedback to determine whether learning goals have been reached. On this point, Participant #4 explained: "I require [the students] to do certain checkpoints throughout [the year]. [The SAE] starts in August, so by September, they have to talk about why they're doing [their SAE], what they're doing… and a step-by-step [explanation of how they are going to do it]. Because I want them to document their experiences." Further, the middle school teachers in this investigation reported assessing their students' SAE projects through regular site visits. Participants #4, #5, #9, and #10 also reported on parental involvement through SAE agreements, SAE meetings for parents, or SAE visits with parental engagement. On this topic, Participant #10 provided an 'SAE Agreement' document that required students to describe their SAE plan, develop an SAE risk assessment, and obtain parent signatures to begin work on their SAE programs. Further, the middle school teachers completed SAE visits on-site with students, in the classroom, or through various learning laboratories provided through their school system. Participant #4 explained that breeders who sold livestock to students were also used as resources to provide expert knowledge to enhance students' learning and as an additional strategy to hold students accountable for their learning. It should also be noted that Participants #3, #6, #9, and #10 included a classroom presentation as a summative assessment of student learning. This presentation was to evaluate students' progress and learning for their chosen SAE. "Sharing their projects," Participant #10 stated: "it kind of helps the kids. It helps them see what other kids are interested in… and sparks some ideas for them and some other interests."

Conclusions

The purpose of this study was twofold: (1) explain how middle school agricultural education teachers have successfully facilitated learning through SAE programs, and (2) describe best practices for SAE programs at the middle school level. In this study, findings emerged through four themes: (1) an eye toward the future, (2) competition as a method of instruction, (3) goal-driven learning outcomes, and (4) accountability for student learning. Therefore, we conclude that based on the data provided by participants in this investigation, SAE can be an integral component of student learning at the middle school level. To accomplish this, the middle school teachers in this study used a future-oriented mindset toward SAEs to set a foundation for their students' learning trajectories, including preparing them for high school expectations and their potential career interests. Further, the middle school teachers scaffolded student experiences to help them advance into more complex SAE programs later in their academic careers. These types of SAE experiences appeared to allow middle school students to explore potential careers based on their interests. Further, the teachers in this study included goal setting as a critical learning component in SAEs. This corroborated the findings of Rubenstein and Thoron (2014), who

reported that goal planning and learning were critical to successful SAE programs and strengthened career choices. The teachers in this investigation also embraced the diverse interests of student and conducted unique projects to facilitate their learning.

Supported by the work of Jones and Edwards (2019), the second theme described how the teachers used competition to build motivation for student learning. To accomplish such, the middle school teachers reported using the National FFA Proficiency Award Program to expose students to the diverse opportunities available in SAE programs. This award program, along with membership degrees and the Agriscience Fair, could serve as external motivators for student participation (Bird et al., 2013). Content and curricular resources provided by the AET were also utilized to teach students about successful record-keeping and data management. Further, teachers used livestock shows, agricultural mechanics shows, record book competitions, agriscience research, and FFA membership degrees to further illuminate the value of SAE programs for students. The teachers also reported creating awards for high-quality middle school students at the local level to recognize students who learned through the use of competition as a method of instruction. In theme three, goal-driven learning outcomes, the middle school teachers discussed the learning attributes and personal growth that students achieved through setting goals to achieve positive outcomes. In the literature, Doss and Rayfield (2021) reported that administrators believed that involvement in FFA and SAE was important. Similarly, the teachers noted that administrators and core content teachers noticed the growth of students who engaged in learning through SAE. Although the goal was to have students experience learning through high-achieving SAE programs, connections were also made to the agricultural industry – a finding supported by the work of Ramsey and Edwards (2012). According to the middle school teachers, students with livestock-based SAEs were reported to obtain the most significant personal growth. In agreement with Thiel and Marx (2019), we conclude that middle school students can achieve skill attainment through participation in Immersion SAEs focused on agriscience research. Traits such as pride, ownership, and professional growth also emerged as positive outcomes.

Emergent findings also revealed that the teachers in this study held students' learning accountable through their SAE projects. From the middle school teacher's perspective, accountability was essential to the success of high-quality SAEs. For instance, the teachers employed various methods to have students document their SAE program, such as SAE record books, whether through AET or paper records, to track their progress. Through this process, these middle school teachers reported that their students tracked time, finances, and skills, most of which were graded. On this point, Bryant et al. (2022) illuminated that when students received grades for their involvement in SAEs, they were more likely to be motivated to develop a competent project. The teachers reported using photo documentation as evidence to support that students were completing high-quality SAE programs. Further, they completed on-site or in-class supervision to evaluate their students' experiences. Finally, some of their students collaborated with experts to monitor the progress of livestock-based SAEs.

Discussion, Implications, and Recommendations

Self-regulated learning appears to have been intimately intertwined with SAE programming at the middle school level (Zimmerman, 1998, 2008). Teachers have facilitated the self-regulated

learning's three core components of (a) forethought, where they allowed students to examine their current learning status and had students create realistic learning goals toward their SAEs, (b) performance, by which teachers allowed students to engage in their SAEs and held their students accountable as they advanced toward their learning goals, and (c) self-reflection, where teachers provided feedback as student's monitored progress toward their established learning goals. Self-regulated learning is a strategy that teachers should continue to employ in all three components of agricultural education's comprehensive three-circle model as they guide their students through learning experiences in the classroom and laboratory, as well as those experiences with achievement-oriented learning outcomes, such as proficiency awards, agriscience fair, career and leadership development events, and membership degrees.

Understanding how teachers have facilitated learning through SAE was vital to reimagining middle school agricultural education programs in the future. For example, this study illuminated how exemplary middle school teachers used competition as a method of instruction to deepen their students' learning. Despite this, livestock-based and career exploration emerged as two of the most frequently reported SAE types for middle school students among the exemplary teachers in this study. Although focusing on careers can be valuable for students, could this practice be too heavily emphasized at the middle school level? Perhaps having middle school students expand into additional SAE types could improve students' knowledge and motivation before entering high school. As such, we recommend that an evaluation be conducted regarding the importance of career exploration versus agricultural literacy and skill development in SAEs at the middle school level. This knowledge could help reposition the discipline to create a more accurate framework that guides the facilitation of high-quality learning for middle school SAEs. Future research should also explore establishing indicators of high-quality SAE programs to elucidate best practices for middle school SAEs. Because the length of instruction varied between states, paired with inconsistencies of when teachers see students during the school week, we recommend that future research on SAEs at the middle school level examine whether a program (i.e., lasting more than one year) or a project (i.e., lasting less than one year) approach would be more appropriate. Perhaps emphasizing projects rather than programs could make the planning and delivery of middle school SAEs for teachers less intensive. Further, perhaps this change could allow teachers to expose students to multiple SAE projects while still focusing on high-quality instruction and other duties. Examples could include in-class, cooperative, independent, or service-learning SAE projects. Future research should also examine the diverse SAE project types that middle school teachers could use to facilitate quality student learning.

Based on the findings of this investigation, we recommend that AET, and other SAE data management systems, explore creating a developmentally focused data management and record-keeping option for middle school students. On this point, teachers in this investigation espoused that SAE was already too abstract for their students to grasp, especially regarding data management and record keeping. This change in approach could streamline the ease by which students are exposed to SAE record keeping and documentation. Finally, the National FFA Organization and state associations should consider ways by which to recognize and celebrate exemplary middle school SAE projects and programs. If all students are expected to complete an SAE, and proficiency awards are based on them, then middle school students should be granted the same opportunity.

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The Impact of a Weeklong STEM Immersion Curriculum Experience in School-Based Agricultural Education

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Abstract

Advocation for the STEM workforce in education has been noted from career sectors ranging from business to agriculture on local, state, and national levels. Modern agriculture is no longer only about manual labor and tending to crops and livestock, it has grown into a sophisticated field that heavily relies on STEM in virtually every aspect. Although research has explored school-based agricultural education (SBAE) students' interest in STEM and the perceptions of SBAE teachers related to STEM integration, little has been done to determine the impact of a STEM-enhanced curriculum on students' knowledge and their STEM interest. Undergirded with human capital theory, this study sought to determine the impact of a weeklong, immersive STEM curriculum experience on SBAE students' sustainable bioenergy content knowledge and STEM interest. The change in sustainable bioenergy examination scores resulted in a statistically significant difference with a large effect size. In addition, SBAE students reported an increase across the semantic scale for science, while other areas remained consistent or decreased. SBAE teachers should incorporate additional experiential learning activities by integrating STEM principles with a particular focus on mathematics, technology, and engineering to increase interest and career specific human capital.

Author Note: This manuscript is based on data published in the Proceedings of the Southern Region Conference of the American Association for Agricultural Education, Eck et al., (2024).

Introduction

The Vocational Education Act of 1963 (P.L. #88-210) shifted the focus of career and technical education to include *off farm* occupations, adding the development of career-specific pathways and increased demand for integration of academics within school-based agricultural education (SBAE) (Camp & Crunkilton, 1985; Crawford & Cooper, 1986). These developments were further impacted *A Nation at Risk* report, which presented evidence that Americans were educationally behind other nations' academics (National Commission on Excellence in Education [NCEE], 1983; United States Department of Education [USDE], 1984). Americans were depicted as illiterate in areas of science, influencing the need to increase educational rigor and requirements for public education (National Assessment for Education Progress [NAEP], 1982; USDE, 1984). Early educational reform targeted student-focused needs, resulting in academic growth in reading and basic mathematics; however, science and higher-order mathematics content requiring analysis were still found lacking (NAEP, 1982; USDE, 1984). The

recommendations of the National Science Board (NSB) (1983) increased rigor and relevance of science and mathematics instruction and the integration of hands-on learning activities, which placed SBAE in an advantageous position for assisting in educational reform by preparing students for the 21st century (National Research Council (NRC), 1988).

Advocation for the science, technology, engineering, and mathematics (STEM) workforce in education has been noted from career sectors ranging from business to agriculture on local, state, and national levels (Ferand et al., 2020; Roberts et al., 2020). Much of this is due to the continual shortfall of individuals with the necessary skills to enter STEM related careers (National Academy of Engineering & National Research Council, 2014). Due to advancements in agriculture, and the interdisciplinary structure in which agricultural education can be embedded, school-based agricultural education (SBAE) serves as a vital preparation ground for STEM content (McKim et al., 2017). Although concepts such as science and mathematics are regularly integrated into SBAE, engineering and technology have historically been ill-represented within curricular resources (Eck et al., 2021; Wang & Knobloch, 2020). Agricultural education has continually been identified as an educational content area to which workforce skills and knowledge needs can be facilitated in the different STEM concepts and activities (Rothwell, 2013; Swafford, 2018a, 2018b). With SBAE having deep connections to applying curriculum to real-world applications (McKim et al., 2017), it is important to recognize the substantial benefits education and training in STEM integration can have within SBAE curriculum (Swafford, 2018). "This training becomes increasingly important considering the connection between K-12 student completion rates and their awareness of, curiosity about, and interest in STEM and STEM careers" (Eck et al., 2023a, p. 3).

In addition, modern agriculture is no longer just about manual labor and tending to crops and livestock. Instead, it has grown into a sophisticated field that heavily relies on STEM in virtually every aspect (National Institute of Food and Agriculture [NIFA], 2019). These STEM aspects span from precision agriculture techniques like using drones to monitor crop health and automated milking systems to genetic engineering and data analysis for optimizing yields, where STEM underpins nearly every step of the modern process. Therefore, the future of agriculture demands a workforce well-versed in STEM fields, increasing the need for STEM integration in SBAE, with emphasis on curriculum that equips students with the knowledge and skills necessary to pursue careers in various agriculture-related fields, such as agricultural engineering, precision agriculture, food science, animal genetics, sustainable fuels/energy and many more, as these careers are crucial for addressing global challenges like food security and sustainable agriculture (United States Department of Agriculture [USDA], 2023).

Although research has explored SBAE students' interest in STEM (Chumbley et al., 2015; Erickson et al., 2020) and the perceptions of SBAE teachers related to STEM integration (Smith et al., 2015; Stubbs & Myers, 2015, 2016), little has been done to determine the impact of a STEM-enhanced curriculum on students' STEM knowledge and interest. This becomes increasingly important as "the U.S. STEM workforce continues to be underprepared and lacking" (Watson et al., 2022, p. 2). Moreover, less than 16% of high school students even considered a STEM-based career (Gonzalez & Kuenzi, 2012), yet the need persists for K-12 students to complete post-secondary, STEM-based degree programs (Seymour, 2002). Watson et al. (2022)

identified a correlation between established and supported interest in STEM content and completion rates of K-12 students.

Purpose and Objectives

The study sought to determine the impact of a weeklong, immersive STEM curriculum experience on SBAE students' sustainable bioenergy content knowledge and STEM interest. Three research objectives guided this inquiry:

1. Establish the change in SBAE students' sustainable bioenergy content knowledge prior to and after a weeklong, immersive STEM curriculum experience;
2. Identify SBAE students' STEM and agriculture interest prior to and after being taught using a sustainable bioenergy curriculum; and
3. Identify SBAE students' career interest in STEM and agriculture prior to and after being taught using a sustainable bioenergy curriculum.

Theoretical/Conceptual Framework

The study was grounded in human capital theory. Human capital theory describes the process of developing a person's knowledge, skills, experiences, and proficiencies necessary for employability and overall wellbeing (Becker, 1964; Schultz, 1971; Smith, 2010). Human capital theory is acquired through education, training, and experiences (Bandura, 1984; Becker, 1964; Nafukho et al., 2004), which ultimately culminates in a more employable individual based on the development of "sector-specific" skills (Smith, 2010, p. 42). The acquisition of specific knowledge and skills not only benefits the individual who has an increased human capital, but also the organization and society, writ large, for which they work and engage (Nafukho et al., 2004). Although human capital theory has been broadly implemented in economics and with teachers (Smylie, 1996), the career-specific human capital development of secondary students is limited.

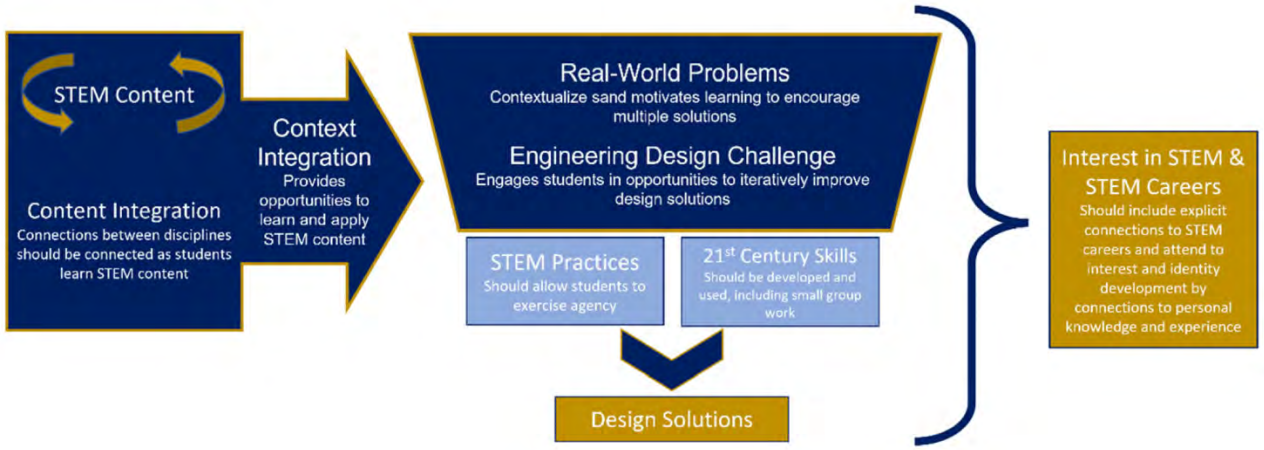
Within the scope of this study, STEM-focused agricultural careers across the bioenergy and renewable fuels sectors served as the specific human capital for which we were most interested in exploring and developing. To accomplish this goal, a STEM-enhanced curriculum on bioenergy and renewable fuels served as an educational experience for SBAE students. This study allowed for the exploration of equipping SBAE students' human capital in the realm of biofuels and renewable energy through a vetted STEM-enhanced secondary education curriculum that challenged students beyond rote memorization of facts and formulas, aiming to cultivate critical the 21st-century skills, such as critical thinking, problem-solving, collaboration, communication, creativity, and innovation, that are highly sought by employers. These skills are essential not only for future careers in agriculture but also for success in any field or endeavor, regardless of career interests (NRC, 2012).

To further conceptualize the interaction of human capital development and STEM integration, Roehrig et al. (2021) established a detailed conceptual framework for integrated STEM learning in K-12 (see Figure 1). Roehrig et al. (2021) stated:

> Our framework builds upon the extant integrated STEM literature to describe seven central characteristics of integrated STEM: (a) centrality of engineering design, (b) driven by authentic problems, (c) context integration, (d) content integration, (e) STEM practices, (f) twenty-first century skills, and (g) informing students about STEM careers. (p. 1)

Figure 1

Conceptual Framework of Integrated STEM Education (Roehrig et al., 2021)



The content within our study aims to clearly connect all STEM areas within agricultural education, providing an opportunity for students to solve real-world problems (i.e., sustainable energy, and engineering practices, i.e., bioplastics) in small group settings, aligning with the conceptual framework developed by Roehrig et al. (2021). Ultimately, the integrated STEM in SBAE project works to increase content knowledge in STEM and agriculture while establishing interest in STEM and agricultural careers.

Methods

This non-experimental, pre-test/post-test, one-group design (Privitera, 2020) was implemented to determine the impact a weeklong, immersive STEM experience had on SBAE students' knowledge about and interests in STEM. Students in three rural SBAE programs in Oklahoma during the spring 2023 semester ($N = 199$) were the accessible population for the study (Privitera, 2020). Each of the three schools were deemed rural according to the National Center for Education Statistics (NCES), with eighth through twelfth grade school enrollment ranging from 65 to 234 students (NCES, 2023). Two of the SBAE programs were single-teacher programs. The other was a two-teacher program. All three served eighth through twelfth grade students and represented two different areas of the state. The three participating programs had five classes per teacher per day, with each class lasting 50 minutes in duration. Individual class sizes ranged from six to 22 students.

The sustainable bioenergy unit of instruction was delivered by three graduate students pursuing doctoral degrees in Agricultural Education at Oklahoma State University. Each of the graduate students was a previous SBAE teacher with five or more years of teaching experience and participated in a two-hour, immersive STEM curriculum training program prior to their four-day teaching experience at one of the three assigned SBAE programs. The two-hour training program provided the graduate students with an intimate introduction to the curricular activities, materials, and resources, including the completion of all the immersive laboratory experiences. The STEM-enhanced curriculum was developed through a compilation of materials from Oklahoma Ag in the Classroom (n.d.) curriculum, National 4-H Council (2016) activities, and from modules developed by the Department of Plant and Soil Sciences at Oklahoma State University to include four, 50-minute lessons. Learning goals were established and cross walked with National agriculture food and natural resources (AFNR) Standards (see Table 1), which are provided by the National Council for Agricultural Education (2015).

Table 1

Sustainable Bioenergy Unit of Instruction and Corresponding AFNR Standards

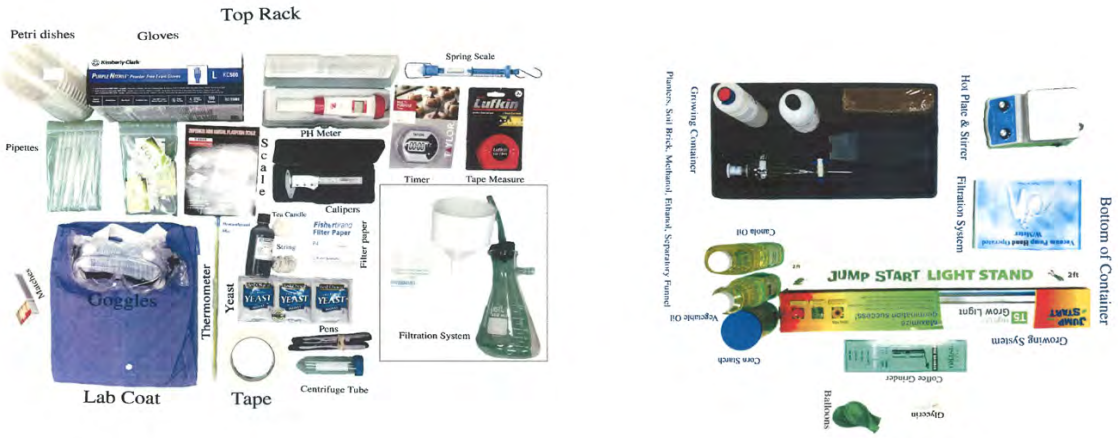
Learning Goals	AFNR Standards/Performance Indicators
Students will be able to define products derived from biomass.	NRS.03.01. Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.).
Students will be able to differentiate between biomass materials.	PS.01.03. Develop and implement a fertilization plan for specific plants or crops.
Students will be able to identify renewable options for making bioplastic.	PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.
Students will be able to test properties of multiple bioplastics.	PS.03.02. Develop and implement a management plan for plant production.
Students will be able to explain the growth and development of legumes.	ESS.01.02. Properly utilize scientific instruments in environmental monitoring situations (e.g., laboratory equipment, environmental monitoring instruments, etc.).

Students will be able to determine seeding rates.	BS.01.01. Investigate and explain the relationship between past, current and emerging applications of biotechnology in agriculture (e.g., major innovators, historical developments, potential applications of biotechnology, etc.).
Students will be able to calculate fertilizer rates.	BS.02.01. Read, document, evaluate and secure accurate laboratory records of experimental protocols, observations, and results.
Students will be able to extract oil from vegetable matter.	BS.02.02. Implement standard operating procedures for the proper maintenance, use and sterilization of equipment in a laboratory.
Students will be able to compare and contrast available oil from a variety of vegetable matter.	BS.02.03. Apply standard operating procedures for the safe handling of biological and chemical materials in a laboratory.
Students will be able to test the viscosity of oil.	BS.03.03. Apply biotechnology principles, techniques, and processes to protect the environment and maximize use of natural resources (e.g., biomass, bioprospecting, industrial biotechnology, etc.).

The learning goals aligned with daily topics within the curriculum including the history of biodiesel and bioenergy, bioplastics, plant growth, ethanol and fermentation, and oil extraction. Each day of the four-day experience, SBAE students were immersed in delivering critical content through relevant laboratory experiences. The laboratory experiences included biomass investigation, bioplastic production, soybean germination, seeding and fertilizing rate calculations, and the production of oil from vegetable matter. The curriculum delivery and laboratory experiences used STEM-enhanced connections and the scientific method. To support the graduate students' SBAE teaching experience, USDA NIFA sustainable bioenergy laboratory kits were prepared for each of the school sites, with a value of $1200 per kit (see Figure 2).

Figure 2

Sustainable Bioenergy Laboratory Kit



A 25-item criterion-referenced examination was used to measure sustainable bioenergy content knowledge. The examination was previously developed based on the sustainable bioenergy curriculum and used in previous research with SBAE students, which deemed the measure valid and reliable (Eck et al., 2023). In addition to the criterion-referenced questions, the modified and validated STEM semantics instrument (Knezek & Christensen, 2008) was included to assess students' perceptions of each of the five disciplines represented by agriculture and STEM and corresponding careers (i.e., a career in agriculture, and a career in STEM). Specifically, five questions were asked and ranked on a seven-point summated scale for each of the seven components. Figure 3 provides an example for science. The same format was followed for mathematics, engineering, technology, agriculture, a career in agriculture, and a career in STEM, with randomized ordering of the scales.

Figure 3

STEM Semantic Survey Example

STEM Semantic Survey: Choose one circle between each adjective pair to indicate how you feel about the subject.

To me, Science is:

1.	Fascinating	1	2	3	4	5	6	7	Mundane
2.	Appealing	1	2	3	4	5	6	7	Unappealing
3.	Exciting	1	2	3	4	5	6	7	Unexciting
4.	Means Nothing	1	2	3	4	5	6	7	Means a Lot
5.	Boring	1	2	3	4	5	6	7	Interesting

All data were collected in person using paper tests and sematic scale instruments. Pre- and post-tests were graded by the graduate students delivering the curriculum, and then one graduate assistant entered all pre- and post-test scores along with STEM semantic scores for each participant into SPSS Version 28. To address the first research objective, descriptive statistics

were analyzed to establish a range in pre- and post-test scores along with group means. To statistically evaluate the change in knowledge from the criterion referenced exams, a paired samples *t*-test was used. In addition, Cohen's *d* was calculated for effect size (Field, 2018). The effect size output was evaluated and interpreted according to Cohen (1992) as being small (0.20), medium (0.50) and large (0.80). For the second and third research objectives, descriptive statistics were analyzed to determine the mode and percentage of agreement for each of the semantic scales.

The primary limitations within the study were related to instructional delivery. It was assumed all students in each SBAE classroom would be in class for all four days to complete the pre-test, four lessons, and the post-test. In addition to students physically being in the classroom, it was also assumed that students would be engaged in content delivery and immersive experiences. However, due to the timing of the sustainable bioenergy unit of instruction, which occurred in May of 2023, students were nearing the end of the school year (last week of school for one of the schools), which caused for frequent interruptions for varying school functions. Considering these factors, 47 pre-tests were removed from data analysis due to not completing the unit of instruction and post-test, leaving 152 complete data sets of students across the three programs who received all four days of instruction and completed the pre- and post-tests. There were an additional 35 STEM semantic instruments that were removed from data analysis due to incomplete data or straight-line responses.

In addition, although the graduate students received the same training, it is likely the actual delivery of the sustainable bioenergy curriculum, students, classroom resources, and teaching styles may have varied from one school to the next. To ensure as much fidelity and consistency as possible, the accessible population was small due to the limitation of three Ph.D. students delivering the curriculum and the access to SBAE classrooms late in the spring semester. Therefore, the findings of the study should be considered in light of the limitations noted.

Findings

Research Objective 1: Establish the change in SBAE students' sustainable bioenergy content knowledge before and after a weeklong, immersive STEM curriculum experience.

One hundred and fifty-two SBAE students participated in a weeklong, immersive STEM curriculum experience focused on sustainable bioenergy. Prior to instruction beginning on day one, students completed a 25-question criterion-referenced examination to establish a content knowledge baseline. Each question on the examination was equally weighted and worth one point, for a maximum score of 25 points. Pre-test scores ranged from a low of four correct answers to a maximum of 18 correct answers, resulting in a mean score of 11.76 (SD = 2.89), which equated to a 47%, or an F letter grade. Four days of sustainable bioenergy curriculum followed the pre-test, culminating with a post-test to measure student growth at the end of the last day. The post-test used the same 25-questions as the pre-test but were reordered to offset test-retest effect. The same 152 SBAE students completed the post test, with scores ranging from a low of five to a perfect score of 25. The post-test resulted in a mean score of 15.65 (SD = 4.18), or a 62.6 (D letter grade).

To further understand the change in content knowledge based on the sustainable bioenergy curriculum, a paired samples *t*-test was analyzed, resulting in a statistically significant difference ($t = 12.23$, $p < .001$). Table 2 provides the pre- and post-test scores evaluated for the paired samples *t*-test.

Table 2

Student Examination Score Comparisons Before and After Sustainable Bioenergy Unit of Instruction

	n	*Mean*[a]	*SD*	*t*	*p*
Before Unit of Instruction	152	11.76	2.89	12.23	.001
After Unit of Instruction	152	15.65	4.18		

Note. [a]Mean scores were based on a 25-point criterion referenced sustainable bioenergy examination.

The change in sustainable bioenergy examination scores (mean difference = 3.89, *SD* = 3.93) resulted in a large effect size ($d = .99$) according to Cohen (1992).

Research Objective 2: Identify SBAE students' STEM and agriculture interest prior to and after being taught using a sustainable bioenergy curriculum.

To further understand the impact of the sustainable bioenergy unit of instruction, data were collected prior to and after the unit of instruction using a semantics scale focusing on agriculture and STEM (Knezek & Christensen, 2008). The semantic instrument had five randomized scales (i.e., 1 to 7) for each of the five content area items (i.e., science, mathematics, engineering, technology, and agriculture), but for consistency in data analysis, responses were recoded to align with one being negative (i.e., responses including *Mundane*, *Unappealing*, *Unexciting*, *Means Nothing*, and *Boring*) and seven being positive (i.e., *Fascinating*, *Appealing*, *Exciting*, *Mean a Lot*, and *Interesting*) on the sematic scale. Table 3 provides the mode and percent agreement for the five scale ranges across each of the five items. Overall, SBAE students reported an increase across the semantic scale for science, while mathematics, technology, agriculture, and engineering decreased.

Table 3

*SBAE Student Agriculture and STEM Semantic Ratings (*n *= 117)*

Item Stem	Semantic Scale	Before		After	
		Mode	%[a]	Mode	%[a]
Science is . . .	Mundane to Fascinating	4	23.1	5	21.4
	Unappealing to Appealing	3	19.7	4	25.6
	Unexciting to Exciting	4	23.9	5	27.4
	Means Nothing to Means a Lot	4	21.4	5	31.6
	Boring to Interesting	4	25.6	3	17.9

Mathematics is . . .	Boring to Interesting	7	27.4	6	24.8
	Unappealing to Appealing	6	24.8	7	23.1
	Mundane to Fascinating	6	21.4	6	22.2
	Unexciting to Exciting	4	29.1	4	34.2
	Means Nothing to Means a Lot	4	25.6	4	24.8
Engineering is . . .	Unappealing to Appealing	7	25.6	4	25.6
	Mundane to Fascinating	6	23.9	7	25.6
	Means Nothing to Means a Lot	7	27.4	7	24.8
	Unexciting to Exciting	6	17.9	4	25.6
	Boring to Interesting	6	21.4	5	23.1
Technology is . . .	Unappealing to Appealing	1	35.0	1	32.5
	Means Nothing to Means a Lot	1	37.6	1	25.6
	Boring to Interesting	1	29.1	1	24.8
	Unexciting to Exciting	1	35.0	1	29.1
	Mundane to Fascinating	7	22.2	4	20.5
Agriculture is . . .	Mundane to Fascinating	7	28.2	7	29.1
	Unappealing to Appealing	7	23.1	7	26.5
	Unexciting to Exciting	7	26.5	7	30.8
	Means Nothing to Means a Lot	7	27.4	7	26.5
	Boring to Interesting	7	44.4	7	41.9

Note. Scale of 1 to 7. [a]Percentage of correspondents selecting the mode.

Research Objective 3: Identify SBAE students' career interest in STEM prior to and after being taught using a sustainable bioenergy curriculum.

In addition to STEM and agriculture content interest, we sought to evaluate career interest in STEM and agriculture. To accomplish this goal a seven-point scale was used across five sematic scales for *A Career in STEM is* and *A Career in Agriculture is* (see Table 4). Although the mode remained consistent across the STEM career sematic scales, the percentage of students selecting the mode increased. The sematic scales for a career in agriculture remained consistent except for a change in mode from six to seven for *means nothing* to *means a lot* and a change from seven to four for the range of *unexciting to exciting*.

Table 4

*SBAE Student Agriculture and STEM Semantic Ratings (*n *= 117)*

Item Stem	Semantic Scale	Before		After	
		Mode	%[a]	Mode	%[a]
A Career in	Boring to Interesting	4	20.5	4	27.4

STEM is. . .	Unappealing to Appealing	4	19.7	4	28.2
	Mundane to Fascinating	4	24.8	4	33.3
	Unexciting to Exciting	4	26.5	4	35.9
	Means Nothing to Means a Lot	4	25.6	4	27.4
A Career in Agriculture is . . .	Unappealing to Appealing	7	24.8	7	24.8
	Mundane to Fascinating	7	26.5	7	25.6
	Means Nothing to Means a Lot	6	21.4	7	21.4
	Unexciting to Exciting	7	19.7	4	25.6
	Boring to Interesting	7	21.4	7	20.5

Note. Scale of 1 to 7. [a]Percentage of correspondents selecting the mode.

Conclusions/Discussion/Implications/Recommendations

The immersive STEM educational experience provided to students within the context of the sustainable biofuels unit resulted in a statistically significant increase in students' knowledge (t = 12.23, $p < .001$). Further, the mean difference of student scores from pre-test to post-test increased by 3.89, resulting in a large effect size (d = .99). Based on these findings, it can be concluded that students' comprehension of STEM based practices were enhanced through the weeklong instruction in sustainable biofuels. Student scores from pre-test to post-test increased 15.6% on average indicating the immersive educational experience provided was effective in increasing understanding of STEM principles. Although student scores increased, the average post-test score of 62.6% indicates student knowledge is still lacking regarding their performance on the criterion-referenced exam. Further instruction is needed for students to gain a better understanding of sustainable biofuels principles, and application of said principles could enhance further acquisition of STEM-related skills. Since SBAE enhances STEM training and potential workforce development (McKim et al., 2017), additional efforts should be made to expand STEM learning activities and applications within the sustainable biofuels curriculum. However, the situated learning experience was still successful in enhancing students' current knowledge regarding STEM practices and sustainable biofuels. Perhaps an increase in STEM enhanced curriculum being delivered through SBAE programs following the framework presented by Roehrig et al. (2021) would further increase student knowledge gains and STEM practices (see Figure 1).

Moreover, student interest in science based on reported semantic scores increased across most items in the scale (4 of 5). Therefore, it can be further concluded that students' interest in science increased because of the instruction they received through the sustainable biofuels curriculum. Semantic scores for mathematics, technology, and agriculture neither increased nor decreased. Scores for semantic stems related to engineering decreased from pre-test to post-test. This supports the findings of Wang and Knobloch (2020) who found SBAE curriculum does not emphasize math, engineering, and technology as heavily as science. Perhaps additional curricular support and exposure to STEM principles is needed for students to experience an increase in interest and enthusiasm for those areas. This could be further enhanced using real-world problems and engineering design challenges as recommended by Roehrig et al. (2021). Student

enthusiasm was highest for agriculture, as reported in both pre- and post-test semantic scores, which is not surprising since students were enrolled in a SBAE class at the time of data collection. This supports the findings of Eck et al. (2023) who identified an increase in student interest in agriculture and its related careers when students are taught situated STEM learning within agriculture. Perhaps grounding STEM based skills in additional agricultural context would lead to higher student enthusiasm for mathematics, technology, and engineering as well, which might increase the interest in STEM and STEM-related careers (Gonzalez & Kuenzi, 2012), which could positively impact the human capital and sector-specific skills (Smith, 2010) needed for employability in these industries (Bandura, 1984; Becker, 1964; Schultz, 1971; Smith, 2010).

Further, the increase in student achievement (i.e., knowledge and comprehension) based on the criterion-referenced pre- and post-test provides an indication of their acquisition of sector-specific skills (Haynes et al., 2012; Smith, 2010; Zimmerman, 1999), thus, indicating enhancement of their human capital as it relates to STEM education. Since individuals prefer to acquire skills in areas that interest them (Smith, 2010), it can be inferred that as interest in STEM-related practices increases, so does their ability to build their sector-specific skills as they relate to STEM education. As such, students' reported scores related to the STEM semantic scale indicate their interest in and enthusiasm for agriculture and its related careers correlates to greater propensity to acquire skills in this area. Perhaps this increased interest in agriculture and agricultural careers is related to students being currently enrolled in an SBAE program, which lends itself to an increase in the interdisciplinary structure in which SBAE integrates STEM content (McKim et al., 2017; Swafford, 2018a).

Considering the goal of SBAE to be an educational content area to which workforce skills and content area growth can be facilitated in relation to STEM (Rothwell, 2013; Swafford, 2018a, 2018b), it becomes increasingly important that these STEM aspects span from precision agricultural techniques to drones and data analysis to meet the future workforce demands (USDA, 2023). Although the STEM-enhanced curriculum showed positive impacts regarding student content knowledge, a longer treatment experience is needed to impact students' long-term career interest in STEM and agriculture.

Recommendations for further research include expanding the scope of the study to include larger groups of students with additional analyses needed to compare factors impacting student learning such as program size, available educational resources, and community population. It is also recommended to include non-SBAE student populations to test the effectiveness of the curriculum and the impact of SBAE enrollment on STEM semantic scores. Longitudinal data collection would further help researchers and practitioners determine the impacts of STEM integration within SBAE and further validate the Conceptual Framework of Integrated STEM Education (Roehrig et al., 2021).

SBAE teachers should work to incorporate additional experiential learning activities, integrating STEM principles with particular focus on mathematics, technology, and engineering in an effort to increase SBAE student interest in these areas and career-specific human capital. SBAE teacher preparation programs should work to further connect STEM concepts to agricultural curriculum and complete SBAE program delivery, helping to increase secondary student completion rates

due to STEM awareness and interest (Watson et al., 2022). SBAE teachers, teacher preparation faculty, and stakeholders should consider the future workforce needs within the various agricultural sectors (USDA, 2023) and the STEM emphasis of those careers (NIFA, 2019) as they prepare and support SBAE teachers and students.

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Program Management and Planning Needs of Oklahoma School-Based Agricultural Education Teachers Based on Career Stage

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This study sought to determine the program management and planning needs of school-based agricultural education (SBAE) teachers in Oklahoma based on their career stage. A needs assessment was conducted with a sample of SBAE teachers from Oklahoma representing various stages of their careers. Needs of teachers were identified through an instrument containing 21 items related to program management and planning, and Ranked Discrepancy Scores (RDS) were used to determine the perceived level of need for each item. Overall, 20 of the 21 items were expressed as needs of SBAE teachers based on RDS. However, the findings suggest that the professional development needs of SBAE teachers in Oklahoma vary depending on their career stage. Early- and mid-career teachers identified all 21 items as needs while the order between the groups varied. Late-career teachers indicated that only 11 of the 21 items were needs in their career stage. These findings suggest that professional development programs for SBAE teachers should be tailored to meet the specific needs of teachers at different stages of their careers. Teacher preparation faculty and SBAE stakeholders should consider these findings to align professional development offerings with the expressed needs of their teachers related to program planning and management.

Introduction

The ability to determine the professional development needs of school-based agricultural education (SBAE) teachers is a crucial undertaking for the profession: "In-service needs assessments have served as a beneficial tool to discover the needs and competencies of teachers within agricultural education" (DiBenedetto et al., 2018, p. 53). As SBAE teachers face mounting challenges in the classroom (Boone & Boone, 2009), and increased expectations related to the required characteristics to be an effective teacher (Eck et al., 2019), identifying the professional development needs of in-service teachers provides a critical baseline to equip teachers to meet the changing demands of the profession and continue to develop students' knowledge and skills (Sorensen et al., 2010). As such, the form and function of professional development take on an important role for enhancing teachers' competence (Borg, 2018), self-efficacy (Yang, 2020), and effectiveness (Bray-Clark & Bates, 2003).

DiBenedetto et al. (2018) identified managing a SBAE program, developing public relations, supervising student work-based learning projects, incorporating technology, and managing student behaviors as consistent needs among SBAE teachers. Several studies pointed to the needs of SBAE teachers in the area of FFA program management (DiBenedetto et al., 2018; Duncan et al., 2006; Roberts & Dyer, 2004; Sorensen et al., 2010; Sorensen et al., 2014). Specifically, FFA award application preparation, fundraising, and supervising SAEs were identified as high-priority needs among SBAE teachers (DiBenedetto et al., 2018; Layfield & Dobbins, 2002). In their review of prior SBAE needs assessment literature, DiBenedetto et al.

(2018) found items related to program management have been consistent needs of SBAE teachers as indicated by needs assessments dating back to 1983.

Not only is professional development a key to teacher success, but the *type* of training provided to teachers impacts their continued development as well (Garet et al., 2001). Tailoring professional development activities to meet the specific needs of teachers likely impacts the perceived benefits of such (Garet et al., 2001; Lee, 2005). A teacher needs-based model for professional development has been found to increase teacher participation, engagement, and comprehension in professional development offerings (Lee, 2005). Garet et al. (2001) identified focusing on content, promoting active learning, fostering coherence, and focusing on teacher outcomes as key features of effective professional development. Their study also found that professional development activities which focused on specific and relevant content while considering teachers' experience level were most effective.

Moreover, Fessler (1992) described that the needs of teachers in the early stages of the teacher career cycle differed from those in the later periods, supporting the notion that teachers of varying career stages have different professional development needs as well. With this in mind, it has been found that differences among SBAE teachers exist regarding levels of experience (Figland et al., 2019) and their perceived competence in specific skills (DiBenedetto et al., 2018). Considering the impact these differences make on teacher effectiveness, special considerations should be given to the career stage of teachers when identifying their professional development needs (Figland et al., 2019, Layfield & Dobbins, 2002; Roberts et al., 2020, Roberts & Dyer, 2004; Sorensen et al., 2014; Washburn et al., 2001).

Early-career SBAE teachers are typically concerned with developing their own competencies (Roberts et al., 2020). As such, in prior research, early-career teachers identified professional development needs such as writing grant proposals, using a local advisory committee, navigating electronic record book systems, training career development events (CDEs), and work/life balance (Figland et al., 2019; Sorensen et al., 2014). Moreover, mid-career teachers were found to be more confident in their ability to carry out job tasks but desire greater proficiency in performing these duties (Roberts et al., 2020). Thus, previous needs identified by mid-career teachers included utilizing online record books, work/life balance, and program management among others (Sorensen et al., 2014). Finally, late-career teachers are more concerned with developing their network maintaining their efficiency (Roberts et al., 2020). To this end, prior studies have shown the professional needs of late-career teachers include such items as organizational skills, time management, and time with family (Figland et al., 2019; Sorensen et al., 2014).

The aforementioned factors play a pivotal role in SBAE teacher effectiveness. Eck et al. (2021) discussed the connection between components of effective SBAE teachers, personal and professional characteristics, and the individual teacher's effectiveness. Specifically, career tenure (i.e., career phase) and intercurricular engagement were identified as areas of consideration within the *Effective Teaching Model for SBAE Teachers* (Eck et al., 2021). Intercurricular engagement encompasses the complete SBAE program (Eck et al., 2021), aligning with program planning and management within SBAE. While these connections have been made, the need for

continual evaluation and development continue within SBAE, especially considering the benefit of tailored professional development (Garet et al., 2001).

Despite the number of needs assessments conducted within the field of SBAE over the past four decades (DiBenedetto et al., 2018), research suggests that needs of in-service teachers vary based on geographical location (Roberts & Dyer, 2004; Washburn et al., 2001). As such, it is appropriate to conduct needs assessment in the context of the state's specific SBAE expectations and standards (Washburn et al., 2001). This becomes even more evident when considering the specific needs related to program management and planning. Therefore, examining the specific needs of Oklahoma SBAE teachers is not only warranted but encouraged by prior literature.

Theoretical Framework

The theoretical framework for this study was based on human capital theory. As individuals invest in themselves, they acquire knowledge, skills, and training which makes them more employable (Becker, 1964; Little, 2003; Shultz, 1971; Smith, 2010; Smylie, 1996). As such, the development of sector-specific skills improves prospective employees' appeal to certain types of employers, thus increasing their human capital (Smith, 2010). The same is true for teachers who develop specific skills related to the field of teaching (Myung et al., 2013). As teachers progress over the course of their careers, their skillsets improve through the implementation of systems meant to assist them in acquiring, developing, sustaining, and evaluating their abilities within the field (Myung et al., 2013).

Further, Smith (2010) found that as individuals engaged in work they enjoyed, their skillsets became more specialized within that work. Thus, the job-specific tasks related to teaching can be enhanced through the teacher's innate interest in their work (Autor et al., 2003). The development of teachers through professional development is a crucial aspect of the development of their teaching specific human capital (Myung et al., 2013). Annually, schools in the United States invest more than $18 billion on professional development opportunities for their teachers (Horn & Goldstein, 2018). To maximize the effectiveness of this investment in teachers' human capital, Myung et al. (2013) suggested providing individualized professional development based on the individual needs of teachers. Within SBAE, these needs become more individualized than those offered by the school or district considering the complete SBAE program (i.e., classroom/laboratory instruction, FFA advisement, and SAE management) and the teacher's effectiveness across these components (Eck et al., 2021).

Purpose and Objectives

Considering the differences in professional needs for beginning teachers and experienced teachers (Figland et al., 2019; Roberts et al., 2020; Sorensen et al., 2014), a demand exists to identify the professional development needs of SBAE teachers across career stages. Therefore, the study's purpose was to identify and compare the program management and planning needs of early-, mid-, and late-career SBAE teachers in Oklahoma. Two objectives guided the study:

1. Identify the self-perceived program management and planning needs for early-, mid-, and late-career SBAE teachers in Oklahoma.
2. Compare the program management and planning needs of Oklahoma SBAE teachers of all career stages (i.e., early-, mid-, and late-career) based on ranked discrepancy scores (RDS).

Methods

This study was part of a larger research project [Rankin et al., 2023]. This non-experimental survey research study employed a census approach to reach all Oklahoma SBAE teachers ($N = 462$). To achieve this goal, data was collected in-person at 25 regional FFA degree checks across the state. In Oklahoma, all teachers attend FFA degree checks in their designated region over a two-week period in late January and early February. The research team traveled the state to provide an overview of the needs assessment, distribute the survey instrument and collect completed hand-written questionnaires. Three-hundred and thirty-eight Oklahoma SBAE teachers returned a survey questionnaire, resulting in a 73.2% response rate. Incomplete survey questionnaires were excluded, resulting in 323 completed instruments for data analysis.

Although this study resulted in a 73.2% response rate, non-response error is still of concern, given the census approach design. Therefore, 55 survey instruments were mailed, along with a cover letter and pre-paid return addressed envelope to Oklahoma SBAE teachers who did not attend the state degree checks. The 55 Oklahoma SBAE teachers who received the questionnaire did not have a chance to complete the instrument at the degree checks due to weather related cancelations or travel limitations. This effort resulted in five non-respondents completing and returning the survey instrument to the research team.

The average years of teaching experience among participants was 11.13. One hundred forty-eight participants indicated they had between one and seven years of teaching experience while 134 had between eight and 23 years of experience. Forty-four participants had 24 or more years of experience. Further, 60% of teachers taught in a single teacher program, 259 were traditionally certified in agricultural education, seven were traditionally certified teachers in content areas other than agriculture, 48 were alternatively certified, and 9 were emergency certified. Seventy-one percent of participants were male, 247 were white, 56 were Native American, three were Hispanic, and two were African American. In addition, 98% of participants indicated they had been enrolled in SBAE as a student. Table 1 displays the demographics of the study's participants.

Table 1

Personal Characteristics of Oklahoma School-Based Agricultural Education (SBAE) Instructors Who Responded to the Survey (n=*325)*

Characteristics	*f*	%
Sex		

Female	92	28.30
Male	230	70.78
Prefer to not respond	3	0.92
Ethnicity		
Asian	1	0.30
Black or African American	2	0.61
Hispanic or Latino	3	0.92
Native American	56	17.23
White	247	76.00
Prefer to not respond	16	4.92
Years of Experience		
1 to 7	148	45.40
8 to 23	134	41.10
24+	44	13.50
Program Size		
Single Teacher	196	59.60
Multiple Teacher	129	39.20
Prefer to not respond	4	0.01
Teaching Area		
Central	80	24.60
Northeast	51	15.80
Northwest	61	18.80
Southeast	85	26.10
Southwest	48	14.70
Education		
B.S.	244	75.08
MS/MEd/MAg	78	24.01
EdD/PhD	1	0.30
Prefer to not respond	2	0.61
College/University Attended		
Oklahoma State University	255	78.46
Other	70	21.54
Youth Organization Membership		
4-H	250	76.00
FFA	322	97.90
< 2 years	7	2.10
3 years	12	3.60
4 years	171	52.00
5 < 6 years	125	38.00
Teacher Certification		
Traditional Agricultural Education	259	79.69
Traditional, other	7	2.15
Alternative Certification	48	14.78

Emergency Certification	9	2.77
Prefer to not respond	2	0.61

Instrumentation

The questionnaire was developed by Roberts and Dyer (2004) and modified by Saucier et al. (2010), Figland et al. (2019), and Coleman et al. (2020). The instrument was adopted and further modified for this study to fit the needs of Oklahoma SBAE teachers. A panel of experts then reviewed the instrument for face and content validity. This panel included (a) one university faculty member of agricultural education, (b) the state FFA advisor, (c) one regional agricultural education program specialist, and (d) two school superintendents who were previously SBAE teachers. Items were adjusted for clarity and general readability.

Twenty-one items related to program management and planning were included in the category that assessed program management and planning needs. To assess the level of need for each item, two 5-point agreement scales (*1 = low agreement, 5 = high agreement*) were used to identify the participants' level of knowledge for the item and their perceived level of the item's relevance to their current SBAE teaching position. The final section of the questionnaire focused on their personal characteristics (years teaching agriculture, region of state, number of teachers in their department, grade levels taught, path to certification, highest degree, college major(s), sex, ethnicity, etc.). Table 2 displays the items included in the study's instrument related to program management and planning.

Table 2

SBAE Program Management and Planning Items

Program Management and Planning Items
Chapter Budgeting
Chapter Fundraising
Collaborating with teachers in other subjects
Completing FFA agriscience fair award application
Completing FFA national chapter award application
Completing FFA online membership roster
Completing FFA proficiency award application
Conducting parent/teacher conferences
Developing a complete agricultural education program (3 circle model)
Developing business and community relationships
Developing FFA Program of Activities
Developing SAE opportunities for students
Evaluating the local program
General strategies for coaching Career Development Events (CDEs/LDEs)
Organizing program support groups (FFA Alumni, booster club, etc.)

Preparing reports for administrators
Repairing agriculture tools and equipment
Selecting course offerings/content to fit the needs of students and the community
Supervising SAE programs
Using a local advisory committee
Utilizing Ag Experience Tracker (AET)

Data Analysis

All data were transcribed from the paper instruments to Microsoft Excel© by a single research assistant prior to data being imported and analyzed using SPSS version 28 and Microsoft Excel©. This study implemented the ranked discrepancy model (RDM) to assess current competencies of SBAE teachers across Oklahoma. This model was selected as an alternative to the Borich (1980) needs assessment model based off the findings of Narine and Harder (2021). Specifically, this method was selected because "instead of positive scores indicating a lack of competence, the RDM provides a negative RDS when training needs are greater (i.e., there are many individuals lacking sufficient ability and few individuals with an abundance of ability), which more clearly conveys that a problem exists that should be corrected" (Narine & Harder, 2021, p. 108). This analysis requires the consideration of positive ranks (PR), negative ranks (NR), and tied ranks (TR) to fully understand the needs of the participants, ranging from those deemed experts to others who are novices, resulting in a ranked discrepancy score (RDS) for each item (Narine & Harder, 2021). For the purpose of this study, teaching experience was categorized into three groups based on the suggestion of Thornton et al. (2020): (a) early-career (one to seven years of experience), (b) mid-career (eight to 23 years of experience), and (c) late-career (24 or more years of experience).

Findings

Overall, 20 of the 21 items related to program management and planning achieved negative RDS, indicating a discrepancy exists between SBAE teachers' perceived level of knowledge and their self-reported relevance for a given item. The RDS for these 20 items ranged from -27.96 to -1.52, with negative numbers furthest from zero indicating a larger discrepancy, thus a greater need. The five greatest needs identified by teachers across all career stages were completing FFA proficiency award applications (-27.96), completing FFA agriscience fair award applications (-21.58), completing FFA national chapter award applications (-18.85), chapter fundraising (-15.20), and chapter budgeting (-14.59). The single item to achieve a positive RDS was completing FFA online membership roster (12.77), indicating individuals' knowledge levels surpassed their perceived relevance for this item. Table 3 displays the overall ranked discrepancy scores (RDS) for program management and planning needs of Oklahoma SBAE teachers.

Table 3

*Ranked Discrepancy Scores for Program Management and Planning Needs of Oklahoma SBAE Teachers (*n=*325)*

Rank	Item	RDS
1	Completing FFA proficiency award application	-27.96
2	Completing FFA agriscience fair award application	-21.58
3	Completing FFA national chapter award application	-18.85
4	Chapter Fundraising	-15.20
5	Chapter Budgeting	-14.59
6	Supervising SAE programs	-12.16
7	Developing a complete agricultural education program (3 circle model)	-11.55
8	Developing business and community relationships	-10.94
9	Organizing program support groups (FFA Alumni, booster club, etc.)	-10.33
10	Repairing agriculture tools and equipment	-10.33
11	Developing SAE opportunities for students	-9.73
12	Using a local advisory committee	-9.73
13	Preparing reports for administrators	-9.12
14	Utilizing Ag Experience Tracker (AET)	-9.12
15	General strategies for coaching Career Development Events (CDEs/LDEs)	-8.51
16	Conducting parent/teacher conferences	-8.21
17	Collaborating with teachers in other subjects	-7.90
18	Developing FFA Program of Activities	-7.30
19	Evaluating the local program	-6.38
20	Selecting course offerings/content to fit the needs of students and the community	-1.52
21	Completing FFA online membership roster	12.77

Early-career teachers (n = 148) indicated a need for all 21 items with a RDS range of -31.08 to -0.68. The five greatest program management and planning needs identified by early-career teachers based on RDS were completing FFA proficiency award applications (-31.08), completing FFA national chapter award applications (-22.30), completing FFA agriscience fair award applications (-21.62), chapter budgeting (-19.60), and developing a complete agricultural education program (-16.22). The five items with the largest RDS indicating the were of the lowest need for early-career teachers were conducting parent/teacher conferences (-6.76), developing business and community relationships (-6.081), using a local advisory committee (-6.08), evaluating the local program (-4.73), and selecting course offerings/content to fit the needs of students and the community (-.068). Table 4 displays the ranked discrepancy scores for program management and planning needs of early-career SBAE teachers in Oklahoma.

Table 4

Ranked Discrepancy Scores for Program Management and Planning Needs of Early-Career SBAE Teachers in Oklahoma

Rank	Item	RDS
1	Completing FFA proficiency award application	-31.08

2	Completing FFA national chapter award application	-22.30
3	Completing FFA agriscience fair award application	-21.62
4	Chapter Budgeting	-19.60
5	Developing a complete agricultural education program (3 circle model)	-16.22
6	Chapter Fundraising	-15.54
7	Developing SAE opportunities for students	-14.87
8	Completing FFA online membership roster	-13.51
9	Repairing agriculture tools and equipment	-12.16
10	Supervising SAE programs	-10.81
11	Utilizing Ag Experience Tracker (AET)	-10.81
12	Developing FFA Program of Activities	-9.46
13	General strategies for coaching Career Development Events (CDEs/LDEs)	-8.78
14	Organizing program support groups (FFA Alumni, booster club, etc.)	-8.78
15	Collaborating with teachers in other subjects	-7.43
16	Preparing reports for administrators	-7.43
17	Conducting parent/teacher conferences	-6.76
18	Developing business and community relationships	-6.08
19	Using a local advisory committee	-6.08
20	Evaluating the local program	-4.73
21	Selecting course offerings/content to fit the needs of students and the community	-0.68

Similarly, mid-career teachers (n = 134) indicated a need for all program management and planning items as well with a RDS range of -34.33 to -4.48. The top five needs for mid-career teachers according to RDS were completing FFA proficiency award applications (-34.33), completing FFA agriscience fair award applications (-26.87), completing FFA national chapter award applications (-22.39), chapter fundraising (-19.40), and developing business and community relationships (-15.67). The five lowest needs for mid-career teachers by RDS were developing SAE opportunities for students (-8.96), repairing agricultural tools and equipment (-8.21), conducting parent/teacher conferences (-7.46), developing FFA Program of Activities (-6.72), and selecting course offerings/content to fit the needs of students and the community (-4.48). Table 5 displays the ranked discrepancy scores for program management and planning needs of mid-career SBAE teachers in Oklahoma.

Table 5

Ranked Discrepancy Scores for Program Management and Planning Needs of Mid-Career SBAE Teachers in Oklahoma

Rank	Item	RDS
1	Completing FFA proficiency award application	-34.33
2	Completing FFA agriscience fair award application	-26.87
3	Completing FFA national chapter award application	-22.39
4	Chapter Fundraising	-19.40

5	Developing business and community relationships	-15.67
6	Using a local advisory committee	-15.67
7	Chapter Budgeting	-14.93
8	Completing FFA online membership roster	-14.93
9	Organizing program support groups (FFA Alumni, booster club, etc.)	-14.93
10	General strategies for coaching Career Development Events (CDEs/LDEs)	-13.43
11	Supervising SAE programs	-12.69
12	Utilizing Ag Experience Tracker (AET)	-12.69
13	Preparing reports for administrators	-11.94
14	Developing a complete agricultural education program (3 circle model)	-11.19
15	Evaluating the local program	-9.70
16	Collaborating with teachers in other subjects	-8.96
17	Developing SAE opportunities for students	-8.96
18	Repairing agriculture tools and equipment	-8.21
19	Conducting parent/teacher conferences	-7.46
20	Developing FFA Program of Activities	-6.72
21	Selecting course offerings/content to fit the needs of students and the community	-4.48

Finally, late-career teachers (n = 44) identified 11 items as needs based on RDS (-13.64 to -2.27). Three items achieved a RDS of 0.00, and seven items had a positive RDS (2.27 to 6.82). The five greatest needs identified by late-career teachers included conducting parent/teacher conferences (-13.64), supervising SAE programs (-13.64), developing business and community relationships (-11.36), repairing agriculture tools and equipment (-11.36), and completing FFA agriscience fair award applications (-9.09). The five items with the highest RDS indicating a lower need were completing FFA national chapter award application (4.55), developing SAE opportunities for students (4.55), general strategies for coaching Career Development Events (4.55), selecting course offerings/content to fit the needs of students and the community (6.82), and utilizing Ag Experience Tracker (6.82). Table 6 displays the ranked discrepancy scores for program management and planning needs of late-career SBAE teachers in Oklahoma.

Table 6

Ranked Discrepancy Scores for Program Management and Planning Needs of Late-Career SBAE Teachers in Oklahoma

Rank	Item	RDS
1	Conducting parent/teacher conferences	-13.64
2	Supervising SAE programs	-13.64
3	Developing business and community relationships	-11.36
4	Repairing agriculture tools and equipment	-11.36
5	Completing FFA agriscience fair award application	-9.09
6	Collaborating with teachers in other subjects	-6.82

7	Preparing reports for administrators	-6.82
8	Completing FFA online membership roster	-2.27
9	Completing FFA proficiency award application	-2.27
10	Evaluating the local program	-2.27
11	Using a local advisory committee	-2.27
12	Chapter Fundraising	0.00
13	Developing FFA Program of Activities	0.00
14	Organizing program support groups (FFA Alumni, booster club, etc.)	0.00
15	Chapter Budgeting	2.27
16	Developing a complete agricultural education program (3 circle model)	2.27
17	Completing FFA national chapter award application	4.55
18	Developing SAE opportunities for students	4.55
19	General strategies for coaching Career Development Events (CDEs/LDEs)	4.55
20	Selecting course offerings/content to fit the needs of students and the community	6.82
21	Utilizing Ag Experience Tracker (AET)	6.82

Conclusions, Implications, and Recommendations

The study's findings indicate that across career stage, Oklahoma SBAE teachers identified 20 of the 21 items associated with program management and planning as needs based on their RDS. Teachers expressed a discrepancy between their perceived knowledge level and the level of relevance they placed on the item, thus indicating a need to improve their knowledge in these areas. Based on these findings, it can be concluded that SBAE teachers across career stages are continuing to build their sector-specific human capital in the area of program management and planning, supporting Smith's (2010) notion that individuals develop skills in areas that interest them. In addition, this aligns with Eck et al.'s (2021) findings that SBAE teachers aim to increase their overall teaching effectiveness by developing career specific skills.

It can be further concluded that early-career teachers need additional support in areas related to supporting a complete, comprehensive SBAE program, yet do not place as much value on the need for fundraising when compared to Oklahoma SBAE teachers at large. The specific needs identified by early-career teachers in Oklahoma support previous findings by Figland et al. (2019) and Sorenson et al. (2014), yet not as much priority was placed on using a local advisory committee, navigating electronic record book systems, training CDEs, and work/life balance. Mid-career teachers identified four of the five needs early-career teachers did, but valued program fundraising at their current career stage instead of focusing on complete program success. Regardless, FFA award applications and fundraising were previously identified as high-priority needs (Layfield & Dobbins, 2002). Furthermore, the differing needs between early- and mid-career teachers align with previous research recommending differing professional development based on career stage (Figland et al., 2019, Layfield & Dobbins, 2002; Roberts et al., 2020, Roberts & Dyer, 2004; Sorensen et al., 2014; Thornton et al., 2020; Washburn et al., 2001).

Late-career teachers needs differed greatly from those of early- and mid-career teachers, as their RDS scores resulted in less need overall, but still identified needs beyond applications and fundraising (i.e., parent/teacher conferences, supervising SAE programs, developing business and community relationships, and repairing agriculture tools and equipment). These needs align with those of other late-career SBAE teachers who were more concerned with developing their network and maintaining their efficiency (Roberts et al., 2020). Could it be that late-career teachers work to establish routines and school/community connections to ease the transition for an early-career teacher who is focused on developing their own competencies (Roberts et al., 2020) as they take over an established program? Perhaps late career teachers view themselves as effective teachers who have an opportunity to focus on components of the complete program (Autor et al., 2003) that are often lower on the priority list as an early career teacher aiming to develop career specific human capital (Smith, 2010). Future considerations should be given to tenure in teachers current school/position, as that could potentially impact the program management and planning needs of teachers.

Late-career teachers identified their top two needs as conducting parent/teacher conferences and supervising SAE programs, while these two items were found in the second half of the RDS list for early and mid-career teachers. Perhaps late-career teachers feel a greater disconnect to students and parents due to increasing generational differences, ultimately impacting relationship building with students and parents. In addition, recent revision to SAE programs and standards (National FFA Organization, 2024) could leave late-career SBAE teachers feeling less efficacy to help students plan and manage SAE projects.

The results of the study represented the views of 73.2% of teachers in Oklahoma; therefore, the results can be generalized to the greater population of SBAE teachers in Oklahoma. However, it is recommended that the study be replicated in additional states and that the instrument be customized to meet the programmatic and cultural needs of those states. Replication using this instrument, and dissemination of results across states and regions, would allow for needs to be clearly compared across studies (Narine & Harder, 2021). Although specific needs were identified among SBAE teachers in Oklahoma regarding program management and planning, further research is needed to identify the preferred method, delivery, and potentially location of professional development events. Moreover, research should continue to evaluate teachers needs as the educational climate continues to change. Given the state specific nature of most professional development offerings, conducting needs assessments on a state level provides greater opportunities for increased teacher human capital (Myung et al., 2013).

Based on the results of the study, we recommend that professional development be offered according to specific career stage. Doing so could potentially address the apparent gaps in knowledge for members of the profession specifically related to their progress in the profession, likely keeping them more engaged with the content being presented. Further, we recommend that the results of this study be used by state staff to align professional development offerings with the expressed needs of their teachers. Such efforts could increase attendance and encourage teachers of all career stages engage with relevant professional development opportunities. Future research should consider the impact of purposeful professional development offerings focused on program management and training considering the career

stage of participants. A qualitative inquiry could help to further explain the differing needs between SBAE teacher career phases.

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A Critical Case Study of Secondary Students' Perceptions of Queerness, Social Positionalities, and School Culture in a Southern Rural High School

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Secondary schools in the United States are often cited as hostile environments for queer and transgender students. Rural schools often pose greater challenges for queer students with fewer accepting and affirming educators and communities. School-based agricultural education (SBAE) and National FFA Organization programs are often found in rural schools and have been cited as unwelcoming environments for minority students. Schools have begun to address hostile school cultures through ensuring students have access to Genders and Sexualities Alliance (GSA) clubs. This qualitative case study sought to share the intersectional lived experiences of high school students with access to FFA and GSA programs and the impacts each organization has on school culture. Findings depicted a lack of administrative intervention and guidance created a hostile environment for queer and transgender students. Recommendations from this work include (1) revising the school's protective policies, (2) providing professional development for educators to better protect queer students, and (3) reimagining pre-service teacher programs to better prepare educators of all disciplines.

Introduction and Literature Review

There exists an urgent need to create safe and affirming schools for lesbian, gay, bisexual, transgender, queer, questioning, intersex, and asexual students (LGBTQIA+). Society has historically viewed and constructed heterosexuality as superior to homosexuality through biased psychological research, religion, and political favorability toward heterosexuality (Meyer, 2007). These views of inferiority towards queerness persist today, with over 510 anti-LGBTQ bills introduced and/or passed into state and federal legislation in 2023 alone (ACLU, 2023).

Two large influences on the homophobic school cultures in the United States identified in the literature are heteronormativity and heterosexism. Heteronormativity broadly refers to the way society views: (a) heterosexual orientations as preferred or normal sexual orientation, (b) gender identities as binary (i.e., masculine males and feminine females), and (c) marriage is only acceptable in a monogamous, heterosexual relationship (Bishop & McClellan, 2016; Forrest, 2006; Gegenfurtner & Gebhardt, 2017; Ward & Schneider, 2009). Normalizing heterosexual, cisgender identities situate sexual and/or gender minorities as immoral, abnormal, or unnatural (Gegenfurtner & Gebhardt, 2017). Heteronormative cultures are especially problematic as, "these behaviors act to create and support a social hierarchy that privileges mainstream [heterosexual, cisgender] identities and behaviors over marginalized ones" (Meyer, 2007, p. 16).

Rural areas often pose greater challenges for individuals who identify as LGBTQIA+ (Gottschalk & Newton, 2009). Rural schools uphold more "traditional" (i.e., heterosexual, cisgender), conservative, and religious viewpoints and values; and queer teachers and youth suffer at the expense of a safe and inclusive environment because of it (Lee, 2019). Rural teachers have been found to feel less comfortable compared to suburban and urban teachers

working with queer students (Page, 2017). Additionally, individuals who identify in the queer community share feelings of loneliness and isolation because there are typically fewer queer individuals in rural spaces (Holman & Oswald, 2016). Given the climate of rural areas, queer youth are at a greater chance to face hostility and homophobia and will therefore face greater challenges because of being out in their school (Kosciw et al., 2014).

Although much is known about rural schools, little is known about how these homophobic and transphobic cultures in rural areas embed themselves into secondary school-based agricultural education (SBAE) programs. Minimal scholarship has been put forth in the agricultural education discipline regarding queer individuals, queer youth, and "multidimensional accounts of LGBTQ life" (Murray et al., 2020, p. 310). While the National FFA Organization (FFA) prides itself on developing leaders and "[making] a positive difference in the lives of students" (National FFA Organization, 2023, FFA Mission Section), several studies have noted it may not be the case for all students. Most notably, studies have found barriers to the inclusion of BIPOC (Black, Indigenous, People of Color) students within the FFA (Barajas, 2021; Barajas et al., 2020; Elliott & Lambert, 2018; Vincent & Austin, 2021). One of these studies also found SBAE students in Kentucky were uncomfortable with gay students enrolling in the FFA (Vincent & Austin, 2021). Therefore, it is of interest to explore the strengths and weaknesses of the FFA in addressing the needs of queer students in a rural Kentucky school.

In addition to supportive staff members, one of the most impactful supports provided to queer students to create safer school environments is providing access to a Genders and Sexualities Alliance (GSA) club (Kosciw et al., 2013, 2022; Steck & Perry, 2016). GSAs "create valuable and necessary spaces for LGBTQ+ youth and their allies to exist, dream, connect, affirm each other, and lead in safe environments without hindrances" (Truong et al., 2021, ix). While the actual number of clubs fluctuates year-to-year, over one-third of queer youth now report having access to a GSA or similar organization in their school (Mayo, 2013). Regardless of individual involvement with the GSA in the school, the presence of such an organization has been associated with more positive teacher attitudes toward queer students (Swanson & Gettinger, 2016) and an overall greater sense of school-belonging (Kosciw et al., 2022).

Two youth organizations (FFA and GSA) arose in the literature as influential to student experiences and school climate. The literature depicts the positive influence GSAs can have on queer youth and homophobic/transphobic school cultures. However, there is no literature to explain the impact of FFAs on queer youth and homophobic school cultures (Murray et al., 2020). Additionally, no scholarship exists exploring a school culture where these two organizations are present. Research is needed to explore the lived experiences of youth engaged in these two organizations to explain the complexities of rural school cultures.

Theoretical Frameworks

From a critical paradigm, the researcher believes research "has an ethical obligation, such as helping to emancipate or liberate those who find themselves in situations that are immoral, unfair, unethical, violent, or generally 'not nice'" (Tracy, 2020, p. 53). Therefore, two critical theories (intersectionality and queer theory) were chosen to design and guide this work. While both theories are fundamentally different in their theoretical assumptions, each provide an

opportunity to bring attention to and critique the various ways marginalized people experience oppression.

Intersectionality

Intersectional perspectives consider how socially constructed systems (e.g., race, gender, class, sexuality, nationality, etc.) intersect and shape individual experiences, rather than considering each system in an additive model (Misra et al., 2020). Intersectional perspectives are founded on the experiences of Black women who highlighted how individuals can experience multiple forms of oppression simultaneously (Collins, 2015; Crenshaw, 1991). Specifically, Black women critiqued both anti-racist and feminist movements in the 1960s and 1970s as only focusing on the experiences of Black men and White women, respectively (Crenshaw, 1991; Combahee River Collective, 1977; Harris & Patton, 2019). Considering the complexities of intersectionality, "there is not just *one way* to do intersectional empirical research" (Misra et al., 2020, p. 2). However, intersectionality is commonly implemented as a field of study, an analytical strategy, and a form of critical praxis (Collins, 2015). As a field of study, intersectionality allows explanations for the origins of social justice movements by examining characteristics of power structures. As an analytical strategy in this work, intersectionality allowed the researcher to study "how intersecting identities produce distinctive social experiences for specific individuals and social groups, to claims that intersectionality constitutes a feminist theory that deals with issues of identity" (p. 12). As a critical praxis, this work also critiqued social injustices shared by participants to highlight the complexity of their experiences and propose liberatory change.

Queer Theory

Queer theory is founded on the concept of *non-normativity*, or the idea of deconstructing what is considered the *norm* (Henderson, 2019). Queer theory believes the *norm* is socially constructed the same as *othering* is socially constructed in similar critical theories (e.g., Critical Race Theory, Feminist Theory). Categories typically *othered* include race, gender, sexual orientation, disability, and class which have all been treated as *non-normative* in society. Queer theory calls into question the establishment of normalcy in such identity categories (Henderson, 2019). Specifically, queer theorists seek to disrupt the accepted binarism (e.g., heterosexual-homosexual, male-female, cisgender-transgender) of identity and the structures which privilege certain identities over others (Tierney & Dilley, 1998). This challenge to binary identity structures is known as *deconstruction.* Disrupting the normalcy of identity offers opportunities for education researchers to ask new questions and recontextualize existing knowledge (Britzman, 1995). Queer studies in educational research allow scholars to provide educators with ways to best support queer and questioning students while highlighting the ways discrimination based on binary identities harms all students (Meyer, 2007).

Intersectional and Queer Framework

Utilizing both queer theory and intersectionality in the same framework produces a unique and powerful explanation of phenomena related to queerness. Intersectionality identifies the various interlocking systems of oppression coexisting in society and shifts away from oppression only occurring on an individual basis (Collins, 2015; Crenshaw, 1991). From an intersectionality perspective, the researcher identified various groups who experience oppression, including queer people. Queer theory furthers this notion of systemic oppression by challenging the very identities used to signify forms of oppression. Queer theory challenges assumptions based upon

binary representations of sexuality and gender identity/expression which constrict queer expressions, identities, and beliefs to what is societally *accepted* or *normalized*.

Purpose and Research Question

Given SBAE programs have been found to marginalize the queer community (Vincent & Austin, 2021), whereas GSA programs can empower queer youth (Mayberry, 2022), it is of interest to research the impact of these two programs on queer students when they coexist in one school. There is also a need to "center more multidimensional accounts of LGBTQ life and critically envision a future for LGBTQ youth research in agricultural education" (Murray et al., 2020, p. 310). This qualitative case study will provide an opportunity to explain the experiences of queer students who are enrolled, or exposed to, SBAE and FFA in a rural high school. This study was guided by one overarching research question: How do students view the overall school culture toward the queer community?

Methodology

This study employed a qualitative, case study approach. Given the interest in two of the youth organizations at the school (the case), a *nested* (Starman, 2013) or *embedded* (Yin, 2018) case study was designed to investigate the sub-elements of the whole case. This specific case was chosen given the uniqueness of both organizations (FFA and GSA) being in the same comprehensive high school. It was difficult to locate such a case during site selection, which would suggest an atypical, unique case worthy of study (Stake, 1995; Starman, 2013).

Researcher Positionality and Reflexivity

To best contextualize the methods employed in the study, the researchers acknowledge the influence of personal research paradigms and social positionalities. This research was designed and implemented from a critical (Tracy, 2020) or critical theory (Guba & Lincoln, 1994) paradigm. From this worldview, we believe knowledge is fundamentally tied to power and cannot be separated from the institutions which create and disseminate knowledge (Tracy, 2020). Further, critical paradigms emphasize the way institutions and systems have shaped the construction of knowledge historically; therefore, critical research aims to critique and transform the "social, political, cultural, economic, ethnic, and gender structures that constrain and exploit humankind, by engagement in confrontation, even conflict" (Guba & Lincoln, 1994, p. 113). Through critical paradigms and research, restitution can be made over time to liberate individuals from oppressive systems.

Site and Participant Descriptions

Before searching for a research site, the researcher and their committee set selection criteria to allow the investigation of the research questions (Stake, 1995). The two criteria were: (1) the site must be a comprehensive public high school (i.e., not a magnet school or career center), and (2) the site must have both an FFA and GSA chapter in the school. The site selected met the two criteria and resided in a rural county of Kentucky (2020 Census). Additionally, the site was representative of the demographics of most high schools in Kentucky with 1,500 students enrolled that mostly were White, non-Hispanic students (87.5%) and qualified for free/reduced lunch (51.7%; Kentucky Department of Education, 2023).

Given the nature of the study working with two vulnerable populations (youth and queer individuals), a full-board review was conducted by the University of Kentucky IRB. Site access as well as parental consent/student assent or participant consent were obtained prior to data collection. Several measures were added to the study to ensure the protection of the participants including anonymous reporting of the findings. To provide anonymity and confidentiality, participants' names were randomly assigned gender-neutral pseudonyms (Creswell & Creswell, 2018; Tracy, 2020). Names toward the front of the alphabet (A & B) were members of the FFA, while names toward the end of the alphabet (O-V) were members of the GSA. Additionally, the name and location of the school have been redacted from the study to provide further anonymity.

In total, four focus groups were conducted in this study. There was no selection process to participate and participants were divided based on their respective organizations. After the collection of consent and assent, 25 students were invited to the focus groups. The researcher organized each focus group randomly into six to seven participants, as recommended by Tracy (2020). Unfortunately, five participants did not attend the focus group discussions due to absence (n = 1), illness (n = 1), and no reason given (n = 3). Table 1 provides a more descriptive breakdown of each focus group in chronological order.

Table 1.
Focus Group Participants

Focus Group	Club	Number of Participants	Pseudonyms
1	FFA	6	Adrian, Alex, Andy, Ashton, Aspen, Avery
2	GSA	7	Owen, Parker, Peyton, Presley, Reagan, Reed, Reese
3	FFA	3	Bailey, Blair, Blake
4	GSA	4	Riley, Shawn, Skylar, Val

Data Collection
Several methods were utilized to collect data to describe the case at the "micro (interactional), meso (organizational), and macro (societal/cultural) levels" (Tracy, 2020, p. 61). Data collection methods included an observation of a regular meeting with each organization and two focus group interviews with each organization in November 2022. In total, two observations and four focus group interviews were conducted. Observation methods were employed as the case study design allowed for real-world settings to be investigated and provided complimentary explanations to interviews for describing the scene (Yin, 2018). In line with recommendations from Tracy (2020), raw notes were taken during each field visit which were expanded into detailed fieldnotes within 36 hours of each field visit.

Focus groups were selected as they helped depict group interactions relevant to the research question (Tracy, 2020) and could add a protective factor for students to feel more comfortable sharing experiences with outside researchers (Gill et al., 2008). The focus groups were semi-structured in nature to allow for a discussion-based format and more organic conversation (Kvale, 1996). Each focus group followed an interview protocol reviewed by faculty members and graduate students from three colleges in two different institutions who were familiar with qualitative education research, secondary teaching, and/or SBAE (Kvale, 1996). Audio recordings were taken during the interviews and were later hand-transcribed by the researcher.

Fieldnotes (e.g., comments, questions, and notes about the responses) were also added to each transcription to contextualize the interviews for future reference (Tracy, 2020).

Data Analysis

The researcher organized all potential data sources chronologically following the closure of data collection to prepare for data analysis. A two-cycle coding process (Tracy, 2020) guided data analysis for the study. During the primary cycle of coding, the researcher utilized initial/open coding methods to break down data into discrete parts and make comparisons (Saldaña, 2016). The researcher performed coding manually which included line-by-line coding of all fieldnotes, interview transcripts, and reflective journals. While coding, a codebook was kept displaying codes, definitions, and examples. Axial coding techniques (Saldaña, 2016) guided the secondary-cycle coding to progress open codes into categories and themes. The themes found among the data were organized by research question to best depict findings for each area of interest. From the two cycles of coding and thematic analysis, there were 124 pages of data analyzed, which resulted in 125 unique codes, 35 axial categories, and one unique theme with three sub-themes**.**

Trustworthiness

Given the nature of qualitative research, it is important to consider how the researcher may be wrong in interpretations of the data collected (Maxwell, 2013) and provide evidence of trustworthiness in the research (Lincoln & Guba, 1986). Several tests were completed to determine trustworthiness of this research. First, credibility was sought by (1) providing triangulation of data by using various methods of data collection (2) peer debriefing the research process with faculty committee members; and (3) member checking with participants during the focus group interviews (Lincoln & Guba, 1986; Tracy, 2020; Yin, 2018). Second, transferability was sought through providing detailed context of the case study in fieldnotes and reflective journals for future researchers to apply knowledge from this study in other contexts (Maxwell, 2013; Tracy, 2020). Third, dependability and confirmability were sought through providing clear audit trails of procedures and data sources in the manuscript (Lincoln & Guba, 1986; Yin, 2018).

Findings

After hours of observations, interviews, and analysis of collected materials, it was apparent there was an overall lack of administrative oversight in the school, which led to the development of the first theme. This *Lack of Administrative Oversight* depicted the impacts of the lack of clarity from the administration on the school culture toward the queer community. Among both groups, students expressed behaviors of dominance, power, exhaustion, and frustration because of the lack of intervention, education, and guidance from the school's administration. Responsibility was placed on the students to navigate these systems and educate their peers, and teachers, on ways to be respectful and compassionate. These feelings from the members, in addition to observations made, were categorized into three sub-themes: (1) *Oppressive Systems in the School,* (2) *Societal School Norms and Perceptions,* and (3) *Staff Influence on School Culture.* Each of these sub-themes described how the lack of oversight from the administration created a hostile school culture toward queer students.

Sub-Theme One: Oppressive Systems in the School

The first sub-theme, *Oppressive Systems in the School,* depicted how the lack of administrative oversight in the school created opportunities for marginalization to occur. Students in both

groups expressed experiences where bullying had occurred due to their gender identity, sexuality, race, and/or religion. Findings in this section are organized by the systemic levels of oppression found in the case study.

Heteronormativity & Heterosexism

Displays of heteronormative and heterosexist beliefs (i.e., the beliefs that heterosexuality is normal and superior to homosexuality) were first noted during the observation of the FFA meeting. In the span of the one-hour meeting, students were found (1) yelling comments like "this is SO gay!" as two students were wrestling, (2) students were mocking the LGBTQ+ acronym and community in front of the researcher, and (3) hearing students make homophobic comments toward a student wearing pride gear at the meeting. Additionally, members of the FFA made heterosexist comments during the second focus group discussion by commenting:

> Bailey: "There are some people that they want to shove it [their queerness] down your throat and rub it [their queerness] in your face."
> Blake: "I feel like they know they're not going to get in trouble because if someone approached them about them or questioned it about them then they can like turn it into harassment or something"

Each of the comments made by these three students show (a) the unaccepting and hateful views held by members in the FFA and students in the school of the queer community and (b) the desire for queer students to be less vocal in their identities and subsequent expressions and actions. Students in the GSA supported the existence of heterosexism in the school as Presley (GSA Focus Group One) said, "It's second nature to say a racial slur or homophobic slur [in school]."

Cisnormativity & Cisgenderism

Several examples of cisnormative beliefs and cisgenderism (i.e., the beliefs that cisgender identities are normal and superior to transgender/gender expansive identities) also emerged in the case study. There was clear evidence of valuing binary gender identities in the FFA as officers of the FFA chapter wore official dress during the meeting that were restricted to male and female gender expressions. In addition, members were expected to recite a "brotherhood pledge" during the meeting, which assumes all members are "brothers."

There were two stories shared during the focus group interviews that depicted the impact of cisnormativity and cisgenderism in the school on students' experiences. Ashton (FFA) shared the following about the use of slurs leading to a fear of gender expression:

> "I've been called lots of names because I'm part of the gay community. You'll hear things in the hallways and just … you know … the f slur [faggot]. They'll use 'queer' in a horrible way too, and the slur for trans people [tranny or he/she]. … It's scary to be out in the open. you're vulnerable."

Many students in the GSA focus groups self-identified as transgender, non-binary, or gender fluid and shared experiences where they were harassed for their gender identity and expression. These students several shared instances where staff, primarily substitute teachers, in the school would refuse to use chosen or preferred names of trans* students. Owen (GSA) shared the following about being transgender:

> "Yeah, I've had like people [students] in general [at school will] be like 'okay but what's your real name?' Like, 'what's in your pants? What's your real name? You're a girl.' They'll be really disrespectful about it and I just have to ignore them. … Honestly, it pains me when people like call me by my deadname and stuff. Like even though I don't hate it, it's really uncomfortable and I sit there like 'should I tell them? Should I not? Should I just sit here and take it or what do I do?'"

In addition to using chosen names and pronouns, students also discussed the impact of conforming to binary gender expressions in the school. Students like Riley (GSA) shared how the dress code and teacher expectations of gender identity and expression impacted trans* students. These findings of heteronormativity and cisnormativity suggest there was a lack of education being provided to the students and staff in the school surrounding sexuality and gender, leaving queer students to bear the burden of coming out and transitioning while simultaneously educating the school on their identities.

Racism

There were also displays of racist beliefs and Whiteness found in the school. During the FFA meeting, several depictions of the confederate flag were seen on the screen and at least three members were wearing confederate symbols, contributing to a racist discourse in the FFA and school. Additionally, students in the GSA noted there were teachers in the school who had said racial slurs in class. Val (GSA) also discussed the presence of racism:

> "Even though like we do have LGBT, there are not a lot of minorities like me. Because I am also Mexican as well. You don't really see a lot of people that are of Color. (In GSA or the school?) School in general. There's just not a lot of good culture here."

Challenges with In/Visibility in the School

Throughout all focus groups, students shared the lack of consistent intervention made by teachers and administrators in the school. In response, students in the GSA shared how they worked to implement advocacy events throughout the school to address the hostility toward queer students. However, these efforts were not always accepted by their peers.

Val: Most [students say they are] LGBT accepting, but [they act] more like tolerating. There is some closed-mindedness – in the school – and you can be looked down on if you're different."

Riley: I would say it's less like accepting, and more like ignoring. Like [the response is] "oh you're gay? Cool! Let's never talk about that ever again. And I will never inquire on your personal life."

Skylar: It's there but they kind of just choose not to acknowledge it.

Val: Yeah, but there is definitely some underlying hatred in this school. One of my friends, I remember, they were texting me [recently]. All they were doing was just holding hands with the same-sex person and freshman boys were throwing rocks at them.

Sub-Theme Two: School Norms and Perceptions

While conducting this case study, I quickly noted the influence of social norms within the school impacting the culture toward queer youth. This sub-theme supports the lack of administrative attention found in the case study. Specifically, the administration did not create a welcoming and

accepting culture toward all students; built on mutual respect and acceptance of differences. This lack of oversight impacted underrepresented students, especially those in the queer community.

There were several descriptions of how the social norms in the school led to cliques and ideological divides in the school. Students shared how there were certain norms and expectations (stereotypes) among the student groups. Additionally, students shared large divides in the school between open-minded (accepting) and closed-minded (unaccepting) students. These stereotypes and ideologies impacted students in the FFA and GSA alike and created unwelcoming spaces for queer students in the school.

Blake (FFA) shared how the school was split into cultural groups, "It's split into like different groups. You can kind of tell when you're at lunches or you go to the auditorium, or cafeteria you can tell where people sit. Culturally based, I guess." Students in FFA Focus Group One shared similar sentiments and felt the cultural groups led to cliques and stereotypes in the school:

Adrian: "I all the time get pushed into a stereotype being in [agriculture] and FFA."
Andy: "They all just kind of think that I'm lesser than. They think that I'm not as smart."
Adrian: "I think they're kind of jealous. I get the opportunity to do so many cool things and I think they're jealous they don't get the opportunity to do these things."

Conversations were also had within the GSA focus groups related to the social norms in the school. Members of the GSA expressed there was a strong political divide in the school between progressive/open-minded students and conservative/closed-minded students, creating both positive and negative aspects of school culture:

Riley: "Oh yeah. I personally identify as gender fluid. Just because it makes me more comfortable. And I can do that at work because everyone respects it. but then like here, they'll be like 'you're a woman, what are you talking about?'"
Shawn: "It's that like country [rural view] … not to like stereotype – "
Riley: "It's the traditional [heteronormative/cisnormative] values."

Some students in the GSA described positive norms in the school like the friendliness of their peers. However, most students shared about the hostility of the school culture and having to navigate unaccepting individuals through code-switching and avoidance:

Reese: "If I'm just hanging out with friends who aren't part of the community, I do kind of change how I act a little bit just because that's how I'm used to acting with them."
Owen: "You may not feel safe to just be yourself around everyone. You feel like you have to pretend to be somebody you're not just to stay safe in any place you are at [in the school]."

Sub-Theme Three: Support and Harassment from Staff Members

Finally, the lack of administrative guidance caused discrepancies in staff members' acceptance of queer students and their ability to intervene in instances of bullying, harassment, and victimization. After my observations and discussions with the students, it was evident staff placed a large role in the school culture toward queer youth, leading to the sub-theme of *Staff Support and Harassment.* Students shared experiences where some staff members contributed to harassment of queer students in the school and did not accept queer students. However, students also identified several staff members who were accepting and supportive of queer students.

From my observation of the FFA, there were times when the advisors may have caused harm. There were several times the advisors used gendered language like "hey guys" when addressing students. Additionally, there were instances during the meeting where I noticed a lack of teacher intervention when hateful comments were made (e.g., "This is SO gay!"). However, Members of the FFA focus groups spoke highly of their agriculture teachers. They expressed their teachers are the best in the school in terms of relationship-building with their students and motivating students. Students felt their advisors created a *family* culture in the FFA, which was welcoming to students. Ashton (FFA), a member of the queer community, specifically felt accepted and supported by the advisors because "[our advisors] love all of us."

Like findings from the FFA, observation, and interview data show the influence of staff support and staff harm. During my observation of the GSA meeting, there were examples of teacher support for their students in the GSA. The teacher utilized several social-emotional learning strategies and trauma-informed practices during the meeting. GSA members shared similar sentiments to the FFA members regarding the club sponsors but differed in the need for identifying trusted and accepting adults in the school. Peyton (GSA) shared the positive impact of their GSA sponsors and said, "Just knowing she's part of [the GSA] made me feel a lot more comfortable in her class." Reese (GSA) echoed these sentiments when they said, "Just Ms. [NAME] herself makes [it safe]. I only met her at the first GSA meeting, but I already feel comfortable with her, and I can tell her anything."

However, there were experiences shared where staff in the school caused harm, harassed students, and did not intervene in instances of victimization and/or harassment. Parker (GSA) said:

> Like these [homophobic] kids, they're loud about it. And we know that the teachers hear them but they don't say anything about it. … at least in middle school, I tried to email the Vice Principal about what had happened and I never got a response.

Conclusions, Implications, and Recommendations

The findings in this study depict the large influence administrators have on student experiences in school. Administration is influential in creating safe, welcoming, and inclusive spaces for queer students (Beck, 2020; Bishop & McClellan, 2016; Gower et al., 2018; Kosciw et al., 2013, 2022). Administrative policies directly influence the ability of teachers to intervene in homophobic/transphobic harassment and the day-to-day culture of the school (Meyer, 2008; Payne & Smith, 2011). The theoretical frameworks for this study guided my thinking at the systemic levels of oppression, which found several systems of oppression present during data analysis. Intersectionality emphasized the importance of identifying the socially constructed systems impacting the experiences of students in this case study (Misra et al., 2020). In addition to allowing systemic levels of analysis to emerge, intersectionality was integral in explaining the presence of multiple systems of oppression present in this case study (Collins, 2015; Crenshaw, 1991). Structural influences, as described by Crenshaw (1991), specifically explain the way societal forces in this case (racism, sexism, heterosexism, cisgenderism, and religious intolerance) reinforced each other and the culture of the school.

Previous studies support the lack of preparation that teachers (Meyer, 2008; Page, 2017; Robinson & Ferfolja, 2002); school psychologists and counselors (Heck et al., 2014); and administrators (Meyer, 2008; Payne & Smith, 2011) receive to teach queer students. The lack of oversight observed from the administrators in this case study, and the subsequent inability of teachers to respond to hateful rhetoric, can be attributed to the lack of training for educators. Therefore, queering pedagogy and practice in education (Britzman, 1995; Meyer, 2008) must happen systemically in educational institutions; especially at the post-graduate level.

Oppressive Systems in the School

Most notably, there was evidence of heterosexism and cisgenderism present in the case study. Heterosexism was first noted during my observation at the FFA meeting when I heard several homophobic comments made by members including "This is SO gay!" Students also depicted the use of the slurs *faggot* and *tranny* by students in the school and also described the presence of heterosexism when a same-sex couple was attacked with rocks for holding hands at school. I'm very interested in this dynamic between students advocating for themselves and their community and the views of the dominant/oppressive group. The dominant group still largely dictates how queer students in this school must exist. Queer students breaking their silence over oppression and hostility were seen as too much, too vocal, or being "shoved down our throats." So, what then is *just enough* or *smaller doses* of queerness that will be accepted? While I think there is some truth to knowing how to approach certain individuals, is it fair to force the student who experiences oppression to assimilate in their pursuit of liberation?

Queer theory assists in understanding the implications of this finding as it explains the way heteronormativity is maintained through power dynamics and social norms (Henderson, 2019; Tierney & Dilley, 1998). Silencing homosexual voices and experiences maintains heterosexuality as the *norm* and homosexuality as the *other.* Additionally, silencing/tolerating those who are homosexual maintains the power held by heterosexual individuals in this case. Students demonstrated this when they used othering language using terms like "them" (Blake, FFA Focus Group Two) when describing gay students. While the students were making hateful comments, this finding speaks to the inability of the administration to willingly acknowledge oppression occurring in the school due to the lack of guidance given by administrators.

From a theoretical perspective, these intersecting oppressive systems were created and maintained by structural powers in this school (i.e., administrators; Crenshaw, 1991; Nichols & Stahl, 2019; Tierney & Dilley, 1998). Therefore, it is recommended that the school staff and administration conduct a robust assessment of the policies and guidelines provided to staff and students. Comprehensive anti-bullying/harassment policies which include protections for sexual orientation and gender identity/expression have been proven to improve school climates (Kosciw et al., 2022; Kull et al., 2016). This assessment should be followed by professional development for intervention techniques to respond to hateful rhetoric and behavior in school. A similar review should be conducted with the school dress code to address (a) disproportionate referrals based on gender identity and (b) banning hateful clothing/apparel.

School Social Norms and Perceptions

In addition to the oppressive systems created, the lack of administrative oversight gave way to disrespectful social norms between groups in the school. Specifically, there were several

stereotypes for groups and divides between accepting and unaccepting individuals in the school, which indicated a lack of respect among students. FFA members mostly described how cliques in the school often negatively influenced school culture. Specifically, students in the FFA felt each clique held a stereotype. For FFA members, they described this as the "ag stereotype." FFA members described this stereotype as being less educated than other individuals because they worked in agriculture. However, Adrian (FFA Focus Group 1) felt this was because other students were "jealous" of the FFA members' opportunities. Regardless of the reason, the presence of a stereotype for agriculture students depicted a culture of disrespect in the school for the various programs offered and members of each program.

Conversely, GSA members mostly described the influence of political ideology and mindset on the acceptance and inclusion of identities. Members discussed a large divide in the school between progressive ideologies/open-mindedness and conservative ideologies/closed-mindedness. Throughout the interviews, participants from the GSA described how acceptance of queer identities typically coincided with open-minded individuals. GSA members noticed an improved culture compared to previous years and again attributed this to a more open mindset of new teachers and the community. GSA members also discussed the stereotypes in the school but attributed them to *identities* rather than *interests*. Interviewees described how the GSA was used to stereotypically identify students as a member of the queer community, which restricted possibilities in the group (McBride, 2020). This difference between FFA and GSA members was explained by both intersectionality and queer theory. Both critical theories emphasize oppression caused by the cultural value placed upon *identities*, not interests, to privilege certain identities over others (Collins, 2015; Crenshaw, 1991; Meyer, 2007). Therefore, it is unsurprising how students in the GSA, who shared experiences of oppression from various marginalized identities, focused on the acceptance/rejection of their identities (Mayo, 2013). While being a member of the FFA and agriculture program may be a core identity to some of the students who were interviewed, it is an identity that can be chosen, unlike identities within the scope of the theoretical frameworks.

Staff Influence on School Culture

The third sub-theme which depicted the lack of administrative oversight's impact on queer students was the influence of school staff members. Students in both organizations discussed the influence of staff members and included examples of support and harassment. During my interactions with the FFA advisors, it was evident they were passionate about education and truly loved their students. FFA students valued the relationships with their teachers and felt they were more helpful and encouraging than other teachers in the school. Unfortunately, teachers would frequently misgender students, deadname transgender students, and out students to their parents - support literature depicting staff contributing to the homophobic and transphobic discourse in schools (Kosciw et al., 2022). Several professional development workshops should be offered to teachers, staff, administrators, and substitute teachers as it has been found to increase their ability to proactively address heterosexism and cisgenderism (Meyer, 2008; Vega et al., 2012). Based on the findings, these workshops should center around: (a) the importance of proper use of chosen names and pronouns for students, (b) implicit biases of staff members which impact queer youth, (c) visibly supporting and acknowledging queer students, and (d) social justice practices and pedagogies.

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Rising Above the Suffering: Assessing Agricultural Educators with Traumatic Situations Involvement in Supporting Students with Adverse Childhood Experiences

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Abstract

Agricultural educators have had a profound impact on their students since the program's inception. Many of these students have experienced Adverse Childhood Experiences (ACEs) and utilize their agricultural educator(s) as a role model due to the strong multi-year, teacher-student relationship they are able to form. This relationship is one of the most powerful strategies available to educators to mitigate the negative effects of ACEs that can last well into adulthood. While agricultural educators are uniquely positioned to support students with ACEs, they often feel unconfident in their abilities, which can cause additional stress, often leading to professional burnout. This study sought to assess how agricultural educators who have experienced personal childhood trauma support students who might be experiencing ACEs. This study utilized responses from nine agricultural educators from Oklahoma and Louisiana who discussed their personal traumatic experiences and how they inform their approach to emotionally supporting students with ACEs. We used an inductive coding process, guided by open and axial coding to form themes and subthemes. Overall, we determined that agricultural educators have a passion for supporting their students experiencing these negative situations, and most leverage their personal past traumatic experiences to connect with students.

Review of Literature

School-Based Agricultural Education (SBAE) has impacted students nationally since the early twentieth century. This program strives to prepare "students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber, and natural resources systems" (National FFA Organization, 2024, para. 1). Currently, agricultural education has 8,466 SBAE programs and 13,253 agricultural educators nationally (Foster et al., 2021). While SBAE has a widespread impact, the agricultural educator can often profoundly influence students experiencing adverse situations, such as childhood trauma, often due to the proximity of the teachers and students (Norris & Norris-Parish, 2024). The Center for Disease Control (CDC; 2022) and the World Health Organization (WHO; 2022) describe ACEs as a traumatic event occurring between the ages of 0–17 years old. Individuals facing Adverse Childhood Experiences (ACEs) can face long-term negative psychological and physical effects (Felitti et al., 1998; Gilbert et al., 2015; Goodman, 2017; Metzler et al., 2017; Monnat & Chandler, 2015; Murphey & Sacks, 2019; Petruccelli et al., 2019). The CDC and the WHO have led the charge researching the impact of students experiencing these overwhelmingly negative situations that range from parental separation/divorce, parental neglect, drug use in the home, mental illness/suicide in the home, or physical, verbal, or sexual abuse (CDC, 2022; CDC, 2023; Felitti et al., 1998; Murphey & Sacks, 2019). To measure an individual's experiences with ACEs, the CDC (2022) and WHO (2022) developed a survey with 10 yes or no questions about the individual's childhood (see Table 1; Felitti et al., 1998). For every "yes" an individual responded to a question, one point is added to their overall ACE score for a maximum of ten points (Felitti et al., 1998).

Table 1

Adverse Childhood Experiences (ACEs) Questionnaire

Question #1	Did a parent or other adult in the household often: Swear at you, insult you, put you down, or humiliate you? Or act in a way that made you afraid that you might be physically hurt?
Question #2	Did a parent or other adult in the household often: Push, grab, slap, or throw something at you? Or, ever hit you so hard that you had marks or were injured?
Question #3	Did an adult or person at least five years older than you ever: Touch or fondle you or have you touch their body in a sexual way? Or, attempt or have sexual intercourse with you?
Question #4	Did you often feel that: No one in your family loved you or thought you were important or special? Or your family didn't look out for each other, feel close to each other, or support each other?
Question #5	Did you often feel that: You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? Or your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
Question #6	Were your parents ever separated or divorced?
Question #7	Were any of your parents or other adult caregivers: Often pushed, grabbed, slapped, or had something thrown at them? Or sometimes or often kicked, bitten, hit with a fist, or hit with something hard? Or ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
Question #8	Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?
Question #9	Was a household member depressed or mentally ill, or did a household member attempt suicide?
Question #10	Did a household member go to prison?

Note. We adapted these questions from Felitti et al. (1998) for this study.

The long-term effects of ACEs can undermine a child or adolescent's bio-psychosocial development and disrupt their ability to form meaningful relationships (Gilbert et al., 2015; Goodman, 2017; Petruccelli et al., 2019). These negative effects of ACEs can cause mental and physical health issues well into adulthood (Felitti et al., 1998; Gilbert et al., 2015; Goodman, 2017; Metzler et al., 2017; Monnat & Chandler, 2015; Murphey & Sacks, 2019; Petruccelli et al., 2019; Reavis et al., 2013). While these long-term effects can be detrimental, ACEs are fairly common in society, with 63.9% of adults having at least one ACE and 17.3% having four or more ACEs (Swedo et al., 2023). The frequency of ACEs also varies widely within other

demographics, such as 19.2% of women having four or more ACEs, compared to 15.2% of men (Swedo et al., 2023). Furthermore, ACEs are more common among some minority populations, such as 32.4% of Native Americans, 31.5% of Multi-Race individuals, 23.2% of Native Hawaiian/Pacific Islanders, and 18.1% of African Americans having four or more ACEs (Swedo et al., 2023). In retrospect, only 8.3% of Asians and 12.2% of individuals with a college degree have four or more ACEs (Swedo et al., 2023).

In fact, individuals with four or more ACEs are ten times more prone to illicit drug abuse, seven times more prone to alcohol abuse, and 12 times more likely to attempt suicide (Reavis et al., 2013). Furthermore, the prevalence of ACEs makes the afflicted individual more prone to risky behavior, such as smoking, violent crime, drug use, dropping out of high school, unemployment, and more than 50 sexual partners in their lifetime (Felitti et al., 1998; Giano et al., 2020; Petruccelli et al., 2019). The prevalence of risky behaviors has been known to subsequently increase long-term health issues, such as obesity, diabetes, depression, and cardiovascular disease (Metzler et al., 2017; Monnat & Chandler, 2015; Murphey & Sacks, 2019; Petruccelli et al., 2019).

The most effective way for an educator to assist in mitigating the negative effects of ACEs is to support the student and assist them in developing the proper coping mechanisms through trauma-informed strategies (Blodgett & Lanigan, 2018; Cavanaugh, 2016; Perry & Daniels, 2016; Pickens & Tschopp, 2017). Agricultural educators are uniquely positioned to emotionally support these students through overwhelmingly negative situations because of strong teacher-student relationships (TSRs) formed through agricultural education (Bird et al., 2013; Schmidt et al., 2023; Watson et al., 2015). SBAE is offered to students from 5th to 12th grade (National FFA Organization, 2024), which allows SBAE teachers to form strong multi-year relationships with students (Norris & Norris-Parish, 2024). While educators may have the opportunity to support these students, many claim they are not confident in their abilities (Norris & Norris-Parish, 2024). Norris and Norris-Parish (2024) determined that the ACE that agricultural educators had the least confidence in supporting students was sexual abuse, with 59.8% of educators claiming to have little to no confidence and only 16.4% being very confident or extremely confident. In retrospect, 47.6% of agricultural educators claimed to be very or extremely confident in emotionally supporting students experiencing parental separation or divorce (Norris & Norris-Parish, 2024). This lack of confidence emotionally supporting students with ACEs can be stressful for the educator (Schmidt et al., 2023). Too much additional, undue stress can also lead to professional burnout (Schmidt et al., 2023). This is further enhanced by agricultural educators experiencing a significant amount of secondary traumatic stress (STS) from emotionally supporting students with ACEs (Schmidt et al., 2023).

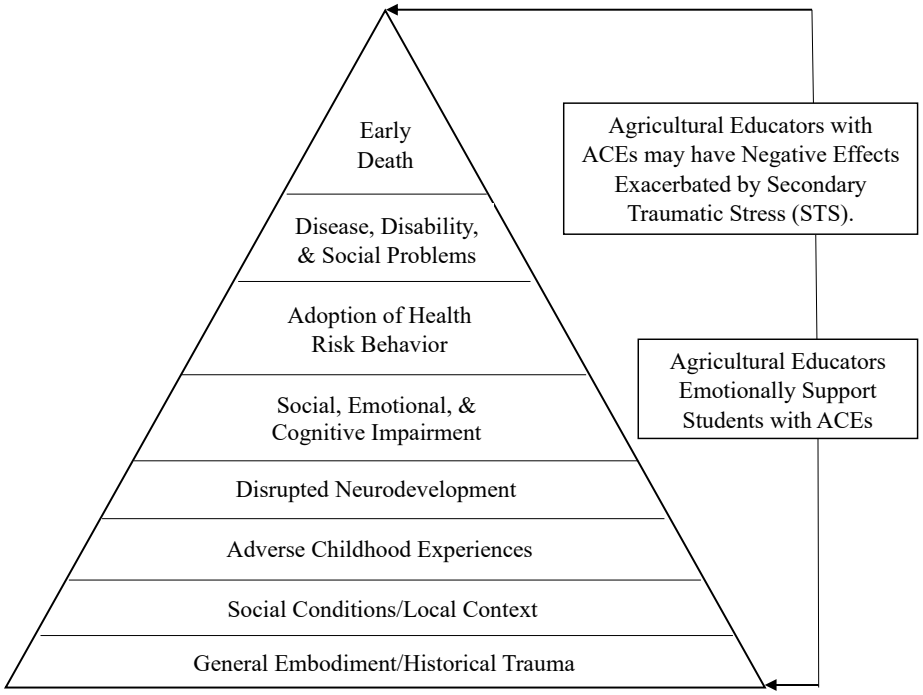
Agricultural educators' unique positioning to be mentors and advisors to students with ACEs, provides these students with a positive adult figure in their lives that is essential to mitigating the negative effects of ACEs (Norris & Norris-Parish, 2024). Norris and Norris-Parish (2024) also found that many agricultural educators have personal experiences with ACEs, with 50.8% having at least one ACE and 10.2% having four or more. In addition to ACEs, many individuals also experience horrific and tragic events in adulthood that can negatively affect mental and physical health (Cao et al., 2018; D'Andrea et al., 2011; Frankham et al., 2020; Kiely et al., 2015; Kristensen et al., 2012; Wiseman et al., 2013; Zineldin, 2019). The loss of a child or

spouse (Cao et al., 2018; Kristensen et al., 2012), serious long-term injury from an accident (Wiseman et al., 2013), spousal divorce (Zineldin, 2019), financial stress (Frankham et al., 2020; Kiely et al., 2015) and many other events that could occur during adulthood can cause negative mental and physical health issues for the afflicted individual.

With 10.2% of agricultural educators with four or more ACEs, the combination of STS from emotionally supporting students with ACEs (Schmidt et al., 2023), navigating the negative bio-psychosocial effects of their personal experiences (Gilbert et al., 2015; Goodman, 2017; Petruccelli et al., 2019), and handling traumatic events through adulthood (D'Andrea et al., 2011) could cause increased stress-related health risks to this subset of individuals (see Figure 1).

Figure 1

Interaction Between the Negative Effects of ACEs and STS Experienced by Educators



Note. We modified this model from Felitti et al.'s (1998) framework.

Theoretical Framework

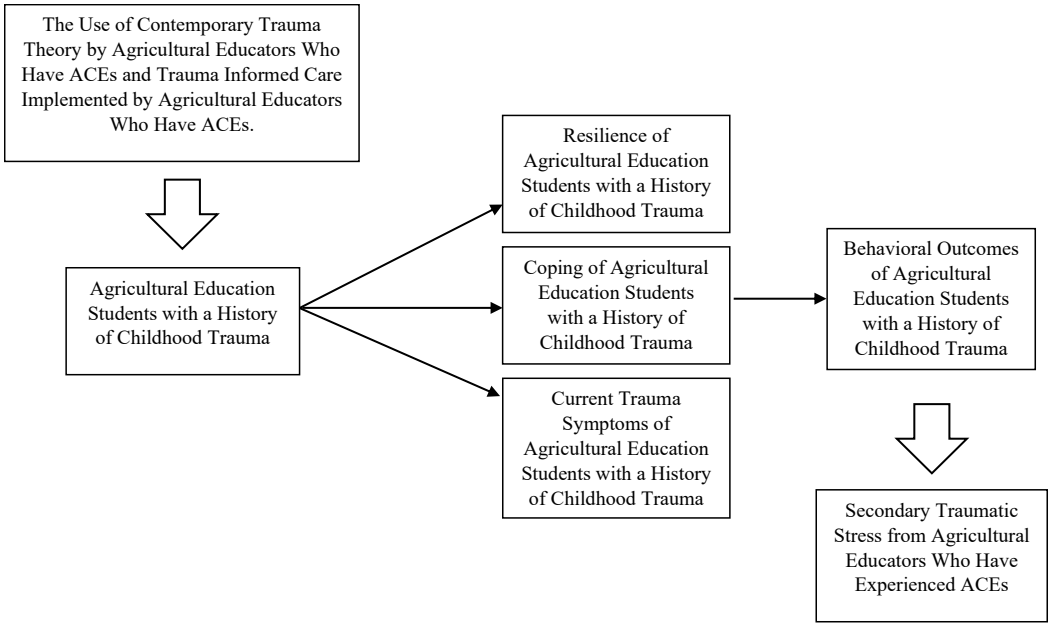
The Contemporary Trauma Theory (CTT; Goodman, 2017; Van Der Kolk, 2014; Williams, 2006) served as the theoretical framework for this study. The CTT depicts how trauma-informed care can assist in mitigating the effects of ACEs and, ultimately, influence the behavior of individuals afflicted with ACEs (Goodman, 2017; Levendosky & Buttenheim, 2010; Shapiro, 2010). ACEs can cause a "disturbance to bio-psychosocial functioning, healthy development, and brain performance in regions that are related to emotions, behavior, and executive functioning" (Goodman, 2017, p. 187). This interference with bio-psychosocial functioning can lead to negative and risky behavior (Felitti et al., 1998; Murphey & Sacks, 2019;

Petruccelli et al., 2019). The CTT relies on the resilience, coping mechanics, and current trauma symptoms of the afflicted individual to influence their behavior (Goodman, 2017).

Agricultural educators are uniquely positioned to administer trauma-informed care that will help mitigate the negative effects of ACEs (Norris & Norris-Parish, 2024). The multi-year TSRs that agricultural educators often form with their students allow them increased access to these students, which can make them more effective at sharing trauma-informed care and the CTT (Norris & Norris-Parish, 2024). While agricultural educators may be effective at emotionally supporting students with ACEs, it can cause them additional stress (Schmidt et al., 2023), and they often feel unconfident in their ability to emotionally support these students (Norris & Norris-Parish, 2024). This lack of confidence is combined with many agricultural educators experiencing the residual effects of their personal trauma (Norris & Norris-Parish, 2024). Understanding how agricultural educators who have personally experienced trauma emotionally support students experiencing similar situations can help inform the agricultural education profession, which can in turn, further influence the profession's impact (see Figure 2).

Figure 2

Effects of Contemporary Trauma Theory Being Utilized by Educators with Past Trauma



Note. Adapted from Goodman (2017).

Purpose of the Study

The purpose of this study was to assess how the personal traumatic experiences of agricultural educators influence their professional lives when supporting students with ACEs. The following research objective guided this study:

1. Describe how former traumatic experiences influence the professional lives of agricultural educators when emotionally supporting students with ACEs.

Methodology

We used a hermeneutic phenomenological case study design to investigate the meaning from the participants' experiences with ACES (Groenewald, 2004; Sloan & Bowe, 2014). Engaging a hermeneutic approach to qualitative research allowed us to interpret themes from the personal experiences of the participants and use their stories to derive meaning (Sloan & Bowe, 2014). Because lived ACE experiences are unique to each individual, the context of the study allowed themes to emerge with distinct, rich perspectives of educators who have experienced ACEs and who are now possibly mentoring students with ACEs (Creswell & Poth, 2018),

Population

The two states selected for the study- Oklahoma and Louisiana- ranked higher than the national average for adults with ACE experiences (CDC, 2022); therefore, we purposively recruited individuals who had personally experienced ACEs and who were teaching agricultural education. We used each state's open-access, agricultural education databases to send recruitment emails requesting participation in the study. Nine ($f = 9$) agricultural educators accepted the semi-structured interview invitation, including eight ($f = 8$) from Oklahoma and one ($f = 1$) from Louisiana (see Table 2). Seven (78%) participants were female, six (67%) were White/Caucasian, six (67%) taught in a rural school district, and eight (89%) held a bachelor's degree as their highest degree earned.

Table 2

Demographics of Participants

Identifier	State	Years of Teaching Experience	Ethnicity	Number of Agriculture Teachers in School	School Description	Highest Degree Earned
F1- Mia	Oklahoma	1	African American	1	Rural	Bachelors
F2- Kim	Oklahoma	3	American Indian	1	Rural	Bachelors
F3- Jean	Oklahoma	1	White	1	Rural	Bachelors
F4- Shay	Louisiana	1	White	3	Urban	Bachelors
F5- Joan	Oklahoma	11	White	3	Suburban	Masters
F6- Gail	Oklahoma	6	White	1	Rural	Bachelors
F7- Ema	Oklahoma	3	American Indian	2	Suburban	Bachelors
M1- Tim	Oklahoma	6	White	1	Rural	Bachelors
M2- Ron	Oklahoma	17	White	1	Rural	Bachelors

Note. To provide anonymity, we assigned each participant a numeric code and a pseudonym (Allen & Wiles, 2016).

We first provided participants with a demographic questionnaire to describe the number of ACE experiences they personally encountered based on Felitti et al.'s (1998) 10 ACE questions. One participant (11.1%) marked two ACE experiences lived, which was the lowest number reported, and five (55.6%) participants experienced four or more (see Table 3).

Table 3

Number of ACEs Experienced by the Participating Agricultural Educators

# of ACE Experiences	# of Agricultural Educators	% of Agricultural Educators
0	0	0.0
1	0	0.0
2	1	11.1
3	3	33.3
4	4	44.5
5	1	11.1

Note. Participants selected which ACE(s) they personally experienced based on Felitti et al.'s (1998) 10 Adverse Childhood Experiences (ACEs).

Next, participants recorded which ACEs they personally experienced (see Table 4; Felitti et al., 1998). Participants ($f = 6$; 66.7%) most experienced Question #1, "Did a parent or other adult in the household often: Swear at you, insult you, put you down, or humiliate you? Or act in a way that made you afraid that you might be physically hurt?" and Question #8, "Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?" Next, participants ($f = 5$; 55.6%) most experienced Question #6, "Were your parents ever separated or divorced?" No participants (0%) had experience with Question #5, "Did you often feel that: You didn't have enough to eat, had to ear dirty clothes, and had no one to protect you?"

Table 4

Personal ACE Experiences of Participating Agricultural Educators

Question	Yes (*f*)	%	No (*f*)	%
Question #1	6	66.7	3	33.3
Question #2	3	33.3	6	66.7
Question #3	1	11.1	8	88.9
Question #4	3	33.3	6	66.7
Question #5	0	0.0	9	100.0
Question #6	5	55.6	4	44.4
Question #7	1	11.1	8	88.9
Question #8	6	66.7	3	33.3
Question #9	5	55.6	4	44.4
Question #10	1	11.1	8	88.9

Note. Participants answered yes or no to each of Felitti et al.'s (1998) 10 Adverse Childhood Experiences (ACEs) questions.

Data Collection

Two members of the research team conducted qualitative, semi-structured interviews (Merriam & Tisdell, 2016) with participants from Oklahoma and Louisiana (see Table 5).

Participants completed a demographic survey, including questions acknowledging which ACEs they personally experienced (Felitti et al., 1998), and then, we completed one-hour, semi-structured interviews via Zoom using a naturalistic approach (Lincoln & Guba, 1985).

Table 5

Semi-Structured Interview Questions

ACE Area	Semi-Structured Questions
- Verbal Abuse - Physical Abuse - Sexual Abuse - Parental Mental Illness - Parental Absence Due to Incarceration - Parental Neglect - Parental Drug/Alcohol Abuse - Lack of Emotional Support at Home	• Have you ever taught student(s) who has/have experienced _____? • If so, did you notice if these students were drawn toward agricultural education? • Did the student(s) ever confide in you about their situation? • What strategies have you found successful in supporting these students?

Note. We modified our semi-structured interview protocol from Felitti et al.'s (1998) framework. Due to the highly sensitive nature of each question, we asked follow-up questions when needed.

Data Analysis

Guided by a hermeneutic approach (Sloan & Bowe, 2014), we inductively analyzed the data (Bryman, 2016). We manually used open and axial coding to identify subthemes and themes following a constant comparative method (Glaser, 1965). To allow for an interpretive approach to the findings, we used explicit exemplary statements from participants to frame each theme (Bryman, 2016). We used Otter.ai (2023) to transcribe the interviews, and then we forwarded the final transcripts to each participant to conduct member checking (Birt et al., 2016). We triangulated data from the transcriptions, field notes, and entries from a reflexive journal (Nowell et al., 2017) to enhance trustworthiness and confirmability of the findings. One limitation of this study is the generalizability of the findings beyond the case study's participants (Bryman, 2016), as well as the smaller sample size. However, because qualitative studies using a hermeneutic approach seek to find meaning in relatively isolated situations (Sloan & Bowe, 2014), we determined that the findings had merit as we still met saturation (Bryman, 2016).

Findings

Research Objective 1:
Theme: Agricultural Education Has a Significant Impact on Students with ACEs

Agricultural Education Played a Key Role Influencing Their Lives Growing up with ACEs

The agricultural educators that participated in the semi-structured interviews in this study had between two and five ACEs that ranged from physical abuse, parental neglect, a parent in the house experiencing domestic violence, a household member being incarcerated, sexual abuse, parental divorce, etc. (see Tables 3 and 4). Several of the participating agricultural educators

reported that agricultural education played a major influence in their lives as an adolescent. Kim (F2) stated:

> My own personal experience with agricultural education rings true for [coping with ACEs]. As a high schooler going through Ag Ed, there were some things that I was dealing with at home, and I found that all I wanted to do [was be in Ag Ed classes]. I just wanted to be in Ag class, because of the relationships I had with my teachers and with the other students. The time we spent in class and outside of class.

The impact of agricultural education described by Kim (F2) provides students experiencing ACEs with a positive role model in their lives. Jean (F3), after describing her traumatic experiences as a child, stated, "I think teachers step in a lot. I know my [agriculture] teacher did. And I think that a student whose parent…does not set a good example… need a good example of an adult to watch." Shay (F4), a second-year educator, also stated:

> I have been through a lot of trauma in my life, and I connect really well with my students who have too. Even though this is only my second year of teaching, I've already had five or six students come to me with problems at home or with other kids or whatnot. So, I really do think that the teacher relationship does draw the students in.

Mia (F1), a first-year educator, described her shock that she was able to emotionally support students with ACEs. Mia (F1) stated, "No, it's just so crazy to be in the position of answering these questions because I was that kid [needing support] … so it's just like crazy to me that now that I am in those shoes." Mia (F1) continued to describe the difficulty of supporting students with ACEs by stating, "I don't know how my teacher ever did this. But it's a lot. It's so hard … I get very invested in my students, and so it breaks me in half whenever I just hear or see things like [students experiencing ACEs]."

Some agricultural educators who have experienced trauma in the past stated that they have encountered issues where situations in the classroom affected their students' lives (F2, F6, F7, M1). Ema (F7) stated:

> I have a student in my first class of the day. A freshman female student that reminds me exactly of me, just by the way she acts, and talks, and asks questions. And I feel that we have those parents that were more overbearing … I forgot to input a grade for her to where it dropped her from a 106 to a 102. And she asked me, she said, '[Name Redacted], I have a question about this.' And, I could see the tears starting to well up, and she said, 'I don't understand what went wrong here,' and I said, 'It's not I have it right here. Everything should be fine.' And she said, 'Okay, because I've already been in trouble for this today. I don't want to be in trouble for this later.'"

Ema (F7) continued to state, "I hate that for her. It's a tough situation, especially because I don't want anybody to feel like that … she's a genius kid. I mean, she's so smart. She's great at everything she does. She's the most polite child I've met. The fact that a 102 isn't good enough ..." Ema's (F7) story continued, when describing the struggles she experienced as a former medical professional:

> I had to get out of [being a medical professional] because I couldn't handle it anymore. I couldn't handle seeing things and suicide notes and everything like that. And it was always kids. It was always kids who felt that they weren't adequate enough for parents, not peers, not other things like that. It was parents and family members were why the situation arrived. That's why I got into teaching because I wanted to try to be that person to fix it before it escalated to that type of point.

Agricultural Educators with Past Trauma Utilize Prior Experiences to Support Their Students Experiencing Similar Situations

Many educators felt that their past experiences helped them support students experiencing ACEs (F4, F5). Shay (F4), after describing her sexual abuse, described how she uses her personal experiences to help students cope with ACEs:

> I've had a lot of a lot of trauma in my lifetime. So, [I use them] all the time, I'll use little snippets of personal experiences. Like, I won't tell them all the details. And I always make sure that I filter out what I do say, but yeah, I'll share little snippets of how stuff made me feel. And, I'll ask them how did this make you feel? Well, it made me feel like this. How are you feeling? Let's talk about some similarities. Let's talk about how we get over that. Let's talk about that's kind of how I do it.

Shay (F4) continued to describe how sharing her personal experiences with students can sometimes help them carry the burden of what they are experiencing:

> Not only does it typically help them bear the burden of what they're trying to go through, but it also connects us on another level, to where we now have that really good student-teacher relationship to where that student trusts me. And they typically end up taking another one of my classes, or they'll sign up for another agriculture class.

Joan (F5) stated when describing the sexual abuse she suffered in college, "While I haven't had a parent who died, my [sexual abuse] experience came in college. And so, that is one that I feel like I can understand a lot more than maybe some of the other things because I didn't have some of those other things." Shay (F4) described examples where she does not use her past traumatic experiences as a direct example but sometimes, it can inform her reaction to the situation. For example, Shay (F4) stated:

> As someone who has experienced [sexual abuse] myself, it's hard to go into a work field where it's only men. Because yes, it was only one man who did something to you, but that still ruins your perspective on every single man. Because that's just the way society is now. It is just the way we've learned, and the way students are learning to grow up. And so they are not comfortable being in a profession surrounded by mainly men because of what has happened. Just because it happened that once, that fear is now instilled in them… All you can do is reassure them that the field is not solely [men in] agriculture. You have to reassure them, and show them, and introduce them to [other] women in agriculture. As for helping them cope, it's easier to help someone when you've been through the same thing. I just kind of talk about my experiences, they share theirs. We

> talked about similarities and differences, how it made them feel, how I got over my issue, and how it could possibly help them get over their issue.

Agricultural Educators with Past Trauma Have an Intense Passion for Supporting Students with ACEs

Agricultural educator's top reason for remaining in the profession is their enthusiasm for student success (Solomonson et al., 2018). Agricultural educators who have past traumatic experiences have a particular passion for supporting students experiencing ACEs (F4, F5, F7). For example, to describe her perspective on the role that teacher relationships play in helping students cope , Ema (F7), stated:

> It [teacher relationships] was for me. And like I said, I had great parents, but they were just overbearing parents. My agricultural teacher knew that I could confide in that situation, if there was something that just became too much. It was easy to call him and talk through it with him to find a better solution. Maybe just vent about it …. I could confide about it, and I try to do that with my kids.

Additionally, Shay (F4) stated:

> My biggest thing is supporting the students because I know what it's like to not have that support at home from an adult. So, I just try to support them. I don't try to push agricultural education onto them. Mine is more of 'Okay. How can we help you get through the day? What do we need to help you?', and then as soon as they get better, I send them on their way.

Joan (F5), after mentioning her sexual assault in college, explained how she supports students experiencing similar situations:

> Letting them talk about it. Letting them know that it was not their fault. That it wasn't their fault and that they are not defined by it. Making sure you validate those feelings. It's like a ripple, it does come in waves. And, letting them know that they are going to be able to get beyond this.

Finally, Joan (F5) described her passion for students by stating:

> I just want to find [the students experiencing ACEs]. They just need a lot of support … just after they confide in you and have talked, and just telling them that it wasn't their fault. That's actually really the biggest thing. The shame and the 'I must have done something.' Helping them [students] unpack that [is key].

Conclusions, Recommendations, Implications

Agricultural education has had a significant impact on individuals who have faced ACEs. In this study, nine ($f = 9$) agricultural educators elaborated on their personal experiences as an adolescent experiencing a minimum of two ACEs. In many instances, these experiences and their

relationship with their agricultural teacher growing up inspired their decision to be involved with agricultural education as students, and later, as teachers. Three key themes emerged as teachers described their personal stories with ACEs. First, for the study's participants, agricultural education played a key role influencing their lives growing up with ACEs, which is congruent to Norris and Norris-Parish's (2024) and Schmidt et al.'s (2023) findings. Educators elaborated how agricultural education courses gave them a space to belong, and in some places, be a distraction to the trauma they faced at home.

Second, agricultural educators with past trauma utilized prior experiences to support students experiencing similar situations. It is not uncommon for educators to draw on previous experiences to support students in need (Blodgett & Lanigan, 2018; Cavanaugh, 2016; Perry & Daniels, 2016; Pickens & Tschopp, 2017); however, due to the highly sensitive nature of most ACE scenarios, the implications can be two-fold. First, agricultural educators can build even stronger relationships and connections with students who might be facing something similar because if a student trusts their teacher enough to open up about their personal situations, they might feel like they are not alone or living unseen (Bird et al., 2013; Schmidt et al., 2023; Watson et al., 2015). However, in some situations, it might also place unnecessary STS on the educators, especially if the situation is too similar to something they might have experienced (Schmidt et al., 2023). If the educator has not fully coped or processed their own trauma, they might start to carry the additional burden from the student, which could be determinantal to the health and wellbeing of the teacher if it is not handled appropriately (Cao et al., 2018; D'Andrea et al., 2011; Frankham et al., 2020; Kiely et al., 2015; Kristensen et al., 2012; Wiseman et al., 2013; Zineldin, 2019). We recommend implementing intervention programs before the added personal pressure and STS contribute to teacher burnout (Schmidt et al., 2023).

Third, agricultural educators with past trauma have an intense passion for supporting students with ACEs. In fact, in some cases, this passion was the reason many of these teachers were drawn to the profession. In many scenarios, these educators felt called or led to teach because they wanted to provide a safe space for students that they may or may not have had as students growing up. This passion furthers the calling that drives many teachers to teach, but again, could lead to a higher risk of STS due to the immense pressure placed on establishing safe connections and relationships with students. Therefore, we recommend building collaborative communities for teachers and future teachers to leverage and remind them of their passion.

Finally, just as the Contemporary Trauma Theory (Goodman, 2017; Van Der Kolk, 2014; Williams, 2006) suggests, trauma-informed care can assist in mitigating the effects of ACEs and, ultimately, influence the behavior of individuals afflicted with ACEs (Goodman, 2017; Levendosky & Buttenheim, 2010; Shapiro, 2010). By relying on resilience, coping mechanics, and current trauma symptoms of the afflicted individual to influence their behavior (Goodman, 2017), individuals who have experienced trauma can recover mentally and physically. However, just as Norris and Norris-Parish (2024) suggested, teachers cannot, and should not, replace professional counselors. In fact, one negative element of TSRs could be teachers who think they can, and need to, carry the emotional burdens of their students. Therefore, we recommend that administrators surround school districts with access to emotional support groups and resources to empower educators to not carry the emotional burdens of their students alone, as well as having resources and processes in place to encourage individuals to seek professional help when needed.

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More Than a Lesson: A Qualitative Analysis of Agricultural Educators' Impact on Students with Adverse Childhood Experiences

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Abstract

School-Based Agricultural Education (SBAE) has impacted millions of students. With this impact, agricultural educators must also navigate external factors, such as Adverse Childhood Experiences (ACEs). Guided by the Contemporary Trauma Theory, we sought to address the role that agricultural educators play in supporting students with ACEs. Using semi-structured, qualitative interviews with 16 agricultural educators from Oklahoma and Louisiana, we inductively used open and axial coding to identify three emergent themes with seven respective subthemes. First, we identified that agricultural educators emotionally support students with ACEs regularly due to the close teacher-student relationships and the socioeconomics of the school district. Agricultural educators also have a desire to support students experiencing ACEs. The second theme was that students experiencing ACEs are often drawn to agricultural education because of the rapport with the teachers, the experiential nature of the coursework, and the nurturing/inclusive environment in the classrooms. Finally, agricultural educators engage teacher- and school-driven strategies to support students experiencing ACEs. Due to the increased risk of secondary traumatic stress affiliated with emotionally supporting students with childhood trauma, we recommend increasing training for handling ACEs. We also recommend cataloging strategies for future educators to access before entering the classroom.

Review of Literature

School-Based Agricultural Education (SBAE) has impacted millions of students for 100+ years. This profound impact has influenced students to seek careers in the agricultural industry (National Council for Agricultural Education [NCAE], 2024), become informed consumers of agricultural products (NCAE, 2024), and develop essential employability skills (Copeland et al., 2020; Parrella et al., 2023). While this impact is substantial, agricultural educators must navigate external factors that influence the lives of their students, such as Adverse Childhood Experiences (ACEs; Norris & Norris-Parish, 2024; Schmidt et al., 2023). The Center for Disease Control (CDC) defines an ACE as a traumatic experience that occurs between the ages of 0 and 17 years old (CDC, 2022). These traumatic experiences can range from parental divorce/separation, parental neglect, substance abuse in the home, parental incarceration, or physical, verbal, or sexual abuse (CDC, 2022; CDC, 2023; Felitti et al., 1998; Murphey & Sacks, 2019). These experiences can undermine a child's ability to feel safe, stunt their neurological development, and destabilize their relationship-building mechanisms (Felitti et al., 1998; Murphey & Sacks, 2019).

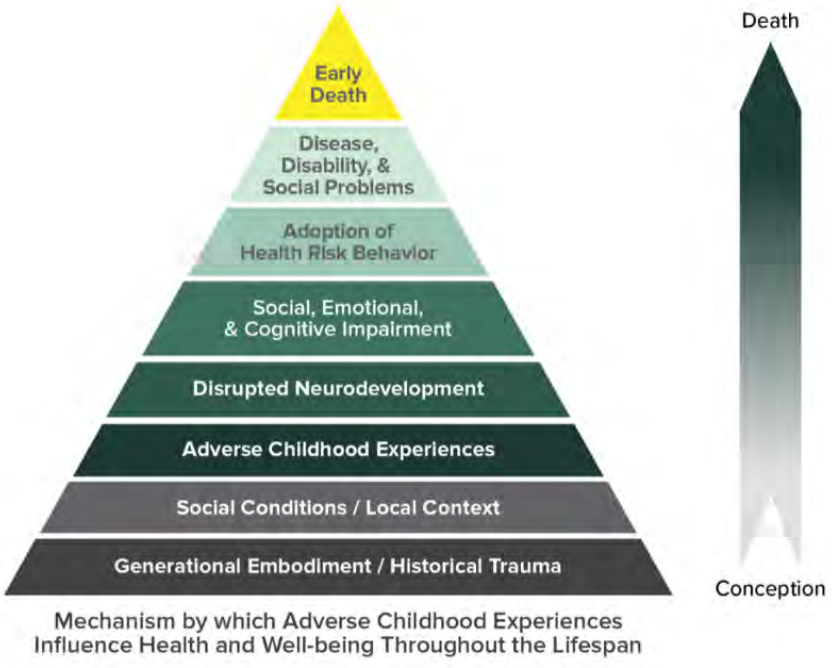
Childhood through adolescence is critical for proper neurological development as an individual transitions into adulthood (Silverman & Hinshaw, 2008). The effect of ACEs can damage these biological processes and can cause psychological maldevelopment (Gilbert et al.,

2015; Goodman, 2017; Petruccelli et al., 2019). The CDC claims that 61% of adults in the U.S. have at least one ACE, and 17% have four or more ACEs (CDC, 2022). This frequency is less common in certain demographics, with 58.8% of college-educated individuals having at least one ACE and 12.2% having at least four ACEs (Giano et al., 2020). In addition, women have a higher prevalence of ACEs, with 64.0% having at least one and 19.2% having four or more (Giano et al., 2020).

The long-term effects of ACEs can be detrimental to the lifespan of the afflicted individual (see Figure 1; Felitti et al., 1998; Gilbert et al., 2015; Goodman, 2017; Metzler et al., 2017; Monnat & Chandler, 2015; Murphey & Sacks, 2019; Petruccelli et al., 2019; Reavis et al., 2013). ACEs can lead to higher rates of obesity, diabetes, depression, and cardiovascular disease (Metzler et al., 2017; Monnat & Chandler, 2015; Murphey & Sacks, 2019; Petruccelli et al., 2019). The high prevalence of negative health outcomes associated with ACEs is coupled with an increase in risky behavior, such as smoking, violent crime, drug use, dropping out of high school, unemployment, and having 50 or more sexual partners in their lifetime (Felitti et al., 1998; Giano et al., 2020; Petruccelli et al., 2019). Furthermore, individuals with four or more ACEs are 12 times more likely to attempt suicide, seven times more likely to abuse alcohol, and 10 times more likely to use illicit drugs (Reavis et al., 2013).

Figure 1

Mechanisms Causing Long-Term Health Effects from ACEs



Note. Model developed by the CDC (2020) and Felitti et al. (1998).

Education professionals utilizing trauma-informed strategies to help students afflicted with ACEs can aid in mitigating their negative effects (Blodgett & Lanigan, 2018; Cavanaugh, 2016; Perry & Daniels, 2016; Pickens & Tschopp, 2017). In fact, Blodgett and Lanigan (2018) purported that "understanding and responding to a child's ACE profile might be an important strategy for improving the academic trajectory of at-risk children" (p. 2). The most effective trauma-informed intervention is the Teacher-Student Relationship (TSRs; Forster et al., 2017; Keane & Evans, 2022; Stoppelbein et al., 2021). The strong bond that agricultural educators form with their students (Bird et al., 2013; Watson et al., 2015) puts them in a unique position to leverage TSRs for the benefit of students facing ACEs (Norris & Norris-Parish, 2024; Schmidt et al., 2023). While agricultural educators are uniquely positioned to emotionally support these students (Bird et al., 2013; Schmidt et al., 2023; Watson et al., 2015), most do not feel confident in their ability to provide reassurance and guidance in that way (Norris & Norris-Parish, 2024). In fact, 59.8% of agricultural educators had either no confidence or were only somewhat confident in emotionally supporting students who experienced sexual abuse (Question #3 of Felitti et al.'s (1998) Adverse Childhood Experiences [ACEs] questions), and 47.5% of agricultural educators claimed to have no confidence or are only somewhat confident in emotionally supporting students with a parent facing domestic violence in the home (Question #7; Norris & Norris-Parish, 2024; Felitti et al., 1998). Agricultural educators felt the most confidence emotionally supporting students experiencing issues related to parental divorce/separation (Question #6; Norris & Norris-Parish, 2024; Felitti et al., 1998) and parent/guardian neglect (Question #5; Norris & Norris-Parish, 2024; Felitti et al., 1998).

While agricultural educators may not feel confident emotionally supporting students experiencing ACEs, their love of students is one of the top factors retaining them in their teaching positions (Solomonson et al., 2021). Similarly, Solomonson et al. (2021) determined that a teacher's attitude toward students and their perceived ability to engage students were two of the top retention factors. Agricultural educators have a deep admiration for their students, which can lead them to worry about their students' home lives (Schmidt et al., 2023). As a result, Schmidt et al. (2023) determined that agricultural educators internalize a significant amount of secondary traumatic stress from their concerns regarding students experiencing ACEs. Secondary traumatic stress is "work-related, secondary exposure to people who have experienced extremely or traumatically stressful events" (Stamm, 2010, p. 13). Schmidt et al. (2023) determined that secondary traumatic stress is a significant predictor of burnout, which is one of the leading causes of teacher attrition (Solomonson et al., 2018; Sorenson et al., 2017).

Agricultural educators report spending 58.65 hours per week in their positions teaching students in classroom settings, visiting students' homes to observe supervised agricultural experience projects, and traveling with students to FFA events (Hainline et al., 2015). This additional time spent with students, and agricultural educators' profound impact, strengthens the TSR, which allows them to administer emotional support to students experiencing ACEs (Bird et al., 2013; Norris & Norris-Parish, 2024; Schmidt et al., 2023; Watson et al., 2015). In addition to this emotional support, educators have a legal and ethical obligation to report any suspected child abuse (Mathews & Kenny, 2008). This mandated reporting obligation saves thousands of

students annually from abusive and neglectful situations (Mathews & Kenny, 2008), but many students will not be removed from their overwhelmingly negative circumstances (Anderson, 2014; Blodgett & Lanigan, 2018; Crosby, 2015; Mathews & Kenny, 2008; Metzler et al., 2017; Murphey & Sacks, 2019; Petruccelli et al., 2019). While agricultural educators cannot replace professional counselors, the TSR built by educators can be a significant factor in mitigating the negative effects of ACEs (Forster et al., 2017; Keane & Evans, 2022; Stoppelbein et al., 2021), and the agricultural educator is an effective vessel of this trauma-informed support (Bird et al., 2013; Schmidt et al., 2023; Watson et al., 2015). Understanding the impact of agricultural educators on students experiencing ACEs will assist in understanding this phenomenon.

Purpose and Objectives

The purpose of this study was to describe the impact that agricultural educators have on students experiencing ACEs. We used the following research objectives to guide the study:

1. Describe agricultural educators' interactions with students experiencing ACEs.
2. Describe how/if students with ACEs are drawn to agricultural education.
3. Assess strategies used by agricultural educators to support students experiencing ACEs.

Theoretical Framework

We used the Contemporary Trauma Theory (CTT; Goodman, 2017; Van Der Kolk, 2014; Williams, 2006) as the theoretical framework to guide this study. This theory describes the effects of trauma-informed support on the behavior of individuals experiencing ACEs (Goodman, 2017; Levendosky & Buttenheim, 2010; Shapiro, 2010). The effects of ACEs can interfere with a "person's sense of control, which may lead to maladaptive internalization of the event. Such maladaptive internalization may result in disturbance to bio-psychosocial functioning, healthy development, and brain performance in regions that are related to emotions, behavior, and executive functioning" (Goodman, 2017, p. 187). The CTT foundation relies on the behavioral changes of the afflicted individual based on their resilience, coping mechanics, and current trauma symptoms (Goodman, 2017). These factors are powerful motivators to modify future behavior and mitigate the long-term negative effects of ACEs (Goodman, 2017).

Agricultural educators are uniquely positioned to provide critical emotional support to students struggling with ACEs (Norris & Norris-Parish, 2024) because of the strong TSRs formed through SBAE (Bird et al., 2013; Forster et al., 2017; Keane & Evans, 2022; Stoppelbein et al., 2021; Watson et al., 2015). This teacher-student relationship can be a highly effective vessel for trauma-informed support and the CTT (Forster et al., 2017; Keane & Evans, 2022; Stoppelbein et al., 2021). This support from an educator can provide a role model for afflicted students, engage them in their academic endeavors, and provide hope for a better future. Understanding the impact of agricultural educators on students with ACEs can help inform the profession of this phenomenon.

Methodology

We used a phenomenological case study design to address the study's research objectives (Groenewald, 2004). Guided by the phenomenological goal of condensing individual experiences related to various phenomena to describe universal themes (Creswell & Poth, 2018), the context of the study allowed participants to share their personal interactions with childhood trauma and potential ACE experience(s). Because most ACE scenarios are highly sensitive and unique, we utilized a case study approach to yield an in-depth understanding of the complex issues through the lens of agricultural educators (Creswell & Poth, 2018).

Population

We purposively recruited participants from Oklahoma and Louisiana as both states ranked higher than the national average of adults with ACE experiences (CDC, 2022) and had open-access agricultural education databases. Using these online databases, we forwarded a recruitment email requesting participation to research the effects of educators' experiences supporting students who may/may not experience trauma. Sixteen ($f = 16$) agricultural educators accepted the semi-structured interview invitation, including eleven ($f = 11$) from Oklahoma and five ($f = 5$) from Louisiana (see Table 1). Fourteen (88%) participants were female, 13 (81%) were White/Caucasian, 12 (75%) taught in a rural school district, and 12 (75%) held a bachelor's degree as their highest degree earned.

Table 1

Demographics of Participants

Identifier	State	Years of Teaching Experience	Ethnicity	# of SBAE Teachers in School	School Description	Highest Degree Earned
F1- Ella	Oklahoma	1	African American	1	Rural	Bachelors
F2- Joy	Oklahoma	3	American Indian	1	Rural	Bachelors
F3- Kay	Oklahoma	1	White	1	Rural	Bachelors
F4- Cora	Louisiana	8	White	1	Rural	Masters
F5- Mila	Louisiana	1	White	3	Urban	Bachelors
F6- Lola	Louisiana	5	White	1	Rural	Bachelors
F7- Luna	Oklahoma	11	White	3	Suburban	Masters
F8- Jean	Oklahoma	2	White	3	Suburban	Bachelors
F9- Tess	Oklahoma	6	White	1	Rural	Bachelors
F10- Ivy	Louisiana	7	White	1	Rural	Masters
F11- Mia	Oklahoma	1	White	1	Rural	Bachelors
F12- Eve	Oklahoma	3	American Indian	2	Suburban	Bachelors
F13- Ava	Louisiana	10	White	1	Rural	Bachelors
F14- Jill	Oklahoma	1	White	1	Rural	Masters
M1- Tim	Oklahoma	6	White	1	Rural	Bachelors
M2- Jon	Oklahoma	17	White	1	Rural	Bachelors

Note. We assigned each participant a participant code and a pseudonym to provide anonymity in the study (Allen & Wiles, 2016).

In the demographic questionnaire, we asked participants to describe their personal ACE experiences based on Felitti et al.'s (1998) 10 ACE experiences. Fourteen (87.5%) participants had experienced at least one ACE scenario, and six (37.5%) experienced four or more (see Table 2). Two (12.5%) of participants did not report any personal ACE experiences.

Table 2

Number of ACEs Experienced by the Participating Agricultural Educators

# of ACE Experiences	# of Agricultural Educators	% of Agricultural Educators
0	2	12.5
1	2	12.5
2	3	18.75
3	3	18.75
4	5	31.25
5	1	6.25

Note. We provided a list of Felitti et al.'s (1998) 10 Adverse Childhood Experiences (ACEs) in the demographic survey, and participants selected which ACE(s) they personally experienced.

Using Felitti et al.'s (1998) 10 ACEs questions, we gauged the participants' overall experience with each scenario (see Table 3). Participants (f = 10; 62.5%) most experienced Question #1, "Did a parent or other adult in the household often: Swear at you, insult you, put you down, or humiliate you? Or act in a way that made you afraid that you might be physically hurt?" Next, participants (f = 9; 56.3%) most experienced Question #9, "Was a household member depressed or mentally ill, or did a household member attempt suicide?" No participants (0%) had experience with Question #5, "Did you often feel that: You didn't have enough to eat, had to ear dirty clothes, and had no one to protect you?"

Table 3

Personal ACE Experiences of Participating Agricultural Educators

Question	Yes (f)	%	No (f)	%
Question #1	10	62.5	6	37.5
Question #2	4	25.0	12	75.0
Question #3	1	6.3	15	93.8
Question #4	3	18.8	13	81.3
Question #5	0	0.0	16	100.0
Question #6	6	37.5	10	62.5
Question #7	2	12.5	14	87.5
Question #8	9	56.3	7	43.8
Question #9	6	37.5	10	62.5
Question #10	1	6.3	15	93.8

Note. Participants answered yes or no to if they had personal experience with Felitti et al. (1998) 10 Adverse Childhood Experiences (ACEs) questions.

Data Collection

Guided by a naturalistic approach (Lincoln & Guba, 1985), two members of the research team conducted qualitative, semi-structured interviews (Merriam & Tisdell, 2016) with participants from Oklahoma and Louisiana (see Table 4). Participants first completed a demographic survey and questionnaire regarding their personal ACE experiences (Felitti et al., 1998), and then completed the semi-structured interviews via Zoom.

Table 4

Semi-Structured Interview Questions

ACE Area	Semi-Structured Questions
- Verbal Abuse - Physical Abuse - Sexual Abuse - Parental Mental Illness - Parental Absence Due to Incarceration - Parental Neglect - Parental Drug/Alcohol Abuse - Lack of Emotional Support at Home	• Have you ever taught student(s) who has/have experienced _____? • If so, did you notice if these students were drawn toward agricultural education? • Did the student(s) ever confide in you about their situation? • What strategies have you found successful in supporting these students?

Note. Because we used a semi-structured process, we asked follow-up questions when necessary.

Data Analysis

We used an inductive data analysis process to identify emergent themes in the data once we met saturation (Bryman, 2016). Using a constant comparative method (Glaser, 1965), we manually used open and axial coding to identify subthemes, followed by theoretical coding to identify central phenomena (Charmaz, 2006). We used exemplary statements from participants to support each theme (Bryman, 2016). We transcribed the interviews using Otter.ai (2023) and conducted member checking by forwarding the transcriptions to the participants to seek accuracy (Birt et al., 2016). To further enhance trustworthiness and confirmability, we triangulated the data by analyzing the transcriptions, field notes, and entries from a reflexive journal (Nowell et al., 2017). Certainly, a limitation with qualitative, case studies is the generalizability of the findings. However, the 16 respondents provided rich descriptions that still met saturation (Bryman, 2016) despite the unique nature of the study, which further supported the need for this case study investigation (Groenewald, 2004).

Findings

Research Objective 1:
Theme: Agricultural Educators Emotionally Support Students with ACEs Regularly

Teacher-Student Relationships

All participating agricultural educators ($f = 16$) had experience emotionally supporting students with ACEs. Most emotional support was initiated through the TSR. The participating agricultural educators built TSR through communicating with students about their lives (F3, F3, F4, F13, M2). Kay (F3) said, "I try to talk to them individually every day and after school, and if they are struggling with something, I talk to them about it. It is just trying to build a relationship with them." Cora (F4) said, "I try to build relationships with them to know what's going on in their lives," and Jon (M2) said, "I have had to fill in as a parent figure for a lot of students." The TSR is particularly unique for agricultural educators because of the extra time spent with students (F2, F4, F13). Joy (F2) described it as, "I think it really boils down to the amount of time that we spend with students in and out of the classroom," and Lola (F6) said, "I have [students] from 6th to 12th grade. I believe for the students that I teach over the course of time, especially for multiple years, I usually have really good relationships with them. I feel like that draws them towards agricultural education." Cora (F4), a former science teacher, also noted, "I have students that I have had three, four or five times, and it just seems like you get to build a better and deeper relationship than teachers that only have them for a semester or a year. It just seems like you get to pour more into them, which helps them to be more open to talk to agricultural teachers." Finally, Ava (F13) said, "I especially think Ag teachers [have an impact] because usually we have them for more than one year. So, I think we end up being a role model." This extended relationship with agricultural educators allowed students to build stronger TSRs.

Some of the lesser-experienced educators noted that they have not had the time to develop TSRs as compared to their more experienced colleagues (F5, F8, F14). Mila (F5) said, "This is only my second-year teaching. I have not encountered [TSR opportunities] in many students," and Jill (F14) noted, "I'm new to the school. A lot of [students] don't know me, and they've been at this school since they were in kindergarten. It's a very tight-knit school, and they don't really have any new teachers coming in. A lot of them have not gotten to that point of coming to me with their issues." Jean (F8), a second-year teacher, said, "I am young in my profession, but my old principal used to call me the 'kid magnet.' I have a lot of energy, and I am kind of crazy in my classroom. I think that helps get students excited, but also helps pull them out of their shell." Nevertheless, agricultural educators reported that the TSR is often the reason students confide in them about ACEs.

Socioeconomics of the School

Some participating agricultural educators reported that the socioeconomics of the school often played a role in how frequently they interacted with students facing ACEs (F6, F9, F11, M1). Several educators reflected on their previous employment locations to draw comparisons to their current schools. Tim (M1) said, "This is kind of a lower income school…this school has a lot poverty compared to other places I have [taught]. It's been a learning experience to navigate through some of the stuff with them." Lola (F6) said, "A lot of our students have rough home lives. We are in a low socioeconomic area. We are a title one school." Tess (F9), an educator who just changed school districts, observed, "I think it's the change in districts. I think it's geographic location. I think it's the poverty here. This is by far the smallest and most rural school I have ever taught in… I have seen it in a few of my students in every school, but the prevalence here is so much more." When discussing student homelessness, Luna (F11) said, "This is the most I've ever had. It's my third school, and I have six kids just this year [who are homeless]."

Participating agricultural educators also reported that the demographics of the school impacted the frequency with which they interacted with students experiencing ACEs. The demographics of the schools from participating agricultural educators are listed in Table 5.

Table 5

Participants' School Demographics

Participant Code-Pseudonym	Free & Reduced Lunch %	Title One School	Minority Enrollment %
F1- Ella	58%	Yes	25%
F2- Joy	72%	Yes	49%
F3- Kay	40%	Yes	64%
F4- Cora	0.3%	Yes	19%
F5- Mila	18%	No	34%
F6- Lola	58%	Yes	65%
F7- Luna	24%	No	45%
F8- Jean	24%	No	45%
F9- Tess	40%	No	38%
F10- Ivy	43%	Yes	26%
F11- Mia	74%	No	44%
F12- Eve	26%	No	49%
F13- Ava	67%	Yes	7%
F14- Jill	51%	No	48%
M1- Tim	73%	No	41%
M2- Jon	27%	No	27%

Note. Statistics reported by the National Center for Education Statistics (2024). All statistics are reported for grades 9–12.

Agricultural Educators' Desire to Support Students Experiencing ACEs

Agricultural educators reported that they desired to help students struggling with ACEs (F1, F3, F11, F12). Mia (F11) stated, "No one tells you how emotionally heavy teaching is… you just want to pick them up and take those kids home with you, and you can't. No matter how bad you want to, it's just not something you can do." Eve (F12) said, "I love my kids more than anything, and I tell them that every day." While educators admire their students experiencing ACEs, they often feel incapable of properly supporting them, which leads to worrisome and stressful feelings (F1, F3). Ella (F1) described those feelings as, "I really felt uncomfortable at first… I have just never been very good at comforting people. I do care to listen. I always want to listen, but sometimes… you just never know what the right thing is to say." Kay (F3) stated, "I think about my students all the time, but I am in a stage of life where I can do that because I don't have a family or a spouse. It's just me and my dog, so, I come home, and I worry about them."

Research Objective 2:
Theme: Students Experiencing ACEs are Drawn to Agricultural Education

Teacher-Student Relationships

Several agricultural educators reported that students with ACEs are drawn to SBAE (F5, F6, F7, M2). The primary driver in students' with ACEs interest in agricultural education is their relationship with the agricultural educator. Lola (F6) stated, "I have some [students] that want to take [SBAE] because, for some reason, they like me as a teacher." Utilizing the TSR can be an effective motivator to draw students with ACEs into the SBAE program. Tim (M2) said, "I tend to find [a better connection] with the kids saying, 'Why are we here? This is just an elective. This is dumb. I don't need to know about agriculture.' And it almost becomes easier to flip them… easier to draw them in." Luna (F7), when discussing the impact of the TSR stated, "There's always those kids who are withdrawn at first. Typically, whenever they've had those kinds of [ACE] scenarios, and then we are around them so much, they really gravitate toward the program and to us as teachers because they feel connected. They know that we care, and they feel comfortable." Mila (F5) also stated, "Yeah, they tell me all the time. They're like Miss, what are you teaching next year? Okay. I'm going take this course because you're teaching it. It's not just me. It's all the teachers in our program because we are a three-teacher program. And we all have students in each of our classes that take it solely because they like us as teachers."

Experiential Nature of Agricultural Education

Participants attributed the experiential and hands-on nature of agricultural education as an aspect that draws students with ACEs to SBAE (F1, F3, F8, F9, M1). Jean (F8) stated, "I feel like a lot of those students [with ACEs] are typically drawn toward more trade-based jobs… we are all about hands-on learning in career tech. I definitely see a higher population that have had Adverse Childhood Experiences go on to that route." Ella (F1), when discussing the impact of SBAE's experiential nature stated, "They're constantly doing stuff. They're up moving. And I think they really enjoy that because they struggle with being in a chair all day, and I feel like most classes are a lot of just sitting down and listening." The technical skills taught in SBAE provide students struggling with ACEs the hope of a brighter future. Kay (F3) stated, "I think that learning these skills helps students who are struggling at home because it gives them something to do, and it could spark an interest in a career, which maybe they're not talking about. They're not having those conversations at home." Tess (F9), when discussing students struggling with ACEs gaining technical skills, stated, "I have actually had some students admit that they come to Ag, even though they don't have an Ag background, but they feel like it can give them some livable skills. They feel like it can give them a different set of skills that will help them get out of the situation that they're in more quickly, post-graduation." Tess (F9) elaborated, "They want to get a good job. They want to be able to weld. They want to be able to go straight to the oil field with some employable skills, so 'I can get the [blank] out of here.' I get that a lot. They want to be better. They need to make money. They need to do things better than their parents did. They want things for life."

Nurturing and Inclusive Nature of Agricultural Education

Multiple agricultural educators discussed SBAE being an inclusive program that allows students with ACEs to feel comfortable and welcome (F3, F5, M1, M2). Kay (F3) stated, "I think that students who have experienced trauma in their life are drawn to and engaged in agricultural education because of its culture. It is the way it's shaped to help students throughout high school." Mila (F5) noted, "I do have a lot of kids that come to school and use it as a safe place. A lot of us teachers have created a really strong relationship with them as far as being able to talk

to them through any situation that they've had." Jon (M2) stated, "Those students with a bad home life or a bad parent experience I think are definitely drawn to agricultural education. At least in Oklahoma because, you know, FFA gives you such a positive atmosphere." Several agricultural educators reported students struggling with ACEs using SBAE as a reason to avoid issues at home (F1, F2, F9). Ella (F1) stated, "I think it could be because being involved in my classes are an easy way to spend less time at home because they are able to spend less time with whoever may be causing them harm," and Joy (F2) noted, "Yes, I've noticed that the students really don't want to be home." Tess (F9), when discussing the impact SBAE makes in the lives of students struggling with ACEs, stated, "I currently have a student who, him and his younger sister rotate who sleeps on the couch and who sleeps on the bed, so they do not have to sleep with the bed beetles because they bite. That kid is not a member of any of my competitive teams, but he stays after school for every practice because he knows I am going to feed him, and he does not have to go home until 5:30 instead of 3:00."

Research Objective 3:
Theme: Agricultural Educators Have a Multitude of Strategies for Supporting Students Experiencing ACEs

Teacher- and School-Driven Strategies

The agricultural educators reported numerous strategies used to emotionally support students struggling with ACEs and engage them in SBAE (F2, F5, F6, F9, F10, M1). These strategies include both teacher- and school-driven approaches. Many of these ideas involve an agricultural educator spending their personal money (i.e., providing meals on trips, supplying needed hygiene items, etc.; F2, F9, M1, M2). Furthermore, these items provide educators with actionable items to specifically help students struggling with ACEs navigate their overwhelmingly negative situations (see Table 6).

Table 6

Strategies Utilized by Agricultural Educators to Support Students with ACEs

Strategies	Example Quotes
Hygiene Items	"I keep hygiene items. I keep things like that, mainly for Ag trips, but I have had students that have noticed, and I encourage them to take things with them if they need them."- Joy (F2)
Active in the Community	"I am very active within the community. Whenever there's a home basketball game, home volleyball game, or a home sporting event, I'm typically there. And so I think that helps draw them in."- Tim (M1)
Purchasing Meals on Trips	"It doesn't bother me to buy a meal. I am willing to do that because I know that if I'm willing to do that, they're going to be a lot more willing to go into a contest."- Tim (M1)
Food Items in Classroom	"I blame it on me being hypoglycemic, but I keep food in my classroom at all times. I feed my babies [students] often."- Tess (F9)
Official Dress and Supply Closet	"We have an official dress supply room that just has a bunch of official dress in it. I hang shoes and clothes in there that get donated to me."- Jon (M2)

Table 6 (Continued)

Teacher Affirmations	"I learned this from a teacher… he told them, 'I love you,' and 'I am proud of you.' I want to make sure that you're hearing this every day from an adult in your life. Me and my teaching partner decided that was the kind of culture that we wanted to build, as well."- Mia (F11)
Utilizing Counselors	"The school is pretty blessed. Our counselor is fantastic."- Joy (F2)
School Clothes Closet	"We have what we call 'the closet,' and it's all donated, school-approved clothes and students can go and shop out of it."- Mila (F5)
Free Meals at School	"Our school offers free lunch, free breakfast, and there's an after-school program where they're able to take meals home with them."- Lola (F6)
"Hope Squad"	"My school has a program called the 'Hope Squad' that has helped a lot. That's a team of students and they get trained in… talking with students who face these kinds of struggles."- Ivy (F10)

Note. These strategies are a summary of some of the details the agricultural educators shared when asked how to support students who might be facing ACEs.

Discussions, Conclusions, and Recommendations

Agricultural educators have a profound impact on students with ACEs. First, by emotionally supporting them through enhanced TSRs, agricultural educators can reinforce relationships that allow students to feel comfortable and at home in agricultural education. Trust and rapport were common elements drawing students with ACES to agricultural education. This trust is further developed through nurturing and inclusive relationships, which is congruent with Forster et al.'s (2017) and Keane and Evans' (2022) findings. Agricultural education appeals to students who desire more hands-on, technical-focused education, which also appeals to students with ACEs experiences. Finally, like Blodgett and Lanigan's (2018) study, agricultural educators noted several personal strategies to assist students facing childhood trauma, such as providing personal funds to purchase student essentials, like hygiene items, meals on trips, supplies, and clothes. The extra money expended, coupled with relatively low teacher salaries (Hanushek, 2016), could create additional stress for SBAE teachers. Participants also noted that helping students see the bigger picture of service by getting active in their community and providing peer and teacher affirmations helps redirect students' focus to serving rather than their circumstances.

Agricultural educators noted numerous occasions where they personally supported students with ACEs. Due to the increased risk of secondary traumatic stress (Schmidt et al., 2023) associated with supporting students facing childhood trauma, we recommend increasing training for handling ACE scenarios. Particularly, if teachers do not feel confident handling these situations (Norris & Norris-Parish, 2024), associated worry can intensify. Due to agricultural educators' strong TSRs, it is imperative for administration and professional organizations to support training opportunities to connect ACE students with counselors, community programs, or other resources to help them navigate personal scenarios, and, in turn, mitigate undue stress on agricultural educators. Similarly, if an educator may be coping with former trauma in his/her personal lives, we recommend implementing support resources to help those educators reach acceptance of his/her ACE experiences. Finally, cataloging specific strategies that agricultural educators have found helpful would be valuable for future educators to access prior to entering the classroom.

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Watch Your Language: A Systematic Review and Corpus Linguistics Analysis of Feedback in the Journal of Agricultural Education

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The purpose of this systematic review of literature was to examine the language surrounding a primary role associated with supervision: feedback. Feedback is powerful and foundational to the on-going professional and personal development of teacher candidates, yet the meaning of the word on its own is taken-for-granted, undefined, and often left to the reader to make their own interpretation. This review is guided by the theoretical tool of corpus linguistics analysis to understand the relationship of words associated with feedback in the context of literature, which provides clarity on the possible representations and meanings of feedback. Clarity of language leads to clarity of research methods, findings, and future direction for practitioners. The existing use of the word feedback reveals more about the agency of those involved with the phenomenon, as well as the implications of this viewpoint. Based on the findings of this review, recommendations and implications for future research and practice involving supervision, and feedback are made to strengthen and unify the field around the subtle, yet impactful use of the word feedback in terms of information, process, or event.

Introduction

School-based agricultural education (SBAE) teachers desire feedback (Disbeger et al., 2022), and their supervisors are the primary agent for fulfilling this important role (Fritz & Miller, 2004; Sikula, 1994). Recommendations for research in *The Journal of Agricultural Education* loosely suggest increasing the quantity of feedback teacher candidates receive from their supervisors without much guidance on effective routines (Bell & Gitomer, 2016), how feedback processes happen (Hattie & Timperley, 2007) or if the time invested in feedback is valued (Nolan & Hoover, 2004) or wasted (Carreiro, 2020). The resounding conclusion about feedback is that it is powerful (Hattie & Timperley, 2007), and has the potential to either positively or negatively alter the trajectories of the recipient. Frieberg and Waxman challenged the field of teacher education to explore feedback processes because they are a core experience of teacher growth, and further argued "increasing the quantity of feedback is not a substitute for quality" (1988, p. 8). Therefore, there is a need for scholarship which more clearly articulates the meaning of feedback and explores the characteristics of feedback practices for supervisors to enact in school-based agricultural education (SBAE). A common theme observed in the agricultural education literature regarding teacher development is that feedback is demanded and highly valued (Coleman et al., 2021; Disberger et al., 2022; Joerger & Boettcher, 2000; Paulsen et al., 2016; Rubenstein & Thoron, 2013; Shoulders et al., 2016; Wolf et al., 2010), and often the concluding remarks of studies include recommendations for research or practice involving feedback. Feedback is not only valued, but it is "influential on the quality of field experience" all teacher candidates must complete before entering the profession (Shoulders et al., 2016, p. 161).

While the purpose, and contexts of feedback are clear, the array of representations of feedback in agricultural education are unclear. When the concept of feedback is used without

clarity, shared understanding, or contextualization, the word itself becomes taken-for-granted, and complicates considerations for research and practice. Conceptualizing feedback is challenging, and across predominant education journals the term feedback is represented in a multitude of different ways (Winstone et al., 2022). Given the importance of both the role of a supervisor, and the influence of feedback on teacher candidate growth (Nolan & Hoover, 2004), self-efficacy (Gall & Acheson, 2010), and instructional performance (Hattie & Timperley, 2007), it is all the more confounding this process has received limited attention in teacher education (Darling-Hammond & Bransford, 2007), and agricultural education scholarship (Fritz & Miller, 2004; Rubenstein & Thoron, 2013). Prior to the year 2001, only three out of 803 articles published in the Journal of Agricultural Education related to supervision (Fritz & Miller, 2003).

This systematic review worked in tandem with a corpus linguistics analysis to generate more understanding about the representations of feedback across contemporary literature in agricultural education. Advancing research and practice related to feedback will not be nearly as influential if conceptualizations of feedback are incongruent. Hence, there is a need to examine and establish a shared language of *what* is meant by feedback as well as *how* the word is used to guide recommendations more effectively for research and practice. In this manuscript, feedback will be used as a word on its own, without clear indication of definition to reinforce the possible implications of doing so in scholarship.

Theoretical Framework

Feedback is powerful, and so too is language and how it is represented (Winstone et al., 2022). Generating a theoretical framework to analyze the language and representations of feedback was central to how this systematic review was conducted. Corpus linguistics is an analytical tool for exploring scholarly works (Brezina, 2018). A corpus is a "large, principled collection of naturally occurring examples of language", and from careful examination of the sequence of words, not simply a single word, meaning can be made (Bennett, 2010, p. 2). Within corpus linguistics, a keyword is typically identified for interest, and then possibilities for its meaning are derived from the associated collocates (Biber et al., 1998). Collocates (or collocations) refer to the relationship between particular words, the context in which they are used, and the strength of that association based on the given context (Brezina, 2018). Corpus linguistics involves a computer-generated analysis of a written text to better understand how language is used, especially in extremely large, and exhaustive texts (Biber et al., 1998). Examples of text used in corpus linguistic analysis include handbooks, textbooks, journal articles, or glossaries. Corpus linguistics should be used as a complementary approach to understand meaning (Biber et al., 1998), and for this study, corpus linguistics accompanied the guidelines of conducting a systematic review of literature. Winstone and colleagues (2022) conducted a review of major journals in education using a similar approach. This study conducted a systematic review with corpus linguistics analysis to derive meaning and clarity around the representations of feedback in agricultural education literature.

Purpose and Research Questions

The purpose of this systematic review was to examine conceptualizations of feedback in agricultural education and see how these conceptualizations might better inform future research

and practice. Through corpus linguistics, conceptualization of feedback will be analyzed at a grammatical level, and further reveal more about how the word is used and how language in future scholarship regarding feedback should be communicated. This systematic literature review aims to answer the following research questions:

1. What contemporary literature exists regarding feedback in agricultural education, and what are the central methods used to research feedback?
2. How is feedback in agricultural education represented in contemporary literature?
    a. How is feedback represented when analyzed through corpus linguistics?
3. What opportunities exist for future inquiry related to feedback in agricultural education to better unify research and practice?

Methodology

A systematic literature review is a tool to synthesize and formulate understanding from the existing collection of literature in response to a research question (Page et al., 2020), and can suggest new directions for research (Newman & Gough, 2020). Systematic reviews are more rigorous when guided by a clear methodology, and this review is reflective of practices related to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 (Page et al., 2020), as well as practices specifically for educational reviews (Newman & Gough, 2020). PRISMA 2020 was the primary source of consultation in conducting this systematic review, beginning with identifying databases and search terms, screening search results, determining eligibility for further analysis, and final inclusion (Page et al., 2020). PRISMA 2020 is a highly structured approach to conducting a systematic review (Page et al., 2020), and Newman and Gough (2020) suggested exploratory research protocols should be flexible.

Identification, Screening and Inclusion of Literature

Identifying relevant literature should be informed by the research questions shaping the systematic review (Newman & Gough, 2020). Articles regarding feedback and supervision were scarce prior to the twenty-first century, and only contemporary articles between 2000-present were included (Fritz & Miller, 2003). Feedback was the keyword of interest and was subsequently used as the only term used when investigating the primary database of interest, which was the *Journal of Agricultural Education* (*JAE*). An initial search yielded 19 articles, and more databases were utilized to mitigate potential limitations of a single database (Page et al., 2020) including Google Scholar and Education Resources Resource Center (ERIC). Search criteria including “feedback source: Journal of Agricultural Education” produced 1,360 findings in October 2022. Duplicate and irrelevant articles were removed, and 34 articles were retained for the purpose of corpus linguistic analysis.

Final inclusion criteria for the systematic review were: contemporary publications in the *JAE* between 2000-present, the participants were involved with agricultural education teacher education (e.g., supervisors, mentors, cooperating teachers, teachers, and teacher candidates), and the word feedback must have been used at least five different times in the context of participants. This selection process was rigorous and mentally taxing because of the manual task of reading through each paper to determine if feedback was used in the desired context of teacher

education. Physical copies of all articles from corpus linguistic analysis (n = 34) were printed and utilized for closer reading. From this collection, (n = 15) fit in the desired criteria and were utilized for eventual synthesis in respect to the research questions guiding this systematic review.

Corpus Linguistic Analysis

Sketch Engine is widely accepted as the premier software for corpus analysis (Kilgariff et al., 2014). All screened literature from the *JAE* for this systematic review was uploaded to the program to understand, in quantitative terms, the representations of feedback. One feature of Sketch Engine software used to aid a quantitative corpus linguistic approach of analysis is Word Sketch (Kilgariff et al., 2014), which generates a one-page summation of a particular keyword or phrase in terms of the "grammatical and collocational behavior" (Kilgariff et al., 2014, p. 9). Collocations refer to the relationship between particular words, the context in which they are used, and the strength of their association based on the given context (Brezina, 2018). Every collocation consists of a node, or keyword (Brezina, 2018). The additional words surrounding the node, known as the "collocation window" (Brezina, 2018, p. 67) are used to better identify the context shaping the grammatical and collocational behavior of the keyword. Selecting a keyword and collocation window are highly important to the process of corpus linguistic analysis (Brezina, 2018), and in the context of this study the key word was *feedback,* which led to more focused opportunities for understanding frequency and how the word is situated from a grammatical and collocational point of view.

After the entire data corpus of selected literature was uploaded to Sketch Engine, the keyword *feedback* was entered into Word Sketch to begin the process of understanding how this word is represented. Word Sketch yields a wide range of quantitative data summarizing how the keyword exists in relation to different grammatical features like object, subject, verb, modifiers, or prepositions (Kilgariff et al., 2014; Winstone et al., 2022). This study echoes the approach of Winstone et al., (2022), and chose to specifically target noun modifiers, verbs, possessors, and prepositions interconnected to the keyword *feedback*. Winstone and colleagues (2022) structure for utilizing Word Sketch was led by the goal of understanding how the keyword was taken to be (e.g. noun modifiers and nouns modified by keyword), what individuals were involved with the keyword (e.g. verbs with keyword as the object, and possessors of the keyword), and what about the keyword was significant (e.g. prepositions representing an action or concept with the keyword). Together, both the systematic review and corpus linguistic approach are foundational for understanding more about the current representations of feedback in the field of agricultural education and are informative for how future research and practice can be strengthened.

Findings

After a rigorous review of literature, the following findings were gathered to answer each research question. The collection of contemporary literature (2000-present) consisted of 15 articles which met the criteria for inclusion, and specifically mentioned feedback more than five times. Most of the studies utilized qualitative methods (n = 10), specifically as observational case studies. A few studies collected quantitative data (n = 5). Additionally, in the majority of studies (n = 10), the primary participants were individuals preparing to become agricultural teachers, such as pre-service, teacher candidates, or student teachers. In total, this review of literature

reflects the perspectives of 976 individuals involved with the phenomenon of feedback including preservice teachers, cooperating teachers, university supervisors and beginning teachers. The keyword *feedback* appeared 268 times in this data corpus, and the ten highest frequency collocates are shown in Table 1 (on the following page).

Table 1

Collocates of the Keyword 'Feedback' from Data Corpus (n =34)

Rank	Position	Collocate	Stat (logDice)	Frequency collocate	Frequency in corpus
1	Left	provide	11.07	27	144
2	Right	from	10.93	55	656
3	Middle	received	10.85	18	51
4	Left	receive	10.74	16	38
5	Right	provided	10.53	19	152
6	Left	providing	10.47	14	56
7	Right	supervisors	10.46	20	199
8	Right	university	10.28	25	393
9	Left	peer	10.11	16	206
10	Left	verbal	10.09	10	33

Note. 10 collocates of *feedback* have been displayed within a collocation window of 5. Collocates with logDice > 10.0 are displayed.

The following were identified as the top ten collocates for the keyword *feedback* in the data corpus using logDice statistics (LogDice (9.5), L5-R-5): *provide, from, received, receive, provided, providing, supervisors, university, peer,* and *verbal*. logDice is the preferred statistical measure for co-occurrences of two items appearing together, especially the frequency of collocates (Brezina, 2018). As an example, *provide* co-occurs with *feedback* at the highest degree of significance from this data set, and commonly is positioned to the left of the keyword, or before it. The top 10 collocates of *feedback* in the data corpus identified using the logDice (09 - LogDice (9.5), L5-R5, C: 5.0-NC: 5.0).

Feedback Representations

The goal of research question two was to understand how the word feedback is represented in contemporary literature. Feedback was represented in a wide variety of ways across the literature and differentiated in meaning within each article. As often as the word feedback was used in abstracts, research questions, findings, and recommendations, few authors operationalized or clearly defined what they meant by the word. According to Edgar et al., (2009), feedback is part of a communication model and is specifically the "receiver's reaction" to information communicated (p. 35), such as the self-efficacy of the teacher candidate. Frost and Rayfield (2020) conceptualized feedback in the realm of "social persuasion", which fits within the theoretical framework of scholarship on self-efficacy (p. 249). Shoulders et al., (2016) represented feedback as a "process", or negative feedback loop where an individual aspires to

close the gap between their current performance and a standard (p. 163). All three of these studies focused on pre-service teachers, yet there is not a clear, or agreed upon definition of feedback among them. Furthermore, the representations of feedback within each article are inconsistent, which further complicates the meaning. The theoretical framework guiding this systematic review became even more important to begin uncovering the predominant representations of feedback as either information (Hattie & Timperley, 2007), an event (Kurtoglu-Hooton, 2016), or a process (Henderson et al., 2019).

Feedback as Information

The most common representation of feedback from this literature review was in alignment with Hattie and Timperley's (2007) definition of feedback, which suggested information transmission from one agent to another. Most researchers in this systematic review clearly used feedback in language which indicated a unidirectional pathway of information from a more knowledgeable agent (e.g., supervisor or cooperating teacher) to the pre-service teacher. When the authors used language to suggest feedback is *given*, *provided* by the supervisor, and then *received* by the teacher candidate, these were key indicators of feedback as information. These are the highest occurring uses of the word feedback to indicate a transmission of information, but this is not the only way to characterize information. Feedback as information includes contextual features such as *positive, constructive, critical, written,* or what Disberger et al., (2022) generally described as a variety of information sources to be interpreted, like compliments, or community support. All together, these indicate feedback information is directed toward the recipient (e.g., pre-service teacher) from an external source (e.g., supervisor).

Feedback as an Event

Within supervision and teacher education, formal evaluations, and post-observation conferences are often scheduled events to formally document teacher performance. When feedback is represented as an event, the practices are focused on the meeting, time frequencies, or structured phases occurring during a post-observation conference (Kurtoglu-Hooton, 2016). While less frequently mentioned, feedback was represented as a *session,* or *conference* and often accompanied by *formal evaluation*, *structure,* or differentiation of *format.* Where the presence of feedback as an event became even more clear is when scholars made recommendation for feedback to occur at a higher frequency (Coleman et al., 2021), under a regular schedule (Disberger et al., 2022a), and across different observation formats (Shoulders et al., 2016).

Feedback as a Process

At times, scholars chose language to indicate feedback was occurring as discourse (Kurtoglu-Hooton, 2016). Instances referring to a *verbal conversation, feedback conversation*, *reflection process* or *dialogue* signaled evidence of how representations were more closely aligned with the process described by Kurtoglu-Hooton (2016). According to Paulsen et al., (2016) the feedback occurring through peer evaluation should be "conceptualized as dialogue" (p. 19). Henderson and colleagues (2019) expanded the definition of feedback as a process to delineate away from the expectation an external or more knowledgeable agent must be involved, and instead positioned the learner (e.g., teacher candidate) as the agent who sources and internally processes. Although infrequent, scholars indicated similar representations where the teacher candidate was self-directing or generating their own self-feedback as the primary agent responsible for their own improvement (Lambert et al., 2014; Stephens & Waters, 2009).

Many of these studies did not include a university supervisor and were solely based upon the experiences of teacher candidates (Lambert et al., 2014; Paulsen et al., 2016; Stephens & Waters, 2009), and perhaps these teacher candidates did view themselves capable of generating their own feedback. At the same time, this could also be evidence of teacher candidates not given a voice in the first place (Stephens & Waters, 2009).

What is Feedback?

The collocates for the keyword *feedback* from the data corpus (n = 34) are indicative of what is meant by feedback, the nature of it, and who is involved with it. The collocates with the highest, unique occurrence were all verbs apart from the preposition *from.* The predominant collocates of feedback were *receive* and *provide,* as well as their according verb tenses (e.g., provided, providing). These collocates support the prior finding of categorizing feedback as information, as they are evidence of the subtle indication feedback is a product, something that can be transmitted, given from one person to another, or even possessed. Grammatically, this positions feedback as the object of a sentence. For example, both statements "university supervisors *provided* additional feedback that would prove useful to their development as a teacher" (Paulsen & Schmidt-Crawford, 2017, p. 172) and "*giving* feedback to the teacher is one aspect of supervision that makes a difference" (Thobega & Miller, 2003, p. 58), reveal a subtle truth about what feedback is taken to be. Disberger et al., (2022a) described feedback as something sought, craved and, when in scarcity, "held on tightly to" (p. 137), and recommendations have been made for increasing the quantity of feedback to satisfy this desire (Disberger et al., 2022b). Similarly, feedback grammatically positioned as the subject of the sentence yields an interpretation as information, such as the statement, "Student teachers acknowledged that feedback *provided* varied by university supervisor (Shoulders et al., 2016, p. 167). Certainly, the utility, variation, and role of feedback information in development is clear in each of these examples. Perhaps the most compelling instance is to consider that the message conveyed about the important elements of a student teaching experience should include "a preservice teacher willing to be monitored and *receive* feedback" (Coleman et al., 2021, p. 258). Corpus linguistics analysis revealed the action verbs position feedback as the object of the sentence, which suggests it is information handed over unidirectionally from an individual in a supervisory position and is passively received by the teacher candidate.

From the selected literature, feedback is also taken to be characterized by distinct features related to how it is given, when it is given, and features of the feedback. The main modifier of the keyword feedback was *verbal*, which indicates feedback is produced through a spoken communication channel. For example, "The researchers recommend more verbal feedback from cooperating teachers during the student teaching internship." (Wolf et al., 2010, p. 46), and "...it is recommended that face-to-face verbal feedback conversations continue to occur during the formal evaluation process to discuss scores and performance" (Coleman et al., 2021, p. 271). This recommendation draws attention toward the mode of feedback, which is verbal. A contrast exists between both statements. The description of *verbal feedback conversations* from Coleman et al., (2021) suggests dialogue occurring, which is indicative of feedback as a process; both the supervisor and teacher candidate are engaged to discuss, and a one-way communication pathway is not clear. On the other hand, the example from Wolf et al., (2010) subtly indicates the direction of the verbal feedback is *from* a cooperating teacher, and not sourced from the teacher

candidate or elsewhere. Both are prime examples of how feedback exists as a verbal communication channel, but in two different ways to either transmit feedback information or engage in a more dialogic feedback process. Table 2 (on the following page) summarizes the three highest frequency collocations and their grammatical use.

Table 2

High Frequency Collocations for each Linguistic Category (n =34)

		Linguistic Category			
Source	Rank	Modifiers of the word 'feedback' (score)	Verbs with 'feedback' as the object (score)	Possessors of 'feedback' (score)	'Feedback' and/or (score)
Journal of Agricultural Education	1	Verbal (10.6)	Receive (12.1)	Supervisor (11.6)	Evaluation (10.8)
	2	Immediate (10.6)	Provide (11.6)	N/A	Encouragement (10.6)
	3	Constructive (10.5)	Give (10.5)	N/A	Observation (10.5)

Other modifiers of the keyword *feedback* included *immediate* and *constructive.* Each has separate meanings yet are revealing of what is most associated with feedback, and what it can be taken to be. It is commonly believed the timing of feedback is important, and this is conveyed in the literature as the high association with *immediate* because of both the desire to know by the teacher candidate following observation (Stephens & Waters, 2009) as well as how "... *immediate* feedback would be a starting place for the student teachers when they met for a follow-up conference with their supervisors" (Paulsen & Schmidt-Crawford, 2017, p. 172). Feedback immediacy supports the retention of memory and facilitates the possibility of acting more quickly to adjust or modify teaching practices. Feedback which is *constructive* also influences the actions of the recipient. When feedback is *constructive,* there can be a delayed response by the teacher candidate as, "...towards the end of the post conference, the preservice teacher began to accept the constructive feedback" (Rubenstein & Thoron, 201, p. 141) The delay however, may not prevent the candidate from finding value in the critique (Meder et al., 2018). It is particularly interesting to consider both the immediacy of feedback in tandem with the content; perhaps more critical or constructive information should be communicated later on during the post-observation conference as opposed to immediately.

Who is Involved with Feedback?

The primary finding of *feedback* as the object signals curiosity of who possesses or is involved in the transmission. The only indicator which reached a high frequency statistic greater than 10.5 was *supervisor*. Supervisors (e.g., university supervisors, cooperating teachers, administrators) were positioned as the main possessor, and thus transmitter or giver of feedback. This notion is supported by the primary role and responsibility of supervisors to include feedback (Fritz & Miller, 2004; Nolan & Hoover, 2004; Thobega & Miller, 2003; Wolfe et al., 2008). The

action is derived from these agents, and they are the source of feedback. As an example, teacher candidates value "the variability in feedback supplied by multiple supervisors" (Shoulders et al., 2016, p. 161). This word choice of *supply* reinforces the building argument for how feedback is information transmitted through a primary agent: the supervisor. Supply is meant to support a demand, and according to Disberger and colleagues (2022), teachers are in high demand of feedback. In their closing recommendations, Edgar et al., (2009) suggested "educating cooperating teachers on proper methods of feedback towards student teachers in the field experience" (p. 42). Located in this recommendation are two interesting notions about both the possession of feedback and what it is meant to be. First, cooperating teachers are indicated as the primary agent of feedback, and the feedback is directed *towards* the student teacher. Secondly, the use of the word *method* suggests something besides information, such as a possible approach which might indicate a process, like structured communication (Edgar et al., 2009). More interestingly, immediately following this recommendation is a direct quote from Tschannen-Moran et al., (1998) "Specific performance feedback from supervisors, other teachers, even students, can be a potent source of information" (p. 20). Placed together, both the recommendation about feedback methods and accompanying call to action about feedback information are confusing, depending what the reader believes feedback is meant to be.

At times, there were instances in the literature which suggested the possession of feedback is beyond the supervisor, but these findings did not achieve a high enough frequency to be considered significant from a statistical point of view. Some authors suggested peers are an additional source of feedback (Clark & Paulsen, 2016; Paulsen et al., 2016; Roberts et al., 2008), which is suggestive evidence the teacher candidates can generate their own feedback, and be more actively engaged in a process.

What is Significant about Feedback?

Feedback is associated with other words to reveal a higher degree of significance and meaning. When placed with prepositional phrases such as *and* or *or,* the author reveals what they believe accompanies feedback. The highest frequency words connected to feedback in this way were *evaluation, encouragement,* and *observation.* For those most familiar with teacher education, these are unsurprising findings, as both formal and informal evaluations accompany the responsibility of a supervisor, and they collect additional information for evaluation through observation (Nolan & Hoover, 2004). Teacher candidates are "...receiving critical feedback and observations" (Meder et al., 2008, p. 296) from their supervisors, and it is important they learn how to, "interact with and receive timely feedback and evaluation" (Joerger & Boettcher, 2000, p. 113) from their respective supervisors. Beyond evaluation and observation, feedback was also referenced in connection to encouragement. This dimension of feedback points towards the emotional and motivational component, which could be linked to building the self-efficacy of teacher candidates (Frost & Rayfield, 2020; Edgars et al., 2009; Wolf et al., 2010).

Conclusion

The findings of the systematic review and corpus linguistic analysis support the notion that feedback is a primary role associated with supervision and teacher education, and this component is highly valued, sought after, and impactful. There were also many cases where the definition of feedback was left to the reader to determine its meaning, and this responsibility can

lead to disagreement and confusion. Defining feedback is often taken for granted by the authors themselves, as many represent the word as information, process, or event, all within the same article. The main representation of feedback is that feedback is information to be transmitted from the supervisor to the teacher candidate. Although never explicitly cited, this information transfer representation is aligned with the more popular definitions and scholarship about what feedback should be taken to be (Hattie & Timperley, 2007; Wisniewski et al., 2020). There are some indications feedback is conceptualized as an event, which is evidenced by how it is framed in conjunction with a structured boundary such as time, or a scheduled conference or session. Other scholars have moved away from using this terminology, and elected language like *post-observation conferences* (Fritz & Miller, 2003; Rubenstein & Thoron, 2013). Feedback as a process is not as clearly observed in the literature, but there are some indications to suggest a bi-directional process which includes dialogue or conversation (Coleman et al., 2021; Paulsen & Martin, 2014). Additional evidence of a feedback process is found in the sense that feedback is something which is learner-centered (Henderson et al., 2019), and the teacher candidate is capable of identifying growth on their own (Lambert et al., 2014; Meder et al., 2018), self-directing (Stephens & Waters, 2009), or generating plans for growth and improvement in community with peers (Paulsen et al., 2016), less the agentic role of a supervisor.

Altogether, the literature representing feedback in agricultural education is unclear on the role of the teacher candidate regarding feedback. Emphasis is placed on teacher candidates' willingness to receive feedback, and most scholarship focuses on the role of the supervisor as the source. At the same time, reflection on feedback is viewed as an important competency for teacher candidates to build, not only during their field experiences but across the entirety of their teacher education program (Lambert et al., 2014; Meder et al., 2018; Paulsen et al., 2016; Stephen & Waters, 2009). These authors specifically position the important role of the teacher candidate as the primary agent, and an active contributor to the process of growth and development. On the other hand, most of the scholarship focuses on the role of the supervisor, and they reinforce this role as a source, supplier or provider of feedback, and the teacher as the recipient (Coleman et al., 2021; Edgar et al., 2009; Paulsen & Martin 2014; Paulsen & Schmidt-Crawford, 2017; Thobega & Miller, 2003; Shoulders et al., 2016). A more structured and clinical approach to supervision is commonly observed in agricultural education teacher preparation programs (Fritz & Miller, 2004).

Implications and Recommendations

It is vital for future research and practice in agricultural education to determine a clearer representation of feedback. Language is powerful, and when a co-existence of meaning is not clearly communicated it can result in conflicting interpretations, implications for practice, or development of research questions (Winstone et al., 2022). In the context of agricultural education and teacher development, the agentic roles of both supervisors and teacher candidates matter in respect to the concept of feedback. Absent a clarified meaning of feedback, the result is a myriad of practices and misunderstandings including, but not limited to, conceptual frameworks, research questions, and recommendations involving supervision and teacher development. Distinguishing feedback as a process, event or information from each other might be subtle in nature, but has implications if left for the reader to make their own interpretation.

Take for example the following outcome from a study related to different supervision formats: “Student teachers also desired a combination of variability in feedback and continuity in the focus of feedback over time” (Shoulders et al., 2016, p.169). In this context, feedback is framed as a desire based on both its variability and focus across time. How might this recommendation lead to different outcomes for practice if specific language was added to clarify how feedback is meant? How might a teacher educator adapt their practice if they evaluated the variability of their feedback processes, feedback events, or feedback information? Different outcomes would surface, just as they would if they analyzed the continuity in the focus of feedback information, feedback processes, or feedback events. Re-written with a higher degree of clarity, what direction might a practitioner take if they knew student teachers would benefit from *a combination of variability in feedback processes and continuity in the focus of feedback information over time*? By precisely writing “variability in the feedback process”, this more clearly describes the research completed by Shoulders et al., (2016) to understand the differences in a format with either one or two different supervisors. Essentially, *how* each supervisor processes the feedback will be different. Moreover, Shoulders et al., (2016) suggested the importance of supervisors communicating with each other prior to future visits so the content of the feedback would be consistent, and not potentially contradictory or disempowering for the student teacher. Here, representing the focus of feedback information is all about *what* is being said. What this boils down to is a difference between *what* is occurring, and *how* it is occurring. Both can and should exist, but without a clearer representation, they co-exist in a way only the reader can make an interpretation of. Clarity of representation in this case, would yield stronger and more unified actions for practitioners.

A secondary implication surrounding the language and grammatical framing of feedback is suggesting it originates from the supervisor, and they are the purveyor of feedback information. Part of this might be a by-product of the lack of reflective practices built into existing teacher education programs, and the teacher candidates are unprepared to generate their own feedback information or engage in feedback processes with a high degree of self-direction (Meder et al., 2018). In fact, adopting a supervisory practice which places the role of reflection, critical thinking and directing the feedback process on the teacher candidate is seen to be risky (Fritz & Miller, 2003). Supervisors in agricultural education have been observed to give less voice to their teacher candidates during feedback processes (Stephens & Waters, 2009). This dominance of voice taken up by supervisors is also reflected too in the grammatical choices made by the authors in this literature review. The heavy emphasis on unidirectional transmission of feedback information from the supervisor to the teacher candidate, is akin to the traditional practices of teacher-centered instruction (Garrett, 2008). The traditional, teacher-centered approach has been noted in agricultural education scholarship, and practitioners have been encouraged to grant more autonomy and agency to preservice teachers as a result (Lambert et al., 2014). According to current literature, the theme of existing language in our field suggests we are mostly operating on a supervisor-centered approach to feedback information and feedback processes. While existing practices might be more learner, or teacher-candidate centered, the language in our scholarship does not yet clearly, or consistently, communicate this. Without a more critical look at our language, writings, and recommendations, we may strengthen traditional approaches to supervision, and skirt the possibility for more imaginative learner-centered approaches which emphasize the engagement, reflection, and agentic role of the teacher candidate in their own growth and development. Scholars have suggested we generate a

paradigm shift by carefully looking at our supervisory practices, differentiating them, and ultimately working in a more collaborative way with teacher candidates to grant them power and agency (Fritz & Miller, 2004; Lambert et al., 2014; Stephens & Waters, 2009).

If we want to change the pathway forward regarding supervision, feedback, and teacher education then we cannot simply make alterations to our research questions, practices, or recommendations; we must begin with our language (Winstone et al., 2022). Scholars must resist oversimplified language calling for more feedback, or improvements in feedback without clearly indicating either *what* or *how*. Situating feedback in a context matters, such as an *event* (e.g., post-observation conference) occurring traditionally between a supervisor and teacher candidate (Kurtoglu-Hooton, 2016). When situated this way, feedback holds a more useful and clearer meaning because the reader is primed to think about feedback as an *event* as opposed to a *process* or *information*. Awareness includes carefully analyzing the extent to which our existing research and practice reflects a traditional approach to teaching, whereas the supervisor is the dominant voice who provides feedback information, and the learner simply receives or rejects it (Garret, 2008). A more learner-centered approach will elevate the role of the teacher-candidate and promote active engagement in the processes of information (Henderson et al., 2019).

Suggesting we need *more feedback* has little utility (Paulsen et al., 2016). What does this mean? More time, occurrences, or quantity of descriptive information? Or, does *more* mean a shift in the process? Such a recommendation does not even touch on the quality or effectiveness of feedback. Furthermore, what does *more feedback* mean in terms of the role of either supervisor or teacher candidate? For purposes of clarity and understanding, I recommend research and practice move away from the single term feedback, and advance toward a vocabulary more appropriately representing the intention. Leveraging definitions of existing scholars related to feedback in practice, and consistently using them in journal publications will promote alignment in research and practice. I believe this confusion can be clarified with a more expansive, and clear phrase in three primary representations:

1. *Feedback information*: a primary focus on the content, information, or ques used to inform a change in practice or performance in relation to a standard or goal. Feedback information can be acquired by the learner, or it can be supplied by an external source or agent such as a supervisor, cooperating teacher, peer, or data.
2. *Feedback process:* a primary focus on how dialogue, discussion, reflection, and relationships drive changes in practice or performance in relation to a standard or goal. Feedback processes can be internally or externally derived, as a mechanism for actively formulating outcomes and actions based on the feedback information available.
3. *Feedback event:* an occurrence where either feedback information or feedback processes occur; a post-observation conference.

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Professional Rededication to SAE: Describing SAE Implementation in the United States

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Abstract

The concept of the 'home project', now known as the Supervised Agricultural Experience (SAE), has been a cornerstone of School-Based Agricultural Education (SBAE) for 100+ years. This experiential element of SBAE provides students with authentic and relevant experiences to enhance the learning process. While agricultural educators throughout the U.S. agree that SAE is an important aspect of agricultural education, many educators claim they are not confident in their ability to implement SAE. This lack of confidence from educators has caused SAE to decline to the point of professional concern. This study aimed to describe SAE implementation nationally. Data utilized in this study was collected from the Agricultural Experience Tracker (AET) through student and teacher entries. AET is a privately owned educational company specializing in student record-keeping for SAE projects. Data represents entries from 619,077 students in 4,820 SBAE programs in 45 states. It was determined that the states utilizing the AET for record-keeping the most were Oklahoma (94%), Montana (94%), and Colorado (92%). Additionally, data suggested that 52.3% of SBAE students have an SAE, and the most common SAE types are within the Animal Science, Plant Science, and Power, Structural, and Technical Systems pathways.

Introduction and Review of Literature

Rufus Stimson and his vision for the 'Home Project'

Rufus Stimson, an early 20th-century agricultural educator, published his book entitled *Vocational Agricultural Education by Home Projects* (Stimson, 1919). Many agricultural education historians credit Stimson for creating the concept of the 'home project, along with other early agricultural educators such as William H. Kilpatrick (Roberts & Harlin, 2007). Stimson was the president of the Connecticut Agricultural College and became deeply concerned about how agriculture was being taught (Moore, 1988; Smith & Rayfield, 2016). During this time, Stimson postulated the project method, and in 1908, accepted a position as the Director of the Smith's Secondary Agricultural School (Moore, 1988; Smith & Rayfield, 2016). This new position allowed him to test the project method and evaluate its efficacy (Moore, 1988; Smith & Rayfield, 2016). The success of the project method at Smith's Secondary Agricultural School would resonate throughout the profession for 100+ years (Moore, 1988; Smith & Rayfield, 2016).

Evolution of the 'Home Project'

The concept of the 'home project', now known as a Supervised Agricultural Experience (SAE), brings an experiential nature to agricultural education allowing students to practice

instruction received through course(s) and FFA involvement (Dyer & Osbourne, 1995; Moore, 1988; Rank & Retallick, 2016; Smith & Rayfield, 2016). Stimson originally encouraged his students to develop a project to "experience" the content taught in his courses (Dyer & Osbourne, 1995). The concept of SAE is based on the educational philosophies of John Dewey (Dyer & Osbourne, 1995; Roberts & Harlin, 2007), who purported that as relevant experiences are incorporated into instruction, the learning process will become more engaging and efficient (Dewey, 1938). This uniquely positions agricultural educators to provide authentic experiences to students through SAE and, therefore, elevate the level of instruction received by School-Based Agricultural Education (SBAE) students (Roberts & Harlin, 2007; Smith & Rayfield, 2016; Wilson & Moore, 2007). It should be noted that the concept of SAE would later be incorporated into the modern three-component model as a cornerstone of agricultural education (Croom, 2008).

Historical Decline of SAE Implementation

When the Smith-Hughes National Vocational Education Act of 1917 was signed into law by President Woodrow Wilson, the inclusion of an SAE was solidified as a requirement for all agricultural education students (Dyer & Osbourne, 1995). The act stated that "education in agriculture of less than college grade" (S.R. 374, p. 934) should require a "…directed or supervised practice in agriculture, either on a farm provided by the school or other farm, for at least six months per year" (S.R. 374, p. 934). Including a supervised experience in this seminal legislation solidified the concept of SAE as a critical component of agricultural education (Dyer & Osbourne, 1995; Moore, 1988; Rank & Retallick, 2016; Roberts & Harlin, 2007; Rubenstein et al., 2023; Smith & Rayfield, 2016; Wilson & Moore, 2007). Until the Vocational Education Act of 1963, federal legislation would not significantly affect the implementation of SAE (Phipps & Osbourne, 1988). Many agricultural education professionals consider the federal legislation passed in 1963 as a pivotal point in the decline of supervised experiences (Phipps & Osbourne, 1988; Smith & Rayfield, 2016). The popularity of SAE increased throughout the first half of the 20th century (Smith & Rayfield, 2016). This expansion of SAE would be halted by the Vocational Act of 1963, which stated that agricultural education "…may be provided without directed or supervised practice on a farm" (S.R. 210, p. 559). This verbiage was included in the legislation to broaden the scope of SAE (Roberts & Harlin, 2007; Smith & Rayfield, 2016; Wilson & Moore, 2007). Unfortunately, many SBAE stakeholders interpreted this as the removal of required supervised projects (Smith & Rayfield, 2016) Throughout the last half of the 20th century, the decline in SAE implementation would reach professional concern (Miller, 1980; Wilson & Moore, 2007).

Impact of SAE

Since Stimson's envisioning of the SAE concept, agricultural education students have been impacted by this experiential project method (Hanagriff et al., 2010; Hanagriff et al., 2014; Haddad & Marx, 2018; Ramsey & Edwards, 2011; Ramsey & Edwards, 2012). Ramsey and Edwards (2011) found that employers expected students to learn skills that were useful to the agricultural industry. Haddad and Marx (2018) determined that students gained valuable employability skills through SAE that were helpful to their future career choices. In addition to skill acquisition, SAEs contributed a significant amount of economic impact to local, state, and national economies (Hanagriff et al., 2010; Hanagriff et al., 2014). Hanagriff et al. (2010)

determined that SAEs had approximately $103 million in direct spending and $189 million in economic impact in Texas. Furthermore, Hanagriff et al. (2014) determined that agricultural mechanics projects produced around $10 million in economic impact in Texas.

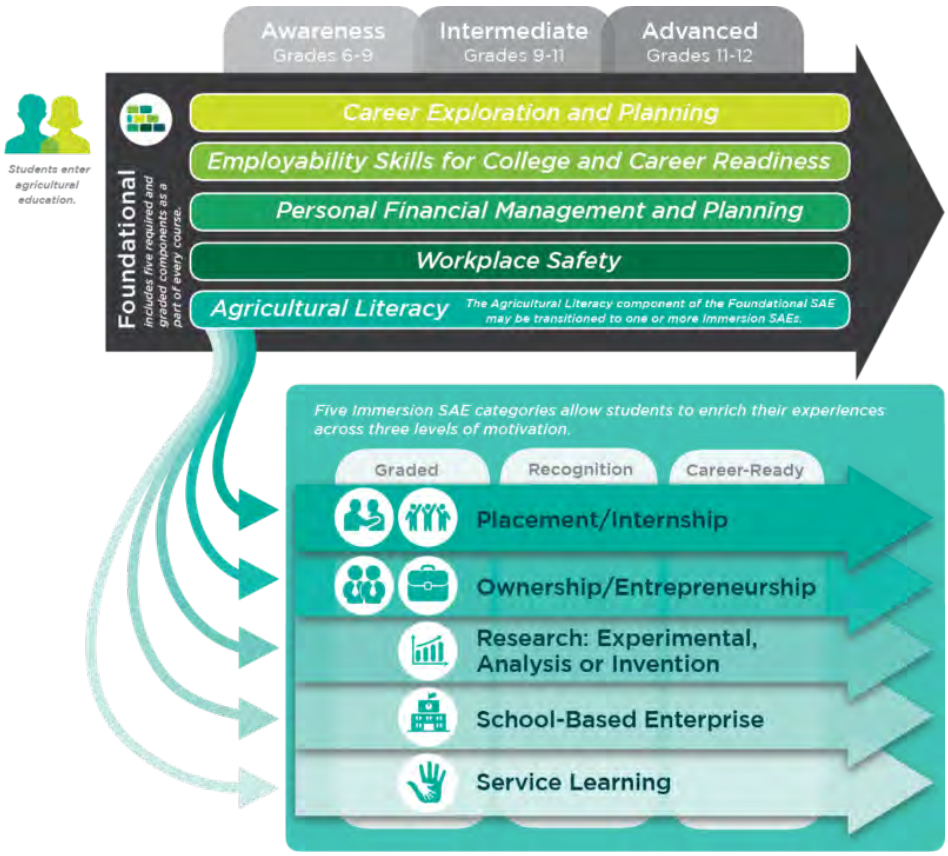
Professional Rededication to SAE

The National FFA Organization and the National Council for Agricultural Education (NCAE) have led the charge to increase SAE implementation (NCAE, 2024). In the early 1990s, the NCAE issued a handbook entitled *SAE: Experiencing Agriculture* and released the *Decisions and Dollars* curriculum (Wilson & Moore, 2007). The National FFA Organization expanded the SAE awards program significantly with new proficiency award categories, the expansion of the Stars over America awards, and the adoption of new accounting principles for SAE record-keeping (Wilson & Moore, 2007).

While SAE implementation has declined since the mid-20th century (Smith & Rayfield, 2016), the profession has taken steps over the last two decades to increase participation (NCAE, 2024). In 2019, the NCAE and the National FFA Organization unveiled a novel SAE model called 'SAE for All' (NCAE, 2024; See Figure 1).

Figure 1

Framework Depicting SAE For All



Note. Framework was developed by the NCAE (2024).

This model onboards new SBAE students to the SAE process through a foundational project (NCAE, 2024). This foundational project consists of five elements, including 1) career exploration and planning, 2) employability skills for college and career readiness, 3) personal financial management and planning, 4) workplace safety, and 5) agricultural literacy (NCAE, 2024). This beginning stage project allows new SBAE students to explore agriculture and develop plans for long-term SAE engagement (NCAE, 2024). The expectation is that students will transition from a foundation project to an immersion SAE as they continue their experience in agricultural education (NCAE, 2024). Immersion projects consist of five types of SAEs, including 1) Entrepreneurship, 2) Placement, 3) Research/Experimental, 4) School-based enterprise, and 5) Service learning (NCAE, 2024). This novel SAE model will assist the profession in engaging in quality SAE implementation nationally.

The introduction of the Agricultural Experience Tracker (AET) has revolutionized how agricultural educators teach SAE record-keeping (Price et al., 2023). The AET is a privately owned company that operates an electronic accounting system specializing in SBAE student project records (AET, 2024). Traditionally, SAE records were stored in a paper record book (Bird et al., 2013; Moore, 1988; Smith & Rayfield, 2016; Wilson & Moore, 2007). As modern society has become increasingly more digital, electronic record books have become more popular, with approximately 78% of SBAE programs utilizing the AET (Hanagriff, 2023). While the AET is utilized by agricultural education programs nationwide, many educators acknowledge being uncertain in their abilities to utilize the system effectively (Ferand et al., 2020; Price et al., 2023; Sorensen et al., 2014; Toombs et al., 2022).

Modern Perceptions of SAE

Overall, agricultural educators agreed that SAEs are a critical aspect of agricultural education and that they are beneficial to students (Blackburn & Ramsey, 2014; Dyer & Williams, 1997; Rubenstein & Scott, 2021; Shoulders & Toland, 2017; Wilson & Moore, 2007). Johnson et al. (2012) found that agricultural educators in North Carolina agreed that SAEs help students with special needs develop career goals and social skills. While educators agreed that SAE was critical for student success (Blackburn & Ramsey, 2014; Rubenstein & Scott, 2021; Shoulders & Toland, 2017), many educators claimed they were not confident in their ability to implement SAE into professional practice (Doss & Rayfield, 2019). This lack of confidence in implementing SAE caused some educators to spend less time focusing on supervised projects (Lewis et al., 2012; Shoulders and Toland, 2017). Lewis et al. (2012) determined that agricultural educators spent 9 to 34 days of instructional time on SAE, and Shoulders and Toland (2017) suggested that SAE was the least emphasized area of SBAE's three-component model. Rubenstein and Thoron (2015) purported that the main factor determining the quality of SAE implementation was the knowledge and dedication of the educator, which is contrasted with only 53% of undergraduate teacher preparation programs offering specific coursework in SAE implementation (Rank & Retallick, 2017).

While SAE has a historical past as a cornerstone of agricultural education (Croom, 2008), very little is known about the current state of SAE implementation. Croom (2008) stated that "for the [agricultural education] model to be successful to a significant degree, there must be a commitment by all stakeholders to deliver all components collectively" (p. 118). As the

profession rededicates itself to SAE, more information on how SAE is implemented nationally will become critical to evaluating engagement efforts.

Theoretical Framework

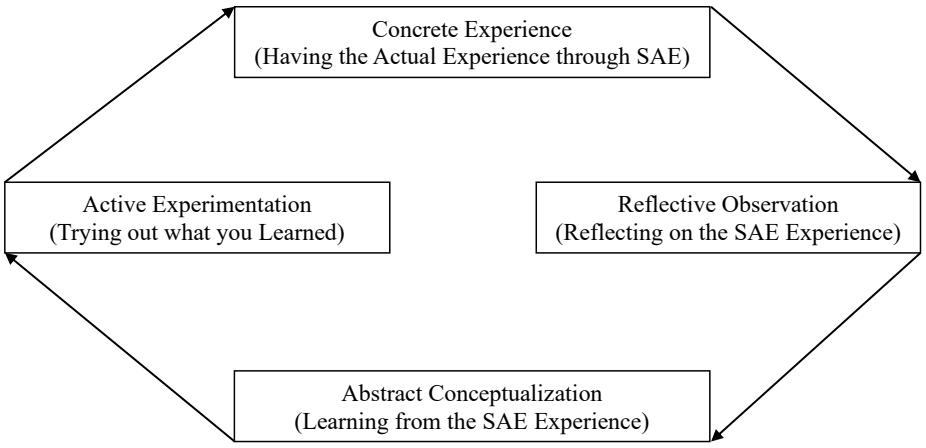
Kolb's Experiential Learning Theory (ELT) guided this study's theoretical focus (Kolb, 1984). This theory's foundation is that as authentic experiences are incorporated into the instructional process, the engagement of the student increases, and the learning process becomes more efficient (Kolb, 1984). Furthermore, this theory purports that students must actively engage in the instructional process and take ownership of their learning for it to be efficient (Kolb, 1984). The ELT is based on six central principles that guide the theory (Kolb, 1984):

1.) Learning is Best Conceived as a Process, Not in Terms of Outcomes
2.) Learning is a Continuous Process Grounded in Experience
3.) The Process of Learning Requires the Resolution of Conflicts Between Dialectically Opposed Modes of Adaptation to the World
4.) Learning is a Holistic Process of Adaptation to the World
5.) Learning Involves Transactions Between the Person and the Environment
6.) Learning is the Process of Creating Knowledge

Baker et al. (2012) suggested that "…[Kolb's] experiential learning model, when placed on the agricultural education model, illustrates the total learning experience of agricultural education" (p. 6). This learning model has been utilized in agricultural education since its inception through the implementation of SAE. Baker et al. (2012) stated "Agricultural education is uniquely poised to help students through an effective model of instruction that is experiential by nature" (p. 12). This utilization of the ELT in agricultural education allows educators to improve their pedagogical tactics and reinforce content with relevant experiences to improve the learning process for students (Baker et al., 2012). The interaction between the ELT and SAE is depicted in Figure 2.

Figure 2

Theoretical Framework for Kolb's Theory of Experiential Learning in SAE



Note. Developed from Kolb's Model of Experiential Learning

Purpose of the Study

The purpose of this study was to describe SAE implementation nationally. The results of this study have major implications for determining the quality and quantity of SAE implementation nationally. Furthermore, this study can help inform the profession on the health of SAE engagement. The following research objective guided the study:

1.) Describe SAE implementation in SBAE nationally.

Methods

Participants

The population of this study included SBAE programs in the United States that utilize the AET as a record-keeping system for student's supervised projects. This study utilized averages per program to extrapolate national estimates on various SAE and AET metrics. The researchers had difficulty determining an accurate and conservative estimate of the quantity of SBAE programs nationally. The National FFA Organization reports 8,817 FFA chapters in the 2020-2021 academic year (FFA, 2023). The researchers were hesitant to utilize this number for national estimates because the number of FFA chapters is not necessarily equivalent to the quantity of SBAE programs nationally. The National Agricultural Education Supply and Demand Study from Smith et al. (2019) reported 9,071 SBAE programs nationally for 2018 but Foster et al. (2021) reported 8,466 nationally in 2020. Ultimately, the researchers chose to average the estimates from the 2018-2020 National Agricultural Education Supply and Demand Studies to determine a conservative estimate of SBAE programs in the U.S. (See Table 1). While there are some known inaccuracies in the National Agricultural Education Supply and Demand report due to some states not reporting data, the response rates for states were between 89% and 98% (Smith et al., 2019; Foster et al., 2020; Foster et al., 2021), which was deemed acceptable.

Table 1

Average Number of SBAE Programs Nationally

Citation	# of SBAE Programs Nationally
Smith et al., 2019	9,071
Foster et al., 2020	8,504
Foster et al., 2021	8,466
Average	≈ 8,690

Note. Figures Based on National Estimates in the National Agricultural Education Supply and Demand Studies.

The researchers estimated there to be 8,690 SBAE programs nationwide. Overall, 6,752 agricultural education programs utilized the AET system, which equates to approximately 78% of programs (Hanagriff, 2023). The researchers excluded 1,982 programs from this analysis because they utilized the AET system for FFA award applications but did not have SAE records imputed into the AET. This provided a sample from 619.077 students in 4,820 SBAE programs

in 45 states. The data from these programs and states were selected because they utilized AET for student SAE records. Overall, this sample represents 55.4% of the SBAE programs nationally.

Data Collection and Analysis

The data analyzed in the study were collected through the AET from teacher and student entries during the 2022 calendar year. Data in this study were analyzed using central tendencies and percentages to derive average values per SBAE program and national estimates of SAE engagement.

Limitations

This study describes SAE implementation from the 4,820 SBAE programs reporting data through the AET. This data collection method limits the study because it is possible that the programs utilizing this system have more supervised student projects than SBAE programs not utilizing the AET. Additionally, the researchers estimate there to be 8,690 SBAE programs nationwide. Overall, researchers agreed that this is a conservative estimate but any variation from this amount could alter the national estimates presented in the study.

Results

AET records were analyzed to determine usage by program and state. It was determined that 55.4% of SBAE programs utilize the AET for student project records. Rankings of states by percentage of use determined states who most utilized the program (see Table 2).

Table 2

Percentage of Agricultural Education Programs Utilizing the AET Record System by State

Rank #1-17	%	Rank #18-34	%	Rank #35-51	%
1. Oklahoma	94%	19. W Virginia	71%	36. Missouri	33%
2. Montana	94%	20. Alabama	71%	37. Mississippi	33%
3. Colorado	92%	21. Kentucky	68%	38. S Carolina	31%
4. Idaho	90%	22. Iowa	66%	39. Indiana	30%
5. Nevada	89%	23. California	62%	40. Rhode Island	25%
6. Nebraska	87%	24. Texas	62%	41. Louisiana	25%
7. N Dakota	87%	25. Illinois	62%	42. Virginia	24%
8. Wyoming	86%	26. Kansas	58%	43. Georgia	23%
9. Ohio	82%	27. S Dakota	54%	44. Tennessee	20%
10. Connecticut	81%	28. Maryland	53%	45. Wisconsin	19%
11. Oregon	80%	29. N Mexico	52%	46. Hawaii	14%
12. Utah	79%	30. Minnesota	51%	47. Florida	11%
13. Arizona	78%	31. New Jersey	50%	48. Massachusetts	6%
14. Michigan	78%	32. Delaware	45%	49. Vermont	N/A
15. N Carolina	75%	33. New York	42%	50. Maine	N/A
16. Arkansas	73%	34. Washington	40%	51. Virgin Islands	N/A
17. Pennsylvania	72%	35. Alaska	33%	52. Puerto Rico	N/A

Note. n = 4,820

The quantity of SBAE programs utilizing AET ranged significantly with 94% of SBAE programs in Oklahoma, 94% in Montana, 92% in Colorado, and 90% in Idaho utilizing the AET for student project records. Additionally, some states and territories had less than 10% of their SBAE programs utilizing the AET, with only 6% of programs in Massachusetts, 0% in Vermont, 0% in Maine, 0% in Puerto Rico, and 0% in the Virgin Islands.

SBAE programs that utilized the AET averaged 5,832.2 journaled hours per program for the 2022 calendar year. This includes 4,662.8 SAE hours, 899.7 FFA hours, and 260.7 community service hours. Overall, it is estimated that SBAE programs spent 50,603,336 hours collectively on SAE, FFA, and community service. These descriptive statistics are reported in further detail in Table 3.

Table 3

Hours Journaled Through the Agricultural Experience Tracker

Descriptive Area	Average Per Program	%	National Estimate (N = 8,690 Programs)
SAE Journal Hours	4662.8	80.0%	40,519,649
FFA Journal Hours	899.7	15.5%	7,818,494
Community Service Journal Hours	260.7	4.5%	2,265,193
Total Hours	5,823.2	100%	50,603,336

Note. n = 4,820. Averages per program have been rounded to the nearest decimal place. National estimates are based on unrounded per program averages to reduce rounding errors.

The average teachers per program had 1.92 teachers and 128 students active on the AET. Additionally, 67 students (52.3%) had an SAE and 66.4% had active journals in the AET (See Table 4).

Table 4

Descriptive Statistics for Average Program in the United States

Program Demographics	2022 Averages Per Program
Number of Teachers	1.92
Active Students (All Grades)	128
% of Students with SAEs (Active)	52.3
% of Students with Journals (Active)	66.4

Note. n = 4,820

Overall, there was an average of 100 SAEs per SBAE program among the 67 students participating, with several students having multiple projects. Of these 100 projects, 28 were foundational SAEs, and 72 were Immersion SAEs. Within the Immersion SAE category, 26 of them were entrepreneurship, 39 were placement, and 7 were research SAEs. This estimates to 865,245 SAE projects nationally (See Table 5).

Table 5

Student SAE Involvement Per-Program by Primary SAE Type

SAE Descriptive Area	# of SAEs Per Program	%	National Estimates (N = 8,690 Programs)
Total Foundational SAEs	28		243,744
Total Immersion SAEs	72		621,501
Entrepreneurship SAEs	26	35.9	222,895
Placement SAEs	39	54.1	336,094
Research SAEs	7	10.0	62,512
Total SAEs Per Program	100	100.00	**865,245**

Note. n = 4,820. Averages per program have been rounded to the nearest whole figure. National estimates are based on unrounded per program averages to reduce rounding errors.

Of the 100 SAEs in the average agricultural education program utilizing the AET in the 2022 calendar year, approximately 35% were within the animal science pathway, 16.6% in the plant science pathway, and 8.0% in the power, structural, and technical systems pathway (See Table 6).

Table 6

Average Quantity of SAEs per Program by Pathway

SAE AFNR Area	Average # Per Program	% of SAEs per Program
Animal Science	35.0	35.0
Agribusiness Systems	4.5	4.5
Leadership Education & Comm.	1.8	1.8
Environmental Systems	1.8	1.8
Food Products and Processing	4.9	4.9
Power, Structural, and Technical	8.0	8.0
Natural Resources	1.8	1.8
Plant Science	16.6	16.6
Biotechnology	0.2	0.2
Other/Not Reported	25.4	25.4

Note. n = 4,820

The average annual income from SAEs per SBAE program totaled approximately $64,212. The largest areas of income from supervised projects included $36,325 in Paid Work Income, $8,119 in Awards/Scholarships/Premiums, and $7,435 in Stock Show Sales. Overall, the researchers estimated there to be $558 million in annual income from SAE projects nationally (See Table 7).

Table 7

Income Values from SAE Engagement in Agricultural Education Programs

Area of SAE Income	Average Per Program	%	National Estimate (N = 8,690 Programs)
Paid Work Income	$36,325	56.6	$315,661,125
Awards/Scholarships/Premiums	$8,119	12.6	$70,552,060
Stock Show Sale	$7,435	11.6	$64,610,256
SAE Labor Exchange	$6,406	10.0	$55,668,116
Used at Home	$2,153	3.4	$18,705,814
Cash/Market Sale	$1,677	2.6	$14,573,668
Rental Income	$1,294	2.0	$11,248,350
Research Funding	$803	1.3	$6,980,241
Total Vale	**$64,212**	100.0	**$557,999,629**

Note. n = 4,820. Averages per program have been rounded to the nearest whole figure. National estimates are based on unrounded per program averages to reduce rounding errors.

In many cases, where students earned an income from their SAEs, the students must invest financial resources into the project. These operating expenses are often associated with entrepreneurship and research projects. These operating expenses for student projects are detailed in Table 8.

Table 8

SAE Investments in Operating Expenses

Expenditure Area	Average Per Program	%	National Estimate (N = 8,690 Programs)
Inventory for Resale	$23,875	32.6	$207,470,908
Feed	$13,015	17.8	$113,096,652
Other Expenses	$6,756	9.2	$58,711,261
Rent	$5,514	7.5	$47,913,612
Fertilizer/Chemicals	$5,500	7.5	$47,797,091
Contract/Custom Hire	$4,563	6.2	$39,648,549
Supplies	$3,154	4.3	$27,409,956
Seed	$2,719	3.7	$23,630,781
Repairs/Maintenance	$1,948	2.7	$16,929,098
Paid Work Expense	$1,877	2.6	$16,308,011
Fuel	$1,530	2.1	$13,297,698
Veterinary Medicine	$1,364	1.9	$11,854,754
Entry Fees/Commissions	$1,344	1.8	$11,675,443
Total Value	**$73,158**	100.0	**$635,743,814**

Note. n = 4,820. Averages per program have been rounded to the nearest whole figure. National estimates are based on unrounded per program averages to reduce rounding errors.

Overall, the average SBAE program had students investing $73,158 in current operating expenses. This excluded non-current (long-term) investments such as breeding animals, land, equipment, etc. The largest areas of investment included $23,875 in Inventory for Resale, $13,015 in feed, $6,756 in other expenses, and $5,514 in rent. The national investments in operating expenses for supervised projects are estimated at $635 million for 2022 (See Table 8).

The average investment for non-current (long-term) items per SBAE program in 2022 totaled $25,514. When non-current item investing is combined with the $73,158 invested in operating expenses (See Table 8), the total investments per SBAE program calculates to $98,672. Overall, the national estimate of SAE spending totaled $857 million nationally (See Table 9).

Table 9

Direct Investments and Economic Impact Values from SAE Engagement

Area of Economic Activities (SAE Investments)	Average Program Value Direct Spending (Per Program)	National Estimate (N = 8,690 Programs)
Total Operating SAE Expenses	$73,158	$635,743,814
Non-Current Asset Purchases	$25,514	$221,716,660
Total Value	**$98,672**	**$857,460,474**

Note. *n* = 4,820. Averages per program have been rounded to the nearest whole figure. National estimates are based on unrounded per program averages to reduce rounding errors.

Conclusions, Discussions, and Recommendations

The concept of the SAE has been a cornerstone aspect of agricultural education since Rufus Stimson first envisioned the project method (Dyer & Osbourne, 1995; Moore, 1988; Rank & Retallick, 2016; Smith & Rayfield, 2016). This experiential component of SBAE provides students with authentic and relevant experiences to engage them in the instructional process (Baker et al., 2012). While agricultural educators agree that SAE is a critical component of agricultural education (Blackburn & Ramsey, 2014; Dyer & Williams, 1997; Johnson et al., 2012; Rubenstein & Scott, 2021; Shoulders & Toland, 2017; Wilson & Moore, 2007), Shoulders and Toland (2017) determined that SAE is the least emphasized area of SBAE. Additionally, many agricultural educators do not feel confident implementing SAE into instructional practice (Doss & Rayfield, 2019), and only 53% of undergraduate teacher preparation programs have coursework dedicated to SAE implementation (Rank & Retallick, 2017). This lack of confidence displays itself with only 52.3% of SBAE students engaged in SAE.

The most common supervised projects within the average SBAE program relate to the animal science, plant science, and power, structural, and technical systems pathways. Baker et al. (2012) states that SAE's purpose "…should be to build student interest and develop important meta–skills, both of which support the classroom and FFA components" (p. 6). Davis et al. (2000) determined that students exhibiting livestock through their animal science SAEs developed employability skills, built character, and were able to use SAE profits to finance higher education. Doss et al. (2019) found that agricultural educators believed agricultural

mechanics SAE projects are highly beneficial to students. It was also determined that records were kept for approximately half of the SAE projects (Doss et al., 2019).

This study estimated there to be approximately 865,243 SAEs nationally across all pathways. These projects resulted in approximately $558 million in income. Additionally, SAE investments in operating expenses totaled an estimated $635 million, and investments in non-current (long-term) assets totaled approximately 222 million. This calculates to an estimated $857 million in total investments from student's supervised projects. Hanagriff et al. (2010) found that Texas SBAE programs had an average direct investment of $93,222 on student's supervised projects. Additionally, Hanagriff et al. (2014) found that student's agricultural mechanics projects contributed $10 million in economic impact.

This study found that the average SBAE program has approximately $98,672 in direct spending from operating expenses and non-current (long-term) investments. This is contrasted with $64,212 in income per program from SAEs, with $36,325 coming from paid work (placement SAEs). This suggests that many SAEs were unprofitable enterprises in 2022. Unprofitability is common for new agricultural enterprises (Rissing, 2019). This lack of income can be concerning, considering Talbert et al. (2005) claims that learning financial literacy is one of the top purposes of SAE, and Retallick (2010) suggested that one of the main motivators for educators to promote SAE to students was utilizing financial management, record keeping, and record analysis to assist in employability skill development. While unprofitability is considered a negative economically, Rissing (2019) claimed that profitability was not the most accurate predictor of the long-term success of an agricultural enterprise. Students can still learn a great deal about financial management through an unprofitable supervised project. This financial literacy gained through SBAE exhibits itself long-term in the lives of students (McKim et al., 2018). McKim et al. (2018) determined that every Carnegie unit of secondary agricultural education completed results in an average of $1,850.67 in additional annual income for secondary graduates and $457.40 in additional annual income for postsecondary graduates.

Recommendations for Future Practice and Research

Croom (2008) stated that "for the [agricultural education] model to be successful to a significant degree, there must be a commitment by all stakeholders to deliver all components collectively" (p. 118). To ensure that agricultural education remains relevant for the 21st century, the profession must take strides to ensure that SAE opportunities are offered for all students. The researchers recommend that agricultural education stakeholders provide detailed professional development on 'SAE for All' to ensure in-service educator competence in SAE implementation. To ensure preservice educator competence for the future, teacher preparation programs should evaluate degree programs to ensure that SAE coursework is required.

As the SAE for All model is implemented in SBAE, the researchers recommend examining its efficacy on student success, student skill acquisition, and the broader implementation of SAE. Additionally, with only 52.3% of SBAE students participating in SAE, research on which populations of students are excluded from supervised experiences should be conducted to assess parity. Furthermore, assessing the continued impact of SAE on economic value and skill acquisition for students is recommended.

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A Fourteen Program Case Study of the Benefits and Challenges of 100% Work-Based Learning/SAE and Social-Emotional Learning/FFA Adoption

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A grant provided funding for Minnesota School-Based Agricultural Education teachers to adopt 100% work-based learning through SAE for All and 100% social-emotional learning through FFA Affiliation. *To investigate teachers' challenges, limitations, and benefits during adoption, a descriptive case study approach was used. The stigma of agriculture and buy-in, limited resources, COVID-19, Supervised Agricultural Experience (SAE) jargon, and long-term financial feasibility were challenges for teachers. Teachers described many benefits including increased access, removing barriers, and increased participation. To make adoption easier, teachers wanted additional resources, networking, best practices, and time for problem-solving. FFA Affiliation's long-term viability, given the pricing model, was the participants' primary concern. We recommend national organizations develop additional resources and provide professional development to support 100% FFA and SAE and that National FFA reevaluate the FFA Affiliation fee structure or potentially eliminate the fees and dues altogether.*

Introduction and Theoretical Framework

Public Law 105-225 and the Smith-Hughes Act first established the three-component School-Based Agricultural Education (SBAE) program model: (a) rigorous, cognitive knowledge development through classroom and laboratory instruction, (b) relevant, psychomotor skill development through work-based learning (WBL) and Supervised Agricultural Experience (SAE), and (c) relational, affective disposition development through social-emotional learning (SEL) and the National FFA Organization (FFA). Students who participate in the total SBAE program are more likely to pursue careers in agriculture as the model increases career and college readiness (National Research Council, 2000, 2009) and provides personal, occupational, and educational benefits (Dyer & Williams, 1997). SAE provides authentic experiences that enable students to apply academic and technical learning to real-world settings (National Council for Agricultural Education, 2020). SBAE graduates who "participated heavily in FFA activities" are more likely to enter careers in agriculture (Fraze & Briers, 1987, p. 24), potentially up to four times more likely than non-members (Adedokun & Balschweid, 2008). 100% FFA membership efforts can even improve equity and diversity in SBAE (Falwell & Guffey, 2023; Roberts et al., 2009; Sheehan et al., 2023). Each component of the SBAE model has demonstrated benefits.

Even with measurable benefits of all three SBAE components, participation often varies. While the intent of the original SBAE model was for students to engage in all components (Case, 2010; Croom, 2008), educational expectations and legislative reforms have caused variation in how and what is prioritized (Hoover & Scanlon, 1991; Retallick & Martin, 2008; Talbert & Balschweid, 2004). Teachers struggle to balance classroom, SAE, and FFA (Shoulders & Toland, 2017; Wilson & Moore, 2007), which may lead teachers to reduce or eliminate SAE or FFA (Sheehan, 2021). Despite increased SBAE enrollment, "fewer students received the benefit

of a complete program... as evidenced by the growing gap between students enrolled in [SBAE] and students who also participated in SAE and/or FFA programs" (Retallick & Martin, 2008, p. 35). The contrast between the philosophical ideal and realistic SBAE experience is concerning.

FFA Affiliation and SAE for All are two approaches designed to reprioritize the three SBAE components as integral. When both initiatives are implemented, all students have access to SEL and leadership through FFA Affiliation, while SAE for All provides students with WBL experiences and career exploration (Sheehan, 2021). Despite signs of progress, SAE for All and FFA Affiliation are relatively new, complex, and expensive to trial, making adoption difficult.

There is limited to no research on SAE for All, in part because SAE participation is harder to track than SBAE and FFA enrollment and FFA. There is some evidence that SAE is the most minimized part of SBAE, with just half of SBAE students nationwide having an SAE (Hanagriff, 2021; Shoulders & Toland, 2017). In some regions, participation in SAE is declining (Barrick et al., 1991; Rank & Retallick, 2016; Womochil, 2019). There was an effort to renew SAE participation in the 2010s (Womochil, 2019), but efforts stalled during COVID-19 and are unclear, resulting in fractured philosophy and practice (Pastir & Thiel, 2023). Even with a renewed focus on SAE in SAE for All—and WBL in Perkins V—teachers describe a need for more professional development and support in SAE implementation (Hainline & Smalley, 2023). Greater focus on and analysis of SAE for All may help teachers implement this component.

Conversely, the gap between SBAE enrollment and FFA membership has narrowed in the last 10-15 years, although research and information on the program remains inadequate. Since 2009, FFA membership has grown by more than 30% (Sheehan & Moore, 2019). Affiliated membership contributed to the largest FFA membership increase since the 1977 Farm Crisis (Sheehan & Moore, 2019). In 2019, while less than 30% of the 8,500 FFA chapters were affiliated, they represented half of the total membership (Sheehan & Moore, 2019). As of the 2023 National FFA Convention, 55% of FFA chapters nationally were affiliated (45% used dues), and 77% of students obtained membership through FFA Affiliation (23% paid individual dues), according to National FFA (2023c). In 2023, 945,988 of the estimated 1,378,771 SBAE students were FFA members (i.e., 69%), up from 63% in 2016 (Carter, 2016; National FFA Organization, 2023d). Research on FFA Affiliation, like SAE for All research, is far too limited. Still, early studies with small samples describe a strengthened SBAE model and increased access and participation, but also identify new challenges, specifically concerns about complexity of the fees, burden of the FFA Affiliation fee on the chapter, and increased teacher workload without compensation (Falwell & Guffey, 2023; Sheehan et al., 2023). National FFA is exploring a simpler dues and fee structure, such as a fee per number of teachers, rather than per student (National FFA Organization, 2023c). National FFA research reports show membership dues and fees represent just 7% of the organization's $50 million annual budget, with 29% of those funds supporting the FFA magazine (2023a). Delegates at the 2022 National Convention discussed and even attempted to eliminate membership fees altogether (National FFA Organization, 2023b).

FFA Affiliation and SAE for All are complicated reforms that require SBAE teachers to think and act differently. The challenges experienced during adoption can provide insight into how to provide a stronger SBAE experience. National FFA has a goal for 100% of SBAE students to have access to FFA by 2028, the 100-year anniversary of FFA's founding (Deimler et al., 2021). Under the intent of the Smith-Hughes Act and ideals of the three-component model,

striving for 100% SAE may soon follow, especially under Perkins V priorities. However, because these programs are complex and data are limited, they should be further investigated.

Diffusion of innovations (Rogers, 2003) provides a useful framework for investigating how a novel idea is implemented by society. An innovation can be viewed as "an idea, practice, or project that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12). Relative advantage, compatibility, complexity, trialability, and observability explain an innovation's diffusion (Rogers, 2003). *Relative advantage* is how much an innovation is better than its predecessor. *Compatibility* is how well an innovation fits potential adopters' values, experiences, and needs. Compatibility reduces adopter uncertainty. *Complexity*, how difficult an innovation is to understand and use, slows adoption. *Trialability* is the "degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p. 232). Trialability promotes adoption. *Observability* describes how innovation results are observable to others. Some discoveries are difficult to articulate, while others are obvious, but observability boosts adoption. These qualities can serve as a framework for exploring 100% SBAE adoption.

FFA Affiliation and SAE for All, as innovations, are complex and expensive to trial and observe. Around 30% adoption is often a tipping point when an innovation takes off and quickly grows (Rogers, 2003). Prior to this project, based on Minnesota FFA association membership data, just 7-10% of chapters in Minnesota had adopted FFA Affiliation, compared to 30% of chapters nationally (Sheehan & Moore, 2019). Two years into the project, Minnesota is nearing 30% adoption. SAE for All participation was unknown prior to the grant project and remains more difficult to measure. Our research was needed to explore teachers' experiences adopting the total SBAE model, specifically as Minnesota approaches a potential tipping point in adoption.

Purpose and Objectives

Research on 100% SEL and FFA, and 100% WBL and SAE, is lacking. As such, our study focused on SBAE teachers who adopted the total SBAE three-component model using FFA Affiliation and SAE for All. We examined teachers' challenges, limitations, and benefits during adoption. Research questions included: (a) how do teachers describe early experiences of adopting 100% FFA and SAE; (b) what challenges and barriers arise when adopting 100% FFA and SAE; (c) what benefits of the full integrated SBAE model were experienced; and (d) what additional support and resources are needed for total SBAE model implementation?

Methodology

This research was part of a United States Department of Agriculture grant, in partnership between the University of Minnesota, Minnesota FFA association, and Minnesota Department of Education. The purpose of the Agricultural Diversity and Leadership/Technical Skill (ADLTS) Challenge grant and research was to increase social-emotional and technical skill development in SBAE programs by removing barriers to WBL programs like SAE and SEL programs like FFA.

Reflexivity Statement

Multiple authors contributed to this study. The primary author, who led data collection and analysis, was a state SBAE staff and lead the state SBAE teacher mentoring program. This rapport helped participants feel comfortable sharing their lived experiences and examples in a

way that best expressed their feelings and thoughts. Two authors interpreted the findings—one with SBAE teaching experience and another without. Three researchers held state-level SBAE leadership positions, and three were teacher educators who teach about the SBAE model. While we intended to remain neutral and minimize bias, the purpose of the grant was to increase FFA Affiliation and SAE for All, which may have impacted how we perceived our findings. Engaging in reflexive practice is crucial for developing trustworthiness and qualitative interpretations (Flick, 2017). We recognize the importance of examining our experiences related to the phenomenon; our methods describe further strategies to maintain trustworthiness and rigor.

Study Design

To participate in the grant and research, SBAE programs and teachers adopted SAE for All and FFA Affiliation. Schools received an annual participant support stipend to defray costs of implementation, such as membership fees. We provided teachers with technical training and professional development to support adoption, and teachers collaborated on shared resources.

In this study we used a single, qualitative descriptive case study design. The project's 2021-2022 academic year was the sole case. We used a descriptive case study approach to investigate our research questions, which provided depth and meaning to describe the case in its real-world context (Yin, 2017). This qualitative approach afforded the generalization of descriptions and explanations (Creswell & Clark, 2017) related to the adoption of 100% FFA and SAE from teacher participants. The case study approach allowed for a rich description of the innovation and narratives of the challenges and benefits teachers experienced during adoption.

Participant Selection

In alignment with priorities and requirements of the grant project, we used purposeful sampling to select schools that could enhance technical skill development through SAE and social-emotional dispositions through FFA. The grant required participant districts to have (a) a minimum of 10% persons of color, (b) at least 30% of its students from socioeconomically disadvantaged home environments, or (c) be situated in a community with at least 10,000 people. While many programs were encouraged to apply, participation was optional, and teachers self-selected to participate. Thirty-one schools inquired about the program; 23 schools (in 14 school districts) applied. In the summer/fall of 2020, we accepted all applicants which met the grant requirements and sampling criteria as participants: 17 schools, including 28 teachers. One district withdrew after selection, but before implementation, due to COVID-19 and teacher changes.

At the conclusion of year two (2021-2022), due to a range of factors, including teacher changes, COVID-19, and local funding concerns, 14 schools and 24 teachers who had begun the program remained. Table 1 describes each school's pseudonym, number of students and grades, percentage of students eligible for free/reduced meals (F&R), and percentage of students of color (BISOC). Also included is each teacher's pseudonym, ordered by district, and their backgrounds.

Data Sources

The primary data source used in this study was mid-intervention interviews with teacher participants conducted with 24 teachers from 14 schools during the 2021-2022 academic year. Five additional teachers began teaching in the participating school districts during the 2021-2022

academic year but were not included in these specific interviews, as they were included in a separate analysis for teachers who joined mid-study.

Table 1

Summary of Participating School District Demographics and Teacher Demographics

District	Grades	# Students	F&R	BISOC	Pseudonym	Teacher Demographics
Chester	9-12	1,200	67%	80.5%	Manuel	2 years teaching; male
Clinton	7-12	560	39%	34.1%	Rachel	9 years teaching; female
Fairview	7-12	1,900	44%	46.1%	Sally	4 years teaching; female
Franklin	7-12	1,900	14%	14.0%	Matt	18 years teaching; male
					Patrick	13 years teaching; female
					Phillip	3 years teaching; male
					Tammy	11 years teaching; male
					Wanda	17 years teaching; female
Greenville	9-12	1,100	24%	13.0%	Larry	20 years teaching; male
Groton	9-12	290	33%	18.5%	Olivia	4 years teaching; female
Hampton	9-12	1,400	44%	64.0%	Bailey	3 years teaching; female
Hartford	9-12	1,100	89%	95.4%	Adam	8 years teaching; male
					Nicole	12 years teaching; female
					Nick	7 years teaching; male
Lakefield	7-12	320	40%	23.8%	Chloe	4 years teaching; female
Madison	7-12	270	65%	88.7%	Beth	9 years teaching; female
					Ford	3 years teaching; male
Milton	7-12	2,500	25%	75.0%	Daniel	3 years teaching; male
					Wyatt	13 years teaching; male
Oakland	9-12	1,500	29%	14.6%	Grace	18 years teaching; female
					Trish	27 years teaching; female
Pontiac	9-12	460	36%	17.2%	Forrest	12 years teaching; male
					Sadie	12 years teaching; female
Salem	7-12	250	32%	39.1%	Heidi	27 years teaching; female

Note: F&R = free and reduced lunch program. BISOC = Black, Indigenous, and students of color.

We used a flexible interview protocol, lasting between 20 and 45 minutes via video conferencing software, of semi-structured questions supplemented by follow-up questions, probes, and clarifying comments (Merriam, 2009). Initial questions on our interview schedule included: (a) what prompted you to participate in the ADLTS professional development program; (b) describe the process of gaining the support/approval of your school administration; (c) as a result of participating in ADLTS, what, if anything, has changed within your SBAE program and the integration of classroom instruction, FFA, and SAE; (d) describe how students in your program have benefited from your participation in ADLTS and the resulting program changes; (e) as we continue ADLTS, how do you intend to continue to improve/enhance your program; (f) what internal/personal barriers or challenges have you faced when embracing or implementing the integrated program model? (followed by how did you overcome these barriers or challenges); (g) what external (e.g., school district, system) barriers or challenges have you faced when embracing or implementing the integrated program model? (followed by how did you overcome these barriers or challenges); (h) what has been the most helpful when

conceptualizing and implementing programmatic changes through ADLTS; and (i) to further advance your program, what resources or support is most needed? We designed questions to elicit teachers' experiences with adopting 100% FFA and SAE, with particular attention to the challenges and benefits of full adoption. We then asked follow-up questions to elaborate on the successes, problems, barriers, and benefits of adoption. We also probed for any strategies or resources that worked, for further support they needed, and for changes to teacher philosophy and practice. Finally, we asked clarifying questions to ensure accuracy in our notes and journals.

Data Analyses

The primary author conducted the interviews virtually and transcribed the interviews verbatim. The primary researcher wrote analytic field notes summarizing the content during the interviews. The interview analysis involved applying deductive and inductive methods, conducted through iterative coding cycles. Utilizing a blend of inductive and deductive methods can yield more robust results than one method alone (Creswell & Clark, 2017; Saldaña, 2015). Our guiding interview questions surrounding experiences, challenges, and benefits were rooted in deductive coding. Through comprehensive and line-by-line examination using the Dedoose qualitative coding software to improve data analysis reliability, the analysis revealed recurring patterns within and between interviews. Selective coding focused on the central themes of early experiences, challenges and barriers, and successes related to implementing the integrated model. It also indicated areas of disagreement across individual experiences, which shed insight on other topics for further investigation. Constant comparative analysis and consistent communication between the two coders allowed for a comprehensive and cohesive understanding of the identified categories and relationships (Glaser & Strauss, 1967). We developed a collaborative coding framework to ensure a shared understanding of codes and themes, ensuring inter-coder reliability through regular meetings. The procedures in this study involved consolidating the data and extracting meaningful quotes that represented the prevailing themes.

To ensure our findings' trustworthiness (i.e., credibility, transferability, dependability, and confirmability; Lincoln & Guba, 1985), we used triangulation, reflective journals, and kept a careful audit trail of our work. To bolster our findings, we engaged in multiple iterative coding cycles and careful confirmation of their trustworthiness. We employed triangulation by cross-referencing the coded themes with our documentation, including research memos and reflexive journals created throughout interviews. As a team, we scrutinized any indications of bias stemming from our unique positionality as researchers and the sole instruments in this study. We used this approach to ensure our results achieved greater validity and trustworthiness.

Results

Question 1: How do teachers describe early experiences in adopting 100% FFA and SAE?

Early experiences with 100% FFA and FFA Affiliation were positive for students and the program, but adoption created some challenges for teachers. To provide experiences for all, some teachers took entire classes to leadership conferences and competitions relevant to the course. Others used choice boards to develop WBL, SEL, and career skills through student-selected experiences. Early experiences with 100% SAE and SAE for All, and expecting all students to participate in WBL, encouraged career exploration and reflection. Most teachers had a graded

SAE component in each course and attempted to incorporate it fully. Teachers realized that SAE experiences could happen in the classroom through career exploration, school-based enterprises (e.g., school greenhouses, apiaries, orchards, manufacturing businesses), and guest speakers, as well as outside the classroom through job shadowing, internships, employment, research, and student-run businesses. Teachers felt SAE applied classroom learning to real-world scenarios.

Question 2: What challenges and barriers arise when adopting 100% FFA and SAE?

Challenges/Barriers of FFA Integration

Three central challenges/barriers emerged as themes in teacher interviews: (a) stigma and buy-in, (b) system limitations and limited resources, and (c) long-term financial feasibility.

Stigma and Buy-in. Multiple teachers spoke of how the stigma of SBAE discouraged some students from participating. Patrick shared, "As soon as [some students] see an FFA jacket, they think, 'No. I am not doing this.' The emblem is important to our organization, but…if we are trying to [include all students], do not put that at the forefront." Wyatt added, "Our urban students, they do not know what it is… [except] that it is what country kids do… that it is for people who are on farms. They do not understand the scope of agriculture." Matt stressed the need to reconsider traditions. He felt parliamentary procedure is important but could also be intimidating and even cause some students to feel excluded. Matt shared, "There is a place for [strict] parliamentary procedure, but maybe not the main focus [at every meeting]."

Daniel expanded on FFA's cultural challenges, "There is automatically this stereotype… who is in school and who would be traveling for FFA, so that has been a problem for some students." He added, "I would also say going to FFA [events] and having all our students have a good experience—which has not always happened—is a bigger problem than we can solve by ourselves." Reflecting on racism her students experienced at the National FFA Convention in 2021, Grace added, "We have a lot of work to do… there is absolutely no reason that any [student] should attend a conference and feel like they are different… they are being singled out… they are the focus of any hurtful things." Bailey emphasized that FFA programming and messaging should be more thoughtful and inclusive, reflecting "I know there are efforts being made… but some students get bad vibes, like it is 'not for me.'" She felt these experiences can be off-putting for students, making it hard to take students to regional, state, or national events.

System Limitations and Limited Resources. Teachers voiced concerns with school constraints, scheduling, and resources. Many programs have limited time, budget, resources, and staff. Some teachers discussed transportation issues and their inability to travel with students. Other teachers raised challenges about participation limits at regional events. SBAE teachers on nine-month contracts struggled to design, implement, or integrate full programming, given that this work often extends into summer months. Trish said, "To walk away from it in June… July… August… it is hard to leave, but without a summer contract, you cannot do FFA activities in [summer]. I tried [to get a] summer contract for years; they always said no."

Long-Term Financial Feasibility. Most teachers worried about the project's grant funds ending and having to pay for FFA Affiliation fees. Tammy stated, "I feel like it is going well, I hope. Our biggest hurdle, as we transition out of the grant, is going to be that financial part; how

do we maintain affiliate membership?" Grace shared similarly that the grant made an enormous difference but fears paying the large FFA Affiliation fees when the grant ends, "I am not gonna lie, our bill for affiliate fees/dues went through the roof because we have so many students, and I do not know how to fix that." Bailey described her reluctance to accept the grant, knowing it would expire. "I am nervous to start something, and then we will not have a consistent source of funding for it later." This can be especially difficult for chapters adopting FFA Affiliation, as they cannot revert to the dues model, and charging students is not an option.

Challenges/Barriers of SAE Integration

Five central themes emerged related to the challenges of integrating SAE for All: (a) accessibility for underrepresented students, (b) teacher overwhelm, (c) integration into school systems, (d) traditional terminology, and (e) COVID-19 pandemic challenges.

Accessibility for Underrepresented Students. Teachers described the challenge of flexibility as SAE was broadened to all students. Many teachers spoke about Special Education (SPED) and English-Language Learner (ELL) education. Bailey shared, "I have a lot of SPED and ELL students. It is not that they cannot do the project, but some of the ways we traditionally present the project or ask students to show their learning is difficult." When using SAE for All, Bailey emphasized the necessity for supportive resources for varied student needs. Sally also mentioned immigrant students' perspectives on agriculture as another key factor. "The fact that they fled their country to not have to live this lifestyle—that is the big battle," she said.

Teacher Overwhelm. While teacher flexibility is important and student accommodations should be made, teacher overwhelm is a concern. Sally expressed, "I am getting to the point of stretched too thin… we need a second person, so we can share [responsibility]." SBAE teachers—with extended duties outside of the base teaching contract—are often overworked, so adding "more" may be difficult. "Whenever you are trying something new it is going to take time, but I am also [teaching] on overload every semester," Larry said. Austin worried about the challenge of having so much to learn as a new teacher, in addition to 100% SAE and FFA.

Integration into School Systems. Teachers outlined district and building policies and practices that pose even more challenges when integrating SAE. Rotating or block schedules, large classes, multiple-person programs, or mixed-grade classes can make implementation difficult. "[One student] could be a senior, and this is their first time, and I have to explain all this stuff to them, but their classmates have been in my room since ninth grade, and they heard it 15 times," Chloe said. Daniel discussed challenges with integrating it into multiple-person programs; specifically, his teaching partner is "not going to put in the time."

Traditional Terminology. Another specific challenge teachers noted was the traditional terminology of SAE when implementing the shift to 100% participation. Several programs found that students, parents, and administrators understood WBL or agricultural experience better than the specialized phrasing of SAE. Beth explained, "I could use SAE terms, but when I said work-based examples, students understood that better." Forrest shared, "All students fit under the WBL umbrella… it is a more inclusive language, and that is why it has been better for us." Further, he added, "We have them do their WBL checkpoints; that is the language that we have tried to use. And it has been met with less resistance than using SAE." Rachel said her

administration understood WBL better than SAE because WBL is used and understood more often in Career and Technical Education overall.

COVID-19 Pandemic Challenges. The pandemic hampered teachers' plans for 100% FFA and SAE implementation. Teachers were limited by online or hybrid instruction; others were prohibited from taking field trips. Changes and inconsistencies impacted teachers and students. Once in-person education resumed, teachers struggled with student engagement and recruitment. Bailey elaborated, "Students are facing a lot of barriers right now in general, both COVID and home life situations." Larry added, "[Recruiting] non-traditional students has been a little more difficult in the last couple years with COVID." After a year of distance learning, other teachers acknowledged students felt more anxious when speaking in front of others, which posed challenges when they required students to present in-class about their SAE projects.

Question 3: What benefits of the full integrated SBAE model were experienced?

Teachers said students benefit from total SBAE model integration. Sadie shared the importance of talking about it, "because we have mentioned it in class, it seems a little bit less scary." All students learn leadership in a comprehensive, integrated model. Forrest reflected how the life-changing moments for students in his program are often not in the classroom but in SAE and FFA experiences. He shared, "The more [students] we can get into FFA and SAE the better… not all students will take a seat at the table, but they have all certainly been offered."

Many teachers' perspectives on SAE and FFA shifted, expanding beyond just FFA award and degree programs. SAE integration goals for teachers included career readiness, career exploration, and reflection on classroom and experiential learning. "There are so many jobs they have not been exposed to yet," Sally said. SAE for All helped expose students to career options in agriculture. Olivia shared how each class is studying careers, and "they are loving it." Many programs used choice boards, which provided a variety of options and allowed for varying levels of resources. Most teachers agreed SAE, and even FFA, should be graded in every course, although grading requirements often differed by school. Franklin teachers focused on key skills they wanted all students to gain from the SAE project but emphasized student interest; "they still get choices in what they want to do, and they get to pick," noted Tammy. "It gives every student a chance to be successful at something in school, because they are using what they have learned outside of school," added Sadie. Teachers acknowledged that while some SAE experiences may not earn an FFA degree or award, they let students explore careers. Many teachers discussed shifting their focus from describing SAE with traditional examples to starting students with foundational projects and then building to immersion. Patrick said teachers with a more limited or traditional view of SAE might be surprised by some of his student's projects, but added, "You have to be flexible, and you have to have students buy into it and be excited about what they are doing." From there, teachers found building toward immersion SAE and true WBL to be easier.

Teachers shared how all students could participate in FFA at all levels, attend events year-round, and explore options without paying a fee. Beth added, "One thing I like about the affiliate option is that students always have that door open." Since all students could participate freely, teachers could promote events to their entire class. Heidi explained, "Nobody feels like they cannot attend [anymore]; it is up to them if they want to participate." Rather than needing to convince students to join first, teachers could focus on what students would be interested in

doing. Teachers said participation in meetings, service projects, and local events increased after 100% membership was available. “It is easier when every time, [the event] includes every student,” Heidi said. Beth added that students did not understand how easy it was to participate and get involved prior to FFA Affiliation. “It is your decision how you use your membership, whether you are going to use it to the fullest of your abilities or not,” Olivia told students. Students had opportunities to build leadership, participate, and explore agriculture without first paying a fee. Membership dues may seem like a small dollar amount, but it can be what stops a student from participating. “Now the barrier is gone,” Heidi said. Like the philosophical change in SAE from immersion projects and awards to foundational experiences, teachers also shifted how they viewed FFA participation. While the concepts of foundational FFA and immersion FFA do not formally exist like with SAE, teachers found it easier to get students to participate if they introduced FFA to them through shorter, exploratory activities like one-time events or class trips rather than committing to an overnight conference, becoming an officer, or joining a CDE.

Question 4: What additional support and resources are needed for implementation?

Teachers consistently described the need for support and resources to fully integrate FFA and SAE. Themes include underrepresented student support, classroom integration resources, and teacher collaboration, which emerged in response to related questions.

FFA and SAE integration increases student access to the complete SBAE program, particularly for underrepresented students, but teachers need help. Given the increasing diversity of his students and community, Matt advocated for making FFA and SAE more inclusive. He shared that even if his efforts are not perfect, “we want everyone to feel comfortable when they come to one of our FFA activities and that they have a place there.” Diversity and inclusiveness benefit all students and teachers, not just underrepresented students. “It allows a different group of students to see those opportunities and experience them more front and center than before,” Matt reflected. Bailey elaborated on the need for SAE for All resources geared toward SPED and ELL education. She asked, “What are some accommodations that can be made for students who struggle with writing or… a presentation, [which] might benefit everyone?” Patrick shared why adapting SAE is important, “Non-traditional SAE ideas are helpful, because for a lot of students the hardest part when I talk about SAE is they have no idea what they are going to do.”

Teachers expressed a need for support with SAE integration and curriculum. Trish noted, “I would like more curriculum ideas. I would love to meet with more teachers and get a toolbox full of ideas of what other teachers are doing. How are they using AET… SAE… and FFA in the classroom.” Several teachers agreed. Overall, teachers wanted concrete examples and methods.

During adoption, most teachers wanted to spend more time collaborating with others. They wanted to discuss how it looked in differing locations and see examples. Sadie stated, “We need more voices in the room, talking about what this is, what it looks like.” Bailey added, “Resources that [others] have are helpful. I would also like to see how other teachers do it.” She knows some teachers “go all out,” but wanted more realistic examples for teachers with strong work-life balance boundaries. Other teachers requested more structured time for collaboration. Tammy wanted “more time to collaborate and chat as they work through the same hurdles.” Some teachers wanted visits and recommendations from staff and state leadership. Grace voiced this sentiment, “[I want somebody to] come in, look at things… watch us teach… or maybe

come to an FFA meeting. I think I am oblivious to some of the things that I could be doing better." Teachers desired help, real-world applications, and integration ideas.

The most consistent request for support related to long-term funding and sustainability of the integrated model, given the current fee structure with FFA. Matt shared, "If I am going to be fully transparent, I am worried… if we have the dollars to support 100% access." Tammy added, "Our biggest hurdle, as we transition out of the grant, is going to be financial. How do we maintain affiliate membership?" Teachers consistently shared how the grant allowed them to trial the integrated model. Many recognized that program changes had benefited their students, but few had plans for how to sustain the changes after the grant ended.

Conclusions

The ADLTS project enabled teachers to fund and prioritize SAE and FFA in their existing curricula to further develop students' WBL, SEL, and career skills. Teachers described the benefits of adopting the total SBAE model and generated new implementation strategies and resources. The ADLTS research project made it easier for SBAE teachers in Minnesota to adopt the complete SBAE model, while also specifically addressing adoption criteria of relative advantage, compatibility, complexity, trialability, and observability. Participating programs have become visual examples in Minnesota, leading to additional programs implementing the total SBAE model. Teachers in the second year of ADLTS implementation felt better equipped to deliver a full experience but continued to face challenges in 100% FFA and SAE integration.

There are several challenges with 100% FFA and SAE. Most teachers described the current FFA Affiliation fee structure as unsustainable, especially in larger districts with several teachers. Many students in affiliated programs have biases and preconceived ideas about SBAE, particularly when discussing leadership and technical skill development using SBAE jargon such as SAE and FFA. SBAE teachers without extended contracts struggled with the increased work but lack of additional compensation associated with 100% FFA and SAE. Potential hindrances to full participation include FFA policies, a lack of accommodation services during competitions, and transportation hurdles for activities above the local level. The findings from our study support challenges observed in similar FFA Affiliation research (Sheehan et al., 2023).

Teachers' mental models for membership and participation grew and evolved under FFA Affiliation as language shifted from "Do you want to be in FFA?" to "What do you want to do in FFA?" Participation does not necessarily mean all students qualify for competitions or win an award, as that is unmanageable and unrealistic (Falwell & Guffey, 2023; Sheehan et al., 2023). When embracing a new mental model, traditions changed as teachers and students adapted FFA activities to be more accessible and inclusive. That said, teachers also reported that sometimes students chose not to take SBAE courses due to the stigma of automatic FFA membership, which supports prior research (Falwell & Guffey, 2023), as well as increasing scheduling constraints. Due to a lack of transparent mental models in Minnesota, teachers continue to struggle to define what FFA Affiliated membership looks like and if it is right for them.

Teachers said early experiences with 100% FFA and 100% SAE helped students access SEL and WBL and increased participation. However, teachers struggled to adapt assignments for diverse learners, attempt integration methods, adjust terminology to promote student and

administrative understanding, and cope with the COVID-19 pandemic. Teachers requested support with resource development, networking, best practices, and problem-solving. Participants' biggest concern was the current fee structure of FFA Affiliation.

Recommendations/Implications

All participating teachers emphasized the benefits of total SBAE model adoption but also shared that funding and staff assistance from this grant were what allowed them to persevere and explore ideas they otherwise would not have attempted. Within diffusion of innovation theory, several variables impede the adoption of the whole SBAE model and should be considered to enhance adoption. We view the perceived *relative advantage* of total model adoption as the most critical predictor of future adoption rate challenges, particularly FFA membership fees. The cost of FFA Affiliation was a persistent concern, regardless of the number of teachers or students in the program. Given FFA's goal of all 100% membership by 2028 (Deimler et al., 2021) and how often teachers voiced concerns about the fees, we recommend evaluating and potentially eliminating fees and dues, at least at the national level. The benefits of removing this barrier for students may outweigh the relatively small percentage of funding FFA Affiliation fees and dues represent in the national organization's budget. If FFA is genuinely integral to and essential within SBAE, it may be appropriate to reconsider charging students or schools for access.

The *compatibility* of total SBAE model adoption aligns with the values and experiences of teacher participants. Teachers shared that although adoption was *complex*, the networking and tangible resources developed throughout the grant and research project made adoption more manageable. We recommend national organizations such as the National FFA Organization, the Council for Agricultural Education, and the National Association of Supervisors of Agricultural Education develop additional resources and professional development for 100% FFA/FFA Affiliation and 100% SAE/SAE for All. We found that foundational experiences of less than 40 hours for SAE increase accessibility for WBL and allow students to trial SAE before selecting or committing to a more intensive immersion experience. SBAE leaders should develop a similar philosophical mental model for foundational and immersive SEL opportunities in FFA (e.g., a differentiation between foundational experiences such as community service and meetings and immersive experiences like conferences, conventions, and CDE/LDE programs). Furthermore, teachers and state staff need resources to best support a variety of underrepresented populations.

Teachers' descriptions of the *trialability* of total SBAE model implementation varied between 100% SAE and FFA. Teachers shared how they changed their expectations for SAE each semester and sometimes in the moment. However, FFA Affiliation is more rigid; it is an annual contract and, once adopted, is essentially permanent. Such financial implications make it difficult for teachers to trial FFA Affiliation. *Observability* of these innovations remains limited, as they are difficult to trial and understand. However, some SBAE teachers have witnessed neighboring programs move to FFA Affiliation and SAE for All and find success, potentially resulting in non-project participants also moving to total SBAE model adoption. As more programs find success and benefits from the innovations, and those successes are shared, more schools may become interested in adopting the innovations themselves. In addition to recommendations for changes to the fee structure, additional resources, and professional development, we recommend national organizations promote stories of programs with successful adoption of FFA Affiliation and SAE for All to better highlight these innovations.

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Tasks Associated with Teaching School-Based Agricultural Education: The Supervised Agricultural Experience Component

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School-Based Agricultural Education (SBAE) teachers face ever changing expectations in the form of workload, challenges, needs, and characteristics of effective teaching. As such, recruitment and retention of qualified SBAE teachers is a problem faced by the profession. Identifying the tasks associated with teaching SBAE can provide insight into the daily expectations of teachers and assist in describing the profession's workload. One such area of focus is directing students' Supervised Agricultural Experiences (SAE). A modified Delphi method consisting of three rounds was used to meet the objective of the study. The panel of experts consisted of 23 doctoral students in agricultural education with at least three years of SBAE teaching experience. Forty-five tasks in 10 themes achieved consensus among the Delphi panel. The findings of the study indicated that SBAE teachers are heavily involved in the planning and implementation of student SAEs while also engaging their communities in SAE activities.

Author's Note: This manuscript is based on data published in the proceedings for the Southern AAAE Research Conference, Best et al., (2024).

Introduction

"The stress, heavy workload, and constant pressure to be better has resulted in a profession that literally devours its young and forces them to look elsewhere for professional and personal satisfaction" (Osborne, 1992, p. 3). Since this admonition was published in *The Agricultural Education Magazine* in 1992, SBAE teacher workload (Torres et al., 2008; 2009), challenges (Boone & Boone, 2007, 2009; Myers et al., 2005), and needs (DiBenedetto et al., 2018) have continued to multiply (Traini et al., 2021). Moreover, the professional characteristics required of SBAE teachers continue to change and be refined (Eck et al., 2019; Roberts & Dyer, 2004), potentially leading to greater strain on teachers (Traini et al., 2021). The pressure on SBAE teachers in the form of extended hours to coordinate a comprehensive SBAE program (Straquadine, 1990) can lead to burnout (Croom, 2003). These factors, along with perceived work-life imbalances (Sorensen & McKim, 2014), may play a significant role in SBAE teachers' intentions to continue teaching (Solomonson et al., 2018; Tippens et al., 2013). Such factors create a complex and multifaceted system of SBAE which teachers are expected to navigate (Haddad et al., 2022; Traini et al., 2021). One domain in which teachers are expected to perform job-specific tasks is Supervised Agricultural Experiences (SAEs).

SAEs have been described as "all the practical agricultural activities of educational value conducted by students outside of class and laboratory instruction or on school-released time for which systematic instruction and supervision are provided by their teachers, parents, employers,

or others" (Phipps & Osborne, 1988, p. 313). SAE is a work-based learning tool intended to prepare students for agriculturally related careers (Robinson & Haynes, 2011). This component of SBAE consists of learning opportunities in which students apply practical knowledge through the implementation of agriculturally related work-based projects (Phipps et al., 2008; Talbert et al., 2014). SAEs, however, historically have been the most underserved component of the SBAE model (Camp et al., 2000; Croom, 2008; Lewis et al., 2012). Torres et al. (2008) found that experienced teachers spent only 3% of their time observing students' SAEs. Recent efforts by the National Council for Agricultural Education and the National FFA Organization have led to the implementation of *SAE for All*, a national initiative to rethink the implementation of SAEs in SBAE through the development of foundational and immersive learning experiences (SAE for All, 2023).

SBAE teachers perform specific tasks related to guiding students in selecting, planning, and executing a SAE as part of comprehensive SBAE programs (Phipps et al., 2008). Doss and Rayfield (2021) identified general SAE related tasks as teaching record keeping skills and assisting students in earning FFA degrees, competing for proficiency and star awards, and earning scholarships. When combined with other responsibilities associated with teaching SBAE, such tasks increase a teacher's workload (Torres et al., 2008) which may lead to stress (Theiman et al., 2012), job burnout (Kitchel et al., 2012), and teacher dissatisfaction (Chenevey et al., 2008). Moreover, teacher self-efficacy has been linked to teacher workload (McKim & Velez, 2016). Considering such factors, a need existed to identify the tasks SBAE teachers are expected to complete regarding all aspects of the profession (Traini et al., 2021), of which supervising student SAEs is an essential component of a comprehensive SBAE program.

Theoretical/Conceptual Framework

The theoretical framework for this study was human capital theory. Human capital describes the way knowledge, skills, training, experiences, and education are developed by individuals over time (Becker, 1964; Little, 2003; Shultz, 1971; Smith, 2010; Smylie, 1996). In addition, human capital is concerned with the employability of individuals as explained by the investment they make in themselves to acquire desirable skillsets (Becker, 1964). As such, increases in individuals' human capital makes them more desirable employees (Robinson & Baker, 2013). As individuals become involved in work they enjoy, the skills they develop become increasingly specialized (Smith, 2010). These specialized abilities are known as *sector-specific skills* (Smith, 2010), which lead to increased job performance (Heckman, 2000). Gibbons and Waldman (2004) also found tasks to be central to human capital, coining the term "task-specific human capital" (p. 203). The authors also posited that acquisition of specialized skills is linked to proficiency in performing job tasks. Task-specific human capital implies that value is inherent to the skills associated with completing job-specific tasks (Gibbons & Waldman, 2004) such as those related to teaching SBAE regarding each of the three components of the program model, including SAEs.

Purpose

Smith (2010) maintained that both general and specific tasks are required of workers in any occupation. Although the literature is replete with inferred *general tasks* associated with the

professional needs, challenges, and characteristics of SBAE teachers as described above, limited literature exists detailing the *specific tasks* required of those teaching in comprehensive SBAE programs. Identifying an all-inclusive list of tasks will offer insight into the daily demands of SBAE teachers and provide contextualization for future research in the field. Prior research indicates a need for the profession to establish a "flexible position description of the agriculture teaching job detailing tasks that are expected as well as those that are not expected" (Traini et al., 2021, p. 179). Therefore, this study's purpose was to identify tasks associated with the roles and responsibilities of SBAE teachers, specifically with the objective to determine the tasks related to supervising students' SAEs.

Methods

This study was part of a larger investigation (Best, 2023). The larger study's purpose and research objectives were adapted to address specific findings related to tasks associated with teaching SBAE regarding supervising students' SAEs. The methods of the overall study are presented here. A modified, three-round Delphi method was used to achieve the study's objectives. This method involved a multiple-round approach to collecting data in which "three iterations are often sufficient to collect the needed information and to reach a consensus in most cases" (Hsu & Sandford, 2007, p. 2). Developed in the 1950s by Norman Dalkey and Olaf Helmer (Dalkey & Helmer, 1963), the Delphi method includes "the systematic solicitation and collation of expert opinions" (Helmer, 1966).

Stitt-Gohdes and Crews (2004) stressed that selection of the panel of experts is among the most critical aspects of the Delphi method and panelists should be those ". . . who are knowledgeable about current information and perceptions regarding the topic under investigation but are open-minded to the findings" (pp. 60–61). The study's respondent frame consisted of doctoral students in agricultural education identified by department heads of agricultural education academic units across the United States. As recent, former, or current SBAE teachers, this population was identified as an appropriate group of potential Delphi panelists due to their knowledge of and competence in SBAE as well as their desire to pursue a terminal professional degree in the field. Potential panelists were deemed qualified to participate in the study based on the following criteria: (a) potential panelists were currently enrolled in a doctoral program (Ph.D. or Ed.D.) in agricultural education with aspirations of joining the professoriate or holding an advanced leadership position; (b) potential panelists were former or current SBAE teachers with a minimum of three years of SBAE teaching experience; and (c) potential panelists were "highly trained and competent within the specialized area of knowledge" (Hsu & Sandford, 2007, p. 3), in this case, SBAE.

On September 13, 2022, an electronic message (email) was sent to department heads of 22 agricultural education programs offering a doctoral degree requesting the names and email addresses of students enrolled in their doctoral programs. Of those, 13 institutions responded, identifying a total of 40 doctoral students as potential Delphi panelists meeting the criteria for the study. Subsequent email messages were sent to panelists during each round of the study with a link to respective instruments requesting their participation following the Tailored Design Method (Dillman et al., 2014). In all, 23 (57.50%) of the initial 40 potential panelists responded to Round 1. Therefore, the 23 respondents were considered the study's panel of experts. Twenty-two (95.65%) expert panelists responded in Round 2, and 20 (86.96%) responded in Round 3.

The instruments used in this study were evaluated for face and content validity by a group of eight experts considered knowledgeable of social science research and SBAE (Gay et al., 2006), including six teacher educators in agricultural education, one statistician who specializes in survey research and instrument design, and one graduate student who was a former SBAE teacher and seeking an advanced degree in agricultural education at [University]. Moreover, reliability in Delphi studies is dependent on maintaining a minimum number of participants throughout the duration of the investigation. Dalkey et al. (1972) indicated 13 responses were needed to establish a reliability coefficient of .90 within Delphi studies. The response rates of this study exceeded 13 participants per round; therefore, the study's results are considered reliable (Dalkey et al., 1972).

The initial email message to the 40 potential panelists was sent on September 29, 2022, describing the study and inviting them to participate. A Qualtrics Survey link to the Round 1 instrument was sent to panelists containing questions pertaining to their personal and professional characteristics as well as the following open-ended question: *What tasks are associated with the roles and responsibilities of a SBAE teacher regarding Supervised Agricultural Experiences in a typical year?* Panelists were asked to provide as many responses as they deemed appropriate to answer this question. Original tasks identified by panelists in Round 1 were analyzed using the constant comparison procedure, and duplicated responses were removed to reduce redundancy (Creswell & Guetterman, 2019).

Round 2 of the Delphi study sought to establish consensus of agreement among panelists (Barrios et al., 2021). An electronic message was sent on November 22, 2022, to the 23 panelists responding to Round 1 with a Qualtrics Survey link to the Round 2 instrument. Tasks identified in Round 1 were presented to panelists to assess their perceived level of agreement for each task. Panelists were asked to indicate their level of agreement using a four-point response scale: *1 = Strongly Disagree, 2 = Disagree, 3 = Agree,* and *4 = Strongly Agree*. An 80.00% level of agreement was selected to reach consensus, indicating tasks receiving a score of 3 or 4 by 80.00% of panelists were retained as tasks achieving consensus of agreement (Diamond et al., 2014). Tasks achieving 51.00% to 79.99% agreement were retained for use in Round 3. Tasks achieving less than 51.00% agreement among panelists were considered to have not reached consensus of agreement and removed from further study.

Round 3 of the study sought to further refine consensus of agreement among the panelists (Brady, 2015) regarding the number of tasks. An email message was sent on December 12, 2022 to the 22 panelists responding to Round 2 of the study with a Qualtrics Survey link to the Round 3 instrument. Tasks identified in Round 2 achieving a level of agreement ranging from 51.00% to 79.99% were again presented to panelists (Buriak & Shinn, 1989). Panelists were asked to indicate whether they agreed the task should be included by selecting either *1* for *No* or *2* for *Yes*. The 80.00% level of agreement identified *a priori* was also used for Round 3 analysis. Tasks receiving this level of agreement were considered to have reached consensus of agreement among the panelists and included in the final list of tasks associated with teaching SBAE regarding the supervision of students' SAEs. Tasks achieving a level of agreement of less than 80.00% failed to reach consensus of agreement and were discarded. Items achieving the 80.00% level of agreement in Round 2 and Round 3 were combined to form a final list of tasks. For each

of the three rounds of the Delphi, statistical feedback was reported per the suggestion of Sackman (1974) who indicated that measures such as frequencies, percentages, mean scores, and standard deviations should be included when reporting the findings of a conventional Delphi study.

Findings

Description of the Delphi Panel of Experts

The panel consisted of experts having taught in 16 different states in SBAE programs ranging from 45 to 700 students enrolled with approximately one-half of the respondents teaching 150 or fewer students. Nine (39.13%) panelists were male, and 14 (60.87%) were female. Twenty-one panelists (91.30%) were white, and 22 (95.65%) were not Hispanic or Latino. Five (22.00%) were currently teaching SBAE, and 21 (91.30%) had taught SBAE in the past four years. The average number of years of experience teaching SBAE was 8.39 years and ranged from three to 21 years. More than 95% ($f = 22$) were traditionally certified. Sixteen respondents (69.56%) were from 25 to 35 years of age. Thirteen panelists (56.52%) taught in communities with a population of fewer than 10,000 people. Ten panelists (43.48%) worked in single-teacher programs, six (26.09%) taught in two-teacher programs, and four (17.39%) were employed in three-teacher programs. Table 1 displays the selected personal characteristics of the Delphi panel of experts.

Table 1

Selected Personal and Professional Characteristics of the Delphi Panel of Experts (N = 23)

Characteristic	*f*	%
Age		
25 to 30	7	30.43
31 to 35	9	39.13
36 to 40	3	13.04
41 to 45	3	13.04
46 to 50	1	4.35
Currently teaching		
Yes	5	21.74
No	18	78.26
Most recent year in which SBAE was taught		
2022	8	34.78
2021	6	26.09
2020	2	8.70
2019	3	13.04
2018	2	8.70
2017	0	0.00
2016	1	4.35
2015	0	0.00
2014	1	4.35

Years of total SBAE teaching experience		
3 to 5	9	39.13
6 to 8	6	26.09
9 to 11	3	13.04
12 to 14	2	8.70
15 to 17	1	4.35
18 to 20	1	4.35
21 or more	1	4.35

Round 1

Panelists identified 168 tasks associated with the roles and responsibilities of a SBAE teacher regarding SAE in a typical year. After duplicated tasks were removed, 80 tasks in 12 themes remained for consideration in Round 2. Themes identified in Round 1 included Committee Service (*f* = 2), Community Development (*f* = 3), Data Management (*f* = 5), Grants and Funding (*f* = 5), Hospitality (*f* = 1), Relationships and Rapport (*f* = 2), SAE Development (*f* = 9), SAE Instruction (*f* = 6), SAE Supervision (*f* = 33), Student Career Preparation (*f* = 3), Student Success (*f* = 6), and Teaching and Learning Resources (*f* = 5). In corresponding order to the abovementioned themes, the most identified tasks for each theme included: serve on county livestock validation committee, and serve on an advisory committee (*f* = 1, 0.60%); provide community development for work-based learning placements, connect students to community members, and provide experiential learning opportunities to students and parents/stakeholders (*f* = 1, 0.60%); manage a record book system (*f* = 11, 6.55%); connect students to available funding for SAE projects (*f* = 2, 1.19%); serve as cook for SAE events (*f* = 1, 0.60%); work to develop trust with family/student (*f* = 2, 1.19%); assist students in obtaining SAE job placements, and assist all students in developing an SAE (*f* = 4, 2.38%); teach students record keeping skills (*f* = 4, 2.38%); conduct SAE student project visits off campus, and supervise student SAE projects (*f* = 11, 6.55%); expose students to possible careers (*f* = 2, 1.19%); assist students with award applications (*f* = 8, 4.76%); and manage school project center (*f* = 4, 2.38%).

Round 2

In Round 2, panelists reached consensus of agreement for 39 of 80 tasks (48.8%) associated with teaching SBAE regarding the supervision of students' SAEs. Of the tasks achieving consensus of agreement, 13 reached 100% agreement among the panelists. Examples of tasks with the highest mean score per theme included: serve on advisory committee above individual school level (*M* = 2.41, *SD* = 1.14); connect students to community members (*M* = 3.36, *SD* = 0.85); train students how to use a record book system (*M* = 3.50, *SD* = 0.67); connect students to available funding for SAE projects (*M* = 3.27, *SD* = 0.70); serve as cook for SAE events (*M* = 1.95, *SD* = 1.09); serve as mentor for students (*M* = 3.68, *SD* = 0.48); work to develop trust with family/student (*M* = 3.68, *SD* = 0.48); assist all students in planning an SAE (*M* = 3.50, *SD* = 0.51); provide hands on opportunities for students (*M* = 3.77, *SD* = 0.43); supervise student SAE projects (*M* = 3.64, *SD* = 0.49); expose students to possible careers (*M* = 3.77, *SD* = 0.43); assist students with award applications (*M* = 3.64, *SD* = 0.49); and manage school project center (*M* = 3.18, *SD* = 0.80). Twenty statements reached levels of agreement between 51.00% and 79.99%, advancing to Round 3 for additional consideration by the

panelists. Twenty-one tasks failed to reach at least 51.00% agreement; therefore, such were eliminated from further analysis. Table 2 displays the results of Round 2.

Table 2

Consensus of Agreement for Tasks Identified by Delphi Panelists in Response to the Question, "What tasks are associated with the roles and responsibilities of a school-based agricultural education teacher regarding Supervised Agricultural Experiences (SAE) in a typical year?" (n = 22)

Tasks by Theme	*M*	*SD*	% Agreement
Committee Service			
Serve on advisory committee above individual school level	2.41	1.14	54.55[a]
Serve on county livestock validation committee	2.09	1.11	36.36[b]
Community Development			
Connect students to community members	3.36	0.85	86.36
Provide experiential learning opportunities to students and parents/stakeholders	3.18	0.80	86.36
Provide community development for work-based learning placements	2.95	0.95	72.73[a]
Data Management			
Train students how to use a record book system	3.50	0.67	90.91
Evaluate student record books	3.41	0.80	90.91
Track SAE data	3.36	0.95	86.36
Attend record book training for teachers	3.32	1.00	81.82
Manage a record book system	3.14	0.89	77.27[a]
Grants and Funding			
Connect students to available funding for SAE projects	3.27	0.70	86.36
Budget money for maintaining school-based projects (i.e., livestock and plants)	2.95	1.17	68.18[a]
Manage barn funds	2.64	1.14	59.09[a]
Develop SAE grants	2.59	1.05	54.55[a]
Manage student funds for projects	1.86	0.99	22.73[b]
Hospitality			
Serve as cook for SAE events	1.95	1.09	36.36[b]
Relationships and Rapport			
Serve as mentor for students	3.68	0.48	100.00
Work to develop trust with family/student	3.68	0.48	100.00
SAE Development			
Assist all students in planning an SAE	3.50	0.51	100.00
Challenge students to start an SAE project	3.45	0.51	100.00
Assist all students in developing an SAE	3.50	0.60	95.45
Assist students/parents/guardians in identifying an SAE	3.45	0.60	95.45

Ensure each student has a viable SAE project	3.23	0.61	90.91
Ensure the completion of foundational SAEs	3.23	0.61	90.91
Guide students' reflection on personal and career goals to develop SAE plans	3.18	0.85	81.82
Assist students in obtaining SAE job placements	2.91	0.75	77.27[a]
Facilitate parent nights to introduce SAE opportunities, expectations, and fair rules and deadlines	2.55	1.06	50.00[b]
SAE Instruction			
Provide hands on opportunities for students	3.77	0.43	100.00
Teach students about SAEs	3.68	0.48	100.00
Teach students record keeping skills	3.59	0.50	100.00
Create cohesive connections between SAEs, classroom instruction, and FFA	3.55	0.60	95.45
Establish SAE expectations in class	3.36	0.85	86.36
Facilitate every student's SAE presentation as part of a class	2.77	0.97	59.09[a]
SAE Supervision			
Supervise student SAE projects (i.e., advising, coaching, and managing)	3.64	0.49	100.00
Work with students, parents, and supervisors to establish clear expectations	3.59	0.50	100.00
Assess student SAE projects regularly (i.e., project development and progress)	3.55	0.51	100.00
Ensure safe student working conditions	3.36	0.58	95.45
Provide technical support for student SAE projects	3.41	0.67	90.91
Conduct SAE student project visits on campus	3.36	0.73	86.36
Remind students of SAE deadlines	3.36	0.73	86.36
Document time/place traveled to supervise student SAE projects	3.32	0.78	81.82
Conduct SAE student project visits off campus	3.27	0.77	81.82
Provide assistance with non-livestock SAEs	3.18	0.85	81.82
Assist students with creating SAE presentations/showcase	2.82	0.85	63.64[a]
Manage clear and consistent communication for all livestock show projects	2.68	1.21	63.64[a]
Advise students regarding best grooming practices for livestock projects	2.59	1.14	63.64[a]
Coach student showmanship	2.73	1.03	59.09[a]
Supervise students at livestock shows	2.73	1.28	59.09[a]
Supervise the growth and development of all livestock projects	2.50	1.19	59.09[a]
Assist students with livestock preparation at shows	2.32	1.13	54.55[a]
Manage entries for livestock shows	2.41	1.18	50.00[b]
Provide weight and feed management for student livestock projects	2.32	1.09	50.00[b]
Check in livestock at shows	2.27	1.20	50.00[b]

Facilitate all agriscience fair projects	2.27	1.20	50.00[b]
Transport students and their livestock projects to shows/fairs	2.18	1.05	45.45[b]
Serve as livestock show coordinator	2.09	0.97	40.91[b]
Facilitate all plant science entrepreneurship SAE projects	2.55	0.96	36.36[b]
Facilitate all plant science placement SAE projects	2.36	1.00	36.36[b]
Manage camaraderie among feeders	2.00	0.98	36.36[b]
Serve as the animal health and nutrition expert for student projects	2.18	1.10	31.82[b]
Facilitate students' purchase of livestock projects	2.14	1.04	31.82[b]
Facilitate all animal science placement SAE projects	2.09	1.15	31.82[b]
Select animals for students' livestock projects	2.09	1.07	31.82[b]
Facilitate all animal science entrepreneurship SAE projects	2.05	1.13	27.27[b]
Book hotels for livestock shows	1.95	1.09	27.27[b]
Make feed store runs	1.77	1.07	18.18[b]
Student Career Preparation			
Expose students to possible careers	3.77	0.43	100.00
Help students connect SAEs to their future goals	3.59	0.67	90.91
Take students on college trips	3.27	0.94	77.27[a]
Student Success			
Assist students with award applications (i.e., proficiency and degree)	3.64	0.49	100.00
Assist students with proficiency planning	3.45	0.51	100.00
Review student award applications	3.50	0.60	95.45
Provide opportunities for student success in SAEs	3.50	0.67	90.91
Facilitate award recognition for SAEs	3.32	0.65	90.91
Assist students with SAE contests	2.82	1.05	72.73[a]
Teaching and Learning Resources			
Manage school project center (i.e., land lab, school farm, and ag barn)	3.18	0.80	86.36
Maintain school SAE equipment	3.09	0.87	77.27[a]
Maintain school project center (i.e., land lab, school farm, and ag barn)	3.00	0.93	77.27[a]
Provide a location for school-based enterprise projects	2.50	1.06	54.55[a]
Maintain school vehicle	2.18	0.96	36.36[b]

Note. Responses utilized a 4-point scale 1 (*Strongly disagree*) to 4 (*Strongly agree*). Smaller mean (M) scores indicate stronger disagreement, and larger mean scores indicate stronger agreement; [a]Denotes 51.00% to 79.99% consensus of agreement and retainment for Round 3; [b]Denotes less than 51.00% consensus of agreement and discardment of the item.

Round 3

Of the 20 tasks achieving from 51.00% to 79.99% agreement in Round 2, panelists reached consensus of agreement (80.00% or more selecting *Yes*) for six in Round 3, one in each of the following themes: Community Development, Data Management, Grants and Funding, SAE Development, Student Success, and Teaching and Learning Resources. Fourteen tasks failed to reach consensus of agreement and were eliminated. Examples of tasks failing to reach consensus included: serve on advisory committee above individual school level (M = 1.45, SD = 0.51); manage barn funds (M = 1.65, SD = 0.49); facilitate every student's SAE presentation as part of a class (M = 1.60, SD = 0.50); assist students with creating SAE presentations/showcase (M = 1.70, SD = 0.47); take students on college trips (M = 1.75, SD = 0.44); and maintain school project center (M = 1.75, SD = 0.44). Table 3 displays all the results of Round 3.

Table 3

Final Consensus of Agreement for Tasks Receiving between 51.00% and 79.99% Agreement in Round Two by Delphi Panelists in Response to the Question, "What tasks are associated with the roles and responsibilities of a school-based agricultural education teacher regarding Supervised Agricultural Experiences (SAE) in a typical year?" (n = 20)

Tasks by Theme	*M*	*SD*	% Agreement
Committee Service			
Serve on advisory committee above individual school level	1.45	0.51	45.00[a]
Community Development			
Provide community development for work-based learning placements	1.80	0.41	80.00
Data Management			
Manage a record book system	1.90	0.31	90.00
Grants and Funding			
Budget money for maintaining school-based projects (i.e., livestock and plants)	1.80	0.41	80.00
Manage barn funds	1.65	0.49	65.00[a]
Develop SAE grants	1.60	0.50	60.00[a]
SAE Development			
Assist students in obtaining SAE job placements	1.85	0.37	85.00
SAE Instruction			
Facilitate every student's SAE presentation as part of a class	1.60	0.50	60.00[a]
SAE Supervision			
Assist students with creating SAE presentations/showcase	1.70	0.47	70.00[a]
Supervise the growth and development of all livestock projects	1.65	0.49	65.00[a]
Advise students regarding best grooming practices for livestock projects	1.55	0.51	55.00[a]
Coach student showmanship	1.55	0.51	55.00[a]
Manage clear and consistent communication for all livestock show projects	1.55	0.51	55.00[a]
Assist students with livestock preparation at shows	1.50	0.51	50.00[a]

Supervise students at livestock shows	1.50	0.51	50.00[a]
Student Career Preparation			
Take students on college trips	1.75	0.44	75.00[a]
Student Success			
Assist students with SAE contests	1.85	0.37	85.00
Teaching and Learning Resources			
Maintain school SAE equipment	1.90	0.31	90.00
Maintain school project center (i.e., land lab, school farm, and ag barn)	1.75	0.44	75.00[a]
Provide a location for school-based enterprise projects	1.75	0.44	75.00[a]

Note. Mean scores in Round 3 based on responses: *Yes* (2) or *No* (1). Smaller mean (*M*) scores indicate stronger disagreement, and larger mean scores indicate stronger agreement; [a]Denotes item failed to reach consensus of agreement.

Final Analysis

Items achieving at least an 80.00% consensus of agreement in both Round 2 (39 tasks) and Round 3 (6 tasks) comprised the final list of tasks associated with teaching SBAE in the area of SAE. In total, 45 tasks spread among 10 themes reached consensus of agreement. The theme Committee Service had no tasks in the theme reach consensus, whereas Community Development had 100.00% ($f = 3$) of its tasks reach consensus. Data Management had 100.00% ($f = 5$) of tasks comprising the theme reach consensus. Grants and Funding had 40.00% ($f = 2$) of its tasks achieve consensus. Hospitality had no tasks reach consensus. Relationships and Rapport had 100.00% ($f = 2$) of the theme's tasks reach consensus. SAE Development had 88.89% or eight of its nine tasks achieve consensus. The theme SAE Instruction had 83.33% ($f = 5$) of its tasks reach consensus. SAE Supervision had 30.30% ($f = 10$) of the theme's tasks achieve consensus. Student Career Preparation had 66.66% ($f = 2$) of tasks in the theme reach consensus. Student Success had 100.00% ($f = 6$) of its tasks attain consensus. And 40.00% ($f = 2$) of the tasks associated with the Teaching and Learning Resources theme reached consensus of agreement.

Conclusions, Implications, and Recommendations

Three overarching conclusions emerged as related to supervising students' SAEs. First, SBAE teachers are competitive regarding SAE-related tasks. Teachers assist students in developing competitive award applications pertaining to their SAEs while creating opportunities for the recognition of student success. Tasks related to student SAE success included assisting students with proficiency award, degree, and star award applications, facilitating award recognition for SAEs, providing opportunities for student success within SAE, and reviewing student applications. This conclusion supports the notion that student competition is used as an instructional approach in SBAE (Jones & Edwards, 2019).

Second, SBAE teachers engage their local communities in the SAE component of their programs. SBAE teachers conduct tasks intended to enhance educational experiences by exposing students to community connections, establishing professional networks for students, and engaging them with members of the local community. Findings of the study supporting this

conclusion were the inclusion of tasks related to Community Development and Relationships and Rapport. Such tasks included connecting students with community members for the purposes of work-based learning placements and experiential learning opportunities as well as working to develop trust among community members, particularly students' families. This supports the assertion that connections to local communities create a variety of local programming opportunities, thus making SBAE programs successful and important actors in their home settings (Sherman & Sorensen, 2020).

Third, SBAE teachers assist students in planning, developing, and implementing SAEs. These SAEs vary and require expertise in the areas of entrepreneurship, placement, agribusiness, and agriscience research. Tasks related to this conclusion included assisting all students in developing and planning SAEs; ensuring each student has a viable SAE project; guiding students' reflecting on personal and career goals to develop SAE plans; creating cohesive connections between SAEs, classroom instruction, and FFA; and providing technical support for students' SAE projects. These conclusions support the claim that SAEs are an integral component of the SBAE model and serve as pivotal and far-reaching student learning experiences in agricultural education (Croom, 2008; Lewis et al., 2012).

Because this study was limited to the opinions of a panel of experts, its findings are not generalizable to the greater SBAE population. Instead, the study should be rigorously replicated with a larger sample size and a more significant scope. We recommend that a national study be conducted regarding career phase (i.e., early, mid, and late career teachers), program size, and community and school expectations regarding SAE involvement. Moreover, we recommend evaluating the competence of preservice teachers in job-specific tasks related to SAE both before and after their clinical teaching experiences. Such findings may inform teacher preparation programs of areas of need in curriculum development and instruction. In addition, studies also should be conducted regionally to account for the various SAE focus areas that exist in SBAE. These findings may identify professional development needs among in-service teachers.

Recommendations for practice include using the findings of this study to better inform potential teachers of the specific job-task expectations of teachers regarding supervising students' SAEs, allowing them to better prioritize the development of such through participating in professional development opportunities tailored to their needs. Further, we recommend that state staff in agricultural education use the findings to create curriculum and program management resources to better support teachers in conducting tasks related to SAEs. Such resources could focus on the implementation of work-based learning opportunities in the classroom, identification of appropriate placement sites, the development of streamlined and useful SAE reporting measures, and the development of a list of best practices for community work-based learning engagement.

SBAE has struggled as a profession with a shortage of qualified teachers for decades (Eck & Edwards, 2019). As workload expectations placed on teachers continue to mount (Traini et al., 2021), retention of teachers becomes more concerning (Haddad et al., 2022). Clearly identifying the job-specific tasks related to teaching SBAE, particularly in the area of supervising students' SAEs, could better inform potential teachers of the specific job-task expectations of the profession, allowing them to better determine if SBAE is the right fit for them. Teacher attrition

and retention rates may be impacted by such decision-making as preservice teachers less likely to remain in teaching may choose a different career path while those more committed to teaching are better prepared for the realities of their career choice, thus, likely improving the long-term retention rate of the profession.

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"By God's Grace, Nothing Will Prevent Me": Exploring Intentions to Implement School-Based Agricultural Education in Liberia

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Abstract

Scholars emphasize the pivotal role of agricultural education in driving development in sub-Saharan Africa, and Liberia, facing challenges such as job shortages, a fragile economy, and a vulnerable post-war youth population, stands uniquely positioned to benefit from school-based agricultural education. This research is a part of a multi-institutional, grant-funded, randomly controlled longitudinal investigation that delves into the long-term outcomes of school-based agricultural education implementation in Liberia. Our study focuses on understanding the intentions of Liberian agriculture teachers, principals, and parents regarding the adoption of school-based agricultural education, including 4-H, within their schools and communities after three trainings. Participants underwent extensive training covering school-based agricultural education, 4-H and youth leadership, school demonstration farms, home entrepreneurship projects, and agricultural innovations. Post-training questionnaires, including quantitative and qualitative data, revealed unwavering determination among participants to implement school-based agricultural education, particularly 4-H and school demonstration farms. Perceived barriers included a lack of support from school administrators and parents and the need for physical resources and tools. Nevertheless, participants expressed passion for the model, foreseeing positive impacts on the youth and the country's agricultural economy. This research sheds light on the potential transformative effects of SBAE in Liberia, providing insights into challenges and motivations for implementation.

Introduction

Sub-Saharan Africa is home to over 1 billion people (World Bank, 2022). By 2050, the population of the region is expected to double, with half under the age of 18 (Yeboah, 2018). Agriculture is the primary source of livelihood for a significant fraction of the population (Geza et al., 2021). Considering the economic prospects of agricultural development and youth engagement in Sub-Saharan Africa, agriculture and youth engagement continue to gain prominence in the region's development initiatives. In Liberia, more than 60% earning their livelihood from agriculture and the sector accounts for 31% of the nation's GDP (International Trade Administration, 2022). Liberia, in its recovery from civil wars, encountered significant struggles that include job shortages, a fragile economy, and a rise in a poor and at-risk youth population (Blattman & Annan, 2011). Aggravating the post-conflict setbacks, historically, Liberia has depended on foreign aid (Eise & Connaughton, 2019) and up to 80 percent of importation, which recorded a significant increase after the war (UNDP, 2020). These socioeconomic conflicts and the codependency of Liberia have negative implications for the future of the country.

Despite multiple constraints to youth participation in agriculture, it is critical to harnessing the economic potentials of agriculture in Africa to address inequality, unemployment, and poverty (Geza et al.,2021). Given the current state of Liberia, agriculture offers a significant opportunity for poverty reduction, gender equity, youth development and rural transformation.

Gobewole (2020) recommends agricultural industrialization and initiatives that save time and increase agro-entrepreneurial capacity through managerial knowledge as strategic focal points for poverty reduction and economic development policies in Liberia. In addition, experts suggest that a solution to reduce Liberia's economic vulnerability is to transform it into an agriculture-based one (Rutherford et al., 2016) to reduce Liberians' income gap and accelerate development (Apeh et al., 2020).

Scholars have pointed out that agricultural education is a potent driver of development in Sub-Saharan Africa (Gill et al., 2016). It is also generally recognized that education in rural areas is considered a fundamental component of increased agricultural productivity, especially with regards to the adoption of new methods, improved inputs, and advanced technology (Lockheed et al., 1980; O'Donoghue & Heanue, 2016). Moreover, it serves as a growth catalyst for rural communities (Apeh et al., 2020), and is directly connected to agricultural industry advancement around the globe. According to Jappah & Smith (2022), teacher training is the backbone of strong educational systems, and the Liberian government needs to invest in teacher training initiatives to accelerate development in post-conflict Liberia. Utilizing education as a tool for agricultural development offers multiple socio-economic benefits because poverty reduction is two times more effective when driven by growth in the agriculture sector compared to growth other sectors (USAID, 2023).

Considering the capacity-building potential of a vibrant teaching workforce and agricultural education, AgriCorps—a nongovernmental organization—in its mission to establish school-based agricultural education programs (SBAE) in developing countries has designed and offered a series of trainings to develop these programs in Liberia (AgriCorps, 2020). SBAE, through teaching, entrepreneurship development, and leadership development, seeks to develop knowledge and skills in students, necessary to make them citizens who are aware of natural and agricultural resources (AgriCorps2020; Thoron & Barrick, 2022). Scholars have pointed out the propensity of SBAE to proffer solutions to small scale farmers in Uganda (Okiror et al., 2011), accelerate agricultural entrepreneurship in Nigeria (Emiri & Nlebem, 2020), Tanzania (Shayo, 2020), and build a more equipped workforce in Congo, Kenya, and Nigeria (Mulei et al., 2020). The outcome of implementing SBAE in low-income countries like Liberia has the potential to result in increased adoption of a variety of agricultural innovations and impact the livelihood of youth through agricultural transformation (Yeboah, 2018), especially in Africa's rapidly changing agri-food systems.

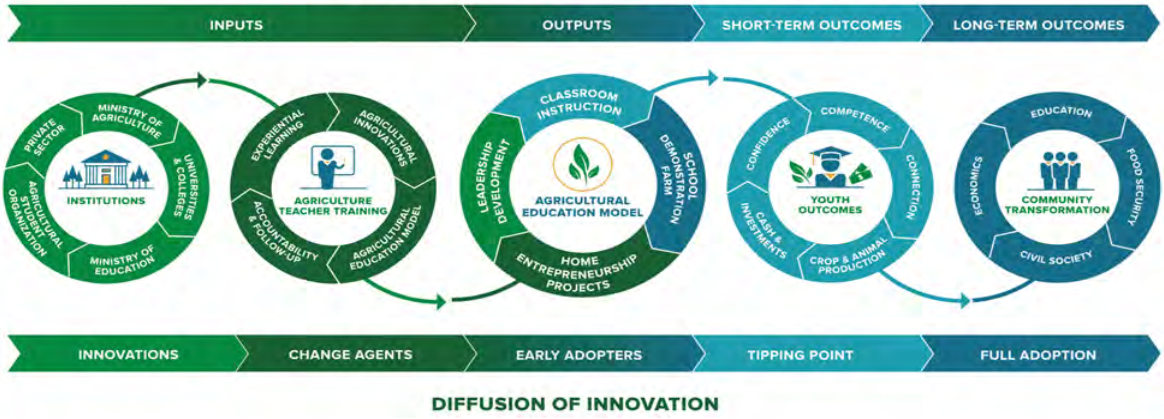
SBAE model in Liberia

Developed more than 100 years ago, school-based agricultural education (SBAE) offers a recognized, cost-effective, and sustainable solution to Liberia's frail economy (State University, 1969; Park, 2014; Schlutt, 1957; Wessel &Wessel, 1982). As Liberia recuperates from the effects of wars, human capital development in education and agriculture will be instrumental to attaining socio-economic stability (Sayndee, 2007). SBAE, as revised by AgriCorps, aims to alleviate food insecurity in developing countries by leverage theoretical foundations of four different bodies of knowledge – diffusion of innovations (Rogers, 2003), experiential learning (Kolb, 2015), positive youth development (Benson et al., 2007) and behavioral economics (Kahneman & Tversky, 1979). AgriCorp's SBAE model as adapted for Sub-Saharan Africa, is a

holistic system of delivering agricultural innovations within a local context of secondary education (Dado et al., 2023). Through their secondary agriculture teacher, science classes, and local agriculture student organization (e.g., 4-H), students learn about improved agricultural methods of which are then adopted in the school demonstration farm and diffused through home entrepreneurship projects (see Figure 1).

Figure 1

School-Based Agriculture System Model as Developed by AgriCorps



According to Shayo (2020), youth are potent pollinators of innovations because of their high proclivity to adopt novel and improved agricultural knowledge which stems from their youthful aggressiveness, creativity, and ease of learning innovations. Daudu et al., (2023) corroborates this in a recent study demonstrating how the resourcefulness and entrepreneurial spirit of youths—described as "an undeniable and untapped potential" (p. 2) can be explored to revolutionize agriculture in West Africa. Utilizing youth as early adopters of agricultural innovations and change agents for the diffusion of agricultural innovations, SBAE can become an economic incubator for Liberian entire rural communities – supplementing existing agriculture and education initiatives.

SBAE has two primary objectives— contributing to youth's academic, vocational, and life skills development through experiential learning methods and improving rural livelihoods by transferring skills and agricultural innovations into the home and community through schools (AgriCorps, 2020). Guided by an experiential learning model, SBAE effectively accelerates agricultural innovation adoption in rural communities by reaching youth through a tailored pathway (Madende et al., 2023) where they live and learn. The implementation of SBAE model in Liberia is driven by a rapidly growing 4-H club membership and leadership who partner with AgriCorps to harness the proven potential of the century old agricultural education model—SBAE.

Purpose and Objectives

This study was a part of a larger investigation exploring long-term outcomes of SBAE implementation in Liberia as well as overall effectiveness of Liberia's SBAE training. The goal of this study was to determine the likelihood that participants in an agricultural teacher training would implement the SBAE model in their school. We consider the implementation of the SBAE model using Ajzen's (1991) theory of planned behavior. The following objectives guided our

study: (1) determine participants' self-reported intent to implement SBAE after attending 3 trainings on SBAE; (2) determine changes participants expect to see as a result of SBAE implementation; and (3) determine participants' concerns regarding SBAE implementation.

Theoretical Framework

Ajzen's theory of planned behavior (1991) was used as a framework to determine how attitudes, subjective norms, and perceived behavioral control influenced the intention of Liberian teachers, principals, and parents to implement the SBAE model in their communities within 12 months after the training. Attitudes toward behavior are shaped by whether one holds positive or negative beliefs about the behavior, directly influenced by their overall belief index. Subjective norms arise from social pressures based on what others approve or disapprove of (injunctive normative beliefs) and whether others engage in the behavior (descriptive normative beliefs). Perceived behavioral control is about the belief in one's ability to perform the behavior, influenced by factors like skills, time, money, and social support. It's assumed that perceived control can predict behavior when actual control knowledge is limited, acting as a proxy for behavioral prediction. The theory of planned behavior (TPB) has been used to predict myriad human behaviors in agricultural education, including Senegalese professors' intent to engage in learner-focused instructional strategies in agriculture courses (Anderson et al., 2019) and agriculture students' proclivity to choose agricultural career paths in Tanzania (Shayo, 2020). This study took into account the determinants of behavioral intentions (attitude toward the behavior, subjective norm concerning the behavior, and perceived behavioral control) and how unanticipated events may prevent people from acting on their intentions as the extent to which individuals can exert genuine control over their behavior relies on their capacity to surmount these barriers, aided by factors such as prior experience and assistance from others (Ajzen, 2020). This framework was a useful tool in understanding the effectiveness of the teacher trainings we hosted in Liberia, specifically how participants discussed their attitudes towards SBAE implementation.

Methods

Study Context

This study is part of a multi-institutional, multi-NGO Randomized Controlled Trial (RCT) funded by USAID, the French Development Agency (ADF), and the National Science Foundation to ascertain the propensity of the SBAE model in diffusing agricultural innovations and facilitating youth development in Liberia. The treatment sample consisted of 100 randomly selected schools, those who would initiate SBAE, and 97 control schools as a control, those who would not initiate SBAE. The initiative led to the establishment of 157 active 4-H clubs across 7 Liberian counties (LISGIS, 2017). The treatment schools were located within five counties: Bong, Lofa, Nimba, Gbarpolu, and Margibi. These counties are in the breadbasket of Liberia, those that produce large amounts of Liberia's rice and cassava.

In 2020, the RCT project was launched in Liberia, of which a major initial component was teacher training. Starting in March, agriculture teachers from the treatment schools began their first of many trainings on SBAE, 4-H, experiential learning, and innovative agricultural methods and techniques. The first 6-day training was offered exclusively to secondary

agriculture teachers who agreed to participate in the RCT. This training introduced participants to the SBAE model, student-centered teaching strategies, and the purposes and benefits of 4-H. The second 6-day training was open to both agriculture teachers and their administrators, including principals and members of the local Parent Teacher Association (PTA). This training introduced participants to agricultural innovations such as planting techniques and how those could be modeled on the school demonstration farm. The third training was three days in duration and highlighted home entrepreneurship projects and 4-H club development along with review from previous trainings. This training also included both agriculture teachers and school administrators and PTA members. Below is a brief description of each training, its objectives, and attendees.

Table 1

Overview of Liberian Teacher Trainings

Training	Description	Training Topics	Attendees
Agriculture Teacher Training I, March 2020	4 separate, 6-day trainings conducted in Lofa, Bong, Nimba, and Montserrado counties; Training facilitated by two AgriCorps staff	Student-centered pedagogy and the purpose and components of School-Based Agricultural Education including 4-H	Secondary agriculture teachers from treatment schools
Agriculture Teacher Training II, September 2020	3 separate, 6-day trainings conducted at Booker Washington Institute; Training Facilitated by AgriCorps and 4-H Liberia staff	Agricultural innovations, practices, and techniques including but not limited to: sweet potato mounds, cassava spacing, proper use of agricultural mulch, composting and green manure, and appropriate fertilizer use.	Secondary agriculture teachers from the treatment schools and their administrators and PTA chairs/members
Agriculture Teacher Training III, May 2021	3-day trainings hosted at individual school sites in Lofa, Bong, Nimba, and Montserrado counties; Trainings led by 14 Liberian Field Officers[a]	Student-centered teaching, Home Entrepreneurship projects, 4-H club development, and agricultural innovations	Secondary agriculture teachers from the treatment schools and their administrators and PTA members

[a] — 14 field officers were trained separately during this same time period. They received duplicate training on the content from each agriculture teacher training in addition to content on facilitation. Once trained, they were tasked with facilitating the third agriculture teacher training in counties they supervise. Field Officers facilitated each training in pairs. Field

Officers are similar to U.S. 4-H Extension agents; their roles are to supervise assigned 4-H clubs, facilitate agricultural trainings for agriculture teachers and farmers, and to connect agriculture teachers/4-H advisors to regional and national resources, activities, and events.

Instrument

This study used survey methods to ascertain participants' intentions to implement SBAE in their schools and their attitudes regarding expected changes and concerns as a result of implementation. Structured pre-and-post-training questionnaires were used to collect data. Although there are instruments designed to deploy the TPB, for this study, we crafted custom questions relevant to our audience, as well as those that matched the cultural competence of facilitators, and participants' reading proficiency. Also, the instruments underwent vetting from multiple American and Liberian professionals to ensure the vocabulary, question structure, and formatting were culturally relevant. The questionnaire included numerous items including participant demographics, reactions to the training, and a content knowledge test. Thirteen items from the post-training questionnaires were used to inform the objectives of this study. To measure participants' intention to implement knowledge gained from the training, participants answered 11, 5-point scaled questions that measured intentions of adoption where 1-"I will definitely not use this information", to 5-"I will definitely use this information" (See Table 2). These items were adapted from Lamm et al. (2020) who created this scale to measure intention to change behavior. Responses from the open-ended question, if you were to use all the knowledge you have gained at this training, what kinds of changes would you expect to see in your students?, was used to identify the intentions of participants to implement knowledge they acquired during the training. Responses from the open-ended question, what concerns do you have about using the SBAE model in your school? was used to identify concerns participants had about implementing SBAE in their school and community.

Data Collection and Analysis

Pre- and post-training questionnaires were printed prior to each training. Upon registration, facilitators administered the pre-training questionnaire to all attendees. On the last day of the training, facilitators dedicated between 30 minutes and 1 hour for participants to complete the post-training questionnaire. In addition to the questionnaires, facilitator field notes from the first and second sets of trainings were collected. Facilitators were asked to capture insights and observations during and after their facilitation experience, then send their notes to the research team.

Questionnaires were mailed to Oregon State University, then scanned and saved digitally. Data from each questionnaire was manually entered into a spreadsheet, then uploaded into Statistical Package for Social Science (SPSS) for analysis. We used descriptive statistics to answer objective 1 and thematic analysis to answer objectives 2 and 3. Thematic analysis was useful for "identifying, analyzing, organizing, describing, and reporting themes found within a data set" (Nowell, et al, 2015, p. 2). This method offered a flexible approach to analyze the open-ended survey questions while generating unanticipated results (Braun & Clark, 2006; King, 2004). While content from each of the three trainings was slightly different, we approached data analysis for the two open-ended questions holistically, illuminating variations by training in the results below. As the focus of this study was to explore participant intentions to adopt SBAE, we

centered data analysis and our reporting of the findings to the voices and perspectives of the participants themselves. The facilitator field notes, however, contained helpful contextual data that helped explain our findings. As such, we chose to include relevant field note commentary in the discussion section. This allowed us to offer context to the study and increase trustworthiness and credibility of our findings (Phillippi & Lauderdale, 2017). To establish trustworthiness of our findings, we demonstrate how our conclusions and interpretations have been derived, make plain our reasons for theoretical, methodological, and analytical choices (Koch, 1994) and offer descriptions in ways that readers can judge transferability of our findings (Lincoln & Guba, 1985).

Results

A total of 357 individuals received training over the course of the three trainings offered in 2020 and 2021 of which, 182 were agriculture teachers, 57 were PTA members and 118 were school principals. In Table 2, we present descriptive statistics reflecting participants' intentions to use the information presented at each of the three trainings. Overall, participants indicated a positive intention to utilize the presented information, with mean scores suggesting a favorable disposition. Specifically, participants showed the highest inclination to use the content related to 4-H club development (M = 4.86, SD = .406) and school demonstration farms (M = 4.83, SD = .378). In contrast, the content about student-centered pedagogy (Training 3) received slightly lower mean scores, indicating a somewhat lower likelihood of implementation (M = 4.67, SD = .398). Despite this, the mean score still suggests a generally favorable intention to use this training's content.

Table 2

Participant intentions to use information from trainings

Training 1	*n*	*M*	*SD*
Intent to use any information	155	4.79	.406
Intent to use overall SBAE model	155	4.79	.506
Intent to use 4-H development information	154	4.86	.363
Intent to use student-centered pedagogy	154	4.79	.481
Training 2			
Intent to use any information	210	4.82	.386
Intent to use school demonstration farms information	210	4.83	.378
Intent to use agricultural innovations content	208	4.80	.476
Training 3			
Intent to use any information	140	4.81	.390
Intent to use overall SBAE model	142	4.77	.440
Intent to use 4-H	142	4.78	.431
Intent to use student-centered pedagogy	138	4.67	.698

Items were measured on a 5-point scale where 1 – I will definitely not use this information, 2 – I will probably not use this information, 3 – I have not decided if I will use this information, 4 – I will probably use this information, and 5 – I will definitely use this information.

Theme: "From Best to Better" – Youth as Engaged Entrepreneurs

Participants resoundingly anticipate transformative changes in their students through the implementation of SBAE, envisioning a spectrum of positive outcomes. This was discussed in a variety of ways and ranged from broad positive changes such as "a great knowledge development and a new way of productiveness for future benefits" and for students to become more "effective" and "better citizens", to specific skills students would obtain such as "leadership abilities", "public speaking", entrepreneurship skills, and business acumen. Several participants mentioned their students would serve as positive role models and they were eager "to see students becoming great leader[s]". Many participants, expressing a poetic sentiment, likened this transformation to "awakening the spirit of my students" and taking their students "from best to better", a common phrase amongst Liberians.

Moreover, participants foresee an impact on student participation in school, extending beyond academics to include personal responsibility for materials and fees. One participant shared, "I will expect them to buy their own school materials like uniforms, shoes, literature books, etc., I will also expect them to pay their own school fees". Another shared, "The changes that I will expect to see in my students is to see them buying some of their own school materials". The prospect of self-funding educational opportunities was reported because of potential profits to be accrued from student home entrepreneurship projects. The conviction in these expectations is captured in statements like, "The changes that I would like to see in my students are to see them growing and selling their own crops and vegetable[s]", "When the knowledge acquire[d] from this training is applied my students will score 100%, everyone will be engaged in to active entrepreneurship", and "Harvesting their crops on their own farm [allows them to pay school fees]". Echoes of entrepreneurship were seen in statements from all three trainings with statements such as "I love to see my students earn their own money", "They will be able to establish their own farm and make more money" and "They will discover the importance of school-based agriculture. To see them controlling their own produce funds. Improving the skills by producing their own crops".

Theme: "Back to the Community" - Youth as Conduit for Improved Communities

The momentum of student entrepreneurship transcends individual gains, converging toward community impact. Participants foresee students disseminating agricultural innovations learned in SBAE to parents and communities, sparking a ripple effect on livelihoods, the economy, and the nation. Participants reported that they expect students to diffuse the new technologies they learn in their agriculture classes and from the 4-H program to their parents and communities. This would take place by involving adults on the school demonstration farm as well as taking new ideas back to their home farms. This emerged as participants shared statements like, "I will expect my student to implement and teach their parents. To improve their life.", "…parents will help us, students will take the ideas to their parents", "Student taking knowledge back to communities" and, "I would like/expect to see parent[s] partaking in the students' demonstration farm work and children working on the farm with willing mind."

The envisioned parental and community engagement is seen as a catalyst for adoption of improved farming methods, with the goal of creating more resourceful communities. This emerged as participants wrote statements like, “Plenty food will be produce[d] in the community. People will learn the improved method of farming”, “I expect my community members to do the new innovation of agriculture” and, “The community people also will change the old way of planting and go by the new way of planting. They will observe plenty yield than the previous years”. One participant discussed this as their community being more resourceful, “I expect to see my school, community, and country to have more trained agriculturalist who would make my school, community and country more resourceful. Develop boys and girls who would assume leadership at local and national levels”.

This theme culminates in a vision of agricultural development as a mechanism for improved lives, directly connecting to matters of food security and poverty alleviation. One participant shared, “I would expect to see students, school or community to use agriculture to develop their own lives and also applying the new ideas”. Another stated, “Some of the changes I would love to see in my students could be sharing the knowledge with the community, applying the knowledge learned to improve the economy, use it as a livelihood skill”. Many participants made direct connections to matters of food security with statements like, “there will be an improvement in food security in Nimba County and Liberia at large” and “The entire communities of our nation will be able to feed themselves.”

Theme: “By God’s Grace, Nothing Will Prevent Me” - Overwhelming Enthusiasm for SBAE

Participants exuded confidence and enthusiasm when asked about concerns regarding implementing what they learned through each training. Their responses reverberate with unwavering commitment, often expressed as “By God grace, nothing will prevent me from applying what I had learned”, “Absolutely nothing, because the mission and vision is very important to the growth and development of our nation” and, “I will do everything possible to implement what I learned from this training”. Even in the face of potential challenges, such as illness or death, participants were resolute in their determination, asserting that nothing else would hinder their implementation efforts. A few shared, “What I think might prevent me from implementing these strategies are sickness, or a call by God.”, “Except death, beside that nothing”, and “Maybe death, but as I live, I will always use this information from this training.”

Overwhelmingly, participants shared sentiments of excitement, commitment, and eagerness at their ability to implement SBAE in their schools. As they answered this item on the questionnaire, participants easily connected the components of SBAE to the outcomes of SBAE and how youth would serve as conduits for community transformation through 4-H, the school demonstration farm, and home entrepreneurship projects. One participant captured this succinctly by stating, “I will change the old method of farming to the new method. I will improve agricultural practices in the school and community.” Participants expressed high expectations of themselves and stated that they were the ones initiating this and making it happen. They were firm in the role they played in this endeavor. A few expressed this with statements such as, “To be one of the best example in my community as a 4-H teacher” and “I will change the old method of farming to the new method. I will improve agricultural practices in the school and community.”

Theme: “My PTA Chair and Principal” - Concerns about Human & Material Resources

While the commitment of the participants resounded in their bold acclimations of implementation, there did emerge a commonality of potential barriers, namely, human and material resources. Interestingly, these concerns more notably emerged in the responses in the post-questionnaires from trainings two and three. Participants expressed the need to have the full support of their school principals and Parent Teacher Association (PTA) chairs were they to be successful in SBAE implementation. Through their responses, it was implied that knowledge and training of SBAE would result in this support. These concerns were shared with statements such as “My limitation could be my PTA chair and my principal. If they are not properly trained by 4-H trainers as [I'm] to understand the functions 4-H in Liberia”, “The lack of the PTAs and the community involvement”, “The only thing that will stop me from using this information is the school principal or the PTA” and, “There are serious reason could put stop to it they are: PTA Agreement, Community participation, teacher and staff are willing”. This theme articulates worries about a lack of support from parents and administrators, which could manifest as a hindrance to students' engagement in the program and insufficient verbal encouragement. One participant expressed this by saying, “Failure of parents to send their children to the demonstration farm.” Two others shared, “If the parents of the student fail to encourage their children to attend school. If the administration of the said school fails to encourage/support the project of the above organization” and “The school administration may not give us the time to perform some of the parents may not want their children to take up extra time for the program.”

Additionally, concerns about resource allocation, including land for the school demonstration farm and agricultural materials, tools, and inputs, were raised as potential barriers that might impede the effective implementation of SBAE. These resources would also likely come from the community, parents, and administrators. Three participants exemplify this concern, “There is need for working tools and improved varieties of seeds. Tools-cutlass, regular hoe, knives, shovel, twine rope, spraying can, watering can, rainboot, meter ruled, stopwatch”, “My concerns is about working tools, farmland, and money. That will prevent me from implementing these strategies” and, “Failure of donors to provide support/cash for training and failure to perform in accordance with the commitment signed. And failure of PTA to support the program.” Participants underscored the pivotal role of the community, parents, and administrators in overcoming these challenges and facilitating successful SBAE implementation.

Discussion, Recommendations, and Conclusions

Our findings unveil the favorable sentiments harbored by Liberians toward the SBAE model and their keen intentions to integrate it into their schools and communities. As per Ajzen (2020), behavior is shaped by individual attitudes, subjective norms, perceived behavioral control, and behavioral intentions. Analyzing the findings through this framework offers valuable insights. The participants in this study, comprised of agriculture teachers, principals, and PTA members, had overwhelmingly positive attitudes regarding the prospect of SBAE implementation. Participants adeptly articulated short and long-term outcomes of SBAE adoption and, through their language, expressed their positive value judgements of these consequences. Although the study did not gauge the subjective weighting of participant beliefs, the data indicated positive evaluations of SBAE implementation outcomes, along with affirmations implying favorable attitudes toward SBAE.

Examining the quantitative findings reveal an interesting pattern; although statistical differences were not measured, mean scores were slightly elevated for the items on 4-H

development and school demonstration farm content. While the participant data does not explain this trend, we postulate that the historical prominence of 4-H in Liberia, with its roots in the 1950s and resurgence post-war in the early 2000s (Brinn & Sheriff, 2018), may contribute to participants' familiarity with the organization. This sentiment was echoed in the facilitator field notes. One facilitator commented that participants enjoyed hearing about the history of 4-H Liberia and that SBAE has been in existence in Liberia since the 1950s (AgriCorps,2020). This familiarity could potentially influence their positive attitudes and, subsequently, their expressed likelihood of incorporating this content in their schools and communities.

Additionally, it is interesting that participants demonstrated a lower inclination toward adopting student-centered teaching methods. The pedagogical approaches presented in the training sessions advocated for a shift towards more experiential, constructivist, and engaged teaching and learning methods—approaches significantly divergent from the British-derived theoretical and lecture-heavy methods in most African countries, including Liberia (Sarrazin & Webb, 2019). Given this, it is understandable that participants may perceive embracing more student-centered teaching as a challenge. This was also echoed in the facilitator field notes. Both AgriCorps facilitators mentioned participants often struggled with the lessons on student-centered teaching, specifically the theoretical roots connecting the new teaching methods to student learning. Facilitators pointed out that they only ever knew the lecture method and, while many knew what a lesson plan was, they struggled to design one that included one content-related activity and one review activity. Facilitators also expressed participant challenges in understanding the purposes and methods of incorporating reflection into the learning experience. Interestingly, participants did not explicitly express specific reservations about integrating these new pedagogies into their classrooms on the post-training questionnaires, therefore, it is difficult for us to draw definitive conclusions about this finding. Future research should explore this phenomenon, potentially by incorporating specific queries related to training content, such as teaching methods. Additionally, follow-up interviews, conducted after analyzing pre- and post-questionnaires, could offer a more comprehensive understanding of participants' perspectives on adopting student-centered teaching methods.

Subjective norms, encompassing perceived social pressures or influences from significant individuals, wield considerable influence over behavioral intention (Ajzen, 2020). Within the context of this study, participants conveyed a perceived lack of support from school administrators and PTA members—individuals identified as potential inhibitors to their ability to implement SBAE. The data does not however, illuminate whether these concerns revolve around the foundational purpose of SBAE, the time required for agriculture teachers to implement SBAE. We also do not have a detailed understanding of what participants precisely mean by "support" or the extent to which they perceive their ability to overcome these potential barriers, other than the mention of necessary recourses and tools to initiate a school demonstration farm. These concerns are integral to participant's perceived behavioral control, representing their perceptions of the ease or difficulty associated with implementing SBAE in their respective schools. Thus, while the data highlights the presence of concerns regarding support and potential barriers, it does not furnish a nuanced exploration of the nature, specificity, or perceived controllability of these impediments. We recommend future research delve into these intricacies, shedding light on the multifaceted dimensions of perceived behavioral control in the implementation of SBAE.

The study findings contribute valuable insights into participant intentions to implement SBAE after attending trainings and yield practical recommendations that can inform future research and training. We recommend allocating sufficient time for survey administration and flexibility that allows for oral responses, translations into local language, or take-home completion of surveys. The questionnaire design should factor in reading competencies of participants as many participants struggled with reading. Survey-related challenges such as confusion, reading difficulties, and participant's misperception of survey as a test needs to be addressed by reiterating its purpose. Consider an expanded training model designed to include principals, PTA members, and other influential community figures, however separate tailored sessions for principals and PTA members may be necessary to emphasize their pivotal role in the success of SBAE implementation. In addition, identifying and extending invitations to additional community influencers, such as traditional rulers, clerics, opinion leaders, elders, farmers, or business owners will set up SBAE for higher receptibility and conversely successful implementation.

Furthermore, developing targeted curriculum and workshops to address implementation concerns and barriers is highly recommended. Begin this process by creating a space that allows participants to voice their concerns and process in small groups and with facilitators. This will be a gateway to support navigation of constraints as well as lead to exploration of ways to provide the tools and resources for school demonstration farms. Bearing in mind that the historical significance of 4-H inspires action, regularly refer to the rich history of 4-H. This is necessary to boost morale and passion for SBAE outcomes as well as contextualize trainings and match unique challenges with relatable contexts. Also, field notes indicated that participants were very receptive to real success stories; embedding these throughout trainings is helpful. Also, acknowledge the difficulty of unfamiliar content and leverage culturally resonant activities, such as singing and dancing in cultures like Liberia in which this is a common pastime. Providing extra time for participants to practice the new ideas and strategies during training sessions is also recommended to optimize the training. Lastly, consider the training space carefully. High temperatures, poorly ventilated training rooms, and sheds are not ideal. Making the physical environment conducive ensures comfort and alertness, particularly after meals.

This study explored the intentions of Liberian agriculture teachers, principals, and parents regarding the adoption of SBAE, including 4-H, within their schools and communities after three trainings. Participants expressed optimism towards the positive impact of SBAE on livelihoods and the Liberian economy as they foresee students disseminating agricultural innovations to their parents and communities. This aligns with Shayo's (2020) perspective on youths as potent pollinators of innovations and Jappah & Smith's (2022) recommendations for teacher trainings as a tool for accelerating development in post-conflict Liberia. SBAE projects to reduce unemployment and other post-war realities facing Liberia's convalescent economy, by augmenting existing agricultural practices and education initiatives.

As a part of a larger study of longitudinal investigation on the outcomes of SBAE in Liberia, training teachers was only the beginning of the study. Current and future work includes additional and continuous trainings for teachers, field officers, principals, PTA members, and farmers as well as robust quantitative and qualitative data collection. Nevertheless, results from this study are hopeful and we look forward to engaging in future studies that help guide Liberia's future.

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Agricultural Education for All: Importance and Ability of Agricultural Educators to Integrate Special Education Competencies into Professional Practice

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Abstract

School-Based Agricultural Education (SBAE) has served students with special needs for decades. The impact of Career and Technical Education (CTE), such as SBAE, can lead to higher earning potential, increased employment rates, and career exploration opportunities for students with special needs. This study sought to assess the professional development needs of SBAE teachers on special education integration. In addition, the study evaluated statistical differences in how male and female agricultural educators value the importance of special education integration and their ability to implement it into professional practice. The instrument utilized fourteen competencies needed for educators to be effective at teaching students with special needs. A census of (N = 204) educators in three states- New Mexico, Utah, and Montana- was conducted with a response rate of 36.27% (n = 74). The results of the analysis in research objective one determined that SBAE teachers feel that special education implementation is important but that their ability to implement it is lacking. Furthermore, research objective two found that male agricultural educators value the importance of special education significantly less than female educators. Based on these findings, the researchers suggest offering professional development that emphasizes the importance of special education integration into SBAE.

Review of Literature

Over the past century, School-Based Agricultural Education (SBAE) has positively impacted millions of students by fostering leadership development (McKim et al., 2017), career exploration (Thieman et al., 2016), and essential employability skills (Haddad & Marx, 2018). While agricultural education has served students with special needs for decades (Teixeira & Edwards, 2020), the diversity in the classroom has increased as students with special needs have gained a higher level of acceptance in traditional classroom settings (Aschenbrener et al., 2010; Easterly & Myers, 2011; Johnson et al., 2012; Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022).

Special education is designed to assist students who qualify for modifications and accommodations to the traditional curriculum due to their unique circumstances (Stair et al., 2016). This is documented through an Individualized Education Plan (IEP) or a 504 plan that details the necessary changes to accommodate the student's needs (Ramage et al., 2021). The details of an IEP are essential to agricultural educators because they are bound by federal law to ensure that the accommodations and modifications to the curriculum detailed in the IEP are met (Needham & Houck, 2019). Currently, there are over 3,000,000 students with special needs nationwide (Office of Special Education and Rehabilitative Services, 2019), with approximately 180,000 of these students served through agricultural education (Teixeira & Edwards, 2020). The

acceptance of students with special needs in agricultural education has risen, but 25% of teacher preparation programs lack coursework in special education integration (Faulkner & Baggett, 2010), contributing to educators' reported lack of confidence in effectively educating these students (Andreasen et al., 2007; Johnson et al., 2012; Kessell et al., 2009; Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022).

In 1975, Gerald Ford signed the 'Education for All Handicapped Children Act', which introduced federal protections for the educational rights of students with special needs (Needham & Houck, 2019). This legislation required that students with special needs be placed in the Least Restrictive Environment (LRE), which is often the traditional classroom setting. (Treder et al., 2000). The differentiation and modification of instruction needed to meet the needs of exceptional students can be difficult for educators of all experience levels (Giffing et al., 2010; Wilkins-Brittain et al., 2022). As the prevalence of students with disabilities has increased in the agricultural education classroom, educators' competence in special education implementation will become increasingly critical to educate these unique students (Aschenbrener et al., 2010; Easterly & Myers, 2011; Johnson et al., 2012; Ramage et al., 2022; Wilkins-Brittain et al., 2022). Differentiating and modifying instruction with compliance to students' 504 plans and IEPs is critical for student success and providing access to agricultural education for all (Ramage et al., 2022; Wilkins-Brittain et al., 2022).

Today, federal law protects the educational rights of exceptional students through the passage of the 'Individuals with Disabilities Education Act' (IDEA) in 2004 (Katsiyannis et al., 2001). This federal legislation requires that students with special needs be placed in learning environments with students who do not have disabilities (Treder et al., 2000). Numerous lawsuits have successfully challenged this assertion, such as MR v. Lincolnwood Board of Education in 1994 (Boyle & Weishaar, 2001; Murdick et al., 2002). This ambiguity in the proper placement of students with special needs can create difficulty for educators.

Agricultural education and other forms of Career and Technical Education (CTE) provide these unique students with exposure to experiential instruction and the application of employability skills in an academic setting (Theobald et al., 2019). Furthermore, students with special needs enrolled in CTE benefit from higher earning potential, preparation for the workforce, and higher employment rates (Theobald et al., 2019; Wagner et al., 2016). For example, Johnson et al. (2012) found that 87% of North Carolina agricultural educators believed Supervised Agricultural Experiences (SAEs) helped students with special needs set career goals and enhanced their social skills. In addition, Giffing et al. (2010) found that 76.9% of agricultural educators agreed that their courses are a suitable placement for students with special needs. With approximately 96% of students with learning disabilities enrolling in at least one secondary CTE course in their academic career (Wagner et al., 2016), educator competence in special education implementation is becoming increasingly critical for success in the classroom (Levesque, 2003).

While competence in special education integration is an essential function of agricultural educators, many claim that they are not confident in appropriately educating students with special needs (Andreasen et al., 2007; Johnson et al., 2012; Kessell et al., 2009; Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022). Ramage et al. (2021) determined that preservice agricultural educators completing their student teaching did not feel confident in

appropriately educating students with special needs. Furthermore, Ramage et al. (2022) suggested that female agricultural educators need more professional development in special education. This lack of confidence in meeting the needs of these students is concerning, considering the litigious nature of not following the procedures set forth by the IEP (Hainline et al., 2019; Hainline et al., 2021). If an agricultural educator does not follow these procedures, it could cause negative professional and financial ramifications from legal action (Hainline et al., 2019; Hainline et al., 2021).

The negative repercussions of not following special education mandates can be damaging to educators (Hainline et al., 2019; Hainline et al., 2021). Ensuring that agricultural educators feel confident in meeting the instructional requirements of students with special needs is critical to agricultural education's continued success in the future (Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022). While many educators report being unconfident in this area (Andreasen et al., 2007; Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022), understanding which specific areas of professional development are essential will help inform agricultural education stakeholders on the needs of educators.

Purpose and Objectives

Agricultural educators meeting the needs of exceptional students is essential to success in the profession (Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022). Recognizing the deficiencies in special education among SBAE teachers is crucial for providing targeted professional development.

Furthermore, Ramage et al., 2022 suggests that past research "…on the professional development needs of SBAE teachers concerning teaching students with special needs has overwhelming featured data from the male perspective" (p. 106). To address this concern, this study assessed the statistical differences in the perceived importance of special education integration among male and female agricultural educators. In addition, this study evaluated the statistical differences in male and female agricultural educators' self-reported ability to appropriately educate SBAE students with special needs.

The purpose of this study was to examine the perceptions of agricultural educators on the importance of various competencies of special education implementation and their ability to integrate those competencies into their professional practice to determine professional development needs. The following objectives guided this study:

1.) Evaluate differences in the perceptions of agricultural educators on the importance of various special education competencies and their ability to implement those competencies into practice to determine professional development needs.

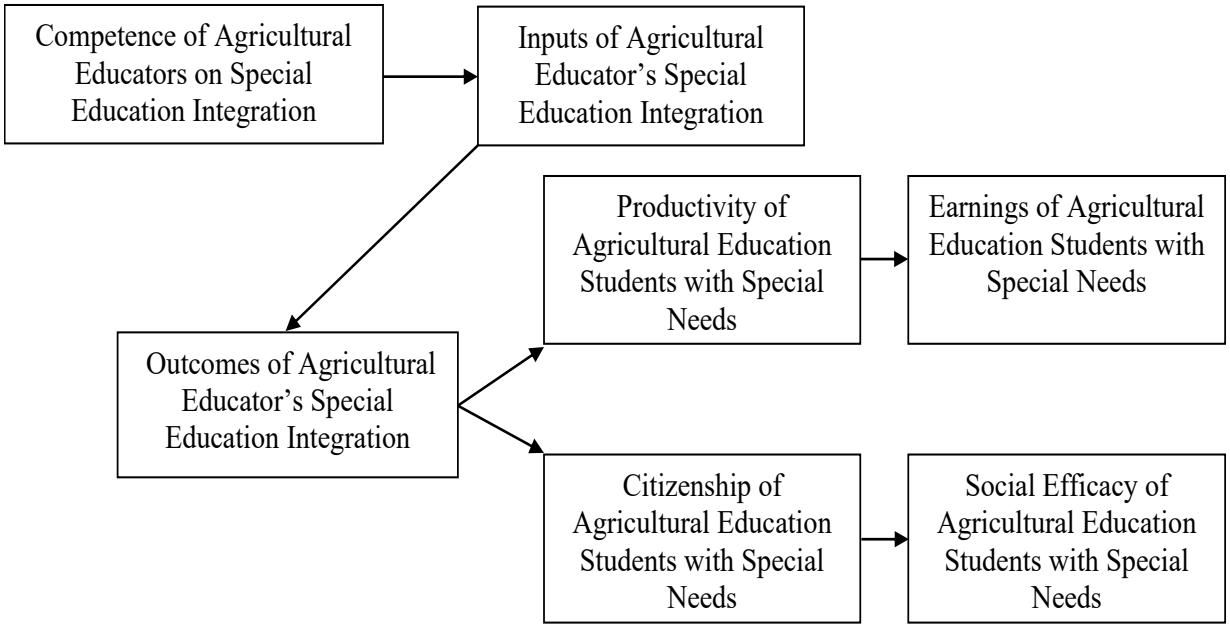
2.) Assess statistical differences in the perceptions of male and female agricultural educators on the importance of special education integration into SBAE and their confidence in integrating special education into professional practice.

Theoretical Framework

The theoretical framework used to guide this study was the Human Capital Theory (HCT). Developed by Becker (1993), the HCT asserts that inputs such as experience, education, and specialized training can increase an individual's competence in various areas of their career. To increase human capital among agricultural educators, specialized training is offered through professional development to ensure effectiveness in the classroom (Easterly & Myers, 2019; Figland et al., 2019; Norris et al., 2023; Yopp et al., 2020). The leading indicator of academic achievement is an effective educator (Eck et al., 2019; Eck et al., 2020; Eck et al., 2021; Rosenshine & Furst, 1971). As SBAE teachers acquire more human capital in special education, it expands their effectiveness through increased knowledge, skills, and abilities to meet the needs of exceptional students (Andreasen et al., 2007; Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022). If agricultural educators are not effective in providing special education students with the proper instructional modifications and accommodations, this ineffectiveness can directly influence the outcomes of agricultural education students with special needs (Andreasen et al., 2007; Wilkins-Brittain et al., 2022). This study sought to ascertain which areas of special education agricultural educators need professional development to ensure effectiveness. In addition, this study evaluated the perceptions of male and female agricultural educators on their ability to integrate special education and the importance of integrating special education into SBAE. This interaction between the human capital inputs on agricultural educators' competence in special education integration and the improved outcomes of agricultural education students with special needs is depicted in Figure 1.

Figure 1

Impact of Agricultural Educator's Competence on Special Education Integration



Methods

Population

This study utilized a descriptive correlational research design in three states- New Mexico, Utah, and Montana- to evaluate SBAE teachers' perceptions of the importance of special education integration into SBAE and their ability to implement special education. These states were selected due to their close geographical proximity to each other, and the research instrument was distributed to ($N = 204$) agricultural educators in these states. The noteworthy demographics of the participating agricultural educators (see Table 1) show that 51.9% were male, 82.7% were white, and 60.8% held a graduate degree. Moreover, 61.5% taught in rural schools, and 82.7% were in the early or middle stages of their teaching careers.

Table 1

Demographic Data of Participating Agricultural Educators

		Participants	
Demographic Area	Demographic Sub-Area	*f*	%
Gender	Female	25	48.1
	Male	27	51.9
Race	White/Caucasian	43	82.7
	Hispanic	7	1.9
	Native American	1	13.5
	Other	1	1.9
Highest Degree Earned	No Degree	0	0.0
	Associates	1	1.9
	Bachelor's Degree	20	39.2
	Master's Degree	29	56.9
	Specialist	0	0.0
	Doctoral	2	3.9
School System Type	Rural	32	61.5
	Suburban	6	11.5
	Urban	13	25.0
	Other	1	2.0
Years of Teaching Experience	Early Career (1-7 Years)	21	40.4
	Middle Career (8-23 Years)	22	42.3
	Late Career (24+ Years)	9	17.3

Note. $n = 52$. The retention of partial responses causes the *n* to vary within the demographics.

Instrumentation

The instrument used in this study was a modification of the instrument developed from Dingle et al. (2004). The original instrument comprised fourteen competencies on special education that educators need for effective implementation in their professional practice (Dingle

et al., 2004). The instrument developed for this study utilized a modified Borich needs assessment to evaluate the perceptions of agricultural educators on the importance of special education integration into SBAE and their ability to integrate special education into professional practice. The modified Borich needs assessment utilized a Likert scale that ranged from 1 = *Not Important/Competent at All*; 2 = *Somewhat Important/Competent*; 3 = *Moderately Important/Competent*; 4 = *Very Important/Competent*; 5 = *Extremely Important/Competent*. The fourteen special education competencies from Dingle et al. (2004) are listed in Table 2.

Table 2

Special Education Competencies Utilized in the Instrument

1. Knowledge of specialized instructional styles and non-traditional teaching practices and procedures.
2. Facilitates the physical classroom environment that allows for flexible scheduling and transition times.
3. Knowledge of instructional adaptations including alternative assignments, supplemental instruction, differential standards, and shortened assignments.
4. Implements lesson plans that are appropriate for diverse learners.
5. Increases participation of students with special needs in general education settings or community settings.
6. Promotes high level integrity, competence, ethics, and professional judgment.
7. Selects, adapts, or modifies core curriculum to make it accessible for all students.
8. Facilitates positive self-image of students
9. Facilitates active participation in a fair and respectful environment that reflects cultural diversity.
10. Knowledge of procedures and regulations for reporting child abuse and the legal rights and responsibilities of teachers and students.
11. Knowledge of general education assessment procedures.
12. Knowledge of interpersonal skills that work effectively with adults who have different styles.
13. Demonstrates strong interpersonal skills that are considerate, sensitive, non-judgmental, supportive, adaptive, and flexible.
14. Demonstrates positive regard for all students, families, and professionals.

Note. Modified from Dingle et al. (2004).

Validity and Reliability

The reliability of the instrument was assessed *post hoc* using Cronbach's Alpha reliability coefficients to measure the scales assessing the importance of special education integration and the ability of agricultural educators to implement the assessed competencies. The reliability coefficient for the section of the instrument assessing competence was .93, and the section assessing importance was .96. According to Ary et al. (2010), these coefficients meet the necessary threshold for a reliable instrument. The validity of the original instrument was assessed by Dingle et al. (2004) and deemed appropriate. To ensure the validity of the instrument for this

audience, two New Mexico State University faculty evaluated the face, content, and construct validity of the instrument and deemed it valid for the purposes of the study. The researchers chose not to conduct a pilot study because Dingle et al. (2004) had previously assessed the instrument for reliability and validity.

Data Collection

The study frame was compiled using agricultural educator directories in each state. Approximately 4.2% of the emails were invalid and considered frame errors during survey distribution. Systematic sampling was used to reduce sampling bias, and every second agricultural educator in the directory was selected for the study. The frame consisted of 62 viable emails in New Mexico, 80 in Utah, and 62 in Montana ($N = 204$). Ramsey and Schafer (2012) recommend a minimum of 30 responses for high-quality descriptive research; this study achieved a total response rate of 36.27% ($n = 74$), surpassing the required threshold. Within the ($n = 74$) responses, there were ($n = 22$) partial responses and ($n = 52$) full responses. Partial responses were excluded from the analysis in objective one ($n = 20$) and objective two ($n = 22$) due to incomplete data collection or missing critical demographic data.

To assess non-response bias, an independent samples *t*-test was used to assess any differences between early responders and late responders (Lindner et al., 2001). Four emails were sent to each agricultural educator to stimulate responses (Dillman et al., 2014). To evaluate non-response bias, participants who responded to the first email ($n = 21$) were considered early respondents and participants who responded to the last three emails ($n = 31$) were considered late respondents. The *t*-test suggested that there are no statistical differences between early ($M = 4.32$, $SD = .73$) and late responders ($M = 4.26$, $SD = .49$) in the special education importance construct $t(50) = .37$, $p = .72$. The analysis also suggested that there were no statistical differences between early ($M = 4.00$, $SD = .80$) and late responders ($M = 3.86$, $SD = .40$) in the special education ability construct $t(50) = .85$, $p = .40$. These results suggest the absence of non-response bias issues (see Table 3).

Table 3

Independent Samples t-test Assessing Non-Response Bias

Constructs	*n*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
Early Responder	21	4.00	.80				
Special Education Ability				.85	50	.40	.24
Late Responder	31	3.86	.40				
Early Responder	21	4.32	.73				
Special Education Importance				.37	50	.72	.10
Late Responder	31	4.26	.49				

Note. $\alpha = .05$. The retention of partial responses causes the *n* to vary within the analysis.

Data Analysis

For research objective one, a modification of the Borich needs assessment model was used to evaluate the perceived importance of each special education competency and assess agricultural educators' ability within each competency to ascertain the professional development needs of the educator (Borich, 1980). Ranked Discrepancy Scores (RDS), recommended by Narine and Harder (2022), were used to measure differences between agricultural educators' perceived importance and ability within each special education competency. Narine and Harder (2022) recommend this method as an alternative to using Mean Weighted Discrepancy Scores (MWDS), recommended by Borich (1980).

Research objective two was assessed using an independent samples *t*-test. To effectively assess Likert scale data with parametric statistics, groups of five or more items were combined to form constructs (Johnson & Creech, 1983; Norman, 2010; Sullivan & Artino, 2013; Zumbo & Zimmerman, 1993). This study formed two constructs - special education importance and special education ability - using Likert data from the fourteen competencies.

Limitations

The generalizability of this study is limited to the participating agricultural educators due to the small sample size ($N = 204$) and the response rate of 36.27% ($n = 74$). Moreover, the study only assessed the fourteen competencies from Dingle et al. (2004). These competencies are unlikely to evaluate all the knowledge and skills agricultural educators need to effectively engage students with special needs. Additionally, all data collected is self-reported by participating agricultural educators and potentially skewed due to educators' misestimation of their perceptions.

Results

Research Objective One

Overall, agricultural educators ranked the importance of each special education competency as *Very Important* to *Extremely Important* with means ranging from ($M = 4.44$, $SD = .66$) to ($M = 4.17$, $SD = .67$). They also ranked their ability within each competency from *Moderately Competent* to *Very Competent*, with means ranging from ($M = 4.23$, $SD = .61$) to ($M = 3.60$, $SD = .95$). The competencies with the lowest RDS were “Knowledge of specialized instructional styles and non-traditional teaching practices and procedures” and “Facilitates the physical classroom environment that allows for flexible scheduling and transition times.” These results suggest that agricultural educators perceived competence in these areas as lacking but essential for success. Conversely, competencies with the highest RDS were “Demonstrates strong interpersonal skills” and “Demonstrates positive regard for all students, families, and professionals,” indicating higher perceived competence in these areas. The results are listed in Table 4.

Table 4

Ranked Discrepancy Scores for Agricultural Educator's Perceived Ability and Importance of Special Education Competencies

Competency	NR	PR	TR	RDS
Knowledge of specialized instructional styles and non-traditional teaching practices and procedures.	26	3	25	-23
Facilitates the physical classroom environment that allows for flexible scheduling and transition times.	27	5	22	-22
Knowledge of instructional adaptations including alternative assignments, supplemental instruction, differential standards, and	26	5	23	-21
Implements lesson plans that are appropriate for diverse learners.	25	4	25	-21
Increases participation of students with special needs in general education settings or community settings.	26	6	22	-20
Promotes high level integrity, competence, ethics, and professional judgment.	24	5	25	-19
Selects, adapts, or modifies core curriculum to make it accessible for all students.	22	4	28	-18
Facilitates positive self-image of students	22	6	26	-16
Facilitates active participation in a fair and respectful environment that reflects cultural diversity.	18	4	32	-14
Knowledge of procedures and regulations for reporting child abuse and the legal rights and responsibilities of teachers and students.	20	6	28	-14
Knowledge of general education assessment procedures.	18	6	30	-12
Knowledge of interpersonal skills that work effectively with adults who have different styles.	17	6	31	-11
Demonstrates strong interpersonal skills that are considerate, sensitive, non-judgmental, supportive, adaptive, and flexible.	14	4	36	-10
Demonstrates positive regard for all students, families, and professionals.	14	5	35	-9

Note. NR = Negative Ratings; PR = Positive Ratings; TR = Tied Ratings; RDS = Ranked Discrepancy Score. The retention of partial responses causes the *n* to vary within the analysis.

Research Objective Two

The second research objective sought to assess any statistical differences in how male and female agricultural educators valued the importance of special education integration into SBAE and their confidence in integrating special education into professional practice. This objective was assessed utilizing an independent samples *t*-test. The results from the *t*-test $t(50) = -1.99$, $p = .05$ suggested that males ($M = 4.12$, $SD = .66$) value the importance of special education integration significantly less than females ($M = 4.44$, $SD = .49$). The results from the *t*-test are reported in Table 5.

Table 5

Independent Samples t-test on the Importance of Special Education by Gender

Constructs	*n*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
Male	25	4.12	.66				
Special Education Importance				-1.99	50	.05	-.55
Female	27	4.44	.49				

Note. α = .05

The second research objective also assessed statistical differences in agricultural educators' ability to implement special education into professional practice. The results from the *t*-test *t (*50) = -1.22, *p* = .23 suggest that there are no statistical differences in the self-reported abilities of male (*M* = 3.81, *SD* = .66) and female (*M* = 4.01, *SD* = .52) agricultural educators to implement special education into professional practice. The results from the *t*-test are listed in Table 6.

Table 6

Independent Samples t-test on the Ability of Agricultural Educators to Implement Special Education by Gender

Constructs	*n*	*M*	*SD*	*t*	*df*	*p*	Cohen's *d*
Male	25	3.81	.66				
Special Education Importance				-1.22	50	.23	-.34
Female	27	4.01	.52				

Note. α = .05

Conclusions and Discussions

Agricultural education and Career and Technical Education (CTE) have had a significant impact on students with special needs (Teixeira & Edwards, 2020), but many educators report lacking confidence in properly educating these exceptional students (Andreasen et al., 2007; Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022). This study aimed to identify the professional development needs of agricultural educators and assess any differences in the importance they attribute to integrating special education and their ability to implement it into practice. In addition, the study evaluated any statistical differences in male and female educators' perceived importance of integrating special education into their instruction and their ability to implement special education into professional practice.

The first research objective assessed the professional development needs of agricultural educators using RDS. Of the fourteen special education competencies that teachers were asked to rank, there was little variation in the importance, with a mean variance of only .27 and a standard

deviation of .61. In the analysis, only 3 to 6 teachers in any category had a positive rating of their ability to deliver the competencies as compared to their perceived importance of the competencies. In addition, between 40.7% and 66.7% of the teachers ranked the value of the skill as equal to their ability to apply it in their professional practice. Overall, all competencies had a negative RDS, indicating that the educators believed that their ability to deliver was not at a level needed for quality instruction of the competency. These results are consistent with other studies on special education integration into agricultural education (Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022). Wilkins-Brittain et al. (2022) found that "…two teachers stated they were not given access to their students' IEPs, and other teachers mentioned they did not review the IEPs of their students" (p. 10). Furthermore, 96% of students with special needs take at least one CTE course at the secondary level (Wagner et al., 2016). A lack of human capital development opportunities for special education in agricultural education, could lead to inadequate differentiation and accommodations for agricultural education students with special needs (Aschenbrener et al., 2010; Easterly & Myers, 2011; Johnson et al., 2012; Ramage et al., 2021; Ramage et al., 2022; Wilkins-Brittain et al., 2022).

Overall, teachers rated their interpersonal skills, such as inclusion of students in a positive atmosphere and working with adults effectively, higher than the other assessed skills. Even with the competencies that teachers were more confident in their ability, there was still a negative RDS. This suggests that teachers realize the value of working with special education students and value the competencies developed for working with this population, but overall believe that their skill set for success is lower than needed. What is most concerning is that the greatest discrepancy scores were in the areas of instructional styles, non-traditional teaching methods, physical classroom environment, and instructional differentiation and modification. These are core competencies for success in educating students with special needs. This trend in self-reported ability is strengthened by Griffing et al. (2010), who found that 23.1% of educators disagreed that their courses are an appropriate placement for students with special needs. This lack of acceptance of special needs agricultural education students could stem from deficiencies in their ability to properly differentiate instruction and provide appropriate accommodations.

The second research objective assessed statistical differences in the perceptions of male and female agricultural educators on the importance of special education integration and their ability to implement it into professional practice. This was assessed by combining the Likert data from the fourteen competencies to form two constructs and evaluating differences between the means utilizing an independent samples *t*-test. Overall, the evaluation suggests $t(50) = -1.99$, $p = .05$ that male agricultural educators ($M = 2.12$, $SD = .66$) value the importance of special education integration significantly less than female agricultural educators ($M = 4.44$, $SD = .49$). This finding is significant because males are recommended for special education services twice as frequently as females (Piechura-Couture et al., 2013; Wehmeyer & Schwartz, 2001). According to Ramage et al. (2022), a great deal of the research on agricultural education students with special needs has been from the male perspective. The ability of male and female agricultural educators to implement special education into professional practice was also assessed. While no statistical differences were found, it suggests that male agricultural educator's self-reported abilities are similar to female agricultural educators.

While this study suggests that male SBAE teachers value the importance of special education significantly less than female agricultural educators, most see the value of SBAE to students with special needs and feel that it is an appropriate place for them (Griffing et al., 2010; Johnson et al., 2012). Johnson et al. (2012) determined that 97% of agricultural educators in North Carolina feel that students with special needs receive similar benefits from FFA than students without special needs, but 64.5% claim that FFA opportunities are limited for students with special needs. In addition, 94.2% of North Carolina agricultural educators reported that SAE is beneficial to students with special needs, but 58.6% claim that students with special needs have a more challenging time conducting a quality SAE project than other students (Johnson et al., 2012). Furthermore, the rankings of the importance of special education integration into SBAE for both male and female agricultural educators corresponded to the *Very Important* descriptor. This ambiguity in the results between male and female agricultural educators is an additional limitation of the study.

As the agricultural education profession continues to progress and find innovative ways to meet the educational needs of exceptional students, teacher educators and SBAE stakeholders must rise to the occasion and ensure that agricultural educators are professionally trained. This training can increase the human capital of the educators and affect the outcomes of students with special needs. Agricultural educators' effectiveness in the classroom in this area could help students with special needs develop a passion for the agricultural industry, become informed agricultural consumers, and explore career options they may not have considered otherwise. This profound impact of agricultural education can benefit all students, and measures should be taken to ensure their success.

Recommendations for Future Practice and Research

To address deficiencies in special education implementation, stakeholders and teacher educators in agricultural education should evaluate in-service and pre-service education offerings. Ramage et al. (2022) suggested that agricultural educators feel that the professional development they have attended on special education was not relevant to agricultural educators and that professional development targeted at agricultural educators would be beneficial to their ability to accommodate students with special needs. Additionally, Ramage et al. (2022) suggested that the professional development provided to agricultural educators should be specific by disability types including cognitive, physical, mental, etc. The results of this study would suggest that professional development based on the impact that agricultural education and CTE have on special needs students would be beneficial.

Based on the study's results, it is recommended that the benefits of SBAE on special needs populations be evaluated. Currently, there is a lack of literature on how agricultural education specifically influences the outcomes of students with special needs. In addition, research should be conducted to further explore the ambiguity of the results that males value special education significantly less than females but that both of their mean scores corresponded to the *Very Important* descriptor. Furthermore, as the profession moves forward, research is needed to determine the best strategies to deliver agricultural education instruction to special needs populations.

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Advocating for Agricultural Education: A Mixed Methods Examination on the Role of Opinion Leadership on Teachers' Advocacy Intentions

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Abstract

The purpose of this mixed methods study was to describe the role of opinion leadership on Louisiana teachers' intentions to advocate for agricultural education. As a result, we found that the quantitative and qualitative data strands were largely complementary. We concluded that the agricultural education teachers in Louisiana reported only a marginal level of opinion leadership. Regarding their intentions to advocate for agricultural education, most teachers indicated they would be likelier to engage in low-stakes advocacy, such as joining their professional organization, meeting with decision-makers, or attending FFA Day at the Capital rather than participating in advocacy considered more professionally risky. The teachers also recognized that they exhibited a deficiency in advocacy knowledge and skills. Going forward, we recommend that future research examine the approaches that teachers use to champion various issues and causes that may affect their programs. We also call for greater emphasis on helping teachers learn how to tell agricultural education's story in ways that motivate decision-makers to become allies for the profession. Finally, we call for greater professional development experiences designed to help agricultural education teachers advocate for their profession.

Introduction and Review of Literature

In recent years, *teacher advocacy* has emerged as a popular buzzword in education (Bradley-Levine, 2018; Velasco et al., 2023). Although debate has occurred over the exact meaning of the term, Velasco et al. (2023) argued that it was an action taken by a teacher to influence the process by which decisions are made in education. As such, teacher advocacy often involves issues that have cultural, economic, political, and social implications that can influence lives. For example, teachers can advocate for change regarding issues that negatively influence students and school systems, such as inadequate resources, misinformation, and poverty. By taking responsibility for enacting positive change at the individual and system levels, teachers begin to serve as a source of good for students, schools, and communities (Catapano, 2006). Despite this, teachers often find themselves grappling with balancing local community and cultural expectations as well as overcoming negative assumptions and stereotypes about advocacy.

The reasons underpinning teachers' hesitation to engage in advocacy efforts are multifaceted and context-dependent. For instance, some teachers avoid advocacy because of concerns that their colleagues, students' families, and community members might respond negatively to this work (Larrabee & Morehead, 2010). Meanwhile, other teachers fear that their school administrators may not be supportive (Marshall & Anderson, 2009). Therefore, the fear of negative career

ramifications has been found to be a statistically significant deterrent for teachers regarding their engagement in advocacy because they consider such behavior *professionally risky* since it could make them vulnerable to criticism from individuals who might control their employment status (Velasco et al., 2023).

Advocacy efforts also frequently require educators to take a stance on contentious issues, which can clash with traditional views that teachers should maintain neutrality and avoid matters that may be considered controversial (Marshall & Anderson, 2009; Picower, 2012). Case in point, Rose (2018) reported that preservice teachers viewed teacher advocacy as "defiant or confrontational" (p. 310). Another deterrent that has surfaced in education is the perception that teacher advocates seek to *buck* professional norms by interfering with their colleagues' work, making it challenging for teacher advocates to champion broader systemic changes in their local school systems (Lortie, 2002). Consequently, teacher advocates have reported struggling with how best to influence other teachers to ensure that the needs of their students can be met (Bradley-Levine, 2017). These negative implications of advocacy work have left some teachers with the perception that advocacy should be avoided altogether (Larrabee & Morehead, 2010).

To mitigate these challenges, multi-layered support systems have been advanced as instrumental in encouraging teacher advocacy (Bradley-Levine, 2011, 2018). For example, creating leadership structures that involve teachers in formal and informal leadership roles can allow teachers to collaborate and influence issues affecting teaching and learning in their school systems (Bradley-Levine, 2011). This type of power structure has been found to promote teacher advocacy as well as more inclusive and collaborative learning environments (Bradley-Levine, 2018). Therefore, a power-sharing approach by which administrators, community members, and teachers collaborate in educational settings can alleviate some of the challenges associated with teacher advocacy because teachers can draw upon others' expertise and support when championing the needs of their students (Marshall & Anderson, 2009).

In agricultural education, Hock and Myers (2018) explained that teacher advocacy has taken on various forms. For instance, teachers can address problems such as the shortage of qualified individuals to fill jobs in industry, lack of support for agriscience programs, misinformation about agricultural products and practices, and other relevant issues. Consequently, advocacy often involves a complex assortment of in-person, online, and written communication to decision-makers to explain why the issue is vital to agricultural education and, perhaps, the broader agricultural industry (Doerfert & Lawson, 2018). Such efforts can be particularly critical when teachers need to demonstrate the relevance of their program to a school system, which, through advocacy, could lead to impactful changes in policies and practice (Casten, 2018). To achieve such, teachers need to mobilize others – alumni, parents, and influential community members – willing to contribute their influence to ensure that a cause receives the attention needed (Doerfert & Lawson, 2018). On this point, Blackburn et al. (2017) noted that a critical component of effective advocacy was ensuring that others found value and supported a teacher's vision. Often, this can be achieved by *telling the story* of agricultural education in ways that resonate and create a sense of urgency for the public as well as those who hold decision-making power (Casten, 2018). To achieve this, however, requires that agricultural educators be viewed as competent by their students, officials in their local school system, and the broader community.

On this point, Lamm et al. (2015) explained that individuals viewed as knowledgeable, well-established, and trustworthy in a social system should be "considered opinion leaders within their networks of influence" (p. 147). Therefore, opinion leaders in agricultural education would be considered vital in influencing advocacy efforts for agricultural education. Despite this, Lamm et al. (2014) reported that opinion leaders in agriculture and natural resources (ANR) were found to be *less optimistic* and *unwilling to take risks*. Therefore, opinion leaders in agricultural education may be less likely to advocate for issues that affect their communities, programs, students, and the broader discipline (LeJeune et al., 2020). By understanding how opinion leaders understand advocacy, insight could be gained into the factors influencing their decision-making. With this knowledge, leaders could identify ways to motivate opinion leaders to champion issues important to agricultural education. Despite this, little empirical data has been advanced that could be used to guide such efforts. This paucity of knowledge motivated the current study.

Theoretical Framework

For this investigation, Lazarsfeld et al. (1948) theory of opinion leadership served as the lens we used to analyze the phenomenon. Through this lens, knowledge is viewed as being disseminated through a two-phase process: (1) opinion leaders receive and process information, and (2) the opinion leaders communicate their views, i.e., complexity, relative advantage, and utility, of such information to their followers, which leads to either the acceptance or rejection (Lazarsfeld et al., 1948). Lazarsfeld et al. (1948) noted that opinion leaders could become influential in a social system through a variety of ways, including (a) appointment, (b) nomination, (c) recruitment, and (d) self-selection. Despite the ambiguous path to opinion leadership, Valente and Davis (1999) maintained that in every social system, individuals emerge who serve as role models to others: "[t]hese role models act as opinion leaders within their communities and can be important determinants of rapid and sustained behavior change" (p. 57). As such, followers often view opinion leaders as more competent than themselves because they can effectively communicate why an issue or cause should be considered important in their context (Valente & Davis, 1999). Further, Rogers (2003) noted that opinion leaders were often considered more innovative, optimistic, and of higher status in a given social system. Therefore, although opinion leaders are often different, i.e., heterophily, they remain similar enough to their followers to gain buy-in and support, i.e., homophily (Rogers, 2003).

In education, teachers hold unique and influential power over the dynamics of teaching and learning within their schools. For example, Spillane et al. (2003) reported that teachers primarily relied on their fellow educators rather than school administrators for advice about teaching. Therefore, teachers' inclination to seek support from their peers often positions other teachers as opinion leaders in educational contexts (Hatch et al., 2005). Consequently, teachers who can proficiently and diplomatically advocate for what they believe is in the best interest of their students and communities have been shown to successfully influence their colleagues to adopt various practices (Marshall & Anderson, 2009). In the current study, we sought to understand better the role of opinion leadership in influencing agricultural education teachers' intentions to advocate for agricultural education. Through this lens, we sought to understand the various approaches that opinion leaders may be willing to employ to drive positive change for agricultural education.

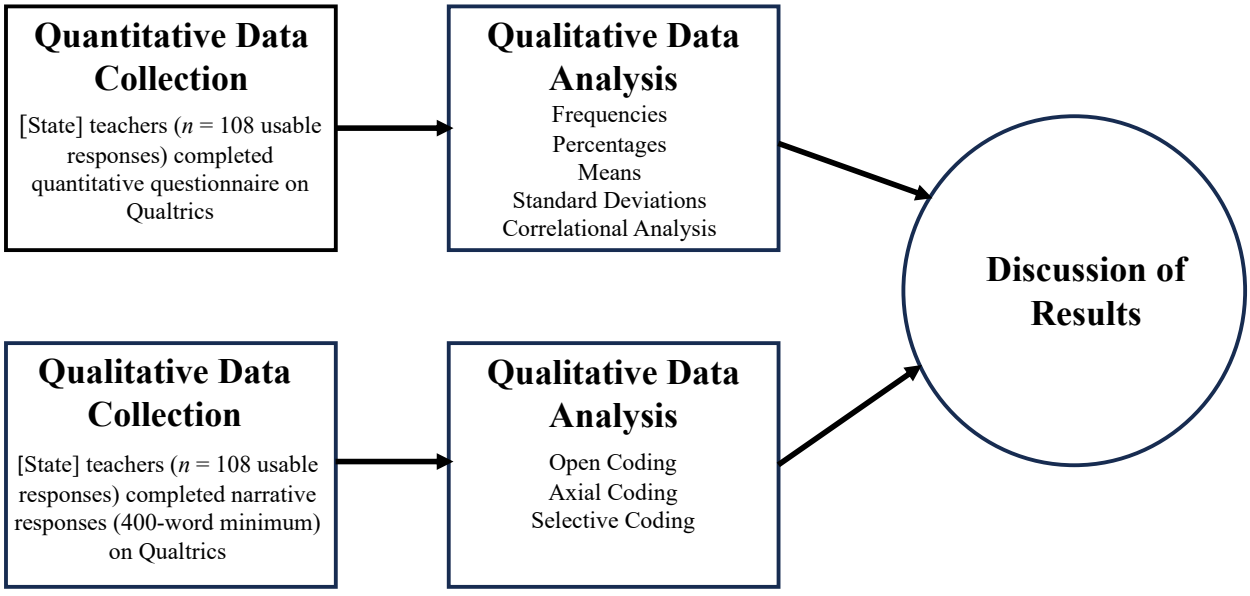
Purpose and Objectives

The purpose of this study was to describe the role of opinion leadership on Louisiana teachers' intentions to advocate for agricultural education. Four objectives guided the investigation:

1. Describe the level of opinion leadership for Louisiana agricultural education teachers.
2. Describe the intentions of Louisiana teachers to advocate for agricultural education.
3. Describe relationships among Louisiana agricultural teachers' level of opinion leadership and intentions to advocate for agricultural education.
4. Describe how the qualitative data provided insight into Louisiana teachers' perspectives on opinion leadership and advocacy for agricultural education.

Methods and Procedures

We used a convergent mixed methods design to integrate quantitative and qualitative data to enhance the quality of the results in the investigation (Creswell & Plano Clark, 2018). Researchers frequently utilize convergent designs to bolster findings when quantitative or qualitative data alone may lack sufficient strength (Creswell & Plano Clark, 2018). By drawing upon both quantitative and qualitative data in this study, the strengths of each data source were used to accurately depict the phenomenon and bolster the results (Creswell & Plano Clark, 2018). As such, we assigned equal priority, i.e., QUAN + QUAL, to each strand of data (Morse, 1991). It should also be noted that the point-of-interface between the two strands occurred during the discussion of results, as both strands were used to offer overarching insights (Creswell &



Plano Clark, 2018). Figure 1 provides a diagram of the methodological approach employed in this investigation.

Figure 1

Diagram of the Convergent Mixed Methods Approach Used in this Investigation

The lead investigator for this study was a graduate student in agricultural and extension education at Louisiana State University. Meanwhile, the other three investigators had served as agricultural education teachers. Each investigator saw value in teacher advocacy and encouraged preserve and in-service teachers to champion issues affecting agricultural education. It should also be noted that we had professional relationships with many of the participants in this investigation, which likely encouraged their participation. Due to our previous relationships with the participants, this had the potential to elicit response bias from participants because they may have chosen to respond in a way they perceived the research team desired. To mitigate this issue, we carefully analyzed responses and did not mobilize any data for analysis that we perceived were dishonest or inaccurate. As such, we recognize the biases we brought to this investigation and attempted to diminish their influence during our interpretation of the findings to the best of our ability.

To achieve the purpose of this study, we facilitated a census ($N = 219$) of Louisiana agricultural education teachers. This was achieved using the Louisiana Agriculture Teachers' Association (SATA) membership directory as the investigation's participant frame. We also used Dillman et al. (2014) tailored design approach to facilitate the collection of data using a web-based instrument created through Qualtrics online software. We recognize that a limitation of this study was that perhaps not all Louisiana agricultural education teachers may have chosen to become members of SATA. Therefore, the possibility of coverage error existed (Dillman et al., 2014). We also incentivized participation with two $50 gift cards. To begin data collection, we sent a pre-notice message to all individuals who met the inclusion criteria, informing them about the study (Dillman et al., 2014). We distributed the web-based instrument using an electronic mail message three days later. Thereafter, we sent reminders to the population of interest at timed intervals in accordance with Dillman et al. (2014). In total, 219 invitations were sent to SBAE teachers in Louisiana. After multiple reminders, 141 responses (64.3% total response rate) were recorded. However, after reviewing the data, we noted that 33 (23.4%) responses were incomplete; therefore, they were excluded from our analysis. As a result, we determined that 108 (49.3%) responses were usable.

Of the participants, 74 (68.5%) were male and 34 (31.4%) were female. Further, most participants had taught agricultural education for more than 21 years ($f = 36$; 33.3%) or between one and five years ($f = 26$; 24.0%). The participants were predominantly White ($f = 97$; 89.8%); meanwhile, seven (0.06%) identified as Black, three as American Indian (0.02%), and one as multiracial. It should also be noted that the majority of participants ($f = 88$; 81.4%) had not served in an elected position for the SATA.

The instrument used to collect data in this investigation included four sections with a combination of previously established and research-developed measures. To establish face and content validity, a panel of experts consisted of three agricultural education faculty members at Louisiana State University, the Louisiana FFA Executive Secretary, and one practicing agricultural education teacher who was not included in the population under investigation. We also pilot-tested the instrument with 28 agricultural education teachers from Louisiana who were not included in the study. As a result of the pilot test, reliability for each section of the quantitative instrument had a Cronbach's alpha of .80 or greater, which was considered acceptable.

The first section of the instrument used Childers' (1986) opinion leadership scale to measure the agricultural education teachers' perceived level of opinion leadership. On this measure, the participants were asked to rate their level of agreement on six items regarding their perceived influence on issues affecting agricultural education. The instrument has been reported to be reliable with a Cronbach's α of .83 or higher (Childers, 1986). Although we slightly adapted the instrument to fit the context of this study, its structure was indistinguishable from Childers (1986). Therefore, each item used a five-point bipolar response structure. For example, we presented each item using pairs of dissimilar statements in which a 1 (one) designated a negative sentiment, whereas a 5 (five) reflected a positive sentiment (Childers, 1986). After collecting data, we averaged the six items to create the participants' overall opinion leadership score.

In the second section of the instrument, we used a researcher-developed scale to measure participants' intentions to advocate for agricultural education. The scale asked participants to indicate their willingness to advocate for agricultural education on 13 items using bi-polar responses, i.e., 1 = *Yes*; 2 = *No*. Then, we averaged the 13 items to calculate an overall intention score. Post-hoc reliability was calculated for the scale, and a Cronbach's α of .91 was obtained. We used the third section of the instrument to collect narrative responses from the participants using the following prompt: "Describe some of your most *memorable experiences* as well as *challenges* advocating for agricultural education." We created a 400-word minimum forced response in Qualtrics for all participants in the qualitative portion. The final section of the instrument asked the participants to provide their personal and professional characteristics.

After completing data collection, we compiled our quantitative items into an SPSS file and cleaned the data while removing any personal identification of the participants. To address research question one, we analyzed data using measures of central tendency, including frequencies, percentages, means, and standard deviations. These measures were utilized to describe the population's opinion leadership and advocacy intentions. After describing these factors, we performed a correlational analysis to examine the relationships between the selected variables. Thereafter, we used Davis' conventions (as cited in Miller, 1994) to describe the magnitudes of the correlation coefficients: $01 \geq r \geq .09$ = Negligible; $.10 \geq r \geq .29$ = Low; $.30 \geq r \geq .49$ = Moderate; $.50 \geq r \geq .69$ = Substantial; and $.70 \geq r \geq .99$ = Very High.

In the qualitative strand, we employed an interpretive qualitative approach (Merriam & Tisdell, 2015). To achieve this, each participant in the study was required to provide a narrative response. To analyze the qualitative data, we used the qualitative analysis software NVivo. The initial data analysis was executed using the constant comparative method, involving three types of coding: (a) open, (b) axial, and (c) selective (Corbin & Strauss, 2015). Open coding entailed categorizing data units into distinct categories, while axial coding involved examining relationships among categories to develop evidentiary support (Saldaña, 2021). Subsequently, we employed selective coding to construct an analytical narrative of the data, which facilitated the emergence of themes by incorporating multiple perspectives (Corbin & Strauss, 2015). Through comparisons and contrasts, the qualitative findings were operationalized by weaving participants' perspectives into detailed descriptions.

Lincoln's and Guba's (1985) four criteria for qualitative quality – credibility, confirmability, transferability, and dependability – guided ethical decision-making in the study. To advance

credibility, we triangulated findings using various forms of data, quantitative and qualitative, and provided context-specific descriptions of our findings. Meanwhile, we ensured confirmability by explicitly addressing our decisions, providing detailed methodological descriptions, and considering rival conclusions (Lincoln & Guba, 1985). We upheld transferability by seeking a census of the population and describing participants' personal and professional characteristics in detail as well as linking findings to existing theory. Finally, we upheld dependability by conducting the investigation in accordance with qualitative inquiry traditions and being transparent about our roles in the study (Lincoln & Guba, 1985).

Findings

Objective #1

The first objective sought to describe the agricultural education teachers' level of opinion leadership. To examine such, the teachers responded to six items from Childers' (1986) opinion leadership scale. When probed about the frequency of individuals they communicated with about issues affecting agricultural education in the past six months, most (f = 27; 25%) indicated they had told a number of people. Meanwhile, participants reported that they only marginally communicated with their colleagues about issues affecting agricultural education (f = 34; 35.2%). Regarding the likelihood of being asked about new information concerning agricultural education, most indicated they were not very likely to be asked (f = 30; 31.5%). Further, most participants indicated that their colleagues (f = 30; 27.8%) informed them about new developments in agricultural education rather than them informing their colleagues. For the item, "When you talk to your friends and neighbors about issues affecting agriculture education," the teachers suggested that they provided some new information (f = 45; 41.7%). Finally, most of the participants indicated that they were often not used as a source of advice (f = 51, 47.2%) in discussions with friends and colleagues about issues affecting agricultural education. It should also be noted that participants' overall opinion leadership score was a mean of 2.94 with a standard deviation of 1.01. Table 1 outlines the level of opinion leadership reported by the agricultural education teachers in Louisiana.

Table 1

Louisiana Agricultural Education Teachers' Level of Opinion Leadership

Statements	1	2	3	4	5
During the past six months, how many people have you told about issues affecting agriculture education[a]	12.1%	25.0%	19.4%	18.5%	25.0%
In general, how often do you talk about to your colleagues about issues affecting agricultural education[b]	8.3%	35.2%	16.7%	16.7%	23.1%
Compared to your circle of friends, how likely are you to be asked about new information concerning agricultural education[c]	23.1%	31.5%	18.5%	13.9%	13.0%

Statements	1	2	3	4	5
In a discussion of issues that affect agricultural education, which of the following happens most[d]	16.7%	27.8%	27.8%	18.5%	9.3%
When you talk to your friends and neighbors about issues affecting agricultural education do you[e]	9.3%	33.3%	2.8%	41.7%	13.0%
Overall, in all your discussions with friends and colleagues about issues affecting agricultural education you are[f]	9.3%	47.2%	4.6%	32.4%	6.5%

Note. [a]1 = *No one* to 5 = *A number of people;* [b]1= *Never* to 5 = *Often;* [c]1= *Not likely* to 5 = *Very likely;* [d]1 = *Your colleagues tell you about new developments* to 5= *You tell your colleagues about new developments most of the time;* [e]1= *Give little information* to 5 = *Give a great deal of information;* [f] 1= *Not used as a source as advice* to 5 = *Often used as a source of advice.*

Objective #2

Thirteen items were used to measure the agricultural education teachers' intentions to advocate for agricultural education. Using a bi-polar scale (1= *Yes*; 2 = *No*), most indicated that they would advocate by joining their professional organization (*f* = 103; 95.4%), meeting with decision-makers at the district/area level (*f* = 98; 90.7%), and attending FFA Day at the Capital (*f* = 93; 86.1%). Meanwhile, the majority of teachers were unwilling to run for an elected position (*f* = 83; 76.9%), attend a rally or demonstration (*f* = 71; 65.7%), or create an informational flyer or video (*f* =55; 50.9%) to advocate for agricultural education. As a result, the overall intention score for participants in this investigation was a mean of 1.34 with a standard deviation of 0.24. Table 2 provides an overview of teachers' intentions to advocate for agricultural education.

Table 2

The Intentions of Louisiana Teachers to Advocate for Agricultural Education

Statement	Yes	No
Join my professional organization (LATA).	95.4%	4.6%
Meetings with decision makers at the district/area level.	90.7%	9.3%
Attend FFA Day at the Capital.	86.1%	13.9%
Informal meetings with decision makers.	86.1%	13.9%
Formal meetings with decision makers.	77.8%	22.2%
Make a telephone call or text to decision makers.	77.8%	22.2%
Writing a letter or email to decision makers.	73.1%	26.9%
Writing a post on social media (i.e., Facebook, Twitter, or Instagram, etc.).	61.1%	38.9%
Donate money to an issue or cause that affects agricultural education.	58.3%	41.7%
Write a newspaper article addressing a relevant issue.	55.6%	44.4%
Create an informational flyer or video.	49.1%	50.9%
Attend a rally or demonstration.	34.3%	65.7%

Statement	Yes	No
Run for an elected position.	23.1%	76.9%

Objective #3

For the third objective, we used correlational analysis to examine the relationship between the variables of interest. As a result, we found a statistically significant ($p < .01$) and moderate negative relationship ($r = -.480$) between the agricultural education teachers' level of opinion leadership and their intentions to advocate for agricultural education. This finding suggested that as the teachers' opinion leadership increased, their intentions to advocate for agricultural education decreased.

Objective #4

Using a qualitative approach, the final objective explored the experiences and challenges faced by Louisiana teachers in advocating for agricultural education. As a result, three themes emerged from our analysis: (a) low-stakes advocacy, (b) advocating to and through students, and (c) a deficiency in advocacy knowledge and skills. The themes tell the story of the actions, aspirations, and deterrents of teachers as they have strived to promote agricultural education.

Theme #1: Low Stakes Advocacy

In the first theme, low-stakes advocacy, we compared the narrative responses of individuals who self-identified as having greater opinion leadership in the quantitative strand with those who did not perceive they exhibited a high level of opinion leadership. An emergent finding from our analysis was that opinion leaders often described engaging in low-stakes advocacy rather than *professionally risker* advocacy behaviors. As such, low-stakes advocacy represented actions that the opinion leaders in agricultural education perceived might have limited potential negative repercussions, i.e., behaviors the teachers viewed as *safe*. Examples of low-stakes advocacy included "joining my professional organization" (Participant's #4, #7, #19, #22, #30, #39, #40, #42, #56, #61, #83, #107) attending "FFA Day at the Capital" (Participant's #8, #11, #24).

The opinion leaders also articulated other forms of low-stakes advocacy, such as building relationships, networking, and subtly influencing decision-makers largely within their local context (Lazarsfeld et al., 1948). As Participant #40 explained: "When advocating, sometimes it's the quiet actions that speak the loudest." Similarly, Participant #61 explained: "Advocacy in agricultural education is not always about grand gestures and public demonstrations. Often, it's the little conversations you have that make the biggest impact."

The individuals who did not report exhibiting a high level of opinion leadership in the quantitative strand, however, indicated that they largely "did not" engage in advocacy for agricultural education (Participant #1, #32, #68). Or they preferred more private advocacy efforts such as "voting for individuals who support agricultural education" (Participant #12, #62, #101) or "speaking with family and friends" about the importance of agricultural education (Participant #16, #91, #108). Therefore, these individuals reported being largely disengaged from advocacy for agricultural education.

Theme #2: Advocating to and through Students

In the second theme, advocating to and through students, 72 participants reported that at the heart of their advocacy was empowering youth through agricultural education. Therefore, the teachers viewed their primary responsibility as educating the next generation about agriculture and inspiring them to become advocates and opinion leaders themselves (Lazarsfeld et al., 1948). On this point, Participant #9 pondered: "…so what's our most potent advocacy tool? Obviously, it's our students." Echoing this sentiment, Participant #100 shared: "When students become passionate advocates for agriculture, it's like a ripple effect – their voices spread far and wide."

To accomplish this, the teachers explained that nurturing their students' *voices* was a powerful way to amplify agricultural causes. Participant #71 explained: "I regularly discuss agriculture and inform my students of issues to ensure they know what is happening, and so they can take action." Echoing this sentiment, Participant #29 explained: "Our students are the future of agriculture. By educating them, we're sowing the seeds for advocacy that will grow for generations." Similarly, Participant #59 argued: "Encouraging students to speak up about issues affecting our school and the broader agricultural discipline is a form of advocacy in itself."
As a result of such work, the agricultural education teachers reported that their students often took action. Case in point, Participant #26 explained that after his agricultural education program consistently lost resources after an administration change, his students took note and "created a petition" to bring about change. "The petition worked; within a few days, my new superintendent asked to meet with me personally, and he apologized. We did not have any problems after that," explained Participant #26. Meanwhile, Participant #60 recalled how her students "were inspiring as they canvased the community during a bond issue to get a new agricultural education building." She continued: "The students and parents came together and were passing out educational materials and talking to people at all different kinds of community events; I didn't even really have to do much, and the bond passed!"

Theme #3: A Deficiency in Advocacy Knowledge and Skills

In the final theme, a deficit in advocacy knowledge and skills, over 60 participants reported that they perceived they lacked the necessary tools to be effective advocates for agricultural education. Perhaps this finding provides insight into why opinion leaders identified in this investigation only reported engaging in low-stakes advocacy behaviors (Lazarsfeld et al., 1948). As such, the teachers expressed a desire for professional development and other educational opportunities that would equip them with the necessary skills. As an illustration, Participant #81 revealed: "I want to advocate for agricultural education better, but I need the tools to do it effectively. With some more training, I think I could be a better voice for the agricultural industry and the teaching profession."

Meanwhile, Participant #15 provided insight into why advocacy may not be practiced by some Louisiana agricultural education teachers: "I think advocacy is viewed as bucking the system. And bucking the system is often frowned upon in agriculture. We need to change this perspective through more education about it." Correspondingly, Participant #39 argued: "Professional development could help bridge the gap between our passion for agriculture and our ability to

influence decision-makers." Meanwhile, Participant #74 explained: "Investing in our own advocacy skills would be an investment in the future of agricultural education."

In particular, the agricultural education teachers suggested they needed help navigating the complexities of "policy and using various forms of media," according to Participant #27. Another suggestion offered by Participant #5 was for state leaders to create "monthly information and fact sheets" that teachers could use as talking points when advocating for agricultural education. She continued: "We do not know what's going on most of the time. By having up-to-date talking points, we can sell our programs better." On the other hand, Participant #98 revealed: "As a younger ag teacher, I do not really know how to even begin forming relationships with our legislature. Just having some tips on how to begin building those relationships would make a big difference." Finally, 37 teachers reported needing more knowledge and skills regarding communicating agricultural education's story better. Specifically, they desired new professional development opportunities that focused on the use of social media, writing for newspapers and print media, photography, and film editing. Consequently, the agricultural education teachers in this investigation desired to continue to nurture their advocacy abilities by pursuing additional support and resources. By helping teachers learn to amplify their voices and providing the public with insights into their experiences through additional training, perhaps a brighter future for agricultural education could be cultivated.

Conclusions, Discussion, Implications, and Recommendations

This investigation aimed to describe the role of opinion leadership on Louisiana teachers' intentions to advocate for agricultural education. As a result of this investigation, we concluded that the quantitative and qualitative data strands were largely complementary. For example, the qualitative data provided deeper insight into the trends reported in the quantitative strand. We conclude that the agricultural education teachers in Louisiana reported only a marginal level of opinion leadership. This sentiment does not appear to have been previously reported. Perhaps this was because Childers' (1986) opinion leadership scale required the teachers to self-report their perceived level of opinion leadership. As such, we recommend exploring alternative ways to measure this phenomenon that allow researchers to take into account whether others in an agricultural education teachers' social system view them as opinion leaders (Lazarsfeld et al., 1948). Perhaps such data could deepen our understanding of the role of opinion leaders in shaping the advocacy behaviors of agricultural education teachers.

Regarding their intentions to advocate for agricultural education, most teachers indicated they would be likelier to engage in *low-stakes advocacy* (Velasco et al., 2023), such as joining their professional organization, meeting with decision-makers, or attending FFA Day at the Capital rather than participating in advocacy efforts considered more professionally risky. This notion was corroborated through quantitative and qualitative data. Of note, the finding also appeared to support the work of Lamm et al. (2014), who found that opinion leaders in ANR were largely unwilling to take risks. Moving forward, we recommend that future research explore ways to encourage agricultural education teachers to engage in advocacy efforts that require more active engagement and buy-in from their followers to better champion issues affecting agricultural education. We also recommend that teacher educators consider including curricular content on practical approaches to advocate for agricultural education in their preservice coursework. These

opportunities could help future agricultural education teachers gain confidence in communicating agricultural education's story in powerful, far-reaching ways.

Because of the statistically significant and moderate negative relationship discovered between Louisiana agricultural education teachers' level of opinion leadership and their intentions, we concluded that opinion leaders in this investigation did not appear to overly engage in advocacy efforts for agricultural education. Such a notion has not been previously reported in the literature. Future research should seek to understand *why* opinion leaders do not appear inclined to engage in advocacy efforts. With this knowledge, perhaps changes can be made to ensure that opinion leaders in agricultural education become better prepared to influence change regarding institutional policy and practice, public attitudes and behaviors, political processes, and power imbalances for marginalized groups.

A key finding that emerged in the qualitative strand was how the agricultural education teachers advocated to and through their students. As such, we conclude that although many of the advocacy behaviors reported by agricultural education teachers were *low-stakes* in nature, they inspired more high-stakes advocacy behavior from their students. In particular, the teachers reported that their students had used petitions and canvased their communities to advocate for additional resources for agricultural education programs. Such a finding does not appear to have been previously addressed in the literature on agricultural education. Therefore, we recommend follow-up studies to investigate the varied and complex ways that agricultural education teachers can inspire their students to take action and champion issues in agricultural education and the agricultural industry more broadly. We also conclude that the agricultural education teachers in this investigation recognized they exhibited a deficiency in advocacy knowledge and skills. As such, the teachers desired more insight into how to effectively advocate for agriculture education better through professional development. This finding was surprising, considering the vast number of needs assessments conducted in agricultural education across various states that have not reported such a need. In response, we recommend that researchers and practitioners who aim to conduct needs assessments in the future consider adding items specifically related to advocating for agricultural education. We also recommend that state agricultural education leaders and teacher educators create professional development opportunities focused on improving agricultural education teachers' ability to advocate for their profession.

In agricultural education, advocacy efforts have become more critical in recent years because less than 2% of the U.S. population is now directly involved in agriculture (American Farm Bureau Federation, 2018). As a result, U.S. citizens are now less likely to support programs and policies that affect agricultural education (Kovar & Ball, 2013). Through advocacy, agricultural educators can seek to change attitudes, behaviors, the political process, and power imbalances in a variety of contexts (National Association of Agricultural Education [NAAE], 2020). Achieving this, however, requires that educators embrace advocacy as a professional responsibility and become *opinion leaders* for their profession (LeJeune et al., 2020). Going forward, we call for greater emphasis to be placed on helping teachers learn how to tell the story of agricultural education in ways that motivate decision-makers to become allies for the profession. Further, additional research should also be conducted to examine how secondary agricultural education teachers can become opinion leaders in their profession by better communicating their job roles and responsibilities to decision-makers at the local, state, and national levels.

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A Phenomenological Study of How Leaders Influenced the Career Choice of Pre-service Agricultural Education Teachers

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Abstract

This phenomenological study explored the career selection process of agricultural education pre-service teachers from Texas Tech University. These students were purposefully selected to participate in this study based on their major and plans to become school-based agricultural education teachers. The study used a qualitative research design, adopting a postmodern humanistic paradigm and a phenomenological approach to explore the impact of certain leaders which influenced the thirteen students' choice to become agricultural educators. Data for this study were collected using semi-structured interviews and observations. Thematic analysis of respondent interviews resulted in three compelling themes: (1) schooling experience as a catalyst to create teachers; (2) intrinsic motivation and intent to teach; and (3) perceived limitations of the teaching profession. However, an overarching theme emerged upon analysis of the data. All respondents reported the influence of leaders on career choice. Overall, the results of the study support transformational leadership as a catalyst for change.

Introduction

Agricultural education has played a significant role in the history of the United States. George Washington, in his 1796 State of the Union Address, recognized the importance of agriculture in promoting individual and national welfare (Washington, 2022). Fitch and Fugate (2015, p.4) state, "the Morrill Act of 1862 provided funding for institutions to teach agriculture, mechanical arts, and military tactics." This funding was a turning point for agricultural education in America, as it allowed for the creation of land-grant universities that taught practical skills in addition to academic subjects. As a result, these universities were able to "produce farmers who were technically competent, who understood the scientific principles that underlay their work, and who were capable of making sound business decisions" (Murphy, 2005, p.21). In summary, federal monies were provided to initiate these hands-on-learning programs nationwide and propelled this new way of teaching and learning into the next century.

The fathers of experiential learning, Dewey and Piaget theorize, learning is a continuous process by which experiences are fundamental to education and adult development. According to Dewey (1933), experiential learning is a process of active inquiry where individuals engage in hands-on experiences and reflect on those experiences to develop new understanding. Experiential learning allows students to interact with each other in an authentic environment, resulting in acquired knowledge (Bell et al., 2013). In their study, the authors explored how pre-service science teachers used technology aligned with situated learning to support reform-based science instruction. Bell et al. (2013) supported the idea that pre-service teachers were able to transfer what they learned through their situated learning experience into their classrooms. Participants in their study reported that modeling (the learning-by-doing method) was a factor that encouraged their use of technology (Bell et al., 2013). Learning by doing has been shown to have impactful results on learning, from birth through high school, demonstrating the importance

of continuing the methodology through university settings (Tulbure & Orboi, 2014). This applies to teacher preparation programs such as Agricultural Education (Bell et al., 2013; Chan, 2012).

Pre-service teachers are internally motivated to teach; however, extrinsic factors, such as salary, benefits, and long work hours, prevent many from entering the profession (Eck & Edwards, 2019; Park & Rudd, 2005; Smith et al., 2017). Eck and Edwards (2019) confirmed that only 50-60% of agricultural education graduates choose to teach, suggesting additional research is needed to determine the course of action. A general education study is in contrast to the overall number of newly certified teacher candidates entering their professions upon graduating at 75-90% (Sutcher et al., 2016). Hanna and Pennington (2015) analyzed three current data sets from the Department of Education and their results yielded a contradiction to the common narrative. Hanna and Pennington (2015) additionally determined that half of teachers at the beginning of their career leave the profession by their fifth year, and 70% of new teachers stay longer than five years.

Student teaching while obtaining a teaching degree is designed, in part, to give the individual an opportunity to experience a live classroom setting. As such, it is understandable that some educators choose to pursue an alternative career after receiving the opportunity to become the primary teacher in a permanent position. Employing encouraging attitudes and behaviors could help recruit new teachers to the profession (Park & Rudd, 2005). Garton and Cartmell (1999) looked at career choices and the factors that influence career change in agricultural education majors. Their study suggests that “Teacher educators need to understand why graduates leave their careers or why they never enter the profession" (Garton & Cartmell, 1999, p. 294). Due to agricultural science teachers being widely recognized as the frontline for creating an agricultural-literate citizenry and educating future agricultural industry professionals, recruiting and retaining new teachers must be a priority (Eck & Edwards, 2019). Stakeholders must engage in ongoing research to determine the best course of action to meet nationwide demands (Smith et al., 2017).

A teacher's motivation to teach is a complex and multifaceted issue that has been studied extensively in the context of education in the United States. One important motivator for many teachers is a desire to make a positive impact on the lives of young people. According to Darling-Hammond and Sykes (2016), many teachers are motivated by a sense of purpose and the opportunity to inspire and shape the future of their students. This is particularly true for teachers who work in high-poverty or low-performing schools, where the potential to make a difference is often greater. Another important motivator for teachers is a passion for their subject area or content area expertise. Many teachers are drawn to the profession because they have a love for a particular subject and want to share that passion with others. Teachers of specialized subjects like science, technology, engineering, and math (STEM) or the arts are often included in the shortage of qualified teachers. Many teachers are motivated by a desire for autonomy and the ability to have a positive impact on their school or community. According to the National Education Association (2018), teachers who feel empowered and valued are more likely to be satisfied with their jobs and stay in the profession long-term.

Agricultural education teachers are a unique group of educators with specialized training in agricultural science and technology. Their motivation to teach is influenced by a variety of intrinsic and extrinsic factors, many of which are specific to the field of agriculture. One important motivator for agricultural education teachers is a desire to prepare students for careers

in the agricultural industry. According to a study by Knobloch and Whittington (2002), many agricultural education teachers see their role as preparing students to become productive members of the agricultural workforce. Another important motivator for agricultural education teachers is a passion for agriculture and the natural world. According to a study by Baker and Stedman (2014), many agricultural education teachers are drawn to the field because they have a love for the outdoors and a desire to share their passion for nature with others. This is reflected in the curriculum and pedagogy of many agricultural education programs, which often emphasize hands-on learning and real-world experiences. Additionally, agricultural education teachers are often involved in research and extension activities, which allow them to stay up to date on the latest advances in agricultural science and technology and to share this knowledge with their students.

Theoretical and Conceptual Framework

The frameworks that served as a foundation included Ajzen's theory of planned behavior (1991) and Atkinson's expectancy-value theory (1957). According to Ajzen's theory of planned behavior (TPB), human behavior is guided by three factors: attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). The first factor is an individual's attitude toward the behavior, which is determined by their beliefs about the behavior's outcome. The second factor is subjective norms, which are the perceived social pressures to perform or not perform the behavior. The third and final factor is perceived behavioral control, which is an individual's perceived ability to perform the behavior. Perceived behavioral control can be enhanced through interventions that provide individuals with the skills and resources they need to perform the behavior (Ajzen, 2006). Atkinson's Expectancy Value Theory (EVT) is a motivation theory that explains how individuals make decisions and take actions based on their perceptions of the value of the outcomes and their expectations of achieving those outcomes (Atkinson, 1957). According to Atkinson, an individual's motivation is influenced by two main factors: the value of the outcome and the expectancy of achieving it. The first factor is the value of the outcome, which refers to an individual's perception of the desirability or importance of the outcome. The second factor is the expectancy of achieving the outcome. While these two theories differ in their focus, they have been combined to create a more comprehensive conceptual framework that can be applied in various educational settings, including agricultural education. In agricultural education, a conceptual framework combining TPB and EVT is particularly useful because it takes into account both the cognitive and affective factors which influence behavior as well as situational factors which may be unique to a particular context.

Purpose and Objectives

The purpose of this study was to explore the career selection process within a cohort of agricultural education pre-service teachers from Texas Tech University. The study used a qualitative research design, adopting a postmodern humanistic paradigm and a phenomenological approach to explore the lived experiences, behaviors, motivations, and the impact of others that influenced students' choice to become agricultural educators. This study was driven by four primary research questions.

1. How do the experiences of emerging adults influence their career choice?
2. What factors impact career choices of pre-services teachers in agricultural education?
3. What motivates their decision to pursue a career in agricultural education?
4. What are the perceived challenges of becoming an agricultural education teacher?

Methodology

The study used phenomenological qualitative research. The overarching focus of this study was to distill the unique perspectives of study participants on the phenomenon of career decision making into a depiction of its universal essence (Creswell & Poth, 2018; Van Manen, 1990). According to Lester (1999), phenomenology involves gathering information and perceptions through inductive, qualitative methods such as interviews, discussions and participant observation, and representing it from the perspective of the research participant. To fully explain the phenomenon of career choice, as the primary researcher, researchers chose to conduct a qualitative study utilizing a phenomenological approach.

Participants

Thirteen agricultural education (AGED) students, referred to hereafter as pre-service teachers, were assigned pseudonyms after selected for the study. These students were purposefully selected due to their major, certification, and future plans to be agriculture educators. One student was a first-year master's student, and another was seeking certification just after receiving their bachelor's degree. Participants represented two different states, Texas, and California, and attended high school of varying sizes. The study adopted a semi-structured interview approach which guides respondents with pre-determined questions but also allows respondents (pre-service teachers) the platform to provide detailed perspectives on their motivation toward embracing and assuming teaching roles in agricultural education.

Data Collection and Analysis

Researchers followed Moustakas (1994) and Dukes (1984) as the models, using the suggested instructions for gathering data and for putting together textual and conceptual descriptions. Personal viewpoints were bracketed out (Moustakas, 1994). Data for this study was collected using semi-structured interviews and observations. The data from the interviews were used to validate the observation, and the observation was only carried out during the interviews themselves. Field notes were taken on a laptop and participant behaviors and facial expressions were documented. Researchers utilized a pre-existing quantitative instrument known as the AGED Fit Choice survey (Lawver, 2009) as a means of information that helped construct the interview guide. An expert panel reviewed and provided feedback for the proposed interview guide. Participants received an email requesting their permission to participate in the interviews and were given the opportunity to select a time for the one-on-one semi-structured interviews. The interviews were recorded and transcribed using the Otter AI software (Beckman et al., 2021). Pseudonyms were assigned to the recorded interviews to safeguard participant identities, with aliases randomly chosen from characters in the movie "Top Gun." A debriefing session was conducted during and after each interview, allowing participants to ask questions, provide additional information, or make suggestions, thereby fostering a stronger researcher-participant relationship (Creswell & Poth, 2018).

The data was reviewed multiple times for identification of emerging themes and patterns. To discover the core meaning and themes within the interview data, the thematic analytic framework proposed by Braun and Clarke (2006) was utilized. Thematic coding, a method commonly used in qualitative research, was used to identify and analyze patterns, themes, or concepts within the dataset (Patton, 2002; Saldana, 2015). The coding process involved systematically assigning codes or labels to segments of the data that represented similar concepts

or themes. This coding process was applied within each episode to ensure a comprehensive analysis of participants' experiences. Thematic analysis allowed for the reduction of the large dataset into smaller, more meaningful themes, increased the rigor of the study through its transparent structure, and facilitated both deductive and inductive coding procedures. Episode profiling was used as a coding technique as described by Ratner (2002).

Inductive coding (Saldana, 2015) was utilized without a pre-existing codebook or set of themes. All codes were developed based on the data provided in the interview transcripts, rather than relying on pre-existing theories or categories. This inductive coding approach enabled the capture of novel findings that were not initially anticipated, provided flexibility during the coding process by not adhering to a specific theoretical framework, and enhanced the validity and transparency of the study findings by minimizing biases and assumptions. Given the exploratory nature of the research questions, inductive coding was suitable for capturing the complexity of the analyzed data.

A two-cycle inductive coding approach was employed, consisting of descriptive coding and emotion coding in the first cycle, and focused coding in the second cycle (Saldana, 2015). Initially, a set of codes was developed by dividing the interview data into episodes. Descriptive coding involved deriving codes that described or illustrated the ideas within each sentence or group of sentences. Line-by-line coding was not performed as some responses were better explained over multiple sentences. To complement descriptive coding, an emotion coding method (Charmaz, 2006) was used. While there were 53 generated themes, the audio recorded the observed emotions at various stages of the interview. These emotions provided insights into the participants' subjective experiences and their relation to different sections of the research (Saldana, 2015). Following initial coding, focused or selective coding was employed to categorize the coded data based on categorical and conceptual similarities. Focused coding is suitable for developing broad categories, themes, or concepts from the data and is applicable to almost all qualitative studies (Dey, 1999). Codes that were very similar were grouped together and assigned an overarching description to further explain the codes. Additionally, categories were combined if they shared a description that could further enhance their understanding. After several iterations, three major themes were developed, representing the ideas and perspectives of the participants. To add rigor to the study, opinions of an expert panel reviewed and provided feedback of the proposed interview guide. The method of triangulation proposed by Denzin (1970, p. 301) was utilized for this study. Researchers used two different methods of data collection: interviews and observations. The non-textual aspects of the interview were informed by the unstructured observations, which provided an evocative layer of depth to the interview's written data. As an additional measure to guarantee credibility, Baxter and Jack (2008) recommends telling a complete, rich, and detailed story that includes quotations from stakeholders, administrators, teachers, and students. Researchers prioritized transparency in the research process, providing a detailed description of the methodology, data collection process, and analysis in the final report.

Findings

Four significant themes surfaced in the analysis of the data collected from the interviews and field report of the potential agriculture teachers at focus in this study: *(1) Schooling*

experiences as a catalyst to create teachers; (2) Intrinsic motivation and intent to teach; (3) Limitations involved in the teaching profession; and (4) Influence of leaders on career choices.

Theme 1: Schooling Experiences as a Catalyst to Create Teachers

Existing research on teaching motivations has shown an occurring interrelationship between the experiences of the classroom environment and intent to teach (Borg & Falzon, 1989; Lynch, 2015; Martin, 2009; Bryan & Atwater, 2002). The respondents agree with this statement, as they detailed numerous positive and negative experiences with teachers, the curriculum, teaching methods, and other external aspects of their education that ultimately led them to choose teaching as their career. The positive circumstances drew them to wanting to become teachers and the unfavorable circumstances fostered a desire to improve upon their own education in order to make it more beneficial for future students', definitely, you know, my former Ag teachers, they played a big role in just forming who I am. Just overall positive, you know, they taught me really good life skills. And I knew I wanted to help other people. I just want to help others figure out who they are." Merlin explained how his teachers had an overall impact on him demonstrating how a good teacher can shape their students' minds and nudge them into a career in teaching. Many of the participants share very similar positive recollections of their relationship with their teachers. However, in the case of a few, bleak and obstructive familiarization with their teachers has governed their decisions. As Wolfman recounted: "My two Ag teachers in high school were awful! So, I was like, if he can teach ag and get away with it, then I could teach ag…" Wolfman's experiences highlight the impact that poor classroom teaching experiences can shape big decisions concerning taking on teaching roles. Furthermore, the participants also describe situations where relationships with their teachers or teaching figures outside the walls of the school have impacted their career choice. Goose's account displays this assertion perfectly, "My dad is an ag teacher. So, I grew up always thinking I would be an ag teacher... My dad was always at the shows with me, and I guess he would probably be the most influential person…" The impact of having a family member in the teaching profession can and how the impact that can have in motivating new teachers, but also the effect of teaching role models.

These students' response illustrated the significant importance of a teacher's attitude, positive demeanor, and method of instruction (i.e., hands on teaching styles) in inspiring them to pursue careers in agricultural education. For learning to occur, the content must match the environment, and once that happens, learners might be buoyed to continue to recreate this synergy (Kennedy, 2005). Emphasizing the effect of the learning environment, Goose shared: "...there were so many classes to choose from, because I went to a big school, and I feel like every single class was the same class. So, I obviously didn't learn anything in ag…." Goose's account exposes the dangers of a monotonous and repetitive classroom structure or modus operandi (Glenberg et al., 2004). As a result of the size of the school and by extension, a populated institution, we see a less intimate and individualized classroom environment. Instead, students were left to guide and support themselves. These choices played a critical part in Goose's decision as he claimed the bad environment, influence of his teachers, and significant influence of agriculture shaped his decision of wanting to become an ag teacher. On the other hand, another participant shows how an interactive classroom environment, endowed with plenty of agricultural related activities, geared them to continue in the academic route. Merlin notes: "...I spent $35 on a rabbit even though I didn't know anything about ag…I went to Houston, and

I made the sale and sold for $1,000... off of one rabbit that cost me $35! From there I bought a pig, lamb, and I got more involved in FFA. That experience with the rabbit made me get involved in the show team, LDE teams, and CDE teams." The participants show that a determining factor was their time spent in FFA. Connecting the practical knowledge garnered through FFA and the subject matter taught in schools, we see a realization of the intricacies and inner workings of an agricultural education program. External factors such as administrative duties, extra-curricular, and non- academic activities serve as cogs in the classroom interaction wheel (Kennedy, 2005). The curriculum also provided another reason for some of the pre-service teacher's affinity for teaching.

The lack of use of agricultural education curriculum is highlighted by Charlie and shows the pitfalls of only "teaching teams." Conversely, they saw a benefit of not strictly adhering to curriculum since agriculture is such a broad subject and allows for more fluidity in teaching. Charlie states: "Because truthfully, I guess I didn't realize all the curriculum aspects that went into teaching. I never ever imagined I would enjoy writing lesson plans, but I actually find writing curriculum to be enjoyable. I'm probably weird in that." We can deduce from Charlie's experience that students' predisposition to curriculum, whether positive or negative, is deterministic in their decision to teach. Curriculum has been a critical component to the modern schooling structure (Labaree, 2012; Kennedy, 2005).

Theme 2: Intrinsic Motivation and the Intent to Teach

One prominent barrier to achieving learning outcomes has been a lack of motivation on the part of the teacher (Dornyei, 2001; Elliot, 1999; Vansteenkiste et al., 2004). Intrinsic motivation is spurred by innate or inwardly factors, such as self-pride and sense of worth, while extrinsic motivation describes motivation spurred by reward or remuneration (Ryan & Deci, 2000; Vallerand & Ratelle, 2002). Intrinsic motivation involves engaging in a task or duty for the sake of personal fulfillment and inherent satisfaction as opposed to the pursuit of some external reward. In this section, motivation is not inspired by external factors, but instead is cultivated internally. The participants demonstrate in parts varying illustrations of having this kind of motivation and recall several intrinsic factors that have directed their choice of career (Reiss, 2012).

The opportunity to work with adolescents, the development of young minds, giving back to society, and assisting students who are disadvantaged are just a few examples of prominent innate reasons the respondents highlighted for becoming teachers. According to Ryan and Deci (2000), these motivators are considered to be aspects of education that possess the appeal of novelty, difficulty and challenge, or aesthetic/ethic value. Participants expressed excitement about working with kids of all ages, though some had a preference for high schoolers and others for younger students. This was a common denominator amongst every participant and demonstrated the need for being caring and empathetic toward children in classroom facilitation. When asked if they wanted to work with children, Cougar shared: "Yeah…I like working with children…I worked for a daycare and I absolutely loved it..." This opinion is resounded by Maverick's response: "Definitely, I think that's really why I'm wanting to teach..."

There was a common goal for all the pre-service teachers to help develop their students to become better individuals and thrive in their environment. However, their reasons for adopting

such ideology differed between participants. With some of the participants their early involvement in teaching at non-academic settings played a part in this, while the others were based purely on giving back. Charlie discussed the involvement in coaching and how it prepared them for a role as an agricultural education teacher: "...During my undergrad, I was involved in coaching the wool judging team and I had been doing so for five years. So, seeing a lot of kids through it, I realized I had underestimated my desire to teach..."

These experiences, whether in the daycare or as a judging coach demonstrate past successes or interaction with children can act as precursors for newer roles in education. However, other participants gave reasons which go deeper into development and creating a better generation of young individuals. Hangman describes this perfectly: "I think they are our future. So, I think it's important they have a good education and understanding of what our industry does and like how important it is and I want them to be excited to be industry leaders or inventors!" Merlin explains in detail why teaching is important: "I saw the opportunities my ag teachers gave to me, and I sort of wanted to give back…" Slider tells a similar experience, but with an emphasis on how agriculture can help America's youth become its leaders of the future: "Yes, it is. I think it is important to shape the minds of, you know, adolescents and people of age just because they're going to be the future of agriculture... One day, going forward and you know, they need a basis of understanding of how everything works." Jester adopts an optimistic stance and hopes to make an impact on their students no matter what they go on to do with their lives, even if it seems unlikely the next president of the United States or the discovery of a cure for cancer will come from their class. Charlie and Iceman, on the other hand, do not see teaching as purely giving back. Charlie illustrated: "I don't know if I view it so much is giving back. It's hard for me to see I impacted them as much as they impact me..." Charlie is of the opinion that teaching does not completely involve giving back because the instructor also benefits from the interaction with the students. Iceman shared: "I haven't really thought about teaching as giving back to society. I wasn't great whenever I was showing in high school, so I mean… I can make makeup from my past mistakes." Although similar to the viewpoint of Charlie, Iceman desires to use teaching as an avenue to amends and reparation for past errors, in hopes of making a new and bright future.

The participants viewed the opportunity to help and support people who come from less fortunate and disadvantaged backgrounds as another reason to pursue a career in teaching. Jester recalled: "...One of my sisters is actually a teacher and she teaches at a low socio-economic school with a high minority rate. And so, a lot of her students don't have the same opportunities our high achieving students are going to have… I think it's super important, and it's really something I want to carry over into my classroom one day..." Maverick shares the same sentiment albeit with a separate caveat for how these opportunities will help their students. They discussed: "Well, I think it opens up a door of many possibilities for them because I see a lot in my hometown there are all the kids who didn't have anything to do after high school…if college isn't for you after high school, look at all these other routes, you can go, within agriculture, because there's so many things they can do." Maverick sees helping their community in a different light. The participant is emboldened by the possibility of helping underprivileged students get exposed to the many job opportunities available outside of their purview. Finally, some respondents brought up the declining state of agriculture. They were determined to get things moving in the right direction and believed action and new initiatives were both necessary in the agricultural sector. Hollywood was one of the participants with this viewpoint, they

responded: “I feel like agricultural [literacy] is kind of dying in a sense. Especially with everything going on in the world right now…I think an ag class should be a core class at every high school.”

In this theme, the emphasis was placed on the significance of motivation in the classroom for the purposes of effective teaching, productive learning, and bolstering the intention to become teachers in the future. The people who took part in the research project exhibited a wide range of examples of intrinsic motivation, and the factors which led them to adopt such a philosophy ranged widely. Some of the participants adopted such a philosophy as a result of previous achievements or experiences with children, while others did so with the intention of cultivating a superior generation of young people. In general, the participants felt there was a significant and consequential opportunity to give something back to the local community and the country.

Theme 3: Perceived Limitations of the Teaching Profession

Common responses from participants centered around their concerns with taking on teaching roles. These challenges included how they might address gaps in their agricultural experiences, developing expertise, their own skill development, and increasing their general knowledge of agriculture. Iceman stated: “So, my knowledge is limited there but I love the subjects and everything about them...” Iceman discussed their shortcomings and provided a bullish mentality on the potential of becoming an efficacious and productive teacher. In addition, the financial aspect of teaching in terms of funding, scholarship, and remuneration took center stage as many participants felt the investments made in education, mostly agricultural education, failed to meet the minimum required for effective execution. Merlin shared: “...obviously I'm not in it for the money. But you know, I also want to live a little and I know there's school districts out there that are gonna pay great but as a first year, non-master’s student, it's going to be a little tough...” According to Merlin, the pay and income made available for teachers, particularly those who do not have a graduate degree, do not fully recompense the amount of labor dispensed while they are on the job. Charlie agreed and recounted a conversation they had with a former teacher who shared: “Salary was his biggest thing. He said he’s just always said like, ‘I’m overworked, underpaid, and underappreciated.’ I think he actually has a t- shirt which says so.” The participants voiced their sentiments on the rigorous and cumbersome nature of teaching and how it could affect several facets of their lives. Hangman said: “I think the time frame, like the hours in traveling so much, is kind of iffy. So, I don't want my job to be a deciding factor for my life choices. And I feel like sometimes, ag teachers just fall into the routine and then they're not actually living life outside of their job…” Hangman is concerned their life will be guided by their job if they choose teaching agricultural education as a profession and feels teaching does not allow any room for self-expression.

The participants also discussed the possibility of burnout and being overworked. Jester added: “Burnout is very real. And I think especially in this career field, you can be overworked very quickly...” With the salary concerns and the probability of being overworked, teachers at bare minimum expect to be treated with respect and appreciation. Some participants raised their concerns and Cougar shared the story of a former teacher’s struggle: “[The teacher] gets to school Monday through Friday at six o'clock AM and some days we don't leave till eight nine o'clock just judging or practicing with teams. His principal walked in one day and was not happy

[the teacher] was not there during regular school hours that day…He was like, 'Oh, sorry, I was five minutes late because I had to go check on a sick pig and didn't even eat lunch. I was doing my job."

Negative experiences with administrators have reduced teacher enrollment and caused a number of very proficient and effective teachers to choose other careers, increasing attrition (Oke et al., 2016). In the end, the participants' optimistic outlook was based on the stability and ease of finding teaching positions. Goose, recognizing the constraints inherent to teaching, pointed out how the appearance of job stability and advancement opportunities can be tricky. Goose said: "I definitely feel like there's mobility anywhere. I think it's harder once you get selective of what area your salary is… So, I mean, once you start being really selective and picky on your needs, it definitely kind of cuts the doors that are open." Despite the obstacles, all of the participants reiterated their happiness with the decision to become teachers and looked forward to starting the new adventure. They saw teaching agricultural education as a valuable degree with extensive potential to bring out positive changes in society. Maverick shared: "I don't think I have any regrets. I do think it's valuable…" Maverick's comment summarizes the consensus held by the respondents. They believed in teaching and were very passionate about creating change. Jester showed this when he recalled: "I think it was just something I was passionate about. It's something I knew I would be good at..."

The theme explores the limitations individuals face when choosing a teaching profession. The findings indicate that participants are concerned about taking on teaching roles due to salary concerns, time and labor-intensive tasks, lack of connections, restricted and highly monitored activities, and poor public perception. Many participants believe that funding, scholarship, and remuneration are the main issues which prevent effective execution. Participants also discuss how teaching's rigors could impact their lives. Burnout, overwork, work-family balance, and respect from coworkers and management are among these concerns. Additionally, the responses show pre-service teachers are aware of the challenges that lie ahead. However, the supportive comments from the participants indicate that the majority of the pre-service teachers plan to enter the classroom and teach secondary agricultural education.

Theme 4: Influence of Leaders on Career Choices

Participants acknowledged that relating to people with influences inspire their decisions to see career opportunities, leadership and self-projections for the future through teaching and learning. This perspective was constant amongst the participants, and they showed a driven passion for what they cherished and shaped their perspectives based on this view. When asked about education through this view and how they chose their careers or developed values, Viper recalled: "My ag teacher was the one that kind of pushed me to be an ag teacher. I wasn't even supposed to go to college... Seeing how my ag teacher acted with everybody else and with me, it kind of inspired me to want to be that person for somebody else too." Merlin makes the point stating that, "My ag teachers played a big role in forming who I am as a person, just overall positive. They taught me really good life skills." Sharing similar views with Merlin, it is affirmed by Hollywood that the practices and behaviors shown by a person or group of people help exert a greater level of influence on others. Hence, developing personal values or modeling a character or behavior is dependent on the people around you, as it is remarked by Hollywood that his perception was shaped by his teacher, who emphasized the supremacy of morality as one of his

core values. Hollywood was impacted by his perception of his teacher, "He did it for moral wealth, not physical wealth. That stuck with me."

The entire concept of this research is encapsulated by role modeling, which is in line with encouraging the future potential of the teaching profession. The majority of respondents openly admit that the possibilities created to learn skills, develop values, and, most crucially, professional values, attracted them to teaching. The entire process is bolstered by character modeling and skill acquisition. This is echoed in Slider's assertion: Slider states, "I want to model myself after them [ag teachers]. They did a lot of project-based learning in class and that was very beneficial to us. We were able to work through problems and we're more engaged in our own learning. The viewpoint presented above is consistent with what Iceman also agreed upon by recounting how he developed a keen interest for teaching. He said: "My dad is a music teacher and impacted so many kids' lives. I'd like to be like him and help as many kids as I can," recounted Iceman. Sharing the same views as others on personal and social values and attraction to teaching and leadership based on respectable personal values and the complimentary social acceptance that comes with positive influence.

The theme examines how individuals are influenced when choosing a career or shaping their values. The findings indicate that participants are influenced by the personal, moral and social values of the people they looked up to in choosing a career like the teaching profession and in developing astute moral values. The findings further revealed that participants are attracted to the teaching profession based on personal value, social influence, moral rectitude, leadership capacity, role modeling, character development, and the creation of opportunities. Many participants shared the view that influencing and modeling are central to engendering interests and positive values. The participants also stressed how moral rectitude and exceptional skills impact social influence and acceptance of the teaching profession. Role models were found to possibly add qualified teachers to assuage the demands of the near future by creating avenues for young people to develop agricultural knowledge skills and enhance their leadership capacity skills and efficiency.

Discussion and Conclusion

Leaders can play a significant role in influencing the career choices of agricultural education teachers. Leaders can inspire and ensure that there is a strong supply of qualified teachers to meet the demands of coming generations by creating opportunities to acquire skills and experience in agriculture to improve their societies and leadership abilities. Participants acknowledged that relating to people with influences inspire their decisions to see career opportunities, leadership, and self-projections for the future through both teaching and learning. This perspective was constant amongst the participants, and they showed a driven passion for what they cherished and shaped their perspectives based on this view. Shaping informed decisions about life on the maximization of opportunities and acquisition of skills, the influence and impact of looking up to a person, as pointed out by Charlie, is sustained in the view of Marlin, who believed that “the development of values, choosing a career, acquiring skills, and maximizing opportunities are determined by the influence of people around a person” and particularly their concerted “efforts to impact” or inculcate knowledge, skills and values in the person. Sharing similar views with Merlin, it is affirmed by Hollywood that the practices and behaviors shown by a person or group of people help exert a greater level of influence on others.

Hence, developing personal values or modeling a character or behavior is dependent on the people around you, as it is remarked by Hollywood that his perception was shaped by his teacher, who emphasized the supremacy of morality as one of his core values.

The majority of respondents openly admit that the possibilities created to learn skills, develop values, and, most crucially, professional values, attracted them to teaching. The entire process is bolstered by character modeling and skill acquisition. This connects to the ideas that transformational leaders have a direct influence on the career paths and motivations for pre-service educators to become agricultural educators. Transformational leadership is the process of encouraging and inspiring others to create meaningful changing in an organization (Burns, 2003), or in this case, a profession. This framework focuses on motivation, collaboration, individual values, and serving as a positive and influential authority figure (Burns, 2003).

Sharing the same views as others on personal and social values and attraction to teaching and leadership based on respectable personal values and the complimentary social acceptance that comes with positive influence, Goose shared how his parents' values and the complimentary societal values influenced him. The theme examines how individuals are influenced when choosing a career or shaping their values. The findings indicate that participants are influenced by the personal, moral and social values of the people they looked up to in choosing a career like the teaching profession and in developing astute moral values. The findings further revealed that participants are attracted to the teaching profession based on personal value, social influence, moral rectitude, leadership capacity, role modeling, character development, and the creation of opportunities. Many participants shared the view that influencing and modeling are central to engendering interests and positive values. The participants also stressed how moral rectitude and exceptional skills impact social influence and acceptance of the teaching profession. The response of the participants showed that leaders or role models can have a big impact on pre-service agriculture education teacher's career decisions. Role models can ensure a robust and active pool of qualified teachers for the future by creating opportunities for youth to develop agricultural knowledge, leadership skills, and efficiency.

Recommendations

Teacher educators should undergo leadership training themselves to better prepare future SBAE teachers to become leaders that can influence others. Agricultural education programs should implement the inclusion of leadership courses and training for pre-service teachers. The findings of this study demonstrate that all thirteen respondents had a transformational leadership experience with a teacher that helped determine their choice to become teachers. Offering formal training for future educators could provide the necessary tools to allow future educators to better understand leadership for inclusion into their curricular and co-curricular programming. This could impact teacher recruitment for an industry with declining numbers. Lastly, the findings of this study support the recommendation to offer continuing education and professional development, specifically focused on leadership, to provide the tools needed for an existing SBAE teacher to become a more effective educator. Combining the results of this research with those of other studies that have focused on the factors which inspire students to become teachers would allow for a more thorough quantitative exploration of the importance of each of these factors.

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"When I feel good, I'm almost pleasant to be around?"
A Case Study of SBAE Teacher Wellness

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Wellness, a concept existing for centuries, has diverse practices across cultures, often characterized by holistic, multidimensional, and integrated elements. The aim of this study was to understand how SBAE teachers conceptualize and manifest wellness in their lives through their lived experiences. A part of a larger explanatory mixed-method sequential design, this research focuses primarily on the qualitative methods and findings. Our qualitative study design identified participants through extreme scores on a quantitative wellness assessment. Nine teachers who participate created their own models of wellness in addition to explaining these conceptualizations through their day-to-day experiences. Findings highlight nine different "elements" of wellness and the various ways in which these elements react together. This study concludes with a proposed model of holistic wellness based on participant conceptualizations and experiences. Recommendations include further research to continue exploring how teachers live "well", while practical recommendations include using the proposed model to engage teachers in discussion about their wellness.

Introduction/Theoretical Framework

While the concept of wellness in Western medicine has existed for over half a century, there is no grand consensus on how it is defined or modeled. Despite this, some essential clarifications have been generally agreed upon by most wellness experts. These include that in addition to being multidimensional, wellness should be considered as a continuum, not necessarily as an ideal end state (Roscoe, 2009). Expanding on this idea of a continuum, Granello (2013) describes wellness as a paradigm where we seek wellness through positive salutogens. This wellness paradigm sits opposite an illness paradigm. This paradigm, perpetuated through the United States healthcare system, consists of avoiding pathogens that cause sickness (Travis & Ryan, 2004). This paradigm follows a deficit approach, leading most health and well-being research to follow (Gable & Haidt, 2005). However, evidence suggests asset-based approaches could significantly increase initiating individual health behavior change (Moore & Charvat, 2007), so an approach such as wellness allows us to build upon knowledge of SBAE teachers' resilience and strength.

While a paradigm of wellness may seem simple to apply, this is far from the case. Within the literature there are many varying working models of wellness, with some suggesting this variety demonstrates a need for a current and comprehensive definition of the term (Terry, 2020). Some models published in academic journals consist of up to 8 dimensions, with most representing the *social*, *physical*, and *intellectual* parts of the individual. In addition to these popular dimensions, others such as *psychological*, *occupational*, and *environmental* appear less frequently (Adams et al., 1997; Granello, 2013; Hettler, 1980; Myers et al., 1998; Roscoe, 2009).

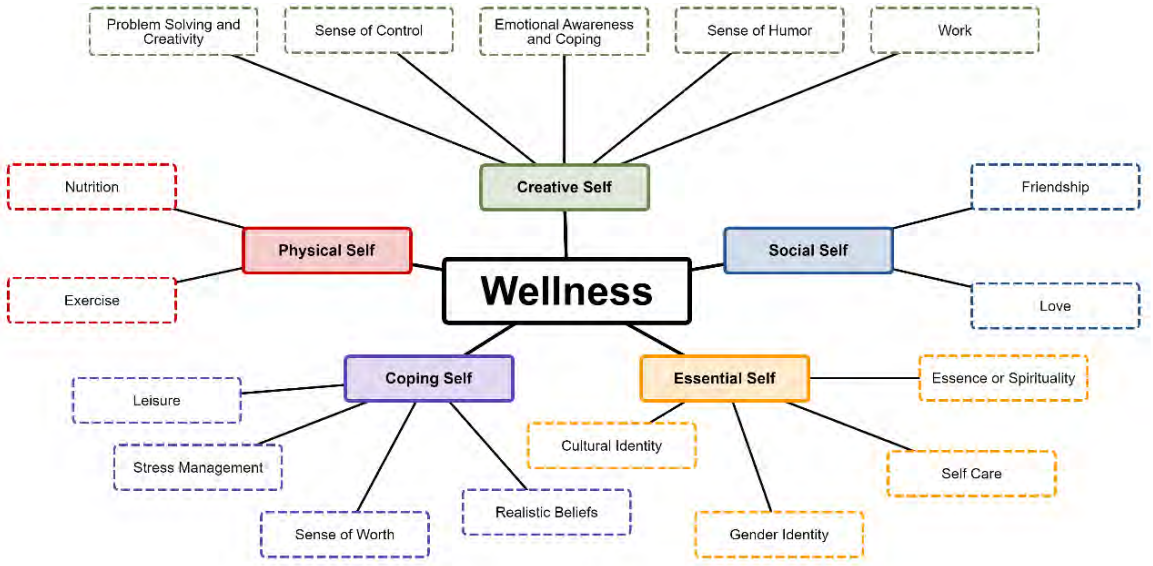
Within this range of theoretical models, we begin to see a dichotomy of theoretical bases emerge. The first being those that tend toward hedonic measures (subjective, i.e., happiness), with the other leaning toward eudaimonic measures (objective, i.e., the process of living well) (Ryan et

al., 2008). Hedonic measures of wellness tend to be smaller, focusing on happiness while eudaimonia measures tend to have many items to correspond with a variety of individual wellness dimensions (Kashdan et al., 2008). Some researchers feel both types of measures are simply different sides to the same coin (Kashdan et al., 2008) while others are less convinced, pointing to examples where a grieving spouse, while showing eudaimonic signs of wellness, would score low on a hedonic measure (Ryan et al., 2008). Ultimately, we agree with a need for a eudaimonic understanding of wellness, following the definition of Wellness proposed by Myers and colleagues (2000): "a way of life oriented toward optimal health and well-being in which body, mind, and spirit are integrated" (p. 252).

Theoretical Framework: The Indivisible Self

When examining eudaimonic models of wellness, the "The Indivisible Self" (Sweeney & Witmer, 1991; Witmer & Sweeney, 1992) stands out as one of the most empirically tested, edited, and retested models pertaining to wellness (Granello, 2013; Roscoe, 2009). This model arose from a factor analysis (Hattie et al., 2004) with data collected over multiple studies, and can be found recreated in Figure 1. Overall, The Indivisible Self consists of 17 third-order factors that average into five second order "domains" of wellness. These domains each represent a different "Self" that can be identified within personal wellness: Physical, Social, Creative, Coping, and Essential. Ultimately, these five domains work together to determine a person's level of Overall Wellness.

Figure 1. The Indivisible Self: An evidence-based model of wellness. (Myers & Sweeney, 2014)



Purpose and Objective

The purpose of this study was to determine how SBAE teachers conceptualize wellness, and to illustrate these conceptualizations through teachers' lives. This research details findings from a larger study designed using a mixed-methods (quan → QUAL) sequential explanatory approach.

The larger study was designed to address the following objectives, but this paper focuses primarily on the second.

1) Describe the wellness of Ohio SBAE teachers. (quan)
2) **Describe how Ohio SBAE teachers conceptualize personal wellness. (QUAL)**
3) Explain the variation of Ohio SBAE teacher wellness through the context of SBAE teachers' lived experiences. (Convergent)

Review of Literature

Teacher Health and Wellbeing

While wellness as a concept has not been explored much in the literature, many negative health outcomes associated with teaching have been. Of note, teachers in particular have been identified as a population with higher rates of mental illness (anxiety, depression, and sleep disorders) and nonspecific health complaints when compared to the general public in Germany (Scheuch et al., 2015), Egypt (Desouky & Allam, 2017), and the U.S. (Kush et al., 2022; Steiner & Woo, 2021). Of note, Steiner and Woo indicate the COVID-19 pandemic may have been the primary reason almost one in every four teachers to leave their jobs by the end of the 2020-2021 school year, while Kush and colleagues found that teachers had the highest rates of adverse mental health outcomes amid the COVID-19 pandemic when compared to healthcare and office workers.

While there are many external variables connected with teacher health and stress, research has indicated that the early years of a teacher's career can be pivotal in their decision to stay in the profession (Borman & Dowling, 2017). While these early years are pivotal, a variety of constructs have been linked to teacher stress and attrition as well. For instance, Wang and colleagues (2015) suggested the more a teacher noted sources of stress coming from *inside themselves* that weren't health related – otherwise known as internality – predicted more illness symptoms. This was in addition to a finding of when teachers scored higher in measures of personal control and teaching self-efficacy, this could predict lower levels of emotional exhaustion and illness symptoms in addition to higher job satisfaction. This idea was similarly supported by Caprara and associates (2006) when they provided evidence that teacher self-efficacy positively influenced job satisfaction and future achievement.

SBAE Teacher Health

While more research is needed to determine the full range of reasons why someone might leave the classroom, teacher mental health continues to be a major obstacle in ensuring our SBAE programs are equipped with competent teachers. As new SBAE teachers enter the classroom, they can find themselves with a lack of work-life balance, potentially leading to an "eclipse" of social lives by their work responsibilities (Traini et al., 2020). While this balance isn't analogous to wellness, it is the practice of balancing work and life in order to achieve harmony between your spiritual, physical, and emotional health (Simmons, 2012). Because a lack of work-life balance has been cited as a reason for leaving the SBAE classroom (Solomonson et al., 2018), it's important to determine exactly what we know about SBAE teachers' physical health.

Examining the literature related to physical health with SBAE teachers leads us to find a sparse variety of studies that seek to examine specific health variables. For instance, Westrom and Lee

broke into this topic with a paper whose findings alerted significant relationships between work responsibilities and negative teacher health outcomes (1990). Shortly after, Woodford and colleagues examined practices relating to safety equipment and their relationship with hearing loss and conservation practices. Interestingly, this work has taken back up through recent studies examining Secondary Traumatic Stress (Schmidt et al., 2022) and impacts of a work-life balance intervention geared toward SBAE teachers (Guffey & Young, 2020).

While deficit approaches have dominated the landscape of health research (Gable & Haidt, 2005), evidence suggests that asset-based approaches to health and health behavior management could significantly increase positive outcomes (Meyers et al., 2011; Moore, 2007). Within the counseling world, wellness' lack of a universal definition has led to a wide variety of wellness models utilized by counselors to guide client conversations (Roscoe, 2008). As we continue the conversation of improving SBAE teacher health and wellbeing, asset-based approaches such as wellness have been missing from the conversation. This research seeks to fill this gap by describing how our teachers perceive wellness and its impact on their lives.

Methods

Sample

After Ohio SBAE teachers were given the opportunity to complete an instrument based off of the Indivisible Self, Ten Ohio SBAE teachers with extreme wellness scores (either highest or lowest) were invited to participate in semi-structured interviews, of which all but one agreed to participate. Interviewees were selected from a list of participants in the quantitative study who indicated "yes" to being invited to be interviewed. The ultimate goal was to collect at least two participant perspectives for each dimension of wellness, with an overall goal of 10 interviewees. Invited interviewees and associated information can be found summarized in Table 1.

Table 1. Participants sampled for qualitative data collection.

						Sampling Scheme						
Pseudonym	Gender	Age	Years Teaching	Parent/ Guardian	Certification	Creative	Coping	Social	Essential	Physical	Contextual	Overall
Bill	M	60s	9+	Ye	Alt		ʍ	ʍ	ʍ	ʍ		ʍ
Carys†	F	20s	1-3		Traditional			ʍ			ʍ	
Charlie	M	20s						ʍ	Ω			
Ellie	F	20s				ʍ		ʍ				
Emerald	F	20s				Ω						Ω
Frank	M	40s	9+	No				ʍ		ʍ		ʍ
Nick	M	20s	1-3				Ω	Ω				
Riley	F	30s	9+				Ω				Ω	Ω
Sylvie*	F	20s	1-3							Ω		
Tori†	F	20s						ʍ				

Note. † = *nonrespondent*; * = *did not respond to interview request*; ʍ = *high*; Ω = *low*

This case-selection variant approach to purposive sampling is common practice, often used to "purposefully select the best participants" (Creswell & Plano Clark, 2018, p. 82). Particularly, this strategy was chosen for its effectiveness in increasing variation between cases (Teddlie & Yu, 2007). When describing the interviewees, an average participant in this strand of data collection is a 31-year-old (M = 31.4, SD = 13.8), female (n = 6, 60%) who had taught for 7 years (M = 7.2, SD = 8.69). In addition, interviewees were overwhelmingly white (n = 10, 100%), were not acting as a parent or guardian of a minor under 18 (n = 8, 80%), was traditionally certified to teach SBAE (n = 9, 90%), and had entered the classroom for their first career (n = 8, 80%). While all other collected demographic variables were examined for potential missing perspectives, they are not reported in this manuscript unless they were important to understand the participants in their context of the qualitative findings. This approach was taken as an effort to maintain the anonymity of the participants and to prevent participant re-identification.

Data Collection

Overall, qualitative interviews were designed to identify particularistic (the situation at hand) and heuristic (personal understanding) factors participants identified as related to their own understandings of wellness (Yazan, 2015). In the exploration of the deeply personal topic of wellness, qualitative data was exclusively gathered through one-on-one interviews. This method aimed to preserve privacy and mitigate social desirability bias risks associated with peers overhearing discussions (Hamilton & Finley, 2019; Kaplowitz, 2000). Despite the option for in-person interviews, participants unanimously chose Zoom sessions, considering factors such as distance and COVID-19 precautions. To uphold precision, all interviews were recorded and transcribed.

The interview process initiated with an activity prompting participants to craft a visual model of their wellness conceptualization using a provided handout. This handout included a fundamental definition of wellness—acknowledged as multidimensional, holistic, and integrated. Participants were encouraged to go beyond a predefined list of wellness dimension labels, fostering a detailed and personalized expression of their thoughts. After a thorough walkthrough of the handout, participants were invited to ask questions. Following this, they created their wellness models, termed here as Conceptual Diagrams (CDs). Subsequently, participants detailed and explained their CDs to the interviewer, who posed follow-up questions for clarity.

Upon concluding discussions about participant CDs, an additional interview component was introduced. This involved a handout featuring a recreation of pertinent tables and figures illustrating The Indivisible Self (see Figure 1). Participants were prompted to share their initial impressions of the 5F-Wel model before the interviewer shared which factor they were an extreme scorer. Participants subsequently shared their thoughts on their personal wellness scores, with prompts to provide details of their lives and experiences when necessary.

Overall, data sources utilized in the qualitative research strand included participant generated data sources such as participant 5F-Wel scores, conceptual diagrams, and interview answers. In addition to these data sources, interviewer generated field notes were used to triangulate findings.

Data Analysis

When interviews were completed, recordings were transcribed, read, coded, and analyzed using the constant-comparative method to identify and describe any themes that arose from the data (Glaser, 1965). Codes and subsequent themes were peer-checked multiple times through the analysis in an effort to maintain validity of the findings. These codes were primarily identified through structural coding, identifying participant quotes of interest to further collect into like groups (Saldana, 2016). At the conclusion of the structural coding, a second round of pattern coding was used to identify major themes that arose from the data (Miles et al., 2013).

Codes that arose from the qualitative data collected within participant CDs, interviews, and follow-up discussions were used in both inductive and deductive analyses. Inductive analyses occurred first, with the goal being to identify and model the factors that participants associate with their own holistic conceptualizations of wellness, and to determine any trends or themes across participants. Deductive analyses occurred next, drawing connections between participants, and seeking to identify the role of wellness within SBAE teacher lives.

Validity and Reliability

Assessing validity and reliability of this qualitative case study followed Merriam's (1998) recommendations. To enhance internal validity, tactics used included those of triangulation, peer examination, and disclosure of researcher bias. For external validity, every attempt was made to illicit and report thick descriptions, in addition to reporting conflicting codes when they arose. Finally, reliability was enhanced through building rapport with participants, in addition to triangulation through researcher field notes as an audit trail.

Positionality

In qualitative research, it is important to acknowledge personal identities and experiences in an effort to avoid assumption based on personal experiences. This research was conducted primarily by the lead author for their dissertation. This author served as an SBAE teacher for four years in an urban area outside of Ohio. Additionally, personal wellness fluctuations impacted their engagement at times with the research, but efforts were made to minimize potential bias and ensure understanding of participant answers through summarizing, restating statements, asking clarifying questions during interviews. Additionally, field notes were maintained after every participant interaction or data review.

Findings

The objective that this paper seeks to address is to "describe how SBAE teachers conceptualize wellness". Through analysis of data, three major ideas arose from how participants conceptualized wellness: the nine *Elements* of Wellness, and the four different ways that these elements can *React.*

Nine Elements of Wellness

Because elements "make up" the universe around us, this theme is named the *Elements of Wellness* because, in the words of participants, these items "make up" wellness. In addition, they "have to be there" for wellness to exist (Carys, Charlie, Emerald, and Tori). Participants identified fourteen unique elements across the nine CDs. After removing elements that only

appeared once, nine Elements remained. Further analyses indicated these elements fell into three categories named here to be *The Self*, *The World*, and *The Interface*.

The Self

The Self as a group of elements was the simplest to identify. This is because language from participants indicated that these three elements were always *inherent*. Discussions around these terms were always used in reference to being a part of a person, be it themselves or another. These three elements consist of **Physical**, **Emotional**, and **Mental**, paralleling the three domains of learning (psychomotor, affective, and cognitive). These three elements were always referenced as not only *a part of* someone, but as three distinct pieces of themselves that were at times conflicting, or at least *not* working together synergistically. Whether or not they were conflicting, participants agreed that *you personally* can work to improve them, so eloquently described by Frank when he described students who found "physical exercises, mental exercises, and emotional exercises" in his classroom.

The primary and most apparent element of the Self, as expressed by participants, is the Physical dimension. Numerous discussions on wellness in interviews began with participants delving into personal health behaviors related their bodies. For instance, Ellie shared her decision to adopt a dog solely to "keep me moving on a daily basis," ensuring she managed to walk 1-1.5 miles even on busy days, driven by the responsibility to care for her canine companion. However, physical wellness extended beyond actions, as indicated by Frank, who emphasized the importance of nutrition in his life and work – noting that, in his teaching labs, the cultivars grown were intentionally chosen to model good food choices for his students.

While this element was the first on everyone's mind, the Physical element also quickly emerged as one of the most limiting factors in participants' perceptions of wellness. A striking example was provided by Emerald, who recounted a major car accident during her first year of teaching, noting how it significantly impacted all other aspects of her wellness due to the physical limitations imposed on her body. Riley echoed a similar sentiment, linking most of her physical wellness limitations to a high school injury that, while initially having limited long-term effects, has become more pronounced and impactful in her 30s.

Moving to the second element of the Self, the **Emotional** aspect of wellness encompasses how individuals perceive, feel, and address their emotions. Ellie shared a powerful metaphor from a 4-H camp training, likening emotions to "a tea bag steeped in hot water—sitting, steeping, but not staying forever." She emphasized the importance of experiencing a range of emotions while knowing *when* to move on. However, Ellie acknowledged her past struggles with being "emotionally toxic" due to discomfort with emotions, both her own and others'.

Additionally, emotions were intertwined with participants' capacity to engage in desired activities, as highlighted by Tori, who admitted, "If I'm feeling bad, I'm not doing anything." After this, she continued to acknowledge the influence of her emotions on how others perceive her, noting that when she feels good, she becomes more pleasant to be around. This connections between feelings and wellness were also emphasized by Charlie, stating that by "chilling out," one can attain a higher sense of wellness.

Completing the exploration of the Self, **Mental** wellness emerged as a significant factor in multiple participants' wellness conceptualizations. Carys, Ellie, and Frank each distinguished mental and physical aspects as separate entities working collaboratively in considering their health. Ellie further described mental wellness as encompassing personal perceptions of self-worth and self-view regarding the physical body. Similar to emotional wellness, mental wellness was directly linked to productivity, as illustrated by Emerald's example of fortifying her mental wellness through participation in weekly crochet classes.

The World

The second group of wellness elements, known as The World, encompasses aspects of our social universe external to the Self. This category comprises three elements of varying intimacy with others: Family, Society, and Spirituality.

Family, the most intimate sphere, is often represented through interactions and commitments to blood relatives. For instance, Frank cited his push-up challenge with his wife and son as a positive family influence on wellness, expressing, "I felt my family was almost never a negative factor to my wellness, even when I find myself spending too much time at school. Well, my wife's a teacher. So, she just understands."

However, not all participants shared this experience, with some facing hurdles due to their family's lack of understanding about work commitments, as illustrated by **Carys** and her husband's recurring conversations about her long working hours: "You're still working long hours. You're not really getting paid that much. I know that you love it and that it's very fulfilling, but it's also very draining for you, and you don't make time for yourself."

Society, the second element of the world, refers to the broader sphere of humanity with which participants interact, though less intimately than with family. Social interactions were deemed crucial for wellness, as emphasized by Riley, who believed that social engagement was key to improving one's wellness: "Social interaction can be the key to improving your wellness." It should also be noted that there were negative influences within Society as well. These included instances where social interactions led to additional responsibilities, as shared by Charlie when reflecting on working with his teaching partner: "He'll be manually entering a list, and I'm like, NO. If I just hadn't talked to him, I don't think I would have taken that on." Here, Charlie details

The third element, **Spirituality**, involves the lowest level of intimacy, with experiences that are not shared with others. Participants discussed the impact of individual spirituality practices on their well-being, like when Carys acknowledged that managing her responsibilities often pushed her spirituality to the bottom of priorities, highlighting the challenge of balancing personal practices with professional demands: "My spirituality has definitely taken the bottom of the totem pole when I want it to be at the top."

Finally, participants emphasized the individualized nature of spiritual practices, describing personalized routines like daily prayer and online church sessions. For example, Tori described a need for "peaceful" moments in her life to maintain her wellness, maintaining that the world around her had great influence on whether or not she found this personal peace.

The Interface

The final grouping of wellness elements belongs to the *Interface*, or the path through which we interact with the outside world. These elements of **Creation**, **Recreation**, and **Vocation** were all needs described by participants with varying levels of saliency. These elements constitute the ways in which we manage our exposure to and from the World. Most aspects of the interface were also described as the choices and actions participants took to optimize their own paths through life.

Creation, identified as a fundamental need by participants, was vividly demonstrated by Emerald. She shared an example of satisfying this need by actively participating in a hometown "show choir showcase." Additionally, traditional crafting practices emerged as outlets for creative expression, with Tori describing how she fulfills her creative needs through a diverse range of activities, including sewing, cross-stitching, drawing, and nurturing plants: "playing with flowers and planting things."

While not universally regarded as indispensable for wellness, creativity came to the forefront when participants delved into discussions about other wellness elements. For instance, Riley, who initially made no mention of creativity, had one of the most visually appealing CDs among participants. This was attributed to her adept use of both color and images, elements that others possessed singularly, if at all. Later in her interview, Riley linked creativity to her job, revealing the challenges that arose from the mental and physical exhaustion resulting from the numerous items she had to "create" in her role: "It led to negative wellness consequences, keeping me from being able to make positive physical wellness choices."

Recreation, a pivotal facet of the Interface, revolves around the pursuit of positive experiences and emotions. Bill characterized these experiences as "the fun stuff, but unrelated to what I do [for work]." Formerly finding joy in the equine industry, Bill now seeks recreation through activities like boating and snow skiing, engaging with his social sphere of friends and family. While Bill integrates social elements into his recreation, younger participants like Carys prioritize personal hobbies, such as working out and maintaining a healthy diet. Carys emphasizes the personal significance of these activities, stating, "Yes, I share them with my husband, but they're important to me personally." Recreational pursuits among participants vary widely, ranging from traditional hobbies like sports for Frank (coaching the cross-country team) to more unconventional "artsy-fartsy" activities like coloring sheets for Emerald. Notably, Emerald explained, "For some reason, just adding color to something makes it stick in my brain," illustrating how recreation is intertwined with her job responsibilities.

The third and final element of the Interface, **Vocation**, revolves around the influence individuals choose to exert on the world. This aspect has already been alluded to in the preceding elements, first evident in Bill's reference to the changing nature of his "fun stuff" and later in Emerald's utilization of color in her job documents. Many participating teachers view their vocation as the primary means through which they influence the world and, consequently, shape their own wellness.

Unfortunately, this element was frequently discussed in a negative light by participants. Vocation, in this context, is characterized by applied effort but often lacks enjoyment.

Participants often associated duties falling under this category with paid roles, such as those related to SBAE teaching. However, they also included non-paid examples, like volunteering or serving as faculty advisors for organizations beyond their local FFA chapters, highlighting the pervasive nature of vocation in shaping their wellness.

Reactions Between Wellness Elements

In addition to the elements of wellness, participants included a variety of relational units between these elements within their CDs. Three types of relational units were identified and are named here as **Venn**, **Branch**, and **Filter** reactions, with a fourth type of reaction being a more intense filter, or a **Great Filter**. These different reactions provide perspectives of how the elements of wellness discussed in the previous section come together and *react* in order to constitute a person's wellness.

Participants utilized **Venn** reactions, named for their visual inspiration from Venn Diagrams, to signify overlap between two distinct wellness elements. This visual representation aimed to convey a sense of "sameness" or "double duty." The term "sweet spot" emerged consistently across all four diagrams featuring Venn reactions, indicating that these reactions are employed to efficiently manage personal wellness. Multiple participants described the "sweet spot" as a position on a map equally representative or important in relation to multiple wellness elements. The use of Venn reactions seems to be a strategic approach to satisfy multiple needs and streamline personal wellness elements, thereby avoiding exhaustion. The prevalence of the term "sweet spot" suggests that, during a Venn reaction, participants deliberately engineer their wellness elements to address limitations, whether in terms of quantity or quality of resources.

Branch-type reactions, identified as the second type of wellness reaction within CDs, are represented as direct, unbroken lines. Participants employ Branch reactions to convey a sense of interconnectedness when linking two distinct elements. These branches, at times, serve to signify a hierarchical relationship. For instance, in Emerald's diagram, a two-level factored structure is illustrated, with "My wellness" dependent on three smaller units: social, occupational, and intellectual. The branches in Emerald's CD indicate that smaller units are integral components contributing to a larger concept of wellness, demonstrating a strategy to depict a multi-factor structure.

Filter reactions are the final type used by participants. Filters are so named because when they appear, they indicate that one wellness element *impacts how you view or interact with another wellness element,* almost as if you're working through a filter. Carys' approach to indicate this was through the inclusion of an arrow in her CD. This arrow described *her ideal flow of focus and energy*. Here, she described that she is her "best self" when she has her "priorities in order."

Alternatively, Emerald and Nick each used Filter Reactions within their CDs as well, but both CDs use filters as a secondary relationship. Emerald described her own hypothetical situation: "If I'm feeling unfulfilled by work, it could be because I haven't been able to be creative here." Emerald is describing a filter approach that relates her work fulfillment to her lack of creative expression within her work. She goes on to describe that if she can identify this, "I try to find ways to be purposively creative" in an effort to "course correct" that area of wellness. When

asked if she found this was an effective approach to ensuring her needs were filled, she smiled and retorted with “It hasn’t failed me yet!”

Great Filters as a theme emerged during convergent data analysis. This recurring theme represented moments that carried profound impacts on participants' days. These filters are described by participants as moments that are uncontrollable, unlikely to happen, and significantly influence how they perceive day-to-day experiences, akin to filter reactions. What distinguishes Great Filters from filter reactions is their defining trait: these moments completely shade everything else within a specific time period, often just a day.

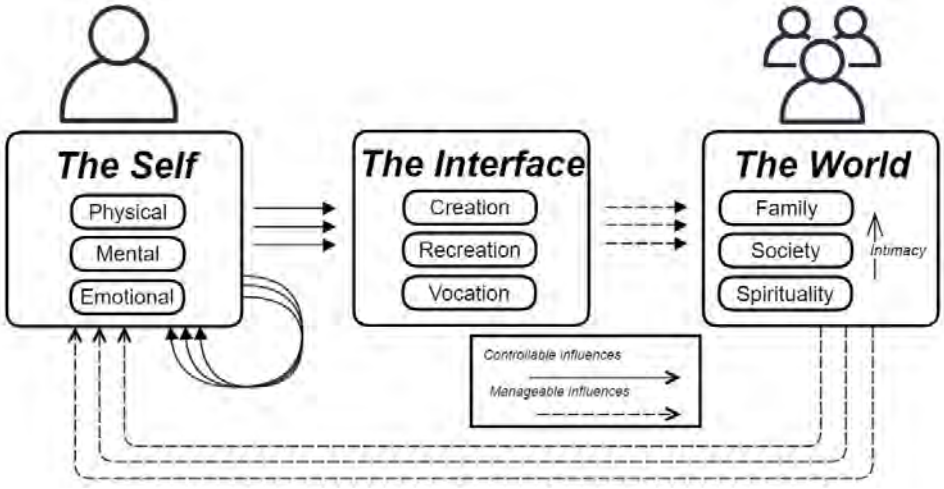
Participants predominantly presented Great Filters through positive examples, instances that excited them to share. Tori, for instance, recounted the morning of her research interview when a student surprised her with a crocheted cow. This unexpected, socially fulfilling interaction served as a positive Great Filter that instantly brightened her day. Other teachers shared similar stories, ranging from students grasping content to winning FFA competitions.

However, Great Filters weren't always positive. Frank shared instances where interactions with his students left him grappling with negative emotions, likely indicative of secondary traumatic stress. These examples included listening to students' experiences in war zones, enduring isolation from family, or facing trauma resulting from being relied upon to translate critical matters for their non-English-speaking family.

Conclusions/Implications/Recommendations

Synthesizing the findings of this study and what we understand about wellness, Figure 2 proposes a new conceptual model for holistic wellness, particularly as lived through participants. Here, you can find the three groups of Wellness Elements. These groups of elements can carry influences into themselves and other elements through a variety of ways, as represented by the arrows. These influence arrows are distinguished further by identifying “controllable” influences that arise from the self, vs. “manageable” influences that arise from outside the self.

Figure 2. A Proposed model of holistic wellness.



Influences from the Self are considered controllable through efforts in physical, mental, and emotional health behaviors. For instance, the 5F-Wel construct of Self-Worth involves thoughts from the Mental element influencing the Emotional element, demonstrated by Emerald's therapy journey. Similarly, one can hypothetically control the pathways to interact with the World via the Interface. However, once decisions are made and actions set in motion, the Interface starts influencing the World. While influences from the Self are controllable, those extending from the Interface to the World are not. Managing these influences is vital as individuals set their own limits on which aspects of the Self they share with the World.

In exploring the World, elements are organized by intimacy, a continuum from friendship to love, with connection or commitment indicating intimacy (Myers & Sweeney, 2014). Participants align with this view, and the present model extends this intimacy continuum to include spirituality. This expansion is justified by participants describing spiritual practices as individual rituals, and when discussing others in relation to spirituality, they do so tangentially, as models or guides. This aligns with Myers and Sweeney's (2014) conceptualization of spirituality as personal beliefs and behaviors recognizing our existence beyond material aspects. Placing Spirituality farther on the intimacy scale reflects its nature as an individual journey influenced by interactions with family and society.

This model allows us to recognize uncontrollable influences from the World and their role in wellness. This is just distinct enough to avoid over-emphasizing them or making them central. Recognizing this, individuals theoretically have the ability to manage their environment to be out of reach of these influences, even if they can't control them. This holistic wellness model doesn't center pre-existing health conditions, illnesses, or major negative life events, as these are theoretically associated with health, not wellness.

Just as Roscoe (2009) discussed through various wellness models, the model presented in Figure X is versatile to assist both pre- and in-service teachers to guide their focus on managing aspects of their lives. When introducing this model, emphasis should be made at the distinction between controllable (originating from within ourselves) and manageable (perceived by/coming from others) influences. It serves as a tool to provide a common language for wellness discussions with teachers, rather than a prescriptive approach.

The primary recommendation for this research from this project is to further research ways to optimize the human experience for SBAE teachers and society at large. This goal is challenging due to individual limitations and a lack of consensus on a holistic wellness definition (Terry, 2020). Additionally, further analysis, testing, and critique of the model presented in Figure X is welcomed in efforts to provide an empirically sound tool for SBAE teachers in the management of their wellness.

In terms of practice, it is recommended that SBAE teachers should avoid overextending themselves at work. Participants indicated that this overextension is an attempt to hit a “sweet spot” and meet creation and recreation needs from their vocational activities. While this may seem manageable, it can lead to blurred boundaries and overworking. It is crucial for teacher educators, state supervisors, and professional organizations to rethink wellness conversations, focusing on actions rather than rigid expectations.

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The Teacher's Noble Sacrifice: An Exploration of Agriculture Teacher Margin

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Abstract

Due to the persistence of the school-based agricultural education (SBAE) teacher shortage, research on this issue must continue. Exploring a variety of aspects of how this shortage manifests may be advantageous for devising paths for teachers to be retained in the career. While considerable literature exists on SBAE teacher retention and related topics, there is an absence of holistic, systemic perspectives which may help researchers recognize key drivers of this issue. This qualitative study utilized the Theory of Margin and sought an understanding of how teachers are experiencing their workloads. The overall theme of this study was The Teacher's Noble Sacrifice, encompassing a holistic picture of teacher load, sources of teacher power, how lacking margin may affect a teacher's power or load, where and how support networks can be utilized, and how these SBAE teachers identify as agricultural educators. The themes emerging from this research are explored for their impact on the teacher shortage with recommendations for research and practice suggested.

Introduction

For years, there has been a shortage of school-based agricultural education (SBAE) teachers (Smith et al., 2023). This shortage has been identified as a major challenge impacting the profession (Disberger et al., 2023; Smith & Smalley, 2018; Solomonson et al., 2019; The National FFA Organization, 2022). The teacher shortage has been approached by researchers qualitatively and quantitatively, from a variety of angles, yet it persists. This problem meets the criteria for a wicked problem as it is complex and may have a variety of solutions (Rittel & Webber, 1973). Furthermore, the persistence of the shortage indicates the problem may be systemic (Meadows, 2008). The SBAE teacher shortage is a problem greater than sum of its parts; thus, it is important to explore different system components that contribute to the shortage.

One driver of the teacher shortage may be the inability of educators to achieve work-life balance (WLB). Illinois teachers reported moderate WLB (Solomonson et al., 2022), as did teachers in the nationwide survey Sorensen et al. (2016) conducted. Factors including working many hours and being married were both related to lower WLB ability (Sorensen & McKim, 2014). Additionally, an unsatisfying work-life balance feels implicit in other reasons teachers leave the classroom. Solomonson et al. (2018) found "family or personal reasons" and "out-of-classroom expectations" (p. 330) as two reasons teachers leave.

Research has linked WLB and job satisfaction (Sorensen et al., 2016). Nationwide, SBAE teachers are generally satisfied with their job (McKibben et al., 2022). In fact, research found no significant differences between the satisfaction of mid-career teachers with intent to leave versus those intending to stay (Solomonson & Retallick, 2018). Furthermore, Walker et al. (2004) found no significant difference in job satisfaction between first year teachers who left, moved, or stayed

in their positions. While these studies capture interesting snapshots of job satisfaction, the pandemic saw some shifts, with McKim and Sorensen (2020) identifying a 23.13% decrease in job satisfaction amidst the pandemic. It is unclear how satisfied teachers are with their jobs presently, especially as the landscape of education continues to shift (McKim & Sorensen, 2020; Shoulders et al., 2021).

The composition of a teacher's workload varies based on their context. The workload of teachers includes "preparation for instruction, classroom/laboratory teaching, laboratory preparation and/or maintenance, grading/scoring students' work, administrative duties-program management, professional activities, SAE observations and recording, [local, area, district, and/or state] FFA activities, CDE preparation, and adult education" (Torres et al., 2008, p. 79). While these components may remain similar throughout career stages, various studies have identified unique challenges at specific career stages, especially amongst teachers early in their career. Early career teachers face expectations unaligned to their experience level (Disberger et al., 2023; Moser & McKim, 2020), spend more time on work at home than peers (Lambert et al., 2011), and are more likely to experience negative emotions (Disberger et al., 2023). The emotional load, a component of the affective domain, is important to consider as it relates to teacher workload.

The two most researched components of the affective domain are stress and burnout. Burnout is caused by prolonged periods of stress (Maslach, 1976) and has been assessed amidst SBAE teachers, with studies indicating moderate levels of stress and emotional exhaustion (Kitchel et al., 2012; Shoulders et al., 2021; Smith & Smalley, 2018). While stress and burnout may be the more prevalent aspects of the affective domain, others have been explored. Other sources of emotional load include expectations surrounding the job (Lambert et al., 2011; Solomonson et al., 2019; Traini et al., 2019). Teachers reported a discrepancy between what was happening in their programs and expectations placed on themselves (Solomonson et al., 2019), noting feelings of inadequacy due to a strong commitment to excellence (Solomonson et al., 2019). Traini et al. (2019) found early career teachers felt they could have work-life balance or success, but not both, supporting previous research by Lambert et al. (2011).

The examples provided of additional emotional load could lead to frustration with the self or the career, but there are some points of power stemming from the affective domain. Teachers reported sources of enjoyment from their career including, "[w]orking with motivated students, autonomy, variety, and support" (Solomonson & Retallick, 2018, p. 14). Moser and McKim (2020) found collaboration and relationships with other teachers were beneficial to teacher retention, suggesting relationships are a source of power. Haddad et al. (2023) discussed the possibility a "SBAE teacher's vision of the purpose of agricultural education must align with their community influencers' if it is to be positioned as supported" (p. 217), suggesting support networks yield teacher power when visions align.

The research on teacher workload led Solomonson et al. (2019) to call for a more sustainable model for SBAE. Making the career sustainable requires the teacher shortage be addressed via systemic change. As a step toward this goal, we believe a holistic perspective on teacher workload, job satisfaction, and life are necessary. As such, a qualitative inquiry was conducted in Michigan to offer additional insights into teachers' lived experiences and perceptions of their workloads.

Purpose and Objectives

How teachers manage their workload varies (Sorensen & McKim, 2014); therefore, it is important for research to capture the depth of teacher experiences. Given the need for depth, a qualitative methodology was employed to address our research questions: (a) how do teachers experience their workload and (b) how does a teacher's workload impact their life?

Theoretical Framework

We operationalized the Theory of Margin as our framework for this investigation. The Theory of Margin (McClusky, 1963) originated in adult education. The theory states an individual has power in their life to accomplish their tasks, derived from physical, social, mental, and economic ability as well as skills (Hiemstra, 1993; McClusky, 1963). An individual also has their own load, comprised of responsibilities at work, home, and life (McClusky, 1963). The difference between power and load is called margin (McClusky, 1963). Margin has been explored in a variety of adult education spaces, including emergency medical education (Kalynych, 2010) and postsecondary education (Biney, 2021). Current research suggests teacher margin plays a role in teachers' decisions to leave the profession (Marzolino & McKim, 2023) and the efficacy of professional development (McKim & McKim, 2023). However, teacher margin was not found to impact other teacher characteristics, such as creativity (Marzolino & McKim, 2024).

Having margin (i.e., wherein power exceeds load) ensures "good mental hygiene" as well as an improved ability to learn, and handle "life's emergencies" (McClusky, 1963, p. 17). As such, margin is critical to teacher retention, especially for early career teachers still trying to learn the job (Disberger et al., 2023; Moir, 1990). We posit the Theory of Margin may also inform how teachers experience their day-to-day work lives, as margin will shift as power and load fluctuate.

Methods

To explore the margin of SBAE teachers in Michigan, we employed a basic qualitative methodology with semi-structured interviews. As the researcher is the instrument in qualitative methodology (Merriam & Tisdell, 2016; Tracy, 2010), we recognize our subjectivity and positionality as integral to the research. The overall mission for this research was to help teachers find ways to navigate their jobs so they may be retained in the field. Each of the authors were former SBAE teachers and have a great passion for helping agricultural educators. The research team believes the system of agricultural education creates explicit and implicit pressures which contribute to reduced teacher margin and teacher attrition. This phenomenon is something they each experienced as former middle school and high school agriculture teachers.

Participants

An email invitation was sent to 12 teachers in Michigan inviting them to participate in this study. Seeking saturation (Morse, 2018), these 12 teachers were invited due to their diversity in certain characteristics, including being parents/guardianship, marital/relationship status, years of teaching experience, and school type. These characteristics were prioritized as they were identified by Stevenson (1982) as salient to margin. Characteristics important to power, load, and

margin but not widely represented across SBAE educators in Michigan, such as race (BIPOC) and sexuality, were not considered. Eight of the 12 teachers participated in an interview. The participants were assigned pseudonyms, outlined in Table 1. Information that may be used to identify participants has been withheld from the table.

Table 1

Participant Pseudonyms and Demographics

Pseudonym	Years Teaching	*Gender*	School Type
Abigail	3	Female	Comprehensive High School
Alex	14	Male	Career and Technical Center
Emily	10	Female	Comprehensive High School
George	3	Male	Career and Technical Center
Haley	22	Female	Career and Technical Center
Leah	5	Female	Career and Technical Center
Penny	20	Female	Comprehensive High School
Robin	23	Female	Comprehensive High School
Shane	4	Male	Comprehensive High School

Note. Names assigned based on gender identity.

Data Generation and Analysis

Data were generated in November and December of 2022. Each participant met with the lead researcher via Zoom for one semi-structured interview lasting 30 to 60 minutes. The interviews were recorded and transcribed using Transcription Star. The interview protocol consisted of 16 questions; the first 10 were asked without participant knowledge of the terminology offered by the Theory of Margin (McClusky, 1963) and the last six were asked regarding the teachers' thinking using theory-specific words and concepts (i.e., definitions provided to participants), soliciting teacher comments based on this shared understanding.

Transcribed interviews underwent open and axial coding (Merriam & Tisdell, 2016). Codes were sorted into categories, which were then organized into themes. The lead author conducted an initial grouping of codes. Afterward, the research team began a peer review process as a means of data verification (Morse, 2018); we met, discussed, negotiated, and reorganized data within these codes, allowing for the emergence of new codes from the dataset when appropriate. Next, the lead researcher categorized the codes and, upon completion, the research team again convened to discuss, negotiate, and reorganize codes, categories, and themes. Vocabulary from the Theory of Margin (McClusky, 1963) was used to assist in classifying some of the phenomena described by teachers, offering itself to naming codes and categories. Validity issues were addressed by taking a systematic approach to the research, with a focus on ontological and educative authenticity (Lincoln et al., 2018). Furthermore, there has been much intent to incorporate multivocality and thick description into this manuscript (Tracy, 2010).

Findings and Discussion

The overall theme of the data was *The Teacher's Noble Sacrifice*, comprised of seven categories (see Table 2). For clarity, categories and the codes are explored within their own sub-headings.

Table 2

A Breakdown of Theme, Categories, and Codes

Theme	Categories	Codes
The Teacher's Noble Sacrifice	A Holistic Picture of Load	Additional Sources of Load
		General Admin Adding Load
		Home Load
		Load Impacts Emotions
		Poor Admin Communication
		Responsibilities of a CTE Teacher
		Responsibilities of a Teacher
	Agriculture Teacher Identity	Agriculture Teacher Identity
		Ag. Teachers Integrating into their Communities
		It Is Ultimately My Responsibility
		Investing in Success
		Noble Sacrifice Mindset
		Power in Appreciation
		The Best Teacher I Can Be
	Boundaries	Ability to do What Needs to be Done
		Conflict Between Work and Home
		Confronting the Realities of Ag Teaching
		Kids Need to Want It
		Needing to Say No
		Questioning Career Choice
	Margin and Work Interplay	Impacts of Reduced Margin
		Margin and Innovation
		Professional Development
	Sources of Teacher Power	Developed Wisdom from Experience
		Joys of Working with Students
		Other Ag Teachers Get Me
		Sources of Power
	Support Networks	Leaning on Co-Teacher
		Support from Alumni & Community Members
		Support from Family
		Support from School Community
	Workload Structure	Ebb and Flow
		Time Management
		Work Management Strategies

Note. Categories and codes are presented in alphabetical order.

A Holistic Picture of Load

The category, A Holistic Picture of Load, expresses the complexities of an SBAE teachers' load. From what responsibilities they have at work to the hidden labor that goes into the job, there are a vast array of duties teachers complete. At the base level, teachers are responsible for *Responsibilities as a Teacher*, *Responsibilities of a Career and Technical Education (CTE) teacher*, and their *Home Load*. *Responsibilities of a Teacher* outlines duties the research team felt all teachers may experience. Study participants shared components of their workload, collectively identifying field trips, grading, lesson planning, preparing for classes, accommodations (IEPs, 504s), behavioral support reports, communicating with special education teacher(s), contacting parents for sports ineligibility, cleaning and organizing their room, collaborating with a co-teacher, meetings, events, curriculum crafting, logistical paperwork, and independent studies for students. Not all teachers interviewed shared the same duties.

When talking about *Responsibilities of a CTE Teacher*, Emily shared, "the classroom stuff's easy, it's the taking care of the CTE program that's the hardest part." Teachers described some of CTE-specific responsibilities, collectively identifying CTE paperwork, accounting work for reimbursement, coaching and organizing coaches for FFA teams, FFA events and trips, officer meetings, leadership and skills contest preparation, managing the agricultural facilities, recruiting students to their program, SAE visits, and facilitating fundraising for the program. Finally, within the non-job aspect of teacher load, *Home Load*, teachers reported the following duties: helping with family business, dishes, laundry, cooking, spending time with family, parental duties, raising children, and supporting their spouse. Importantly differences in home load differed between parents and teachers without children.

Load is further complicated by three other codes, all increasing the burden placed upon teachers. The code *Additional Sources of Load* consists of aspects of teachers' jobs adding to their workload, from parents to paperwork. Emily shared, "[parents] really don't understand what [teachers] do on a day-to-day basis." Further, Abigail expressed her angst with additional sources of load, stating, "paperwork freaking sucks, that's not why people become teachers." These aspects of load often carry with them an intangible burden. Other aspects of load represented in this code include ineffective professional development (Abigail), a lack of predictability (Alex), and mentoring new teachers in the building (Haley). Outside of these duties, there is an emotional component to teacher load. *Emotional Load* includes teachers' descriptions of how their load made them feel and how their feelings impacted their load. George shared, "there are days where I feel closer to breaking, even when I leave early." He further explained, "if I have problems with students all day where we're struggling… I've got to work through that with them and it's just emotionally and physically taxing." Emily shared, "if [additional duties are] stuff I know I can do, I'm not as stressed and I'm not as short with people at school." Furthermore, *Administration Adding Load* explores an abundance of ways administrators shape a teacher's workload, from poor communication complicating the job to a perceived lack of trust negatively impacting relationships. Shane recounted an instance where administrators changed the schedule, resulting in the cancelation of a program with elementary students. Robin and her new co-teacher had to negotiate to ensure the FFA pay they were receiving wasn't halved when that co-teacher was hired. Teachers also expressed "time deadlines surprise me sometimes because they'll tell

me one thing and then the next time, I get a different time deadline" (Emily) and "it seems like frequently there are things that pop up and it's just like there's another thing that we have to do" (George). This unpredictability adds to load.

Agricultural Educator Identity

The Agricultural Educator Identity category comprises ways in which identity is informing or informed by being an agricultural educator. Each teacher exists both as a teacher and a person; there is the person they are at work, and the person they are in their most natural and authentic state. The following codes suggest being an agricultural educator is not simply an identity characteristic, but an identity in and of itself. *Agriculture Teacher Identity* emerged from teachers sharing how they go above and beyond for their students because that's who they are. Teachers act as "fail safes" for students (Shane), try hard to do it all by themselves (Robin, Shane), make decisions to preserve student "self-esteem" (Penny), and make themselves known in the community to benefit their program (Abigail, Shane). While these characteristics and actions may exist outside of the written job description, teachers are still considering them, because they perceive them as components of agriculture teacher identity. *Agriculture Teachers Integrating into Their Communities* showcased the variety of ways teachers are involved at the community level, from helping with the local Farm Bureau (Leah, Shane) and serving as 4-H leaders (Haley, Robin) to being involved in their churches (Alex, Robin). *The Best Teacher I Can Be* captures the desire for teachers to do whatever it takes to provide quality educational experiences for their students. A reoccurring topic evident in this code was self-improvement. Emily shared she attends professional development to learn new things. Haley shared that she does "extra studying" and "courses" "just to keep [her]self current in the [agricultural] industry."

Noble Sacrifice Mindset captures evidence teachers are willing to sacrifice themselves (i.e., their time, energy, and/or wellbeing) to ensure students and communities receive strong programming. The sentiment that extra time needs to be spent to get the job done was shared by Emily and Haley. Shane expressed tension between boundaries and being successful with contest teams, who are supported by local industry members. Finally, Robin shared she had cancer earlier in her teaching career, saying "I don't know why I didn't take more time off. I probably should have, but like, it was the beginning of the school year, it was during the pandemic… I want to be able to meet them, you know?" This powerful quote and story embody the noble sacrifice mindset and what we perceive to be her love and care for her students.

Investing in Success showcases how teachers justify devoting themselves to their students and the profession. Penny captures this sentiment well and shares two sides of the same coin in her interview, beginning with, "if [margin's] lower and you're not seeing [success], it'd be really hard to keep pushing and doing some of those things [working toward your] goals," adding later that, "I guess it would be really hard to do the amount of work and the time and everything that I put in [my job] to just be mediocre." *It is Ultimately My Responsibility* explores how aspects of the job may be suitable for delegation, but the teacher needs to make sure it gets done appropriately. Shane shared, "you create a [program of activities] with the students, but ultimately you're still responsible for getting all that done." Robin utilizes community support for preparing students for contests, but also likes to have things done her way. To achieve balance, Robin prepares lists and emphasizes clear communication with community partners.

However, while others are helping, she still feels responsible for the outcomes. While the mindset of individual responsibility is present and may sometimes work for teachers, *Power in Appreciation* demonstrates that teachers are willing to give more of themselves when they are being appreciated (Abigail, Shane, Emily) and that they question their career decision when feeling unappreciated (Emily, Shane).

Boundaries

The need for, or desire to, set boundaries manifested in a multitude of ways. *Ability to do What Needs to be Done* featured teachers exploring their capacity. Shane demonstrates by questioning, "so is [workload] achievable? Yes. Is it realistic? Maybe not so much." Abigail also reported "achieving my goals steadily for two years and three months now," though she added this trend is "probably not" sustainable. This is representative of a boundary struggle teachers are facing. Appropriately, *Needing to Say No* also arose, with Haley sharing that, as an early career teacher at her former school, "I overloaded my plate to the detriment of my family sometimes for sure, because I didn't want to tell anybody no." Other teachers have "learned that ag advising is the only thing [school extracurricular] I can do" (Emily) and learned "that I can't do everything myself" (Robin). Alex approaches opportunities with intentionality, "saying yes to the things I want to be a part of and no to things I don't want to be a part of." Shane reports feeling pressured to "build [community] relationships as the ag teacher," but has turned down a position on the local Farm Bureau board, a boundary he's been able to set. *Confronting the Realities of Teaching Agriculture* melds with this, though this code featured mid- to late-career teachers reflecting on how their boundary setting around capacity has shifted as they've been in the career. Emily shared, "I didn't realize how much time FFA, being the advisor, took," later adding "after 10 years it kind of gets a little easier." Penny found a way to communicate with students her need for boundaries: "but there's only so much of me… there's just only so much that one person can do." Furthermore, the code *Kids Need to Want It* featured teachers maintaining boundaries around the length to which they would work for students. Haley shared that she's "refused to fill out forms for kids" and faced parental backlash, wondering, "why I need to waste my time for something your kid does not value or want?" Robin shared that she wants students to "meet me halfway," stating she "won't pull them over the finish line, like I'll push them but I won't pull them." George added that new activities in his program are not generated by himself or his co-teacher, that "if we're adding anything new, I make sure its student driven… I make sure that [students] are leading the cause… we'll try [students' new ideas] as long as we're comfortable with our workload."

When boundaries are not set or are ineffective, *Conflict Between Work and Home* may arise. Leah shared, "my work takes up so much time that the only stuff I get to do at home is the stuff I don't actually want to do, like laundry, dishes, and making dinner." Penny shared, "I am divorced and do not have a family or kids, which would be a big challenge, I feel, with how much that I put into the program." Alex complemented this by sharing that, during the FFA contest season, "for those eight weeks, my wife just knows that I'm not going to be present at home." Home is often what is being sacrificed to make work achievable. Furthermore, lacking boundaries between work and home may lead to *Questioning Career Choice*. Emily and Shane shared this happens for them in times of low margin, with Emily sharing, "[w]hen that [margin] gets really low is when I start questioning whether or not I want to be a teacher and whether or

not I want to do something else in the industry." Shane finds comfort in his 'why' statement, though that's sometimes not enough: "… [b]ut you look at your why statement and it brings you back to why am I doing this?"

Margin and Work Interplay

Impacts of Reduced Margin were plentiful. Haley identified a lack of margin as something that "burns you out faster," sharing that "you get to a point where you can't, your body physically is like, I'm done," attributing this to sickness. Shane shared that, during periods of low margin, "your career satisfaction starts to dwindle and I think that's what leads to teacher burnout." Also attributed to lack of margin were decreased job satisfaction (George, Robin) and reduced happiness, both at work and at home (Abigail, Leah). Alex shared how being in a period of low margin feels, "I would say the lack of margin would be if you don't feel like you're ever going to surface to the top, if you don't feel like you're going to win or achieve or be successful." When in a period of low margin, teachers found that *Professional Development* (PD) efficacy can be affected. Haley shared that, without processing time or time to try new things, insights from PD aren't retained. Alex shared that PD feels more approachable when "you've got things under control and it's not overwhelming." Abigail noted a difference between "actually helpful" PD and "[PD] that is pushed on you because either your [district] or your school has some sort of agenda that they are trying to accomplish," noting that her "margin increases tenfold when it is helpful PD." Margin may play a role in teachers determining if they wish to attend a PD session.

Teachers also suggested *Margin and Innovation* are linked. George shared, "I would say when that [load] is smaller or when [power] does get closer to that equal point is when I do feel more comfortable to try something new." Leah shared she can "brainstorm new ideas" and think about how to "do [classroom activities] differently" when she has margin. Robin attributed increased innovation when margin was greater, "because you have the time to think of those things, you're not just in survival mode." Overall, margin impacts a variety of home and life domains for teachers, evoking a variety of responses and emotions.

Sources of Teacher Power

Teachers derive power from a multitude of areas. *Sources of Power* details a variety of these power sources, such as "predictability" (Alex), autonomy (Robin), and a positive outlook (George). Robin's idea of autonomy is attributed to a boundary she was able to set and uphold: "I detest chickens. Like, I never wanted to do [contest name], so we never did it." George shared that "a good day working with a student… makes me feel better about my job, my load hasn't decreased, my power hasn't increased, but it's improved my outlook." George's improved outlook also aligns well to the code *Joys of Working with Students*. Leah said she "love[s] working with the kids," that "getting up in the class each day and teaching" is "definitely" something that she wants to do. Abigail stated that "every teacher need[s] to see their students succeed," and Emily emphasized this by sharing "seeing [students] achieve things at state level and regionals reminds me why I do what I do." Emily also mentioned positive feelings about "light bulb" moments with students. Robin shared that she is working in a poor district within a poor county, "but the tradeoff for the kind of people I work with and the kind of kids I work with is worth it to me because our kids are amazing." Teachers are finding power via their students

and through community with other SBAE teachers, evidenced in the *Other Agriculture Teachers Get Me* code. George reported "[other ag teachers] understand the struggles that I have, they understand maybe some of the successes…"; Emily also found power in others who can identify with her struggles. Robin shared that, "[ag teacher conference] reiterates why you enjoy your job and it gets you around other people who enjoy their job and it sort of gives you the boost that you need to go back and go at it again." Finally, more experienced teachers were heard in the *Developed Wisdom from Experience* code, where teachers reported finding power via a familiarity with the calendar and ability to estimate how much time is necessary to prepare for various tasks and events (Emily), being willing to accept help from others (Penny), and having an established program with familiar routines (Robin).

Support Networks

There are a variety of support networks teachers use to help bolster their power or alleviate their load. *Support from Alumni and Community Members* features the various ways teachers are being supported by this population, including cleaning their classroom, coaching teams, running events when family emergencies happen, running facilities (like land labs), moral and personal support, and financial support. *Support from School Community* refers to in-district support, such as mentor teachers, fellow teachers, administrators, and students. Penny calls her school a "utopia" and shared, "I couldn't imagine teaching in another school district; I've never once, ever asked to do something and my administration told me no." Also within the school community, but existing as a distinct code is *Leaning on Co-Teacher*, which came from teachers with experience in multi-teacher programs. Robin shared her "[co-teacher and herself] tried to split up the duties so that we didn't both have to do the same thing," which theoretically adds balance to both their loads. Penny shared she was excited her new co-teacher was "passionate about plants," as Penny felt her greenhouse facility was being underutilized. George shared that his co-teacher is a source of support, but "I'd say the struggle with leaning on my co-teacher for support is, most often when I'm feeling pressure, she is as well," implying there are times the load is still so large that both can exist in margin deficit. Finally, *Support from Family* ranged from spouses or significant others to other family members. Leah felt she has been able to achieve "a lot of that work-life balance" because her husband "came to our chapter events, he volunteered at different things, he actually even came into class and helped coach kids for CDEs and things like that." Leah appreciated that her husband "at least somewhat tries to understand [her] job and be a part of it." Family members who are supportive can be a source of power, though those who are unsupportive may negatively impact a teacher's power and/or load.

Workload Structure

The codes within Workload Structure center teachers' observations of how they cope with their loads. *Work Management Strategies* include an emphasis on prioritizing needs (Alex, George, Leah, Penny). "Everything that needs to get done gets done," shared Penny. Alex complemented her comment by sharing, "it's okay to put [tasks] away and get to [them] the next day." *Time Management* relates to prioritizing needs. In this aspect, Leah shared she feels her goals may be achievable but her timeline is not. Alex also emphasized the ability to set goals with reasonable timelines, a skill he's trying to share with his students. George questioned, "[s]o do [my co-teacher and I] get everything done that we want to? No. It's very difficult to try and get

everything done," reiterating that timelines need to be realistic. Additionally, Emily brought up an emotional load added to her existing load when time management isn't cutting it, "When I get to that point where I have so much on my plate and I don't feel like I have enough time in the day, then it gets..." she goes on to express how she feels like she is drowning.

Teachers also noted an *Ebb and Flow* to the calendar year. George listed the months when he's been the most stressed, generally choosing the months in which Michigan teachers have a variety of contests or applications due, then reflecting, "so I picked about five of the 10 months we're in school, so that's cool for me to visualize now." Haley was able to pinpoint the month of February as "torture for ag teachers - we used to joke that we saw each other more during the month of February than we saw our families." Alex emphasized the "seasons" of the job, explaining that there may be seasons that are "a little more work-heavy" and seasons where "you're going to have more freedom." Leah shared that she copes with these heavy work periods by "knowing that this doesn't last forever, knowing that I just got to get over this hump," and Alex and Robin both mention a "light at the end of the tunnel." Alex took a moment to reflect on the teacher retention issue, sharing, "in five years, how many teachers actually survive…it's very little…because I feel like that [load] is so daunting at the beginning [of teaching] and so large that [new teachers] don't see the light at the end of the tunnel."

Conclusions and Recommendations

Teacher margin is critical for professional growth and retention (Marzolino & McKim, 2023; McClusky, 1963; McKim & McKim, 2023); thus, understanding the professional experiences of agriculture teachers in relation to their margin is critical within a sustainable system of agricultural education. In this study, we explored the workload and margin of agriculture teachers in Michigan. Our analysis had two limitations. First, this study reports the experiences of eight SBAE teachers in a single state; we recognize the limited scope and recommend future work exploring the lived experiences of SBAE teachers in different areas. Second, teacher load and power change daily as well as gradually throughout a career, influenced by acquiring experience and unpredictable life circumstances. Therefore, the data collected in this study are a snapshot that will continually change. Thus, we recommend continued scholarship exploring how SBAE teachers experience margin across career stages and other non-work transitions. As teacher retention remains a consistent issue, developing our understanding of teacher margin, including the current study, will inform strategies for future change.

To synthesize the findings from this study, three emergent conclusions are shared, starting with the Noble Sacrifice Paradox.

The Noble Sacrifice Paradox

The overall theme from this study is *The Teacher's Noble Sacrifice*. This theme describes a mindset participating teachers held containing two dimensions. First, teachers wanted to continually expand their ability to provide plentiful opportunities for students, a noble endeavor. Second, teachers were willing to sacrifice parts of themselves (e.g., time, energy, relationships, health) to achieve that noble endeavor. The paradox of noble sacrifice, however, is the sacrifices

required to achieve the ever-expanding noble outputs within agricultural education often erode the ability (i.e., power) of teachers, forcing them to question their future in the profession.

The Experience Conundrum

The "solution" to the noble sacrifice paradox is increasing teacher power while limiting the expansion of outputs expected from the teacher and the program. Expanding power and intentionally managing expectations appear achievable through experience, phrased by participants as the "light at the end of the tunnel." The experience conundrum, however, is teachers find it hard to cling to a non-guaranteed, brighter future when in prolonged periods of margin deficit. The time delay (Marzolino & McKim, 2023) required when relying solely on experience to build teacher power and margin is untenable for early career teacher retention. To address this conundrum, we unpack four strategies for increasing teacher power, informed by the experiences of participants in our study.

First, early career teacher power should be built by increasing work efficiency and normalizing firm boundaries. Second, teacher power appears to increase through workload predictability; therefore, mapping the seasonality of work expectations for early career teachers could be an effective way of increasing margin. Third, encouraging teachers to adjust the definition of success away from things that are hard to achieve and reserved for a few teachers/programs (e.g., winning a state contest) to things achievable by all teachers/programs (e.g., building meaningful connections with students, facilitating innovative instruction) may also bolster power. Fourth, teacher power is rooted in community, including students and other SBAE teachers. Thus, empowering these communities to provide support which is authentic and aligned to the vision of teachers is critical to enhancing teacher power.

The Identity Challenge

Teachers in this study appeared to struggle aligning their identity, boundaries, and the expectations of the profession. Teacher identity appeared intertwined with the lofty expectations of productivity and success embedded within the profession. At the same time, teachers articulated the necessity of maintaining boundaries. The identity challenge emerged as the boundaries teachers wanted to establish precluded realizing their achievement-based identity as agricultural educators. This was evident as teachers discussed busy seasons within the profession. These busy seasons yielded power- and identity-affirming student/program success; however, these seasons also created the trials of margin deficit which led teachers to question their future in the profession.

To address the identity challenge, we must critically analyze the interconnections of teacher identity and success to begin untangling being an agriculture teacher from being unable to maintain desired boundaries. To be sure, the interconnectedness of agriculture teacher identity and sacrifice-requiring achievement is strong; thus, the pathway to separating these two will require every actor within the system of agricultural education critically evaluate their role in contributing to the problem. To guide this work, a collective vision for a sustainable agricultural education system in which agriculture teacher *expectations* are reasonable, *boundaries* are permissible, and *identities* are obtainable is recommended.

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Examination of Skin Shades and Undertones Within Secondary Classroom Textbooks

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Abstract

Classroom textbooks are a resource that teachers have used for over a century to provide a plethora of learning opportunities. Meanwhile, for over 40 years psychologists have examined the implicit characterizations of likeness and bias among the shades and undertones of skin color. Within this study, researchers examine the skin shades and skin undertones that exist within 45 agriculture textbooks released by three of the US' largest textbook publishing companies. A total of 2,824 images were reviewed, scanned, coded, and recoded to determine a preferred skin shade and skin undertone use within the last ten years of textbook publications. Results determine the existence of a color line that does not reflect that of the country. In addition, numerous skin shades and skin undertones were not identified within the images. Recommendations exist for practitioners, teacher educators, scholars, authors, and textbook publishing companies.

Introduction

Colorism is the hierarchical social value of skin colors and skin undertones (Dixon & Telles, 2017), which is not necessarily tied specifically to race, but rather the phenotype of an individual (Monk Jr, 2021a; Hannon, 2015; Strmic-Pawl et al, 2021). One unique aspect of colorism is the perceived likeness from both in-group and out-group members of any given Ethnoracial background (Uzogara & Jackson, 2016). Scholars define the skin color and skin tone where colorism occurs as the *color line*. Preconceived concerns and serenity toward an individual from both in-group and out-group members are linked to career acceleration as well as negative physical health effects (Monk Jr, 2021a). Unfortunately, the physical health effects span larger than emotional discomfort.

Colorism and the color line is not a new or emerging issue, rather first brought to scholarly attention by DuBois who directly refers to the color line in *Of the Dawn of Freedom* essays explaining, "the problem of the twentieth century is the problem of the color line, —the relation of the darker to the lighter races of men in Asia and Africa, in America and the islands of the sea" (Du Bois, 1903, p.16). The color line refers to a skin shade/tone that typically is reflective of a lighter color. Individuals whose shade and tone are closer to the color line receive more favorable opportunities than individuals further from the color line, a phenomenon which has been passed through generations of communities from various ethnicities (Kerr, 2005).

The color line can account for negative impacts on educational performances; students of darker shades and reddish tones are more susceptible to be admitted into special education programs, after school suspensions, and experience poor academic instruction (Crutchfield et al., 2022; Mickelson, 2014). To gain a further historical understanding of the trends of colorism in the United States, one should look back to Jim Crow Era policies. Latino youth who were closer to phenotypic whiteness, have been observed having an easier time assimilating and having access to in-group socialness; thus, resulting in improved school performance (Altschul et al., 2008).

Previous work regarding representation and the types of representation present show anti-black ideologies and narratives of Afro-Latinos, including less favorable conditions for Afro-Latinos with darker skin color (Busey, 2021). Additional colorism studies show the closer to whiteness, the less in-group and out-group discrimination is faced (Abrams et al., 2020; Moffitt, 2020). While previous literature showcases how skin color representation exists, it is minimal in the field of agricultural education (Reddy-Best et al., 2018).

Currently, there is no previous work regarding both colorism and agricultural education; however, research regarding representation does exist (Brown et al., 2022; Estepp et al., 2022; Cropps & Esters, 2021; Wiley et al., 1997). If the acceptability of, and the comfortability of, an individual's skin tone exists within the employment of immigrants (Han, 2020), occupation and income levels (Keith & Herring, 1991), criminal justice (Monk, 2019), and preschool television programs (Hamlen & Imbesi, 2020); then it is easy to assume that a favorable skin color line exists among the materials that are exposed to secondary agricultural education students.

Theoretical/Conceptual Framework

This study utilizes a conceptual framework derived from both Critical Race Theory (CRT) and the theory of Social Semiotics. Each assisted the researchers in the interpretation of data, which led to the conclusions, implications and recommendations. Critical Race Theory (CRT) is comprised of five main tenants, all of which revolve around the salience of race and its position in our society, experiences of people of Color, and dismantling of the current systems in place which uphold white dominance (Cabrera, 2018; Bell, 1992). Critical Race Theory is first seen in the field of education in the turn of the century, with Ladson-Billings (1998) who explains the importance of engaging in racial discourse in education, as education is a field which is not always equitable for Black, Indigenous, and other People Of Color (BIPOC) students. The five tenants of Critical Race Theory, when applied to education, is rooted in the concept of: race is a permanent fixture within the society of the United States; the ideology challenges dominant perspectives; a true commitment to social justice; centrality of lived experiences and experiential knowledge; and the need for multi-disciplinary perspectives (Gillborn & Ladson-Billings, 2010; Yosso et al., 2009).

Social Semiotics is a linguistic theory which examines how an individual's culture, experiences, and background impacts the interpretation of signs (Rightler-McDaniels & Hendrickson, 2014). For example, an individual who is familiar with driving norms in the United States will associate a red octagon to stopping, even if the red octagon does not have the word *stop* on the sign or is not necessarily in a road. Experiences can drive an individual's interpretation of any given sign. In the case of textbook representation, the signs being used are images within the textbooks. In 2014, Akrong discovered that over 80% of students who favored the images of individuals in an exercise book were interested in obtaining a career in health and fitness. The images provided an implicit semiotic reference for the reviewers/students.

Purpose

The purpose of this descriptive study is to identify the central skin shade and skin undertone that comprise a skin color line utilized in secondary agricultural education textbooks. The following objectives sought to assist in the solving the study's purpose:

Objective 1: Describe the skin colors present within secondary agriculture textbooks.
Objective 2: Describe the skin shade present within secondary agriculture textbooks.
Objective 3: Describe the skin undertones present within secondary agriculture textbooks.
Objective 4: Describe the relationship of the skin colors present to the book publication year.

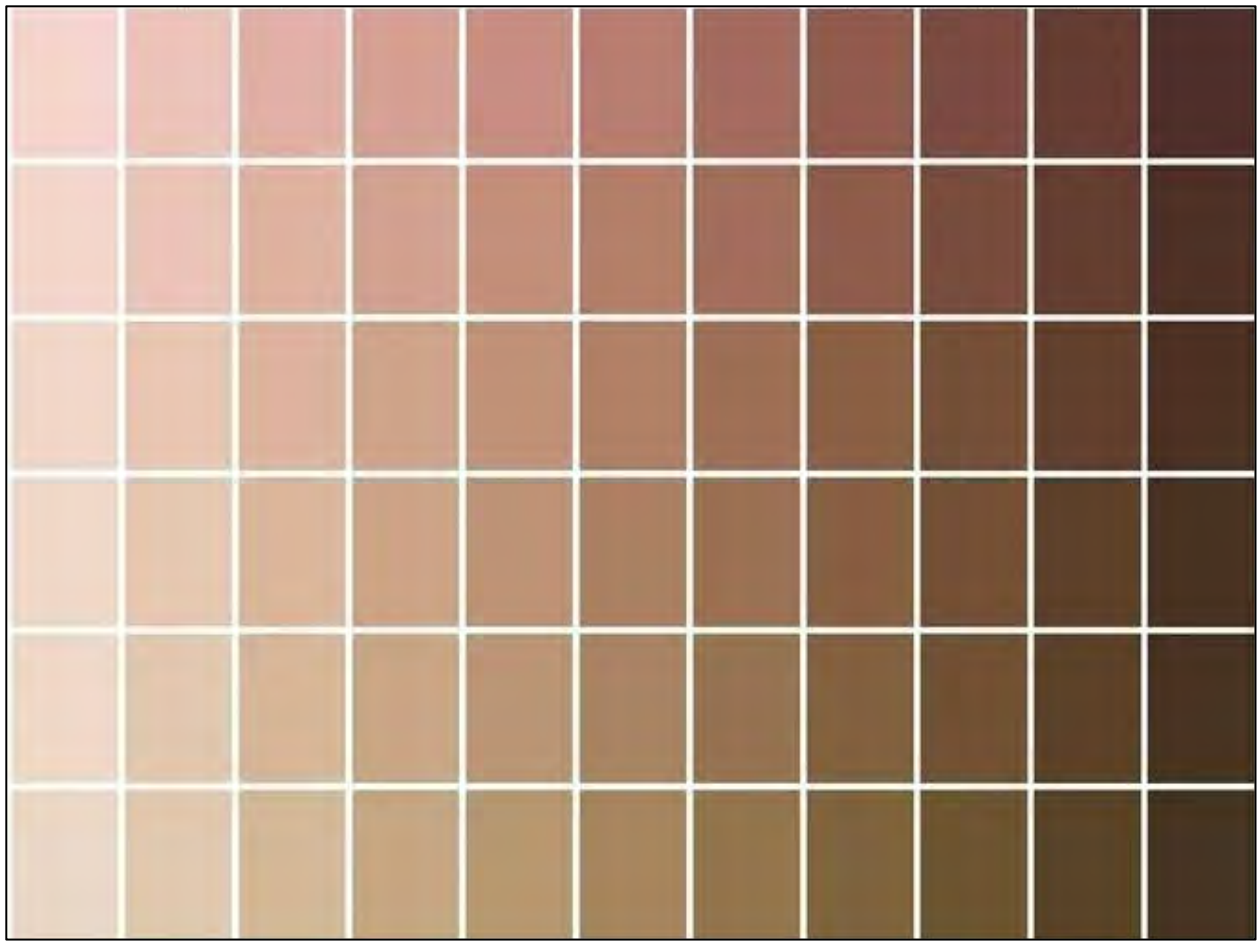
Methodology

The researcher utilized a descriptive cross-sectional research design to analyze photographs present within secondary agriculture textbooks. Cross-sectional research is descriptive, takes place in a specific moment in time, and is used to determine frequency of an outcome in a population (Levin, 2006). In the context of the current study, the researcher observed textbook photographs and determined the varying skin colors and undertones. Using descriptive cross-sectional research is useful within social sciences, as it allows researchers to observe a sample of the population within a short amount of time and allowing research to show current trends (Lunenburg & Irby, 2013). The researcher used a transformative worldview in which the researchers are interested in marginalized populations and the power relationships currently present within society (Creswell & Creswell, 2017).

The population of the study was the 33 textbook publishing companies within the United States according to Hickey and Jones (2012). To assist in narrowing the scope and minimize the opportunity for missing documents, the top five textbook publishing companies were selected; however, only three produced secondary agriculture textbooks: Cengage, McGraw-Hill, and Pearson (BookScouter, 2020). Forty-five textbooks were obtained from the textbook publishers via online book subscription, purchase, or loan. Each textbook represented the books available for purchase for all secondary schools for the 2020-2021 academic school year.

To accurately record skin color data, the L'Oreal Skin Color Guide (Figure 1) was utilized. The L'Oreal skin color guide is comprised of 66 skin colors and moves across the grid from lightest to darkest shades, and down the grid from pinkish to yellowish undertones (Burns, 2021; Garcia & Abascal, 2016). Previous research observing skin colors utilized the Martin-Massey Skin color guide, which comprises of ten shades, ranging from the lightest to the darkest possible shade (Fuentes et al., 2021; Reddy-Best et al., 2018). However, due to low levels of inter-coder reliability present in the Martin-Massey scale as well as the ease of study replication (Hannon & DeFina, 2016), the researchers chose the L'Oreal Skin Color Guide. The L'Oreal Skin Color Guide is not an exhaustive scale, but is widely used (Ly et al., 2020) for its accurate depiction and triad evaluation of color, undertone, and shade. After recording each data point, frequency tables were designed to reflect the L'Oreal Skin Color Guide in an effort to determine a skin color line (Reddy-Best et al., 2018) within the classroom textbooks. The L'Oreal Skin Color Guide provides a digital site that provides a thorough analysis of each image through its scanning software.

Figure 1.
A Replication of the L'Oreal Skin Color Guide Reference Table



While examining the images of individual people within the textbooks, the researchers recorded color, undertone, and shade as a magnitude code onto an Excel spreadsheet. All magnitude codes were summated to provide an overall frequency for each shade and undertone present. Following similar methodology from previous studies regarding textbook representation looking at both colorism and gender, only individual photos were utilized (Reddy-Best et al., 2018). An image with a single individual refers to a single human individual, but not merely the only subject captured in the photo. To be considered an individual photo, the photo must refer to the human with a caption identifying them as the single focus of the photo.

Textbooks with black and white photos were not utilized in this study to increase the researchers, and the software's, ability to accurately code skin colors, skin shades, and skin undertones present. At the conclusion of the review, the researchers evaluated 2,824 photos. To increase reliability of skin color, shade, and undertone coding, the Schem Color online system was used to isolate skin colors to best match skin colors present to skin color correlated in the scale. The online system was utilized in areas which had a clear view of the skin color, and not in over exposed areas or areas with shadows. To maintain consistency in interrater reliability, the researchers utilized a test-retest reliability with an 92% agreement level.

Results/Findings

The skin colors represented across all 45 textbooks show where representation is missing, as six shades in the L'Oreal Skin Color Guide have no representation at all. The L'Oreal Skin Color Guide reads as co-ordinates, matching vertical number and horizontal letter to determine specific square. When shade alone is referenced, only a number will be used, indicating the total for the given shade. When undertone alone is referenced, only a letter will be used, indicating the total shades present with the given undertone. When specific colors, meaning both shade and undertone, are referenced, both a number and a letter will be utilized to represent the exact coordinate of the guide.

Objective 1 refers to the overall representation of skin colors present within secondary agriculture textbooks. The majority of the skin colors present reflected lighter skin undertones and shades with Skin color 3A (*f* = 172; 6.09%) being identified the most followed by 2D (*f* = 157; 5.56%) and 1D (*f* = 151; 5.35%). Multiple skin colors were non-represented, but the common theme were the darker skin colors beginning at 7F (see Table 1).

Table 1.
Overall representation of skin colors in secondary agriculture textbooks


1 2 3 4 5 6 7 8 9 10 11
(f = 55) 1.95%
(f = 111) 3.93%
(f = 172) 6.09%
(f = 123) 4.36%
(f = 96) 3.4%
(f = 29) 1.03%
(f = 13) 0.46%
(f = 10) 0.39%
(f = 13) 0.46%
(f = 11) 0.39%
(f = 4) 0.14%
A
(f = 82) 2.9%
(f = 103) 3.65%
(f = 125) 4.43%
(f = 88) 3.12%
(f = 51) 1.81%
(f = 24) 0.85%
(f = 15) 0.53%
(f = 8) 0.28%
(f = 6) 0.21%
(f = 7) 0.25%
(f = 2) 0.07%
B
(f = 99) 3.51%
(f = 124) 4.39%
(f = 120) 4.25%
(f = 89) 3.15%
(f = 32) 1.13%
(f = 23) 0.81%
(f = 18) 0.64%
(f = 10) 0.35%
(f = 3) 0.11%
(f = 3) 0.11%
(f = 3) 0.11%
C
(f = 151) 5.35%
(f = 157) 5.56%
(f = 123) 4.36%
(f = 68) 2.41%
(f = 29) 1.03%
(f = 14) 0.5%
(f = 11) 0.39%
(f = 6) 0.21%
(f = 0) 0.0%
(f = 1) 0.04%
(f = 0) 0.0%
D
(f = 92) 3.26%
(f = 100) 3.54%
(f = 79) 2.3%
(f = 31) 1.1%
(f = 12) 0.42%
(f = 7) 0.25%
(f = 4) 0.14%
(f = 1) 0.04%
(f = 2) 0.07%
(f = 0) 0.0%
(f = 1) 0.04%
E
(f = 58) 2.05%
(f = 74) 2.62%
(f = 74) 2.62%
(f = 37) 1.31%
(f = 12) 0.42%
(f = 5) 0.18%
(f = 0) 0.0%
(f = 0) 0.0%
(f = 1) 0.04%
(f = 0) 0.0%
(f = 2) .07%
F

Objective 2 refers to the skin shades present within the textbooks. The skin shades are in reference to the horizontal numbers across the top of the L'Oreal Skin Color Guide. The shades increase in darkness as the numbers increase. Skin shade 3 was the most prevalent (f = 693; 24.54%), followed by skin shade 2 (f = 669; 23.69%) and skin shade 1 (f = 537; 19.02%). The skin shades least present in the secondary textbooks were skin shade 11 (f = 12; 0.41%); skin shade 10 (f = 22; 0.78%), and skin shade 9 (f = 25; 0.89%). Shades the 6 through 11 accounted for merely 9.09%. Shades 1 through 5 of the skin color guide accounted for over 90% of the population.

Table 2.
Skin shades present in secondary agriculture textbooks (N = 2,824)

Shade	Frequency	Percent	Ranking
1	537	19.02	3
2	669	23.69	2
3	693	24.54	1
4	436	15.44	4
5	232	8.22	5
6	102	3.61	6
7	61	2.16	7
8	35	1.24	8
9	25	0.89	9
10	22	0.78	10
11	12	0.41	11

The intent of objective 3 was to determine the representation of skin undertones present within the secondary agriculture textbooks. The skin undertones are represented in the skin color guide using the vertical letters A-F. The undertones shift from red undertones to yellow undertones alphabetically starting at A. The results will be reported A-F and represent all shades for the given undertone. Table 3 displays skin undertone A to be most prevalent (f = 637; 22.56%), followed by D (f = 560; 19.83%), and skin undertone C (f = 524; 18.56%). Skin undertone F, that was reflective of more yellow, was the least identified (f = 263; 9.31%).

Table 3
Describe the skin undertones present in photographs within secondary agriculture textbooks

Undertone (Vertical Letters)	Frequency	Percent	Ranking
A	637	22.56	1
B	511	18.09	4
C	524	18.56	3
D	560	19.83	2
E	329	11.65	5
F	263	9.31	6

The outcomes of Objective 4 will describe the relationship present among skin color representation and the publication year of the textbooks sampled. The textbooks within the sample were all published between 2011-2021 (see Table 4). The majority of skin representation

were in the books published in 2015 with Skin shade 2 (f = 231; 27.83%) being the most prevalent. In 2021, skin shades 9-10 were missing leaving the year as the least diverse of the 11 years of published textbooks.

Table 4
Describe the relationship of book publication year to skin shade representation

Year	1	2	3	4	5	6	7	8	9	10	11
2011	25.41% (f = 62)	17.62% (f = 43)	20.49% (f = 50)	20.08% (f = 49)	6.97% (f = 17)	4.92% (f = 12)	3.28% (f = 8)	0.41% (f = 1)	0.82% (f = 2)	0.0% (f = 0)	0.0% (f = 0)
2012	14.41% (f =34)	22.88% (f = 54)	19.92% (f = 47)	19.92% (f = 47)	3.14% (f = 31)	3.81% (f = 9)	2.54% (f = 6)	2.12% (f = 5)	0.42% (f = 1)	0.42% (f = 1)	0.42% (f = 1)
2013	23.31% (f = 62)	18.8% (f = 50)	17.29% (f = 46)	15.41% (f = 27)	0.15% (f = 22)	8.27% (f = 22)	2.26% (f = 6)	2.26% (f = 6)	1.13% (f = 3)	0.75% (f = 2)	0.38% (f = 1)
2014	8.33% (f = 2)	29.17% (f = 7)	25.0% (f = 6)	8.33% (f = 2)	6.67% (f = 4)	0.0% (f = 0)	4.17% (f = 1)	0.0% (f = 0)	0.0% (f = 0)	4.17% (f = 1)	4.17% (f = 1)
2015	20.36% (f =169)	27.83% (f =231)	25.9% (f =215)	12.05% (f =100)	6.02% (f = 50)	2.65% (f = 22)	1.81% (f = 15)	1.45% (f = 12)	1.08% (f = 9)	0.72% (f = 6)	0.12% (f = 1)
2016	19.03% (f = 59)	18.06% (f = 56)	27.42% (f = 85)	19.35% (f = 60)	0.97% (f = 34)	2.26% (f = 7)	0.97% (f = 3)	0.32% (f = 1)	0.32% (f = 1)	1.29% (f = 4)	0.0% (f = 0)
2017	15.94% (f = 22)	24.64% (f = 34)	26.81% (f = 37)	15.94% (f = 22)	5.8% (f = 8)	3.62% (f = 5)	2.9% (f = 4)	2.17% (f = 3)	0.72% (f = 1)	0.72% (f = 1)	0.72% (f = 1)
2018	17.99% (f =25)	28.06% (f = 39)	28.78% (f = 40)	17.27% (f = 24)	14.39% (f = 20)	7.97% (f = 11)	3.62% (f = 5)	2.17% (f = 3)	3.62% (f = 5)	0.72% (f = 1)	1.45% (f = 2)
2019	18.35% (f = 29)	15.82% (f = 25)	21.52% (f = 34)	22.15% (f = 35)	1.39% (f = 18)	4.43% (f = 7)	1.9% (f = 3)	0.63% (f = 1)	0.63% (f = 1)	3.16% (f = 5)	0.0% (f = 0)
2020	20.48% (f = 60)	28.67% (f = 84)	24.57% (f = 35)	11.95% (f = 35)	5.8% (f = 17)	3.07% (f = 9)	3.41% (f = 10)	1.02% (f = 3)	1.02% (f = 3)	0.0% (f = 0)	0.0% (f = 0)
2021	11.8% (f = 19)	27.33% (f = 44)	37.89% (f = 61)	13.66% (f = 22)	5.59% (f = 9)	0.62% (f = 1)	2.48% (f = 4)	0.62% (f = 1)	0.0% (f = 0)	0.0% (f = 0)	0.0% (f = 0)

Conclusions & Implications

The researchers acknowledges none of the photos within the textbooks were photographed with the intention of skin color shades and tones being recorded. Skin colors may be altered by lighting, shadows, and possible filters. However, the author made no adjustments to the skin colors to show as close to exact representation present within the textbooks. The use of the color-picking technology assisted in recording accurate data which could not be altered by researcher bias, which is an issue seen in colorism studies which do not allow researchers the ability to directly match skin color to skin color guides (Hannon & DeFina, 2016).

Although it cannot be assumed textbooks authors are purposefully excluding people of darker skin shades and undertones from textbooks, the data shows representation is missing resulting in a true color line representation within the textbooks from three of the largest textbook publishers in the United States. With the absence of many shades and undertones, student acknowledgement of representation is a real concern toward the recruitment and retention of racially diverse student groups to agriculture.

The severe shift in representation is present when comparing the second half of the skin color guide to the first. Representation of individuals with fair skin and red undertones is present; however, moving down to both yellow undertones and darker skin shades, representation decreases at a great amount. The lightest five shades hold the majority of representation within the secondary agriculture textbooks at an astounding 90.91%. Monk Jr. (2021b) posits that skin shades 1 and 2 have minimal representation in the United States as opposed to the findings. For students of Color who are darker than Shades 5-6, the social semiotics provides messages of little representation within the disciplines of agriculture. The color-line present within the textbooks is reflective of studies regarding education and the negative experiences of students of Color (Crutchfield et al., 2022).

A fairly distributed line of skin undertones are present in the textbook; however, a natural breaking point seems to exist between undertones A-D from E-F. As a result, the textbooks reflect undertones that resemble more fair+pink rather than fair+neutral (Lovas, 2017). These continued semiotic messages implicitly provide a characteristic of human skin-tone bias (Rossen et al., 2008). Although teachers and teacher educators are limited in their efforts to change the undertone use within textbooks, they can be cognizant of the resources provided and reflect undertones that reflect a variation of the fair+pink, fair+yellow, and fair+neutral skin undertones.

Across all 45 textbooks the results yielded in 6 darker shades had no representation present. Overall, the most tones present within the textbook are fairer shades with a red undertone. While undertones have even distribution, shades are missing the same amount of equally distributed representation among the textbooks. A distinct difference is representation is present in the bottom right corner of the L'Oreal Skin Color Guide, which signifies the lack of darker skinned individuals with yellow undertones.

Due to the growing climate of cultural awareness, the researchers sought to examine the data to specific years, one can see a change in representation from year to year. Nevertheless, the data does not support an improvement of representation across skin colors. While some years do have minimal representation across all shades, the textbooks from 2020 and 2021 do not show representation at all for the two darkest shades featured on the L'Oreal Skin Color Guide. Although authors did not record repeating volumes and their possible increase, overall, there was not an increase of representation in the most recent publications featured within the sample size. Considering that the largest volume of skin color diversity occurs mostly in 2015, leads the researchers to posit that the context of the book has a larger implication rather the year.

The data shows exactly where representation is occurring and where the representation is lacking. If one combines the results from research objective 2 & 3, an agricultural education textbook color line presents itself which entails color shades 1-4 and color undertones A-D. As a result, a deficiency exist implying a color line representation and a color line bias. Whether implicitly or explicitly, the social semiotic could be creating a subconscious signal of reciprocal distancing among students of Color leading to feelings of isolation (Essien et al., 2020), which is often seen in fields such as STEM (Hurtado et. al., 2010). The lack of representation of students of color needs to be addressed. Missing representation may lead to students lacking a sense of belonging within the field and may prompt students to leave agricultural education classes.

Recommendations

Publishing companies and textbooks authors should place a larger emphasis on skin color variation when creating educational resources for youth. Resources should be provided to textbooks authors to ensure creating equitable and diverse educational resources is the starting point and should be expected. Specific resources for creating culturally competent resources may include a number of diversity focused and equitable initiatives. Secondary teachers should continue to request textbooks and review the books to see if the images reflect their community and student enrollment prior to adopting the books as a classroom resource.

When addressing the possibility of how a textbook should look to create equitable representation of all skin colors, shades must have the equal representation seen when isolating undertones present. Overall, there is an even distribution of undertones present within the secondary agriculture textbooks. This even distribution should be the expectation for skin shades to ensure students see representation as close as possible to themselves.

Future research surrounding intersectionality and representation of textbooks in agricultural education should be addressed. While this study shows where representation is missing, it does not begin to break down the intricacies associated with representation of intersecting identities such as gender and skin color. Women of Color may not see themselves represented at the same rate as their white or male counterparts. As intersectionality is an important part in addressing and forming identity, it should be explored and studied to provide the field with specific information pertaining to representation.

Future research surrounding colorism and agricultural education should be explored such as: student perception of textbook representation, student salience of skin color and perceived discrimination, and student perception of in-group and out-group interactions regarding different skin colors. While research regarding racial equity and students of color is increasing in the field of agricultural education, skin colors and effects of colorism are not currently being explored (Barajas et al., 2020). The existing gap in agricultural education research should be addressed considering the projected increase of multiracial individuals who may be ethnically ambiguous in their phenotype (Hyman, 2018).

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The Needs of Oklahoma School-Based Agricultural Education Teachers Related to Teaching Agriculture, Food and Natural Resources Topics

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Abstract

One of the most important factors to developing and sustaining agricultural educators is identifying their highest in-demand needs. Identify teacher needs on a regular basis is important to continue offering professional development opportunities that are relevant to current situations facing the teaching population. This study, undergirded in Teacher Human Capital Theory, aimed to identify the technical agricultural topics school-based agricultural educators (SBAE) deem as important to their teaching career, as well as their perceived level of knowledge on the 56 identified topics. Ranked Discrepancy Scores (RDS) were utilized to analyze the perceptions of the SBAE teachers across the eight agricultural career and content pathways identified by The Council. Agricultural teachers across Oklahoma were found to have in-demand needs across all technical agricultural topics identified in the instrument. The agricultural career and content pathway of agricultural biotechnology systems was found to have the highest mean RDS across the eight agricultural career and content pathways. Findings from this study can aid Oklahoma State University in identifying purposeful and direct professional development that focuses on the highest in-demand needs of Oklahoma SBAE teachers.

This manuscript is based on data published in the Proceedings of the Western Region Conference of the American Association for Agricultural Education, Rankin et al., (2023).

Introduction,

One of the most critical factors in developing and improving agricultural educators is to correctly identify their highest in-demand needs (Layfield & Dobbins, 2002). Research in agricultural education has identified various teachers' training needs as it pertains to classroom management and instruction (Albritton & Roberts, 2020; DiBenedetto et al., 2018; Layfield & Dobbins, 2002; Smalley et al., 2019). As such, "agricultural educators are required to have both subject specific and technical knowledge requiring an appropriate amount of knowledge and skill to be considered an expert while constantly adapting to new technologies and practices in the field" (Albritton & Roberts, 2020, p. 140).

Prior experience in technical agriculture and natural resources, the designated agricultural career and content pathways taught, and a teacher's personal contextual experiences all influence their abilities, knowledge, and potential skill transference in educational settings (Yopp et al., 2020). Technological advances are continuing at a rapid pace, and as such, teachers need to be continually trained on up-to-date information and systems in content-related areas to remain effective in the classroom (Yopp et al., 2020). Teachers who possess a deep understanding of

different careers and content pathway knowledge tend to guide students in examining logic and reason across different content areas (Yopp et al., 2020).

Teachers have the greatest influence on students' future success (Chetty et al., 2014), but with the breadth of agricultural education, school-based agricultural education (SBAE) teachers need continued in-service in content and technical skills to be effective (Sorensen et al., 2010). The emerging needs of the early 2000s revealed technical agriculture skills in career pathways such as agribusiness systems, animal sciences, biotechnology systems, environmental systems, natural resources, plant science, and power, structural & technical systems (DiBenedetto et al., 2018). The agribusiness pathway was identified as an area of high need for Oregon SBAE teachers of all career phases, with specific gaps in recordkeeping and using AET (Sorensen et al., 2014). Additionally, this technical skill gap was found in Oklahoma preservice teachers who lacked the basic financial literacy skills to effectively instruct in the agribusiness pathway (Price et al., 2023). Animal sciences technical skills centered around small animal science and veterinary technology for Georgia SBAE teachers (Duncan et al., 2006; Peake et al., 2007). Technical teaching skills were needed for the biotechnology systems to advance general agriscience instruction as well as in focus areas of animal science and plant sciences (Duncan et al., 2006). Natural resources and environmental systems represent technical skills and content in aquaculture and soil management (Duncan et al., 2006; Joerger, 2002; Peake et al., 2007). Power, structural, and technological systems pathways depict a variety of skill gaps ranging from equipment repair and maintenance to electricity concepts (Duncan et al., 2006; Peake et al., 2007; Sorensen et al., 2010).

Furthermore, technology is rapidly developing, changing the career options for 21st century students and impacting the relevant practical skills and content SBAE teachers use to prepare SBAE students for careers (Christensen. et al., 2009). Demanding that current SBAE teachers not only have a breath of agricultural content knowledge and skills but also stay attuned to the advancements and innovations happening within agricultural career pathways (Peake et al., 2007). Following the recommendations of Duncan et al. (2006) to use timely and relevant state needs assessment to discover national trends to better recognize and meet SBAE teachers' technical skill and content knowledge needs.

Identifying the needs of school-based agricultural education (SBAE) teachers can provide opportunities for professional development and pre-service teacher education, which can lead to retention of teachers within the profession (Smalley et al., 2019). Challenges continually facing newly hired and veteran SBAE teachers include teaching practices and curriculum accessibility (Barry et al., 2022; Eck et al., 2019; Smalley et al., 2019). It is important to identify teacher needs on a regular basis to continue offering professional development opportunities that are relevant to current situations facing the teaching population (Avalos, 2011).

Purpose and Objectives

The purpose of this study was to identify the current level of knowledge and perceived relevance of teaching technical agricultural content topics in agricultural education by Oklahoma SBAE teachers. Specifically, technical agriculture topics across the eight agriculture, food and natural resources (AFNR) content pathways (The Council, 2023) were evaluated. This study aligns with the American Association for Agricultural Education research value related to *advancing public*

knowledge of AFNR systems (AAAE, 2023). One overarching research question guided this study: What are the needs of Oklahoma SBAE teachers related to teaching technical agricultural topics, based on ranked discrepancy scores (RDS), in the eight technical agricultural content pathways?

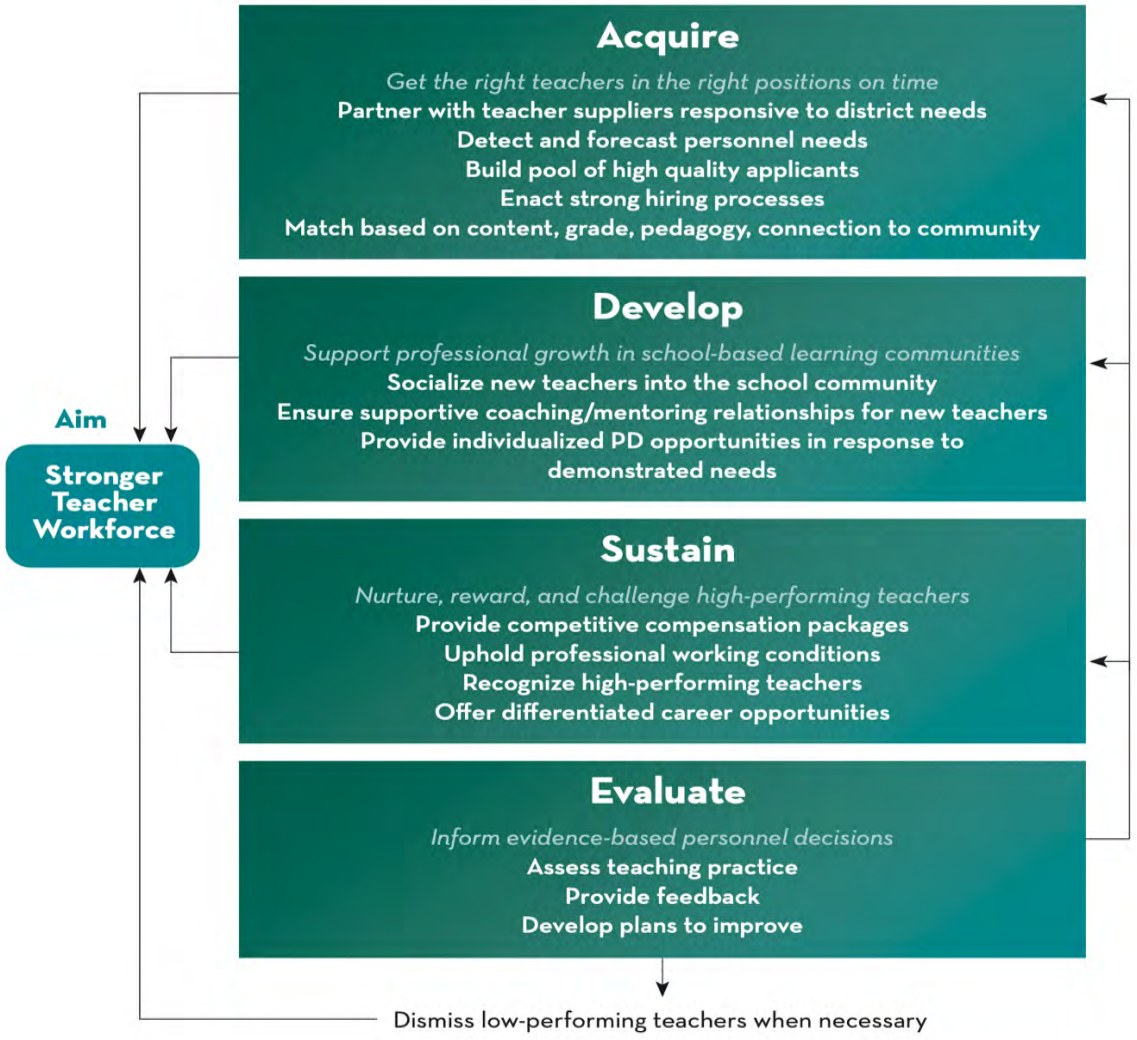
Theoretical/Conceptual Framework

This study was undergirded by the Teacher Human Capital theory (Myung et al., 2013), which outlined four distinct areas for advancing teaching and improving learning (see Figure 1). The Teacher Human Capital framework is presented as a systems approach with four criteria (i.e., acquire, develop, sustain, and evaluate) working together to explore teacher recruitment, development, reward, and retention (Myung et al., 2013). This study focused on the criteria of *develop* specifically. *Develop* outlines the need to "provide individualized PD opportunities in response to demonstrated needs" (Myung et al., 2013, p. 8).

Although teacher induction programs are common across the United States, induction programs that aim to be intensive, sequentially delivered, and comprehensive to individual teachers' needs are typically rare (Myung et al., 20130). Key considerations for developing teachers are to provide opportunities for intense and on-going professional development that focuses on their subject matter, as well as providing mentorship opportunities within their specific field of study (Myung et al., 2013). Additionally, professional development focused on developing key components of teachers should targeted to meet the needs of the teachers and be embedded in being able to be integrated immediately into the daily life of the teachers (Myung et al., 2013). Figure 1 outlines the complete model focusing on a stronger teacher workforce with four primary criteria.

Figure 1

Teacher Human Capital Framework



Note. From "A Human Capital Framework for a Stronger Teacher Workforce" (Myung et al., 2013, p. 8).

Methodology

This non-experimental survey research study employed a census approach to reach all Oklahoma SBAE teachers ($N = 462$). To achieve this goal, data was collected in-person at 25 regional FFA degree checks across the state. In Oklahoma, all teachers attend FFA degree checks in their designated region over a two-week period in late January and early February of 2023. The research team traveled the state to provide an overview of the needs assessment, distribute the survey instrument and collect completed hand-written questionnaires. Three-hundred and thirty-eight Oklahoma SBAE teachers returned a survey questionnaire, resulting in a 73.2% response rate.

Although this study resulted in a 73.2% response rate, non-response error is still of concern, given the census approach design. Therefore, 55 survey instruments were mailed, along with a

cover letter and pre-paid return addressed envelope to Oklahoma SBAE teachers who did not attend the state degree checks. The 55 Oklahoma SBAE teachers who received the questionnaire did not have a chance to complete the instrument at the degree checks due to weather related cancelations or travel limitations. This effort resulted in five SBAE teachers completing and returning the survey instrument to the research team. After analysis of non-respondents, data were found to be non-differential from the original respondents. Incomplete survey questionnaires were excluded, resulting in 328 (71.0% response rate) completed instruments for data analysis.

Two-hundred fifty-nine participants were traditionally certified in agricultural education, while an additional seven were found to be traditionally certified in other content areas. Forty-nine participants were identified as having an alternative certification, with an additional 10 having an emergency certification. Participants indicated having achieved either a bachelor's (n = 247), master's (n = 78), or an Ed.D./Ph.D. (n = 1) for their highest degree earned. Respondents were primarily male (69.9%), spanning single (60.0%) and multi-teacher (40.0%) programs. Lastly, participants were able to select all races/ethnicities that constitute their being, resulting in 247 self-identified as white, 56 as Native American, three as Hispanic, two as Black/African American, and one participant self-identified as Asian.

Instrumentation

The questionnaire was developed by Roberts and Dyer (2004) and modified by Saucier et al. (2010), Figland et al. (2019), and Coleman et al. (2020). The instrument was adopted and further modified for this study to fit the needs of Oklahoma SBAE teachers. A panel of experts then reviewed the instrument for face and content validity. This panel included (a) one university faculty member of agricultural education, (b) the state FFA advisor, (c) one regional agricultural education program specialist, and (d) two school superintendents who were previously SBAE teachers.

In total, the questionnaire included 57 items related to teaching technical agriculture across the eight content pathways identified by The Council (2023). Each of these items used two, 5-point Likert-type scales (1 = low agreement, 5 = high agreement). The first scale asked participants to rate their current knowledge level of the item (perceived ability, while the second focused on the degree of relevance the item had to their job (perceived importance).

Data Analysis

All data were transcribed from the paper instruments to Microsoft Excel© by a single research assistant prior to data being imported and analyzed using SPSS version 28 and Microsoft Excel©. This study implemented the ranked discrepancy model (RDM) to assess current competencies of SBAE teachers across Oklahoma. This model was selected as an alternative to the Borich (1980) needs assessment model based off the findings of Narine and Harder (2021). Specifically, this method was selected because "instead of positive scores indicating a lack of competence, the RDM provides a negative ranked discrepancy score RDS when training needs are greater (i.e., there are many individuals lacking sufficient ability and few individuals with an abundance of ability), which more clearly conveys that a problem exists that should be

corrected" (Narine & Harder, 2021, p. 108). This analysis requires the consideration of positive ranks (PR), negative ranks (NR), and tied ranks (TR) to fully understand the needs of the participants, ranging from those deemed experts to others who are novices, resulting in an RDS for each item (Narine & Harder, 2021).

Findings

After analysis and organization of the data, it was found that RDS scores ranged between -26.74 and -2.73, indicating a discrepancy between the perceived level of knowledge and relevance to the SBAE teachers' career field. These discrepancies with negative scores indicated SBAE teachers have a higher perceived relevance to their career field and a lower perceived level of knowledge (Narine & Harder, 2021). Agricultural Biotechnology Systems was found to have the highest mean RDS among its items compared to other pathways at -20.52. Food Products & Processing Systems was found to have the lowest average RDS among its items compared to the other pathways with a mean RDS of -6.99. Table one displays the six technical agricultural topics related to the agribusiness (AB) systems career and content pathway.

Table 1

Ranked Discrepancy Scores for Teaching Agribusiness Systems Topics

Item	RDS
Economics	-26.44
Recordkeeping Skills	-24.62
Issues in Global Agriculture	-22.49
Ag Business Operations	-20.97
Agricultural Sales and Marketing	-18.84
Financial Management	-2.77

The mean RDS for the agribusiness systems grouping of topics was found to be -19.36, which made it the second highest grouping of agricultural topics behind agricultural biotechnology systems. Economics was found to have the highest RDS (-26.44) among the six agribusiness systems technical agricultural topics. Table two displays the seven technical agricultural topics related to animal systems (AS).

Table 2

Ranked Discrepancy Scores for Teaching Animal Systems Topics

Item	RDS
Animal Diseases/Parasites	-18.84
Animal Nutrition	-14.59
Animal Production	-12.16
Animal Health	-11.25
Animal Reproduction	-8.21
Specialty Animal Production	-6.38
Show Animals (i.e., care, feeding, fitting,	

selection)	-6.08

The mean RDS for the animal systems grouping of topics was computed at -11.07. Animal diseases/parasites was identified as having the highest RDS (-18.84), while show animals (-6.08) was found to have the lowest discrepancy between Oklahoma SBAE teachers' knowledge level and the perceived importance to their careers. Table three displays the seven technical agricultural topics related to the agricultural biotechnology systems (ABS) career and content pathway.

Table 3

Ranked Discrepancy Scores for Teaching Agricultural Biotechnology Systems Topics

Item	RDS
Genetic Engineering	-25.84
Evolution of Biotechnology	-22.80
Preparing Solutions and Media	-20.97
Aseptic techniques	-20.97
Culturing Cells	-18.84
Bioethics, laws, and public perceptions	-17.63
Principles of Genetics	-16.41

The mean RDS for the topics related to agricultural biotechnology systems was -20.52. Genetic engineering was found to have the highest RDS (-25.84), whereas principles of genetics (-16.41) was found to have the lowest discrepancy between Oklahoma SBAE teachers' knowledge level and the perceived importance to their careers. Table four displays the six technical agricultural topics related to the environmental service systems (ESS) career and content pathway.

Table 4

Ranked Discrepancy Scores for Teaching Environmental Service Systems Topics

Item	RDS
Global Positioning Systems (GPS)	-24.01
Water & Wastewater Treatment	-21.28
Biofuels/Alternative Energy	-20.36
Surveying and Mapping	-16.72
Environmental Science	-11.85
Soil Science	-2.74

The mean RDS for the environmental service systems grouping of topics was -16.16. Global positioning systems (GPS) was identified as having the highest RDS (-24.01), while soil science (-2.74) was found to have the lowest discrepancy, which was tied for the lowest RDS, regardless of career and content pathway. Table five displays the seven technical agricultural topics related to the food products and processing systems (FPS).

Table 5

Ranked Discrepancy Scores for Teaching Food Products and Processing Systems Topics

Item	RDS
Meat Science	-10.33
Standards and Regulations	-9.12
Food Preparation	-7.60
Food Science and Technology	-7.60
Quality Control	-6.38
Food Storage	-5.17
Food Safety and Sanitization	-2.74

For the food products and processing systems technical agricultural grouping of topics, the mean RDS was found to be -6.99. Meat science was identified as having the highest RDS (-10.33), whereas food safety and sanitization (-2.74) was tied for the lowest discrepancy, regardless of career and content pathway, between Oklahoma SBAE teachers' knowledge level and the perceived importance to their careers. Table six displays the seven technical agricultural topics related to the natural resource systems (NRS) career and content pathway.

Table 6

Ranked Discrepancy Scores for Teaching Natural Resource Systems Topics

Item	RDS
Entomology	-21.28
Precision Agriculture	-17.02
Renewable Energy Resources	-17.02
Aquaculture	-16.72
Forestry	-15.20
Wildlife Management	-13.07
Natural Resource Management	-11.55

The natural resource systems grouping of topics mean RDS was -15.98. The technical topic of entomology was identified as having the highest RDS (-21.28), while natural resource management (-11.55) was found to have the lowest discrepancy between Oklahoma SBAE teachers' knowledge level and the perceived importance to their careers. Table seven displays the 10 technical agricultural topics related to plant systems (PS).

Table 7

Ranked Discrepancy Scores for Teaching Plant Systems Topics

Item	RDS
Turfgrass Management	-26.75
Tissue Culturing	-25.53
Landscaping	-19.45
Plant Classification	-17.93
Floriculture	-17.02
Plant Propagation	-14.89
Plant Growth	-12.77
Agronomy	-12.46
Plant Reproduction	-10.94
Nursery/Greenhouse Operations	-9.73

The plant systems grouping of topics mean RDS was -16.74. Turfgrass management was identified as having the highest RDS (-26.75), which was the highest technical agricultural topic among all, regardless of career and content pathway. Whereas nursery/greenhouse operations (-9.73) was found to have the least discrepancy between Oklahoma SBAE teachers' knowledge level and the perceived importance to their careers. Table eight displays the six power, structural and technical (PST) systems agricultural topics.

Table 8

Ranked Discrepancy Scores for Teaching Power, Structural & Technical Systems Topics

Item	RDS
Agricultural Mechanics Project Construction	-21.28
Electricity	-16.41
Agricultural Structures (i.e., building construction, concrete)	-13.68
Plumbing	-7.90
Arc Welding (i.e., SMAW, GMAW, GTAW)	-5.47
Oxyfuel Cutting/Welding	-3.34

The mean RDS for the power, structural and technical systems grouping of topics was -11.38. Agricultural mechanics project construction was identified as having the highest RDS (-21.28), while oxyfuel cutting/welding (-3.34) was found to have the lowest discrepancy between Oklahoma SBAE teachers' knowledge level and the perceived importance to their careers. Table nine outlines all technical agricultural topics across the eight AFNR content pathways in ranked order.

Table 9

Ranked Discrepancy Scores for Teaching Technical Agricultural Topics

Item	RD Scores	Content Area
Turfgrass Management	-26.75	PS
Economics	-26.44	AB
Genetic Engineering	-25.84	ABS

Tissue Culturing	-25.53	PS
Recordkeeping Skills	-24.62	AB
Global Positioning Systems (GPS)	-24.01	ESS
Evolution of Biotechnology	-22.80	ABS
Issues in Global Agriculture	-22.49	AB
Water & Wastewater Treatment	-21.28	ESS
Agricultural Mechanics Project Construction	-21.28	PST
Entomology	-21.28	NRS
Ag Business Operations	-20.97	AB
Preparing Solutions and Media	-20.97	ABS
Aseptic techniques	-20.97	ABS
Biofuels/Alternative Energy	-20.36	ESS
Landscaping	-19.45	PS
Agricultural Sales and Marketing	-18.84	AB
Animal Diseases/Parasites	-18.84	AS
Culturing Cells	-18.84	ABS
Plant Classification	-17.93	PS
Bioethics, laws, and public perceptions	-17.63	ABS
Floriculture	-17.02	PS
Precision Agriculture	-17.02	NRS
Renewable Energy Resources	-17.02	NRS
Surveying and Mapping	-16.72	ESS
Aquaculture	-16.72	NRS
Electricity	-16.41	PST
Principles of Genetics	-16.41	ABS
Forestry	-15.20	NRS
Plant Propagation	-14.89	PS
Animal Nutrition	-14.59	AS
Agricultural Structures (i.e., building construction, concrete)	-13.68	PST
Wildlife Management	-13.07	NRS
Plant Growth	-12.77	PS
Agronomy	-12.46	PS
Animal Production	-12.16	AS
Environmental Science	-11.85	ESS
Natural Resource Management	-11.55	NRS
Animal Health	-11.25	AS
Plant Reproduction	-10.94	PS
Meat Science	-10.33	FPS
Nursery/Greenhouse Operations	-9.73	PS
Standards and Regulations	-9.12	FPS
Animal Reproduction	-8.21	AS
Plumbing	-7.90	PST
Food Preparation	-7.60	FPS
Food Science and Technology	-7.60	FPS

Item	RD Scores	Content Area
Quality Control	-6.38	FPS
Specialty Animal Production	-6.38	AS
Show Animals (i.e., care, feeding, fitting, selection)	-6.08	AS
Arc Welding (i.e., SMAW, GMAW, GTAW)	-5.47	PST
Food Storage	-5.17	FPS
Oxyfuel Cutting/Welding	-3.34	PST
Financial Management	-2.77	AB
Food Safety and Sanitization	-2.74	FPS
Soil Science	-2.74	ESS

Note. AB = Agribusiness Systems. AS = Animal Systems. ABS = Agricultural Biotechnology Systems. ESS = Environmental Service Systems. FPS = Food Products and Processing Systems. NRS = Natural Resource Systems. PS = Plant Systems. PST = Power, Structural and Technical Systems.

The final rank order of the technical agricultural content pathways, based upon the mean RDS, was (a) agricultural biotechnology systems ($\bar{x}$ = -20.52), (b) agribusiness systems ($\bar{x}$ = -19.36), (c) plant systems ($\bar{x}$ = -16.74), (d) environmental service systems ($\bar{x}$ = -16.16), (e) natural resource systems ($\bar{x}$ = -15.98), (f) power, structural & technical systems ($\bar{x}$ = -11.38), (g) animal systems ($\bar{x}$ = -11.07), and (h) food products & processing systems ($\bar{x}$ = -6.99).

Conclusions, Implications, and Recommendations

SBAE teachers in Oklahoma identified a need related to all 56 items associated with teaching technical agricultural topics across the eight content pathways, aligning with nationwide training needs related to classroom instruction (Albritton & Roberts, 2020; Layfield & Dobbins, 2002; Smalley et al., 2019). The greatest need, based on RDS, was in agribusiness systems followed by plant systems and biotechnology systems. This aligns with the long-standing focus of SBAE programs in Oklahoma being related to animal science and agricultural mechanics. Agribusiness and biotechnology are newer focus areas as many programs expand their capacity with additional SBAE teachers (Rankin et al., 2023). This change in focus areas could be an implication of the change in technical and teaching needs in a post-COVID pandemic era.

Overall, the statewide needs assessment provided an opportunity for the research team to *evaluate* the teacher human capital, by allowing SBAE teachers to provide input based on their personal decision making and needs within their classroom (Myung et al., 2013). Providing SBAE teachers with an opportunity to self-evaluate and reflect on their practice leads to increasing their overall career specific human capital and their teaching effectiveness (Eck et al., 2021). In this case of this study, the needed career specific human capital relates to technical agriculture content knowledge to further student engagement in relevant content and curriculum (Barry et al., 2022; Eck et al., 2019; Smalley et al., 2019).

Implications of agricultural biotechnology systems having the highest mean RDS could be that SBAE teachers in Oklahoma see a need to learn more about the career and content pathway, as they previously may not have had coursework or training. Additionally, with the rise in

popularity of agriscience research supervised agricultural experiences (SAEs) in Oklahoma, SBAE teachers could potentially see a benefit to having agricultural biotechnology systems training for future SAE opportunities and course content offerings across other agriculturally related career and content pathways.

Ultimately, the findings of this study should be used to guide professional development in Oklahoma, as these are the current needs associated with the majority (71.0%) of SBAE teachers in Oklahoma (Avalos, 2011). Focusing on teacher development through the lens of the needs assessment helps to advance and improve participating teachers (Layfield & Dobbins, 2002). Furthermore, this purposeful professional development targeted at teacher's needs, corresponds with the *develop* function of the teacher human capital framework (Myung et al., 2013). Additional research is needed to determine the preferred method of receiving professional development to best meet the needs of SBAE teachers across Oklahoma. As this type of needs assessment has resulted in positive outcomes in multiple states to date, it is recommended that this study be replicated in states where a needs assessment has not been conducted in the past five years. Conducting needs assessments provide SBAE supporters (i.e., SBAE teacher preparation faculty, state FFA and agricultural staff, and career and technical education directors) an opportunity to determine state specific needs and provide purposeful professional development, resulting in impactful research.

It is also imperative to identify pre-service teacher needs as they journey through their post-secondary coursework. It is recommended that a modified version of this study be implemented to identify perceived knowledge level of different technical agricultural topics in the eight AFNR content pathways and their perceived importance to their teaching career. Conducting this study semesterly can allow for a longitudinal view of different teaching cohorts, and allow for faculty advisors to assist pre-service teachers in course selection as they proceed through their post-secondary educational programs.

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The Intersection of Imposter Phenomenon and Multiracial Identity of Youth in Secondary Agricultural Education

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Abstract

The racial demographic of the United States is ever changing, and the increase of multiracial children is substantial. This multiple-case study examined the lived experiences of multiracial youth in secondary agricultural education. This study finds evidence of Impostor Phenomenon among these multiracial students in regard their races. This study provides insight to advise other educational institutions and organizations on how these multiracial students perceive and are perceived, within agricultural education, how it affects them, and gives recommendations to improve the future experiences of multiracial students withing agricultural education.

Introduction

According to the U.S. Census (2021), the United States is more racially and ethnically diverse than ever before. Naturally, with more diversity in a population, so is the existence of intermarriage between races, ethnicities, and cultures. In 2013, one in ten babies born was identified as biracial - an increase of ten times the count in 1970 (Parker et al., 2019). Some people refer to being biracial, or multiracial, as being "mixed". Root (1992) uses the term multiracial to reference people who identify with two or more racial heritages, based upon socially constructed racial criteria. Thus, we will predominantly use multiracial through this study, although biracial may also be used.

Forty-six percent of the current multiracial population is under the age of 18 (Parker et al., 2019). Despite this, limited literature exists on multiracials in education, and even less literature regarding multiracial youth in education. In Millville et al. (2005), biracial adolescents were said to experience racism and pressure to identify with a specific racial group along with continuing curiosity and exploration about issues of race and culture. When it came to how multiracial individuals identified themselves, a study by Phinney and Alipuria (1996) revealed that most multiethnic participants at the college level used a monoethnic self-label, meaning that they identified as a single race/ethnicity. When it came to whether they used a White or a minority label, it varied based on the racial composition of the school they attended. Individuals associated with higher-status groups, within social backgrounds, are more likely to claim multiracial identity than those associated with lower-status groups (Townsend et al., 2012). The participants in the study by Phinney and Alipuria (1996) that were attending a college with a higher percentage of minority students tended to use a minority monoethnic label. A White monoethnic label was least frequently used, although half of the adolescents attending a campus that was majority White, used a White monoethnic label, showing signs of assimilation (Phinney & Alipuria, 1996).

A lot of the literature on assimilation has varying degrees of definitions, but according to Wallendorf and Reilly (1983), full assimilation is said to have occurred "when the impact of the norms associated with the culture of origin becomes very small, at which point the person has effectively become a member of the culture of residence". Unfortunately, this can mean the disappearance of an ethnic/racial distinction and the cultural expression of it through cultural and social differences (Alba & Nee, 1997). Some literature benchmarks intermarriage as part of assimilation (Rumbaut, 1997; Walters & Jiménez, 2005). Rumbaut (1997) suggested that

intermarriage further dilutes ethnicity and that these children want to be more American than Americans. Some multiracial individuals feel torn because "acting White" is regarded as disloyalty to one's group (Portes & Zhou, 1993). Although, they are never fully accepted by either the dominant group or their ethnic community (Alba & Nee, 1997). Multiracial research has been focused on individual identity development with little attention to parent-child relationships (Laszloffy, 2005). One of the biggest challenges for the children of interracial parents is that they lack a specific family member who can understand their racial identity (Rockquemore et al., 2006). Mixed-race individuals typically don't have parents with an identical racial background as them, and thus face the difficulty of finding racially similar role models (Townsend et al., 2009).

When it comes to education, the literature on the dynamics of multiracial individuals is somewhat limited, although the literature on these individuals is more expensive in education than in other areas. In a study done by Williams (2011), it was found that Black-White multiracial students had various and common experiences in school. While the teachers knew that the students were multiracial, they would identify them as being monoracial, specifically Black, with no regard as to what the students wanted to be identified as. Renn (2009) also notes the recurring situations in which students of multiple races and ethnicities are forced to "choose only one" on data collection through the federal government, in which they are not given the right to self-identify. The option to choose a multiracial option is a modern approach and was not available at the time. Johnston and Nadal (2010) infer that the message conveyed to these multiracial individuals as being “monoracial is the norm or ideal, and that being multiracial is substandard or different" (p. 127). The existing focus on multiracial literature is on developing a sense of identity and the internal struggle in choosing between multiple racial backgrounds (Poston, 1990) instead of examining race-related experiences within a monoracially-designed society (Johnston & Nadal, 2010).

In Collins's (2000) study of biracial Japanese Americans, he found that all the participants wanted people to know how it felt to be labeled as something they are not and to be recognized as their self-named identities. Identity conflict and partial or complete failure to integrate both heritages into a cohesive racial identity were evident in most of the participants when they were young. Many indicated that their development was influenced profoundly by their experience in the school context. Limited contact with multiracial or other children of color was a major factor and resulted in a generally negative development and validation of self. This was due to race-based acts of discrimination, bias, and stigmatization. Many felt rejected by members of both races since they were without peers who were like themselves. Most participants asserted their biracial identities gradually and experienced periods of confusion before reaching a positive identity.

Williams (2011) found that most of the multiracial participants in her study had mainly White friend groups when they were younger, but as they got older, transitioned to mainly Black friend groups. Unfortunately, the students who changed from White friend groups to Black, still did not entirely feel as if they fit in with either of their friend groups. Additionally, in another study, multiracial students also had to deal with discrimination and racial slurs by other students (Lewis, 2001). Findings by Brackett et al. (2006) suggest that not fitting into other people's conceptions of racial categories may lead to experiencing more racial discrimination. Cheng and Klugman (2010) found that most multiracial individuals tend to be less attached to their schools than their corresponding monoracial groups, suggesting that a sense of belonging is increased with the identification of a large distinct in-group. This lack of attachment is because multiracial

adolescents are defining themselves as distinct from monoracial students by identifying with multiple racial groups; thus, leading to feelings of impostorism.

Theoretical Framework

The concept of the Impostor Phenomenon (IP) refers to individuals who, despite being successful according to external standards, do not experience an internal sense of success. They consider themselves 'impostors'. They believe that their success has not come from their ability, but rather them having to work harder, manipulate others' impressions of themselves, or sheer luck (Clance & Imes, 1978). As a result of these feelings, they often limit their capabilities and stay in positions that are less than their abilities (Clance, 1985). The term Impostor Phenomenon was coined by Clance and Imes (1974), to describe people that doubt their abilities and competencies. Those experiencing impostor phenomenon ignore all evidence of competence and feel as if they are going to be exposed as an 'impostor' at any time. People who experience IP would not label themselves as impostors, but if they read the description, they would immediately connect to it.

Clance (1985) mentions six dimensions in which individuals experiencing IP display certain characteristics:

1. *The Impostor Cycle.* Clance (1985) states this cycle as: Invitation – Acceptance—Joy/Good Feelings—Bad Dreams/Worry/Fear— Immobility/Procrastination—Frenzied Work—Success—Praise—Relief—New Challenge—Denial of Previous Success—Fear Again. Impostors found themselves trapped in this behavior pattern, thus reinforcing the thought that their success was not due to their own abilities, but due to some other contributing factor (Clance et al., 1995).
2. *The Need to be Special, to be the Very Best*. People suffering from IP have been among the top performers since adolescence and have difficulty accepting the fact that they are one among many exceptional people and that they cannot remain number one forever (Clance, 1985).
3. *Superwoman/Superman Aspects*. Imposters are perfectionistic in their need to be the best and expect to do so flawlessly and with ease. This goal is difficult or impossible to obtain given our humanity, thus giving those with IP feelings of failure (Clance, 1985).
4. *Fear of Failure.* When those who experience IP have set a goal for themselves, they experience terror when thinking of failure. They work extremely hard to ensure they never fail because shame and humiliation are equated with underperformance and making mistakes (Clance, 1985).
5. *Denial of Competence and Discounting Praise.* Those who suffer from IP are "ingenious" in their ability to deny or disclaim the objective evidence that they are indeed intelligent and/or successful (Clance, 1985). They develop ways to discount proof that they are competent and refuse to accept and internalize this obvious proof. They possess the inability to accept positive feedback and can distort any resulting praise (Clance, 1985).
6. *Fear of and Guilt About Success.* Those who suffer from IP are frightened of the consequences of success that they crave and that their success will lead to being asked to take on more responsibility. Feelings of IP are used to provide them with a way to stay humble (Clance, 1985).

Although schools vary vastly from state to state, they are all continuously increasing in racial diversity, making it imperative for schools to increase their awareness of said diversity. This awareness should also come to include those extracurricular activities associated with the schools,

such as secondary agricultural education programs, to better support students of color (LaVergne, 2008). As found in Bernard et al. (2018), the possibility of racial discrimination experiences at Predominantly White Institutions (PWI) are suggested to lead to social isolation. This isolation may precede and perpetuate cognitions of IP that lead to making internal attributions or blaming themselves, to make sense of this racial discrimination (Bernard et al., 2018).

Research indicates that IP is higher among students in minority populations as a group (Parkman, 2016). Imposter Phenomenon is found to be influenced by experiences of racial discrimination (Bernard et al., 2018), primarily for the feelings of intellectual incompetence (Clance & Imes, 1978). The significance of this study is to see if the Impostor Phenomenon, regarding multiracial individuals and their identities, is prevalent due to the belief that they do not have the right to fully claim any of the races within themselves. Those who may experience racial IP are multiracial, and while they possess multiple races, they may have come to believe that they are not "enough" of either of their races to fully claim that they are members of those races. The difference between IP and racial IP is that IP is based on the individuals' feelings, while racial IP is based on the individual's feelings about whether society allows them to be labeled as the race(s) they claim to be. While those who experience IP are often successful in their endeavors, those who experience racial IP have the possibility of failure, not by their genetics, but because the society they are in does not accept them as the race(s) they choose to identify as. Racial Imposter individuals try to prove their claim to their race(s), through knowledge or a picture, but their claim can still be rejected by society (Chakaverty, (2022).

Purpose Statement and Research Objective

The purpose of this study was to examine the lived experiences of multiracial graduates of secondary agricultural education programs and determine if feelings of Impostor Phenomenon existed. The broad focus of this qualitative case study was to explore the lived experiences of multiracial graduates of secondary agricultural education programs. By studying lived experiences, the researchers analyzed how the interactions described by the participants between society, family, school faculty, and peers are impactful to multiracial students, and how those impacts affect feelings of being an impostor. Understanding these experiences can be beneficial for inclusion and the recruitment of multiracial-identifying students in agricultural education programs. The primary research question sought to determine: what elements of racial Impostor Phenomena exist for multiracial students during their enrollment in secondary agricultural education programs?

Methodology

To examine the lived experiences of multiracial graduates in secondary Agricultural Education programs across the United States, a multiple-case design was implemented. A case study facilitates the exploration of a phenomenon within its context using a variety of data sources (Baxter & Jack, 2008). Crabtree and Miller (1999) state that an advantage to this approach is the close collaboration between the researcher and the participant, enabling participants to tell their stories. Each participant was treated as a single case, and cross-case analysis was utilized to identify the themes. While the primary focus is on individual cases, researchers may engage in cross-case analysis to identify commonalities or patterns across multiple cases (Yin, 2014). Yin (2014) suggests that multiple case studies should have between two to ten cases depending on what

the researchers see is appropriate for the phenomenon. Having multiple cases allows the researcher to explore differences within each of the cases and draw comparisons (Yin, 2003).

After receiving approval from the Institutional Review Board (IRB), snowball sampling in the form of email advertisements was utilized by the researcher to obtain participants of multiracial backgrounds. To obtain participants, emails were sent to college professors of agricultural education who then forwarded to students who met the criterion. In the email, a Qualtrics survey was distributed to gauge interest in participating in the study. Twenty-seven participants, (n = 27), expressed interest in participating. When given the opportunity to schedule a time, only nine individuals (n = 9) scheduled an interview. Participants were selected first based on whether they were multiracial, and then if they were graduates of secondary agricultural education programs.

Consent was obtained from each of the participants before the research was conducted. Interviews were conducted in the form of one-on-one video conferencing. The video conference software allowed for the recording and transcription of the interviews. All interviews were conducted by the researcher. The researcher had 10 initial questions, though the interviews resembled more of a guided conversation. Longhurst (2003) states, "Although the interviewer prepares a list of predetermined questions, semi-structured interviews unfold in a conversational manner offering participants the chance to explore issues they feel are important" (p.145). Twenty possible follow-up questions were prepared to be asked as further probing questions to possible answers. The nature of the questions focused on the participant's experiences and feelings regarding their multiracial identities and their sense of belonging within different groups. After implementation, the interviews averaged 50 minutes.

A total of eight interviews were conducted out of the nine that completed the online questionnaire. The one individual who had previously responded with interest had misread the qualifications and was still currently enrolled in secondary education, thus making them ineligible. Initial interviews were conducted along with follow-up interviews. Field notes were taken during each interview. The interview recordings were username and password-protected and only able to be viewed by the researcher to maintain confidentiality. The researcher reflected on each interview after it was conducted and recorded in a reflective journal. All interviews were recorded and later transcribed for coding and interpretation. Part of the interpretation of the interviews and content of the field notes included analyzing for verbal and nonverbal cues seen in the recordings as they indicated various emotions (Tracy, 2013). These cues included changes in pitch or tone, disfluencies like "umm," and long pauses. The researchers' cycle of coding focused on the question: Which elements of racial Impostor Phenomenon existed during the secondary Agricultural Education experience? For this question, the researcher used Elaborative coding. The researcher used the six dimensions of the Impostor Phenomenon as the constructs and assigned each dimension a color in which they then highlighted data that fit each code in the corresponding color. The presence of two or more dimensions of IP alluded to experiences of the IP within each participant.

Reflexivity is deemed essential in qualitative research because the researchers are the "instruments" in data collection and recording (Glesne, 1999; Watt, 2007). Reflexivity statements should include the consideration of the phenomena being studied, as well as how the researcher's bias and behavior impact the study (Watt, 2007). Two of the three researchers identify as multiracial, with one identifying as white. Being multiracial, the researchers acknowledge their

personal bias seeing as their perceptions of multiracialism and agricultural education have been shaped through their own personal experiences. All three researchers are graduates of secondary agricultural education programs and pursued careers in agricultural education.

The eight participants in this study are all residents of the United States and are between the ages of 18 and 29. All eight participants self-identified as white as one of their racial identities. In addition, the participants self-identified at least one other race/ethnicity of Black, Asian, and Hispanic backgrounds. The two participants with a Hispanic self-identification are specifically of Mexican and Puerto Rican descent while the participants identified with Asian heritage are Filipino and Taiwanese. Two of the eight participants have multiracial parents: thus, providing a multiracial background. All participants were graduates of secondary agricultural education programs. Three of the eight participants are current agricultural educators, and four are currently earning a degree in agricultural education. To protect the confidentiality of participants, pseudonyms were used for their names. The demographics of the participants are listed in Table 1.

Table 1
Participant Demographics (*n* = 8)

Alias	Race and Ethnicity	Gender	Career	Region
Rachael	Black, White (British), Hispanic (Mexican)	Female	College	South
Meagan	Black, White	Female	College	South
Torri	Black, White	Female	Professional	South
Shanika	Black, White	Female	Professional	West
Anaya	Black, White (French)	Female	College	West
Kaitlyn	Asian (Filipino), White, Hispanic (Puerto Rican)	Female	Professional	West
Isaac	Black, White	Male	College	Midwest
Stephanie	Asian (Taiwanese), White	Female	College	South

Findings

The primary research question for the study was to see if the participants showed any elements of the Impostor Phenomenon regarding their races. Participants shared many stories and expressed their feelings about their ethnicities, and how their multiracial identity played a role, emotionally, during everyday tasks and events. Clance (1985) noted that individuals must exhibit at least two of the six dimensions to be considered to experience impostorism, although the characteristics of these dimensions may vary. All participants experienced at least two dimensions, with a total of four of the six dimensions being expressed in the culmination of all data.

Need to Be Special / The Very Best

Participants in the study suffering from the racial Imposter Phenomenon expressed a desire to be treated like everyone else rather than seeking to be special or seen as geniuses. Those suffering from IP racially, wish to be just like everybody else, and treated and seen as a person, although they realize that the nuance of their racial identity created a visual difference when among a homogenous demographic.

Rachael shared her desire for a sense of belonging among her racial counterparts. She said, "[…] if they just had a conversation with me and didn't regard my color, or my mannerisms, or how I talked […] I would definitely feel like I belong, even if I didn't look like them." Meagan expressed similar thoughts when discussing her involvement with FFA. In middle school, she felt her skin color didn't matter, but her experience changed in high school when others emphasized her multiracial heritage. Meagan emphasized her identity as a person, saying, "[…] I'm not here to say I'm Black or White. I'm not here to only make a difference because I'm Black or anything like that." Anaya recounted childhood experiences of longing to look differently due to racism and bullying. She said she would pray to God, "Please give me blue eyes so that people will accept me. Please give me straight hair." She recalled being bullied for her appearance and the pressure from her teacher and classmates to change her hair. Kaitlyn echoed the desire to blend in during school and with FFA, describing herself as a "master chameleon."

Isaac shared the positive impact of his teacher treating him as a person, as opposed to treating him differently because of his skin color or what last name was. He noted, "[…] that was one of the very few times in my life that I was treated by another individual as Isaac. Not as a Black kid."

Superman/ Superwoman Aspects

Impostors are very perfectionistic in almost every aspect of their performance. This is derived from their need to be the very best (Clance, 1985). Some of the participants of the study showed aspects of this dimension through their hard work in FFA to be seen as an equal to their White counterparts, as well as the hard work of striving to shed a good light, if not a great light, on their races to those around them.

Rachael and Torri shared instances of working hard for leadership positions within the FFA and their dedication to chapter events. Rachael shared about working hard in her struggle to be seen as equal to her White teammate to be considered for President the next year. She spoke about being more active in her chapter than her competition, "[…] it just seemed like everything was handed to her even though she did nothing. And so, I worked extra hard to be able to... be looked at, be given opportunity... and to even be considered as President […]" Torri described a different, yet similar situation in her FFA chapter. For context, she ran for President after being secretary the year before and was passed over for two others, one being new that school year and one being uninvolved. It should be noted that she was deemed "unmarketable", and that both the members selected as President and Vice-President were White.

When speaking about his dedication to excellence, Isaac spoke of the struggle to succeed, and that his multiracial identity elevated the difficulty. "It didn't help being Black, because being Black means that you have to work twice as hard just to get half as much." Isaac expanded on this by referencing how his hard work assures those around him see 'his people' favorably, saying that he had to put himself on a pedestal to represent all Black people.

Fear of Failure

For racial IP sufferers, Fear of Failure manifested in various ways, such as being singled out or rejected because:

- They don't look like everyone else (Rachael Meagan, Torri, Kaitlyn, Anaya, Shanika, Isaac)
- They are speaking another language or speak with a certain accent. (Rachael, Torri, Anaya)
- They *don't* speak another language or *don't* speak with a certain accent. (Kaitlyn, Anaya)

- They listen to different music or wear different clothes. (Rachael, Meagan, Shanika)
- Others don't believe their parents are of the races they claim them to be (due to physical features or lack thereof). (Anaya, Torri, Shanika. Kaitlyn, Stephanie)
- They may have to speak against their "friends" on the harmful words they said towards their race, or other races. (Rachael, Shanika, Isaac)

Often in the interviews, the participants discussed using code-switching and assimilative tendencies as coping mechanisms to avoid potential fears and judgments. For instance, Rachael confessed her fear of expressing her Hispanic ethnicity and speaking Spanish among her peers, fearing that she would stand out and compromise her identity. When asked if she felt like she could incorporate both her identity within an agriculture classroom, she emphatically replied, "Absolutely not." She described how she would switch between identities when entering different environments. Meagan shared a similar sentiment, where she felt the need to be conscious of the music she was listening to when entering school worried how the advisors might react, believing that if they heard "they would get so mad at me." Torri also felt she had to be conscious of her actions around certain groups of people to avoid triggering prejudice.

Some participants felt compelled to tolerate racial comments from friends for fear of losing acceptance. Shanika was one of those participants and said, "I really wanted to have friends and so, there were some cases where you kind of just ignore the things that usually you want to filter out and you want to call people out on."

Most of the participants felt as if they had to prove who they were and where they came from when questioned on their racial status. Participants felt like they would be rejected as a member of their race unless they could come up with "proof." Anaya had to prove her French heritage by speaking the language, although she was then critiqued on that linguistic ability. Torri was asked to prove her claim to Blackness by showing a picture of her father because she didn't 'look' Black. Stephanie, on the other hand, didn't want her Asian heritage known due to the pressure of expectations placed on Asians regarding academics. She feared she would not be able to live up to the stereotypes of being Asian if others knew her heritage.

Denial of Competence and Denial of Praise

Those who suffer from IP often deny or disclaim the objective evidence that they are indeed intelligent and/or successful (Clance, 1985). While denial of competence is usually only done by the individual in IP, when it comes to racial IP, the researcher found instances where competence was denied by society as well. Both denial by others and denial by of self are discussed below.

Denial of Competence from Others. Throughout the interviews, the participants shared moments where they were stripped of their identity through the denial of one or more of their races by those around them. Jasmine encountered this both in school and within FFA, saying that there was always someone who made her feel she didn't belong. Shanika's racial identity was dismissed many times because her chosen career path is not a "typical" African American choice. When the researcher asked about her identity, Anaya shared that her racial identity has changed over time and that when she critiqued white people, they used her racial composition against her. She went on to say, "But I wouldn't want <u>that</u> to like... make me lesser than when it comes giving an opinion on a particular topic." "That" is referring to the fact that she is of the race she is critiquing. She

fears that her opinion would be looked at as lesser because she possesses the race that she is choosing to critique.

Torri spoke about how her grandmother unintentionally denied her Blackness by 'revoking' her ability to use the N-word because of her lighter skin color. Both Torri and Isaac faced instances where derogatory comments were made about their racial identities, yet they were excluded from those racial categories by peers. Torri said, "I [would hear] them say something derogatory and negative towards my Black identity, and they say, "But we're not talking about you"." Similarly, Isaac, when discussing with other FFA members about a current racial injustice incident of the time, was not included in blanket racial statements, leading him to remind others of his identity.

Participants often felt inadequate regarding the percentage of their racial identities and their knowledge of associated cultures and languages. Although for this situation, Meagan, Anaya, Torri, Kaitlyn, and Rachael all shared that they felt very unwelcomed when or if someone told them that they were 'not enough' to be a part of their group in various forms or fashions. When asking Rachael what would take away her sense of belonging within a group, she shared "Saying "You don't know us. You don't know our struggle." [is] something I really struggle with, especially with the White side of it […] Like [saying] my culture is not valid because "You don't practice our culture"."

Denial of Competence from Self. Participants in the study faced challenges related to their self-perceived competence regarding their racial identities. While external denial of competence was common, some participants still felt confident in their racial identities. However, imposter feelings emerged when they began to doubt their own competencies, affecting their sense of belonging to racial groups. Specifically, Stephanie and Kaitlyn had strong feelings of incompetence in the past because of their efforts to fit in, often identifying as White in various settings. They also did not have (what Kaitlyn described as) "a strong foothold" in their non-White culture enough to where they felt like they could "fully represent other people that have that same ethnicity." When the researcher asked Kaitlyn if she felt like she was 'doing it right' regarding her multiple races, she spoke about how it took a long time to feel proud of her racial identity.

Kaitlyn desired to expand her cultural knowledge by learning Spanish to be a comfort to those who didn't know English and to connect with her Filipino heritage. She often felt as if she was a "watered-down version" when learning about her culture and languages. She spoke of how she did not want to misrepresent minorities but felt like she had a responsibility to represent them. Rachael shared similar feelings of incompetence in not having an extensive knowledge about all the traditions and values of her races saying " I don't know what they go through every single day, because I don't look like them.[…] These are some things that we probably have experienced similar experiences. But I can never say that I'm them." When asked about her Black racial identity, she questioned whether it was wrong to claim a connection to a race when she didn't resemble it physically. Shanika, who identifies as a Black woman, experienced moments where she wasn't accepted as such. These experiences seemed to impact her self-competence as a Black woman, leading to feelings of confusion about how others perceived her identity.

Conclusions and Recommendations

The guiding theory and framework used for this study is racial Imposter Phenomenon. The experiences of the participants show that society’s nonacceptance of a multiracial identity adds

elements to the Imposter Phenomenon, thus becoming racial Imposter Phenomenon. In response to the findings of this study, and recognition of its limitations, four conclusions were drawn from the hours of interviews and the data analysis process. Every participant exhibited at least two of the six dimensions of the Impostor Phenomenon; thus, qualifying each participant of impostorism (Clance, 1985).

This study concludes that multiracial graduates of secondary agricultural education programs lack the guidance needed to navigate their racial status within a monoracial society. The lack of diversity and multiracial role models leads to feelings of isolation and alienation (Brown, 1995). Being in an environment where the surrounding society is supportive of racial heritage is imperative. The researcher suggests that educators and students be encouraged to self-identify through introductions on the first day of school, award applications, and demographic survey entries. Self-identification involves individual characteristics and educational environments (Harris et al, 2015), so providing the opportunity to self-identify in an agricultural environment can enhance a sense of belonging. This can also be used as a way for students to locate role models of similar backgrounds. For the most part, multiracial students have monoracial parents of two different races and have difficulty finding racially similar role models and adequate guidance (Townsend et al., 2009). Many of the study's participants are in single-parent households and lacked the guidance of both their parents on racial matters. Fortunately, teachers and parents can intervene and help promote a healthy multiracial identity. Agricultural educators are encouraged to create opportunities for students to explore their ethnicities/races. Students can explore and form a sense of cultural identity by turning to their family histories (Heuman, 2009). Assignments that encourage students to explore and reflect on their family history can also be expanded to cover a range of topics outside of race and ethnicity, like adoption, single-parents, and inter-faith contexts (Diggs, 2004; Heuman, 2009). Furthermore, Black land grant institutions have a unique position to support the agricultural developmental needs of underrepresented and underserved populations (Harris & Worthen, 2004). Hosting youth events and activities in 1890 and 1994 land grant institutions can create more opportunities for safe exploration. Additionally, exploring food and recipes can be a method of teaching about different cultural groups and traditions. Food is readily available and can act as a symbol and be integral to many traditions and celebrations that embody identity and culture (Long, 2001).

Experiences in the National FFA Organization (FFA) were discussed by many of the participants throughout the interviews. The youth organization, FFA, is contusive to a particular style and culture and thus magnifies impostor feelings within multiracial members. Clance (1985) states that while most of the fears of "not being good enough" experienced by IP victims are confined to career and intellectual pursuits, these fears can spill over into their relationships with others. Many participants felt they had to dress a certain way (i.e., boots and jeans) to fit in with FFA kids. The norms fostered within agriculture and FFA, while not inherently bad, still made some of the participants feel like they didn't belong because they did not identify with those norms. That, coupled with the lack of diversity within FFA (Lawrence et. al., 2013) may make them feel like they are not socially accepted, thus creating feelings of IP. To help multiracial students feel more welcome in FFA culture, the researcher recommends giving all students equal and equitable opportunities. Allowing students to express their individuality through hair, clothing, and music can help accomplish this. In Kaitlyn's words, allow students to "have [their] own personhood", even within the FFA. Historically, race has been tied to elements like skin and hair and is given

positive and negative connotations, which are often internalized (Mercer, 1991). For instance, African American and Black textured hair is an element of appearance that connects directly with individual and collective culture (Garrin et al., 2017). Hair (Garrin et al., 2017), clothing (Tajuddin, 2018), and music (Hesmondhalgh, 2008) can be part of symbolism that represents a self-identity and collective culture. Switching up aspects like music genres and artists when playing music at events and activities can aid this effort. Environments should be welcoming, safe, supportive, fun, caring, and challenging to everyone who enters them (Jennings et al., 2006). Multiracial individuals can suffer negative consequences when not able to express their chosen racial identity (Townsend et al, 2009). Moreover, a multiracial option should be added as a demographic group for data collection for the National FFA and respective state associations. Providing an option to self-identify is vital, as broadly used methods for race identification on surveys have caused concerns due to their inability to capture the self-identity of youth (Herman, 2004). Additionally, we can support multiracial students by promoting their positive potential and actual achievements (Cargo, 2003). Advisors also have unique abilities in these aspects. FFA advisors can create "clout" in the community for these students to those who may think otherwise of their capabilities and intentions (Royce et al., 2004; Royce et al, April 2004). Through FFA, advisors are even able to offer opportunities to our members to gain control of activities in the Program of Activities (POA). In turn, activities can improve the equity and quality of their lives where they would not be available, helping all students feel welcome.

Society's traditional notions and assumptions about race are challenged by multiracial individuals because they cannot be placed into society's preexisting racial categories (Spickard, 1992). False understandings of how certain racial groups should behave, look, and exist within U.S. society are led by racial stereotypes (Omi & Winant, 2015). Multiracial students are pressured within agricultural education to fit monoracial labels, standards, and stereotypes through monoracial racism. Monoracial stereotypes attempt to categorize, racialize, and fit multiracial peoples into monoracial understandings of race (Harris, 2017). Racism and stereotyping were experienced by the participants throughout the study. While these multi-race individuals often acquire a marginal status that gives them a moderate amount of privilege and respect, they are never fully accepted by either the dominant group or their ethnic community (Alba & Nee, 1997). The presence of assimilation and code-switching was prevalent due to the pressures on multiracial students to fit into monoracial standards. Teacher preparation programs and teacher educators need to prepare pre-service teachers by explicitly sharing strategies that address race in the classroom to prepare them to teach diverse students of color (Gay & Howard, 2000; Milner, 2003). The researcher suggests that teacher preparation programs address a variety of topics including proper verbiage and language, racism, stereotypes, microaggressions, tokenism, representation, imagery in curriculum, analyzing school demographics, community engagement, integrating culture in curriculum, and engaging and interacting with diverse parents. Educators should self-reflect and become aware of their biases to avoid perpetuating these stereotypes and pressure to assimilate. Educators can also raise awareness about how monoracial people (both white and People of Color) commit acts of monoracism. This awareness can validate the discriminatory experiences of multiracials, and aid monoracials in their actions (Hamako, 2014). Benedetto and Olisky (2001) cite three areas of intervention designed to promote the development of a healthy multiracial identity in youth and recommend implementing these interventions whenever possible. These three areas include awareness, communication, and exposure. Multiracial students will have the benefit of enhanced self-esteem and a well-rounded sense of the world if they feel supported, validated,

and accepted in school (Schwartz, 1998). Like earlier recommendations, teachers can also implement diverse teaching methods in the classroom that can provide a sense of inclusivity. Critical Youth Empowerment (CYE) is a conceptual framework available that is based on the integration of youth empowerment processes and outcomes at the individual and collective levels (Jennings et al., 2006).

An element that continued to resurface was the topic of effective role models. The results led to the conclusion that Multiracial students lack role models within secondary agricultural education, including FFA, that reflect multiracial identities. Multiracial individuals have to refer to other racial minorities to find role models within the FFA that represent them. "In looking for images of oneself or one's group, and not finding them, individuals may feel that their racial identities are being ignored or are invisible in the larger culture" (Fryberg & Townsend, 2008). Not being able to find that 'role model' happens often for multiracial individuals, seeing as a lot of the multiracial role models who are available to them may claim monoracial identities. The lack of a significant amount of role models also implies the lack of multiracial participation within FFA presently, or in the past, which would have snowballed into possible role models in the present day. The testimonies of the participants show that representation, especially within an area of limited racial diversity such as agriculture, is ever more important to students within FFA to increase a sense of belonging. Wardle (2000) recommended several ways to enhance multiracial student's sense of belonging, including finding role models so students can see themselves in images and past achievements throughout the curriculum. Educators can show their multiracial students the multiracial role models available to them in the organization, both past and present, and possibly incorporate the research of their achievements in agriculture alongside their monoracial counterparts. However, when incorporating the achievements of multiracial individuals, ensure the recognition is meaningful and not tokenistic or only for an image. The researchers suggest that secondary agricultural education programs utilize the demographic makeup of their school and community as a strength, and search for local role models for students. Overall, The National FFA Organization and agricultural education teachers should make greater efforts to recruit minority members and foster diversity (Luft, 1996; Moore, 1994). This can lead to an increase in multiracial and diverse role models for students to identify with.

Multiraciality is still a new topic within agricultural education, especially within the context of the Impostor Phenomenon, so future research is vast. Therefore, the researcher proposes several avenues for further research on the topic of multiracial agricultural education students. First, the researcher proposes that future researchers increase the number of participants interviewed to be able to include a variety of different racial combinations. Secondly, future research should include a comparison of those multiracials who possess a culture that speaks a language other than English to those whose cultures only speak English. This research could assess if the ability, or lack thereof, to speak one's cultural language impacts the degree of IP compared to those who would not have a second language as a factor. Another line of research would be to compare the IP feelings of multiracial individuals in rural/suburban/urban FFA chapters or compare those feelings within chapters of low and high racial diversity. This would assess if the racial makeup of the school affects multiracial students' overall feelings of impostorism. Added to that, research comparing FFA chapters with white, minority, and multiracial advisors would be of added value to see the influence the advisors had on the IP feelings of the multiracial students if the advisors were of different races.

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Teachers' Motivations and Barriers to Integrating Agricultural Content into Elementary School Curricula

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The purpose of this study is to explore what motivates elementary school teachers to integrate agriculture into their curriculum and instruction. In addition, it explores what barriers teachers face to integration and what agricultural organizations could do to assist teachers. Teacher completed an online survey (n=114) and interviews (n=12) to share their experiences teaching agriculture in their classrooms. Our study found that teachers are motivated to teach agriculture because they are compelled to teach their students about where their food comes from, their instruction relates to agriculture, and agriculture is important to their community. Despite teachers understanding the importance of teaching agriculture, they face challenges such as time, curriculum restrictions, lack of resources, and deficit of knowledge when teaching agriculture. Teachers also provided suggestions on what agricultural organizations could do to help. The findings of this study can be utilized by agricultural organizations and agricultural literacy professionals to guide their resource design and program for educators.

Introduction

Agricultural literacy has been a topic of research for many years. In a broad definition, the National Research Council defines an agriculturally literate individual as someone who understands the food and fiber system, including the historical, economic, social, and environmental impacts that the system has on all individuals. (National Research Council, 1988). One study compiled responses from agricultural literacy coordinators to define agricultural literacy as the education of agriculture to youth and adult audiences, showing agriculture's role in society (Knobloch & Ball, 2003). A more recent study posited that agriculturally literate individuals should be able to analyze and assess *trade-offs* to society and individuals from agriculture enterprises (Powell et al., 2008).

Agricultural literacy is considered as having knowledge of the food system and an understanding of agricultural processes that contribute to the production of plant and animal products (Frick et al., 1991; Meischen & Trexler, 2003). Kovar and Ball (2013) discussed how, as the global population grows, agricultural knowledge is becoming increasingly necessary to meet the demand for efficient growing practices to expand food production. Therefore, the world requires an agricultural literate population to support the agriculture industry and navigate its challenges (Kovar & Ball, 2013).

While the definition of agricultural literacy may fluctuate, the need for an agriculturally literate society remains. Developing youth and adults who are agriculturally literate is not a new idea, but its importance continues to become more pressing. As agriculture advances and fewer individuals are directly connected to production agriculture, the need for an agriculturally literate society becomes even more critical to making educated and informed agricultural decisions (Kovar & Ball, 2013). Today's elementary school students often lack knowledge about the

agricultural industry and food systems. For example, students may be unable to make the connection between agriculture and its importance in everyday life (Brandt et al., 2017). Agricultural experiences and prior knowledge play a significant role in a student's level of agricultural literacy. However, many students do not have access to agricultural experience due to a variety of factors. As a consequence, students often demonstrate low levels of agricultural literacy (Hess & Trexler, 2011). This study focused on understanding the benefits and challenges teachers face in including agricultural content in elementary classrooms.

Literature Review

In 1986, a study measured the agriculture knowledge of 2,000 elementary, junior, and senior high students in Kansas (Horn & Vining, 1986). Although Kansas is a significant agriculture producing state, fewer than 30% of students in the study correctly answered basic agriculture-based questions. Significant advances in education and agriculture have occurred since 1986, but agricultural literacy remains low for several populations. A systematic review conducted in 2022 analyzed 12 studies aimed at measuring the agricultural literacy of primary and high school-aged students. The review concluded that students demonstrated low levels of agricultural literacy at both levels (Cosby et al., 2022).

One benefit of integrating agriculture topics into general education content is connecting students to concrete examples with which they may be familiar. Agriculture provides a context to students of how general education concepts are applied in everyday life (Knobloch, 2008; Vallera & Bodzin, 2016). In addition, integrating agriculture into general education curriculum can help students understand the connection between agriculture and science through the use of examples to which students can relate (Mabie & Baker, 1996; Vallera & Bodzin, 2016). When students participated in an agricultural literacy unit within their general education class, interest in the content taught increased (Knobloch & Van Tine, 2004). Another study highlighted that in teaching agricultural education, experiential learning and activities aided students' abilities to observe, communicate, compare, relate, order, and infer (Mabie & Baker, 1996).

Trexler et al. (2000) found that schools and families are the primary sources from which students receive information about agriculture and the food system. Teachers in the study discussed how the information shared in a student's home will vary depending on the parent or guardians' experiences with agriculture. For this reason, teachers see it as their responsibility to teach healthy eating to their students and create a place where agriculture topics can be discussed, including nutrition and environmental issues that affect the food system (Trexler et al., 2000). Teachers understand the benefits and indicate a positive attitude toward incorporating agriculture into their general education curriculum (Bellah & Dyer, 2006; Knobloch & Ball, 2003). Knobloch (2008) found that of the 689 teacher participants, 97% expressed that agriculture would enhance the curriculum, and 84% believed that agriculture could be taught in any subject. Bellah and Dyer (2009) found that teachers expressed favorable attitudes and perceptions toward agricultural content. However, teachers reported a lack of time, interest, and knowledge as reasons they would not use such content.

Although teachers understand the importance of agriculture and are interested in ways to integrate it into their classroom teaching, they face barriers to integration. Some teachers

perceive a lack of self-efficacy in teaching agricultural topics without guided resources and a lack of awareness of relevant resources (Burrows et al., 2020). Many teachers cite not having any knowledge or experience with agriculture as a reason for not being able to create agriculture-related classroom content (Trexler & Heinze, 2001; Trexler & Hikawa, 2001). Comfortability with the material also restricts teachers' motivation to teach agriculture (Knobloch & Ball, 2003; Trexler & Suvedi, 1998).

In addition, teaching state-mandated standardized tests may take precedence over teaching agriculture. Teachers may be more concerned with teaching the content they perceive their administrators expect to be taught in their classrooms (Burrows et al., 2020; Trexler et al., 2000). Another factor that limits a teacher's ability to teach agriculture concepts is not having time to plan and implement agriculture-related activities in the classroom (Knobloch & Ball, 2003; Knobloch & Martin, 2002). Despite this need and desire for agricultural education within elementary school settings, teacher resources and curricula incorporating agricultural topics are lacking. When agricultural topics are present within upper-elementary school standards, often no links are made between curriculum and standards (Allen & Harper, 2002). The science curriculum sometimes acknowledges the agriculture connection, but the content appears as an individual or one-off example (Vallera & Bodzin, 2016). Teachers using such curriculum often do not possess extensive agricultural knowledge to make those connections for students (Trexler & Heinze, 2001).

Theoretical Framework

Schema theory, when applied to education, suggests that a teacher's previous life experiences and ideas toward a content area influence how they think about and process the information connected to the content area (Yang, 2023). Teachers directly influence the content taught in their classroom and the focus of each learning activity (Winther et al., 2002). Teachers' schemas about agriculture will likely influence what they choose to teach. In a study conducted by Knobloch and Martin (2002), it was found that if an elementary teacher perceived agriculture as being relevant to specific careers, valued and believed that agriculture could be integrated into various subjects, and had positive perceptions of agriculture, the teachers would be more likely to include agriculture in their curricula. The topics and content areas teachers choose to implement in their classrooms also connect to the schemas they hold for each topic area.

Hess and Trexler (2011) used schema theory to compare urban elementary students' understanding with nationally developed benchmarks related to agriculture literacy. A similar study used schema theory to compare students' understanding of agricultural technology to grade-specific benchmarks for agricultural literacy while examining the relationship to students' backgrounds and experiences (Trexler et al., 2013).

Expectancy-value theory proposes that the interest level of the content, the content's perceived usefulness, and the effort needed to teach such content all play into the value and motivation instructors have for teaching specific content (Eccles & Wigfield, 2002). Based on these assumptions, agriculture literacy content should strive to meet the precepts of schema and expectancy-value theories and the beliefs and motivations of teachers to allow for further implementation and integration. Expectancy-value theory was used in a study to understand

teachers' beliefs and motivations that lead them to become mentors (Kuhn et al., 2022). Another study used expectancy-value theory to understand the factors influencing students' motivations and intentions to complete school (Ball et al., 2016).

Objectives

This study aimed to explore what motivates teachers to integrate agriculture into their curriculum and what teachers needed to teach agriculture in their classrooms. Three questions guided our research:

1. What motivated teachers to teach agriculture in their classrooms?
2. What barriers prevented teachers from integrating agriculture in their classrooms?
3. What could agricultural organizations and institutions do to assist instructors in teaching agriculture in their classrooms?

Methods

For our study, we used an explanatory sequential mixed methods design (Creswell & Plano Clark, 2018). We surveyed elementary teachers in Illinois who had previous experience teaching agricultural topics in their classrooms and used the findings to create an interview protocol to gain more insight into the survey answers. Online surveys enabled us to collect data from a geographically dispersed sample of participants (Burkholder et al., 2020). By conducting interviews, we were able to understand the personal stories of the individual experiences that influenced participants' interests in teaching and integrating agriculture into their classrooms (Burkholder et al., 2020).

Sample

We recruited participants to take our online questionnaire through an electronic mail list provided by Illinois Ag in the Classroom. Individuals on the list included those who had attended a Summer Ag Institute in 2022 and 2023. We emailed the questionnaire to 492 participants, and 114 completed it for a 23% response rate. Survey participants were put in a drawing for one of five $50 gift cards, funded by Illinois Agriculture in the Classroom.

Teachers who answered the questionnaire were primarily from rural schools (71%) with only 12% from urban schools and 17% from suburban schools. Questionnaire participants were most likely to have taught from six to 20 years (50%), with other teachers representing both fewer and more years in the classroom. Sixty-two percent of teachers taught 1st grade through 5th grade.

At the end of the questionnaire, individuals indicated their interests in being interviewed about teaching agricultural topics. We had 30 questionnaire respondents who indicated they would be interested in participating in an interview. Of those, 12 participants responded to requests for interviews. As a form of social exchange, those interview participants received agricultural-related books to use in their classroom, sponsored by Illinois Agriculture in the Classroom.

Instrumentation and Data Analysis

The questionnaire was based on a previous study by Knobloch and Ball (2003) addressing elementary school teachers' beliefs about teaching agriculture in their classrooms. The original questionnaire used by Knobloch and Ball (2003) was unavailable. Therefore, we utilized the results of the original study (Knobloch & Ball, 2003) to recreate the original questionnaire. We analyzed their findings to understand what the original question had asked. Our online questionnaire, developed using the Qualtrics XM © online platform, was created with the understanding that participants had already completed an agricultural education-based training through Illinois Agriculture in the Classroom. The questionnaires were sent using the electronic mail function of Qualtrics XM ©. The questionnaire was resent one week after the first request to those teachers who had not yet responded. The questionnaire was closed two weeks after it was opened. The questionnaire was anonymous. Those teachers who chose to be interviewed were taken to a separate Qualtrics XM © questionnaire to enter their contact information and keep their questionnaire answers anonymous.

After data collection, we reviewed the data from the questionnaire and created an interview protocol restating questions in an open-ended format. Semi-structured interviews were conducted and recorded through scheduled Zoom meetings. After each interview, a transcript was generated, edited to include pseudonyms, and reformatted. We uploaded the interview transcripts to a qualitative analysis platform, Dedoose, and the researchers analyzed the transcripts. We used inductive coding to create themes for each research question, which provided further insight into quantitative results from the questionnaire.

Findings

Motivations to Teach Agriculture

The first research question we asked identified reasons that elementary teachers choose to teach about agriculture in their classrooms. Through our questionnaire and interviews, teachers discussed various reasons that inspired them to teach their students about agriculture. Table 1 includes the number of teachers who answered the questionnaire with *Strongly Agree* (5) or *Slightly Agree* (4) using a 5-point Likert-type scale.

Table 1

Teachers that Strongly Agreed or Agreed with Motivations to Teaching Agriculture (n = 114)

I'm interested in teaching about agriculture because…	*n*	*%*
There are more careers in agriculture than in any other industry in the U.S.	*87*	*67%*
My past experience in agriculture.	*76*	*67%*
My experience with youth development projects (4-H/FFA) in agriculture.	*50*	*45%*
It meets Illinois Learning Standards.	*84*	*75%*
It shifts my instruction from lower-order thinking to higher-order thinking.	*79*	*69%*

The topics were turned into open-ended questions to gain more information during interviews. Three themes motivating teachers emerged in the interviews: importance of agriculture, content connection, and community.

Theme 1: Importance of Agriculture

Several teachers highlighted that their reasoning for teaching their students about agriculture was to ensure they know where their food comes from. Teachers also wanted to teach about agriculture to expose their students to the agriculture industry and the processes that get food and other agricultural products from the farm to them.

One teacher shared her reasoning for teaching agriculture in her elementary school classroom, “I think it’s really important for kids to know where the things that they use come from, especially when they’re young. A lot of times they think it comes from the store. That is extremely important.” (Alexis, interview)

A second-grade teacher told us how she makes it a goal for her students to understand where their food comes from: “I think that’s a pretty big goal that I have for my second graders to expose them to as many opportunities as possible to get them interested [in] that.” (Abigail, interview)

Another reason teachers stated that influences their decisions to teach agriculture is how important agricultural products are in everyday life. Therefore, students should learn about how agriculture affects them and the world around them. In our survey, one teacher wrote about how teaching agriculture introduces the students to how agriculture affects them every day, “My students learn how agriculture affects their lives every day, and pointing this out to them with lessons in the classroom usually makes them think about their world in a different light.” (Teacher, questionnaire)

One teacher discussed in our interviews that the students should learn about agriculture to better understand how much agriculture impacts their lives:

> There are so many different avenues that it affects your life. And whether, like I said, whether your family farms or not, it’s still affecting you somehow, a big proponent of the food you put on your table. Well, it took agriculture to get that. (Connor, interview)

Many teachers saw the importance of the agricultural industry and wanted to promote agricultural careers to students beyond farming. Teachers who completed our questionnaire and participated in our interviews discussed how they hoped teaching agriculture in their classrooms would persuade students to explore a future in the agriculture industry. We had several teachers share that they teach about agriculture to show students careers in agriculture and the numerous opportunities available to them in the agricultural industry. One teacher wrote in our survey, “We live in a rural area, and learning about agriculture and it's importance helps the students seek careers within their communities or surroundings.” (Connor, interview)

Another teacher explained in the questionnaire that teaching about agriculture also gives students the opportunity to explore careers outside of production agriculture, “I think it gives kids exposure to modern farming and jobs that they would otherwise never see.”

Theme 2: Content Connection

When discussing their reasoning for teaching agriculture, teachers mentioned that they can easily fit agricultural lessons into other subjects they teach. Additionally, they can use those lessons as a means to meet state educational standards. One of our questionnaire responses from a teacher explained how agriculture can fit into any subject, "Agriculture can be taught as an interdisciplinary subject: history, science, math, critical thinking skills." (Teacher, questionnaire)

In an interview, one teacher commented on how agriculture topics and lessons can easily fit into any subject or standard being taught:

> I really feel like we can probably make anything fit a standard. Agriculture especially the world economy of course that can fit in with math and how savings, spending, and the financial literacy part of that can definitely go with agriculture … But like NGSS [Next Generation Science Standards] standards, you know, they fit into anything to do with agriculture as well. So I feel like I can just weave it into all avenues of our curriculum and into our standards. (Abigail, interview)

Teachers also discussed how, when teaching common school subjects, they utilize agriculture as a way to illustrate real-world uses of the class content. Likewise, class content can be more relatable for students through examples contextualized in the agricultural industry since students encounter agriculture daily. In our survey, a teacher shared that agriculture can provide real-life examples for students in class content: "When students can see real-world applications of the material in class they are more interested and invested in their learning." (Teacher, questionnaire)

Another teacher wrote in a survey response that learning about agriculture can equip them with skills that will help them in the future: "Students learn real-world transferable skills while learning about where their food, fuel, and fiber comes from to become an informed consumer." (Teacher, questionnaire)

Theme 3: Community

Through our interviews with teachers, many of them shared their previous experiences with agriculture, from growing up on a farm to being a resident of a rural farming community. Teachers shared how those experiences influenced them to educate their students about agriculture. One teacher described how growing up on a farm gave her a passion for agriculture and how she loves to share that part of her life with her students:

> I have always had a strong passion for agriculture. I showed beef cattle before I was even a Cloverbud. Bringing that background into this experience with my kids. I love to do it because I know that they really enjoy it as well. And learning about things I enjoy, it makes it easier to teach. Because when you have a passion for it, then it just comes naturally. (Kimberly, interview)

Another teacher told us how she utilized living on her husband's farm to bring agriculture experiences to her students,

> I would have taught about pumpkins prior to being married to a farmer. Now, I feel like there's so much more background knowledge that I have that I can add to any of the units that I do. For example, soil, we talk about soil in second grade. I ended up during COVID creating a whole video about soil on our farm. (Allie, interview)

Other teachers commented that their school being in a rural community was a significant motivating factor in teaching agriculture in their classrooms. Many discussed how they felt it was important that their students understand what was happening in their community. One teacher shared, "We live in a rural area, and learning about agriculture and it's importance helps the students seek careers within their communities or surroundings." (Teacher, questionnaire) In our survey and through interviews, several teachers shared reasoning similar to this teacher's point of view, expressing that because their students live in rural farming communities, it is important to learn about agriculture so they understand what is going on around them.

In our survey, one teacher wrote that since the school is in a farming community, it is a great opportunity for students from a farm family to share with their peers about what they do:

> Any opportunity to expose children to something they do not normally come in contact with is great. We have many farming families in our school and this gives those kids to be the 'experts' when we have these discussions in class. They can give a lot of first-hand knowledge. (Teacher, questionnaire)

Barriers to Teaching Agriculture

Our second research question asked what barriers teachers faced that prevented them from integrating agriculture into their classrooms. In the survey, 44% (f = 49) of teachers responded that they encountered barriers to teaching agriculture. Teachers then answered an open ended question to explain what the barriers were. The answers were coded into four themes as found in Table 2.

Table 2
Teachers' Perceived Barriers to Teaching Agricultural Topics (n = 63)

Barrier	*f*	*%*
Time	24	46%
Curriculum Restrictions	23	44%
Lack of Resources	9	17%
Lack of Knowledge	7	13%

Interviews delved deeper into these barriers and how teachers faced various challenges to teaching agricultural lessons and using related activities. The same four themes were found in the interview responses.

Theme 1: Time

Time was the most identified barrier that teachers encountered. With agriculture not being a required subject, teachers are challenged to find available time to incorporate agriculture lessons and topics into their curriculum. In the survey, one teacher shared:

> There is a lot of pressure to get through our curriculum in a short amount of time. It can fill up all of the teaching time we have and leaves very little time for teaching things not addressed in the curriculum. (Teacher, questionnaire)

More than just finding the time of day to teach agriculture lessons, a few teachers shared how it can be challenging to match their lesson plans' timing with the agriculture industry's timing.

> For instance, tomorrow I'm going to be introducing the nitrogen cycle. Well, whenever I look at that, we always say, okay, in the springtime of the year, you're going to see farmers pulling these big white tanks of anhydrous ammonia in the field. What do they use that for? Well, now there's that disconnect there. Okay. Well, I'm not going to see that for another six months again. How do I get the students to relate to that after something they have seen or aren't going to see for a while, that disconnect between the timing of everything. I try to plan my units so that they are more timely. (Connor, interview)

Theme 2: Curriculum Restrictions

Many teachers shared that having a strict curriculum was a barrier they faced when integrating agriculture into their classrooms. Some teachers shared that pressure from school administration to teach to the required learning standards limits their ability to teach agriculture lessons and topics.

> There's so much stress put on reading and math … But our literacy curriculum cycles through these different science and social studies themes. And it's almost like a checked box like, oh, we're going to make this cross-curricular, but it really doesn't dive deep. I think there could be a lot more done that supports reading standards just like we're pressured to do. But using content that's relevant to ag. (Sandra, interview)

Teachers also expressed that the content area they teach influences their opportunities to integrate agriculture. One teacher stated, "I teach math classes, so not sure how to include it into my curriculum." (Teacher, questionnaire) Another teacher voiced that they struggle to connect agriculture to their art education class.

Theme 3: Lack of Resources

A lack of resources was another common barrier that teachers shared. Often, agriculture lessons are designed to be hands-on, requiring more materials.

> I cannot handle gathering more things. If it was an ag lesson that required me to go out and get pipe cleaners and glitter and cut out 72 circles the size of a dime, …if there were a million supplies with it, I would not be inclined to give it a try. (Sandra, interview)

With an increase in needed materials, funding becomes another obstacle.

> "It's always there's always a financial barrier because I would like to do more like I really want to do, and I've tried to order equipment, and you have to write a grant, and there is not always enough funding for everybody to receive their grant. (Tracy, interview)

Theme 4: Teacher's Lack of Knowledge

A final theme that arose was the teacher's lack of knowledge. One interviewee shared that they do not teach agriculture in their classroom due to their lack of knowledge, they stated, "... what am I supposed to be teaching? What would be helpful? Yeah. I honestly don't even know where to start." (Sandra, interview)

When a teacher has little to no agricultural experience, it can be a challenge to incorporate agriculture topics and lessons into their curriculum.

> Agriculture is not something that I'm super familiar with. It does take a little longer to lesson plan. I have gone to the Ag in the Classroom summer institutes to become more aware on how to do those things. But it's not something that I think of first, it's something that I have to work a little harder at. (Jillian, interview)

Assistance for Teachers Incorporating Agricultural Education

The third research question asked about how agricultural organizations could assist teachers in incorporating and teaching agriculture in their classrooms. Teachers were able to give suggestions for what they felt agricultural organizations could do to help them. The survey included an open-ended question asking for input and the same question was used in the interview. In both sets of answers, two themes emerged: connections and resources.

Theme 1: Connections

Our first emergent theme was teachers requesting connections to farmers, agriculture industry professionals, and agricultural businesses. Teachers shared how the connection with agriculture professionals would provide them with an appropriate resource while also giving their students personal connections to the agriculture lessons and topics.

> One thing I'd really like to see, this is more district-based than anything and community-based is just whenever those topics come up, what's the availability of getting that firsthand knowledge? Hey, what farm can we go to? How can we see this? Can we take a field trip? We're limited in the number of field trips we can take …We have a nice sprawling campus where we can see fields, but the interaction between the farmers and the actual people there is pretty well limited. But I think that firsthand interaction, speakers, availability of the actual industry itself, that's limiting." (Connor, interview)

Theme 2: Resources

The second theme from our survey responses and interviews was that teachers wanted resources from agricultural organizations to help teach agriculture in their classrooms. Many teachers suggested creating resources with readily available materials and funding teachers to include agricultural lessons and projects in their curriculum.

Jillian explained how she is hesitant to use lesson plans that require a lot of materials or hard-to-find materials,

> I guess with like hands-on activities, using things that are easy to come by. Things that we already have at school like construction paper or scissors and glue. Just easy things to get a hold of because anytime I see a lesson plan with lots of supplies, I'm going to be I don't have time to go get all those things. (Jillian, interview)

Another teacher explained that because teachers were already limited on time, if agricultural organizations provided resources with accessible materials, more teachers would use them,

> Because I think that's the struggle for a lot of people, is that they feel like they don't have time to plan a whole lesson and figure out what items they need and put all of the pieces together. Those that are already there and ready made, make a world a difference for people. (Kimberly, interview)

Many of the teachers shared that a barrier they faced in teaching agriculture was having the funds to incorporate hands-on agricultural experiences and projects into the curriculum. In our questionnaire, one teacher wrote: "I would love to be able to do hands-on experiences more but funds are a struggle."

In an interview with Tara, she discussed how they received a grant for a field trip to visit an organization's office and farms, and she would like to take her students on more field trips like that if more grants were available,

> Probably those kinds of experiences like … we're going to have an open house this date, if you can bring your kids here, or even funds that help us get kids there. I think transportation is our biggest barrier … And the school district says we can have one field trip per school year … Our school districts can't afford to pay for [multiple field trips]. (Tara, interview)

Conclusions, Recommendations, and Implications

From the teachers who participated in our study, three themes emerged from the reasons they are motivated to teach about agriculture. The teachers shared that they teach about agriculture because it is important to teach students the impact agriculture has on them, agriculture is related to the content they teach, and their school is a part of an agricultural community. These results parallel the existing literature that teachers understand their role in teaching their students about agriculture (Trexler, 2000) and the opportunities it brings for their students' learning and building skills for their future careers (Knobloch & Martin, 2002). Also, agricultural concepts can be used to enhance the curriculum (Knobloch, 2008), as a context for class content (Mabie & Baker, 1996), and provide real-life examples for students (Vallera & Bodzin, 2016).

One theme that provided new information was many teachers shared that a major factor in their decisions to teach agriculture was because the school is a part of rural or agricultural communities. Therefore, it is important for students to learn about agriculture to understand their surroundings and be informed about their communities. This theme supports our theoretical framework that teachers' experiences and beliefs towards subjects influence the content they teach (Winther et al., 2002; Yang, 2023).

Results detailing barriers to teaching agriculture in elementary school are consistent with prior research. Those barriers are allocating time to lesson plan and teach agriculture (Bellah & Dayer, 2009), having to focus on standardized testing content (Trexler, 2000), needing resources (Burrows et al., 2020), and low levels of teacher self-efficacy related to teaching agriculture (Knobloch & Ball, 2003).

In our interviews, teachers discussed what actions they would suggest agricultural organizations do to assist teachers in integrating agriculture into their curriculum connections and resources emerged as two themes. Teachers expressed that they would like more resources to help them teach about agriculture, which supported the barriers that Trexler and Heinze (2001) and Trexler and Hikawa (2001) found. The theme of wanting connections to agricultural professionals is a new request based on the literature we reviewed.

We found similar themes to Knobloch and Ball (2003) that teachers are motivated to teach about agriculture because they see how it benefits their students. Our results support the themes in Knobloch and Ball (2003) that agriculture easily fits into other course content, agriculture helps students connect content to real-life examples, and agriculture as a context for content. Our study found that teachers' personal experiences in the agriculture industry played a role in influencing their choices to integrate agriculture.

Our four themes that emerged regarding barriers that teachers face align with the challenges that arose in the Knobloch and Ball (2003) study. Both Knobloch and Ball (2003) and our study found that adjusting their class schedules to accommodate agricultural lessons or focusing on topics other than those included in standardized tests was difficult. In addition, in both studies, teachers recognized their need for resources that would help them with agricultural instruction and also advance their knowledge of agriculture. The barrier of not having adequate resources supports the suggestion for the creation of additional agricultural resources for teachers.

Our research sample was limited to elementary-grade teachers who were already interested in providing agricultural education in their classrooms due to their voluntary participation in an agricultural education-based summer institute. We also acknowledge that all three researchers have a history of working within elementary-grade agricultural instruction and, therefore, may also bring biases in favor of agricultural education.

Our recommendation is that agricultural literacy professionals continue to provide non-agriculture teachers educational resources while also providing them with assistance in the integration and implementation of agriculture content in their classrooms. Teachers have a need for new and updated resources that they could use in their classrooms to teach agricultural facts and concepts. Future Ag in the Classroom resources may not need to be created as full, complete lesson plans but rather just components that teachers can manipulate to meet their needs. In addition, future teacher training should focus on ways to implement one content area into multiple contexts.

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Parents' Value of their Children Learning about Agriculture in School

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Abstract

It is commonly held that parents have a profound impact on child development. Decades of research investigated the ways parents, the community, and school staff interact to foster student learning during kindergarten through twelfth grade education. Agriculture provides for daily needs through the growth, harvest, and processing of food, fiber, fuel, and forestry products. This research sought to understand the level of importance parents place on their children learning about agriculture in school. A 26-question survey was distributed to a nationally representative sample of parents having at least one child in K-12 education within the United States. Results of this study indicate parents found it important, even very important, for students to learn about many agricultural topics in school. Factors historically associated with parent perceptions and support of student learning proved to not significantly impact this indicated level of importance. Therefore, further research is needed to understand what impacts parents' value of their students learning about agricultural topics in school. The conclusions of this study are of primary importance to entities conducting agricultural education outreach such as Agriculture in the Classroom programs, Extension, Career and Technical Education, agricultural industry organizations, and others interested in agricultural literacy.

Introduction

Parent and child development, knowledge, and behaviors are interconnected. Theories throughout the decades have examined many aspects of this familial relationship. Uri Bronfenbrenner brought together several of these notable theories through a five-system model indicating it is the interaction of environmental changes, culture, extended family/community, immediate family, school, religion, and peers which influence child development (Bronfenbrenner, 1979). Parent-teacher-student relationships affect students' engagement (Schock & Jeon, 2023). Parents have long been outspoken in support of or opposition to school curriculum, teachers' choices, administrators' authority, and school board decision-making. Dating back to colonial times, parents initially refuted Thomas Jefferson's approach to public schooling, preferring their children receive the religious education of their family's choosing or stay home to work on the farm (Buell-Hiatt, 1994). From truancy laws to segregation then desegregation to addressing accommodations for disabilities, parents have argued all sides of these issues at the local, state, and federal levels (Buell-Hiatt, 1994; Library of Congress, n.d.). While many of these curriculum debates have deep emotional ties, teachers continue to contend parents should be involved in curriculum conversations (Najarro, 2021; Seginer, 2006).

In 1988 the National Research Council stated all students, kindergarten through twelfth grade, should receive some agricultural instruction, incorporated into existing course content, outside of vocational courses at the secondary level (National Research Council, 1988). The council indicated agriculture affects all Americans, economically, socially, and environmentally; therefore, students should have some agricultural instruction as a complement to other academic

areas. The National Agriculture in the Classroom Organization's (NAITCO) programs across the United States and territories began and continue to host teacher professional development, supply standards-based lessons and resources, convene farm field trips, and other initiatives to work toward an agriculturally literate society (National Agriculture in the Classroom, 2023). The logic model for agricultural literacy provides a road map for AITC program planning, indicating human, financial, and program resources are needed to affect populations of educators of pre-kindergarten through adult students, youth activities, policymakers, and consumer information, with the end result to influence change in knowledge, skills, attitudes, behaviors, and practices relating to agriculture (Spielmaker et al., 2014; see Appendix A). While parents could be grouped into the consumer category of outputs in this logic model, parents are not explicitly stated as an audience of focus for agricultural literacy outreach efforts. Yet, child development and education research explicitly state parents are a key factor in what and how a child learns. This quantitative study seeks to investigate the level of importance parents place on their children's understanding of agricultural concepts.

Conceptual Framework

Foundational theories by Maslow, Piaget, and Vygotsky illustrate the structure of child development. Maslow explains the most basic needs are considered deficiency needs; once one is met or mostly met, the next can need can be addressed (McLeod, 2018b). Piaget's stages of cognitive development outline four stages of development denoted by age. He observed children all progress through these four stages, however, at different rates of speed (McLeod, 2018a). While Piaget did not relate his theory to the school classroom, later researchers did make this connection. These researchers used Piaget's findings to define a teacher's role as a facilitator of learning, meeting each student where they are at, assessing individual needs, and realizing children could be at different points within each stage. Vygotsky's theory of cognitive development introduces the sociocultural element of human development (McLeod, 2022). Key to Vygotsky's theory is the zone of proximal development which defines ways instruction from someone with greater knowledge, such as parents and teachers, can increase children's learning.

Uri Bronfenbrenner effectively incorporated pieces from each of these theories into his ecology of human development theory (Bronfenbrenner, 1979). His concentric circle model indicates those closest to the child have the most and earliest influence; as the circles expand, teachers, community members, and extended family are added as influencers of the child's development (Bronfenbrenner, 1979). If this system is supportive, nurturing, and affectionate, it will positively affect the child (Guy-Evans, 2020). It is the progression of these child development theories which builds the framework for this research. Parents and schools have a reciprocal relationship, each affecting the other to assist children in growth and learning. Therefore, understanding parents' perspectives on student learning can strengthen relationships with schools and teachers, ultimately affecting children's learning.

Literature Review

In 1988 the National Research Council published *Understanding Agriculture New Directions for Education.* This book introduced the term agricultural literacy, defining an agriculturally literate person as someone whose "understanding of the food and fiber system includes its history and

current economic, social, and environmental significance to all Americans" (National Research Council, 1988, p. 2). Over the course of three decades, Frick, Powel, Agnew, and Trexler, Kovar and Ball, and the American Farm Bureau Federation have added to this original definition. The most current definition was coined in 2014, "An agriculturally literate person understands and can communicate the source and value of agriculture as it affects our quality of life" (Spielmaker et al., 2014, p. 1).

In 1976, the first series of teacher-focused materials was produced by the United States Department of Agriculture. In 1981, state governors were asked to appoint a state-level task force for implementing Agriculture in the Classroom (AITC) programming. From conception to 1997, USDA remained the national coordinating entity for AITC programs. In the late 1990s a national consortium was established. This later became the National Agriculture in the Classroom Organization (NAITCO), a standalone 501(c)(3), separate from USDA but with a memorandum of understanding to continue agricultural literacy outreach (Adelhardt, 2006; National Agriculture in the Classroom, 2023). Today, NAITCO remains the managing body of state and territory AITC programs with a board of directors comprised of state and territory program leaders. Annually programs are requested to submit a state or territory report to NAITCO. In 2021, 43 states, one territory, and the District of Columbia reported activity (*2021 AITC Program Report*, 2021). These programs reached 22,000 teachers and 916,000 students, supported by more than $14,000,000 in total budgets.

In 2013, Kovar and Ball published a synthesis of agricultural literacy research summarizing 20 years of work since the publication of the *Understanding Agriculture New Directions for Education* book. These authors cite a continually growing population as well as societal interest in economic, social, and environmental issues to reaffirm the need for an agriculturally literate population (Kovar & Ball, 2013). A multistate research committee was established in 2014 to aid in the support and execution of agricultural literacy outreach and research (NIMSS, 2019). As of November 2022, more than 80 publications have been documented as published by members of this committee since its inception (NIMSS, 2019). The National Center for Agricultural Literacy (NCAL) was established at Utah State University in 2015. The NCAL objectives are to provide research, learning resources, and professional development to agricultural literacy program stakeholders, including through NAITCO (National Center for Agricultural Literacy, n.d.). The National Agricultural Literacy Outcomes (NALOs) were published by members of NCAL and the multistate research committee. These outcomes provide learning objectives organized in five themes to tie agricultural concepts to appropriate K-12 educational standards (Spielmaker & Leising, 2013). These outcomes have guided the generation of lessons and supporting resources created by AITC programs to teach agricultural content to K-12 students. The National Agricultural Literacy Curriculum Matrix houses lessons as a free-to-download database, categorized by NALOs and curriculum standards (Spielmaker, 2019).

Throughout the more than thirty years of agricultural literacy research, much effort has been put into understanding what students and teachers understand about agriculture and its application in everyday life. Researchers have worked to understand how teachers value agriculture as a means to contextualize required content standards, or measure levels of agricultural literacy of many audiences. However, no research has been recently published investigating parents' value of their children learning about agriculture in K-12 outside of Career and Technical Education courses.

In colonial America, local jurisdiction of schools was placed under the governance of townships. Township boards were made up of average community citizens, inevitably some parents of children attending schools (Buell-Hiatt, 1994). During this genesis of U.S. public schools, some leaders argued every child was deserving of a basic education, yet parents believed it was their right to select between private or public schools. Over time, parent-teacher associations formed as a result of these sorts of debates (Woyshner, 2000). Buell Hiatt argues additional legislation addressing truancy, Head Start and early childhood programs, and the Education for All Handicapped Act of 1974 would not have gained traction without widespread parent support (Buell-Hiatt, 1994).

From science to reproductive health to religion and more, parents have negotiated to alter public school-required curriculum for decades (Cheung & Kwan, 2021; Gill & Schlossman, 2003; Hirschoff, 1977; Kantor & Levitz, 2017). Constantine, Jerman, and Huang surveyed parents in California about their levels of support for several sex education topics taught in public schools (2007). Of the 1,284 parents surveyed, 89% preferred a comprehensive sex education curriculum while 11% preferred an abstinence-only approach. Researchers differentiated these results by highest level of education achieved by the parent, political ideology, and geographic area of the state to look for any trends in these independent variables (Constantine et al., 2007).

Cheung and Kwan investigated more than 600 parents' perceived goals for their children's early math learning in Hong Kong (Cheung & Kwan, 2021). In this quantitative study researchers used factor analysis to narrow a list of 38 questions developed with influence from previous research to a list of 12 questions divided into three subcategories. Researchers found the two-way interaction between parents' goals for their student and parents' highest level of education to be significant ($F(3.34, 534.49) = 6.53$, $p < .001$, $\eta p2 = .04$). Parents with at least a high school or postsecondary education indicated higher math learning goals for their students than those who had completed less education. As parents' perception of the importance of their child's math reasoning skills increased, so did parents' view of their child's approach to learning math. This suggests parents' goals for their children's math learning does impact how the children learn about this subject (Cheung & Kwan, 2021).

A 2019 study about physical education curriculum evaluated parents' own experiences in physical education courses and how this related to the importance they put on the value of physical education within school curriculum for their children (Lago-Ballesteros et al., 2019). The sample included parents of more than 1,800 teenagers at 32 different secondary schools in Spain and Portugal. A multiple regression model found that parents' current activity level did not predict the value of their support for their children to take these courses. In another study, parent motivation and demonstration of perceived value in science and math resulted in their adolescent children taking more math and science courses (Harackiewicz et al., 2012). School intervention providing parents with materials and guidance in how to support their teens' science and math learning did help parents be more positively influential in their children's work in these courses.

According to the U.S. Census Bureau and the U.S. Department of Agriculture, the Millennial generation, born between 1981 and 1996, is the largest food purchasing portion of the U.S. population as well as the largest segment caring for children under the age of 18 (Census Bureau,

2023; Kuhns & Saksena, 2017). Consumers define quality grocery items by products' freshness, minimal processing, health & nutrition, product sourcing, sustainability, and labor standards (FMI, 2023). Confusion in food labeling and marketing of food combined with a personal disconnect to food production has caused uncertainty in purchasing decisions of U.S. consumers (Powers & Roberts, 2022). In addition to purchasing decisions at the grocery store, U.S. citizens are faced with decisions about agriculture, food, and natural resources in the voting booth. Since 2000, 10 state-level bills and ballot initiatives about farm animal welfare have been brought to legislators and voters in 12 different states (Hopkins et al., 2022). Due to the strong influence parents have over child development and school curriculum, this study narrows the focus to parents as consumers.

Purpose and Research Questions

Given parents' influence on children's knowledge and development, this study seeks to understand the level of importance parents of kindergarten through twelfth-grade students place on their students learning about agriculture in school. This study investigated two questions:

1. What level of importance do parents place on their students learning about agriculture in school?
2. What factors influence the level of importance parents place on their students learning about agriculture in school?

Methods

This quantitative study sought to identify the level of importance parents place on their children learning about agriculture in school. Researchers developed a 26-question instrument with 19 questions based on each of the five National Agricultural Literacy Outcomes (NALO) themes, plus one question about parents' perceived importance of their student learning about agriculture in a general sense, three questions about agriculture or school involvement, and three questions about demographics. For each of the 20 questions addressing importance, respondents were required to select from a five-point Likert-scale, ranking from not at all important to extremely important. Taking influence from Cheung and Kwan's (2021) work with parents' perceived importance of mathematics learning goals, the NALO themes provided groupings for the goal statements. The demographic questions asked addressed research question two. The rural, suburban, and urban classification was assigned by reporting zip code provided by respondents in alignment with U.S. Postal Service zip codes and the United States Department of Agriculture's Economic Research Service's Rural-Urban Commuting codes (USDA ERS, 2023). The respondents' highest level of education achieved was asked, as this is considered one of the most stable predictors of social and economic characteristics of students (Sirin, 2005). Finally, respondents were asked to categorize their field of work to control for any bias of respondents working in education or agriculture. These questions were asked at the end of the survey, following the NALO theme-based questions.

A panel of experts was used to determine the face validity of the instrument questions. These experts were faculty in agricultural education and science teacher education with previous experience teaching at the primary and secondary levels. Cronbach's alpha was calculated post-

hoc to determine the reliability of the 20 ranked-item questions where values of 0.7 or higher are considered acceptable with 0.8 or higher showing very good internal consistency (Pallant, 2016). The Cronbach's alpha of these 20 questions ($\alpha = 0.951$) indicated high reliability.

To reach a nationwide sample of parents of K-12 grade children, Centiment was contracted to distribute the survey. According to the U.S. Census Bureau, 63,214,000 people are parents of coresident biological, step, or adopted children under the age of 18 (2022). To obtain a statistically significant sample, with a 95% confidence level and a 5% margin of error, a random sample of at least 385 parents across the United States was needed. Only one parent per household was allowed to complete the survey to eliminate violating the assumption of independence. Qualtrics was used to collect survey responses. Microsoft Excel and SPSS were used to analyze the data. A consent to participate letter was included and no personally identifying information was collected. Approval of research with human subjects was obtained prior to data collection.

Threats to internal and external validity were reduced by conducting a one-time survey of a random national sample of adults. However, some limitations still existed. To address a threat to external validity, this research should not be generalized to subject areas outside of agriculture or applied to a time period other than when the survey was completed. Additionally, a threat to internal validity, some participants may have more direct exposure to agriculture, food, or natural resources than others. This involvement in agriculture may be accounted for in the question about field of occupation, however, it is possible the agricultural involvement is not their primary occupation therefore not disclosed. To address this, an ANOVA evaluating the impact occupation had on the NALO themed questions was conducted analyzing agriculture and natural resources and education occupations' responses separately from the rest of the sample. For each group of questions by NALO theme, there was not a statistically significant difference between these two occupations' responses and all other responses based on $p < .05$ (Theme 1 $p = .675$, Theme 2 $p = .894$, Theme 3 $p = .586$, Theme 4 $p = .782$, and Theme 5 $p = .907$). Therefore, respondents with agriculture and natural resources and education occupations remained within the dataset for analysis.

Research question one was addressed by the descriptive analysis of the 20 Likert-scale questions. The six independent variable responses: level of education, occupation, zip code, ages of children, school participation, and agriculture participation were summarized by descriptive data. Further analysis was conducted to determine if relationships existed between independent demographic variables and the parents' value of children's agricultural understanding. For analysis, the 19 questions affiliated with the five NALO themes were categorized by theme. For each respondent, a summary score by NALO theme was calculated by obtaining the mean response to the questions within each theme. Then, multiple linear regression analysis was conducted with each theme score as the dependent variable and all six demographic factors as independent variables to determine if any of the parent demographic factors or community type (metropolitan, micropolitan, or small town/rural) affected the type of agricultural information a parent holds as important for their child to learn. Preliminary tests were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. With six predictor values, a sample of at least 97 respondents was needed to ensure a medium effect size ($R^2 = .13$), indicating strength in the correlation between variables.

Results

Centiment distributed the Qualtrics survey from July 18-31, 2023. In this 14-day period, 409 parents completed the survey; 212 identified as female (52%), 197 as male (48%) with ages ranging from 25 to 50 years old with the mean age being 38 years old (*SD* = 6.21). Most respondents (40%) reported a high school diploma/GED as their highest level of education, bachelor's degrees (23%), and associate degrees (16%) followed. Most respondents indicated working in consumer services (19%) which includes occupations such as banking, utilities, retail, and hospitality (U.S. Department of Education, 2002). Manufacturing, construction, and transportation (17%) and health care (15%) followed. Forty states were represented by 382 (93%) people and 27 (7%) people listed invalid zip code numbers. Of the valid zip codes provided, 310 were located in metropolitan areas, 43 in micropolitan areas, and 29 in small town/rural areas.

To further understand parents' involvement with their children's schooling, respondents were asked to indicate participation in a list of nine school engagement opportunities within the last two school years. Most parents (64%) helped their children with homework assignments or attended a parent-teacher conference (62%). Only one parent indicated participation in all nine activities whereas 94 (23%) indicated participation in one activity. Similarly, parents were asked about their agricultural experience within the last year. Of the eight provided options, many (48%) visited a county or state fair or bought produce directly from a farmer while only eight percent indicated they personally raised livestock. Some (3%) described participation in other agricultural activities such as: attended FFA banquet, received produce from a neighbor, entered food in the county fair, sheared sheep, prepared local produce from a food bank, and cultivated other products. To gain perspective on the volume of agricultural experiences participants had, an agricultural engagement score was calculated, by adding the total number of responses per person. No respondents indicated participating in all eight activities, while 13 (3%) indicated participating in zero agricultural activities in the past year.

Research Question One

To address the first research question investigating the level of importance parents place on their students learning about agriculture in school, 20 Likert-scale questions were asked. One question asked parents to rank the overall importance of learning about agriculture in school. Extremely important was the most frequently selected response (*f* = 151), while the mean response (*M* = 4.02) indicates parents believe it is very important agriculture is taught in school (Table 1).

Table 1

To What Extent is it Important that your Student Learn About Agriculture in School (n = 409)

	Not at all important	Slightly important	Moderately important	Very important	Extremely important	*M*	*SD*
	f (%)	*f* (%)	*f* (%)	*f* (%)	*f* (%)		

3 (0.7)	21 (5.1)	90 (22.0)	144 (35.2)	151 (36.9)	4.02	.929

The remaining 19 questions were written with influence from the five NALO themes (Table 2). All questions had a mean response of moderately important ($M \geq 3$) or above. The question with the highest mean response ($M = 4.26$) aligned with NALO Theme 3: Food, Health and Lifestyle, asking parents to rank the importance of their students learning about safe methods to prepare and store food. A question associated with NALO Theme 5: Culture, Society, Economy, and Geography had the lowest mean ($M = 3.69$) and the highest standard deviation ($SD = 1.059$). The question asked parents "to what extent is it important that my student learn how agricultural events and inventions affect how Americans live today."

Table 2

Parents' Ranked Importance of Agricultural Content Taught in School (n = 409)

	Not at all important *f* (%)	Slightly important *f* (%)	Moderately important *f* (%)	Very important *f* (%)	Extremely important *f* (%)	*M*	*SD*
T1: Land and water use	8 (2.0)	23 (5.60)	75 (18.3)	161 (39.4)	142 (34.7)	3.99	.966
T1: Environmental factors	7 (1.7)	32 (7.8)	93 (22.7)	150 (36.7)	127 (31.1)	3.88	.996
T2: Cultural differences	3 (0.7)	27 (6.6)	74 (18.1)	171 (41.8)	134 (32.8)	4.01	.883
T2: Renewable resources	3 (0.7)	22 (5.4)	77 (18.8)	153 (37.4)	154 (37.7)	4.06	.919
T2: Differing viewpoints	9 (2.2)	23 (5.6)	94 (23.0)	159 (38.9)	124 (30.3)	3.89	.973
T2: Ethics	7 (1.7)	29 (7.1)	89 (21.8)	164 (40.1)	120 (29.3)	3.88	.968
T3: Basic needs	4 (1.0)	23 (5.6)	73 (17.8)	147 (35.9)	162 (39.6)	4.08	.94
T3: Financial costs	7 (1.7)	23 (5.6)	80 (19.6)	164 (40.1)	135 (33.0)	3.97	.952
T3: Steps of production	10 (2.4)	28 (6.8)	81 (19.8)	155 (37.9)	135 (33.0)	3.92	1.001
T3: Safe food prep	3 (0.70)	10 (2.4)	61 (14.9)	140 (34.2)	195 (47.7)	4.26	.852
T4: Population growth	3 (0.7)	26 (6.4)	94 (23.0)	158 (38.6)	128 (31.3)	3.93	.928
T4: Scientific advancements	6 (1.5)	24 (5.9)	77 (18.8)	176 (43.0)	126 (30.8)	3.96	.929
T4: Biological processes	7 (1.7)	29 (7.1)	106 (25.9)	148 (36.2)	119 (29.1)	3.84	.982
T4: Harmful and beneficial organisms	3 (0.7)	21 (5.1)	87 (21.3)	165 (40.3)	133 (32.5)	3.99	.901
T4: Scientific discoveries	7 (1.7)	40 (9.8)	99 (24.2)	148 (36.2)	115 (28.1)	3.79	1.014

T5: Supply and demand	3 (0.7)	13 (3.2)	87 (21.3)	158 (38.6)	148 (36.2)	4.06	.875
T5: Inventions	14 (3.4)	39 (9.5)	112 (27.4)	140 (34.2)	104 (25.4)	3.69	1.059
T5: Global economy	5 (1.2)	33 (8.1)	86 (21.0)	155 (37.9)	130 (31.8)	3.91	.977
T5: Role of government	8 (2.0)	24 (5.9)	96 (23.5)	138 (33.7)	143 (35.0)	3.94	.997

A question associated with Theme 3: Food, Health, and Lifestyle, "To what extent is it important that my student learn the steps of production for a processed product, from farm to store" had the second highest standard deviation (*SD* = 1.001). However, these two highest standard deviations are just over 1.0, therefore there is low disbursement of responses and few outlying responses on all questions.

Two questions addressed Theme 1: Agriculture and the Environment and had a summed mean rank of very important (*M* = 3.93). Four questions addressed Theme 2: Plants and Animals for Food, Fiber and Energy with a summed mean rank of very important (*M* = 3.96). Theme 3: Food, Health and Lifestyle had the highest summed mean rank (*M* = 4.06) with four questions addressing this theme. Five questions addressed Theme 4: Science, Technology, Engineering, and Math and had a summed mean rank of very important (*M* = 3.90). Four questions addressed the final theme, Theme 5: Culture, Society, Economy, and Geography with a summed mean rank of very important (*M* = 3.90).

Research Question Two

The second research question investigated what factors influence the level of importance parents place on their students learning about agriculture in school. Using multiple regression models, the theme scores were the dependent variables, and the independent variables were the demographic variables including: occupation, education, location (metropolitan, micropolitan, and small town/rural), school involvement, and agricultural experience. These regression models were structured as a forward entry model as previous literature indicated parents' occupation, education level, location, school involvement, and agricultural experiences all have influenced parents' view of their children's learning therefore these five factors will remain in each model for evaluation (Bronfenbrenner, 1979; Cheung & Kwan, 2021; Hoover-Dempsey & Sandler, 1997). To investigate the relationship between these variables, correlation coefficients were calculated (Table 3). Most variables had low correlation however, school involvement and agriculture experience indicated a strong positive relationship with $r = .526$. This was the strongest relationship in the model, with the correlation coefficient closest to +/-1.0 of any factor, and was statistically significant $t = <.01$, $p < .05$. However, the variance inflation factor (VIF), indicating the strength in relationship between predictors, for all five regression models is between 1.0 and 2.0 indicating low correlation. A VIF of 1.0 or less indicates no correlation, 1.0 to 5.0 indicates some correlation, and 5.0 to 10.0 indicates high correlation (Hayes, 2023). Therefore, it is not a strong enough relationship to indicate multicollinearity, instances of high correlation between two or more independent variables in a multiple regression, so the two factors were retained in the model.

Table 3

Correlation Matrix

	Level of education	Occupation	Location	School involvement	Agriculture experience
Level of education	--				
Occupation	-.060	--			
Location	.080	-.065	--		
School involvement	-.095	-.040	.036	--	
Agriculture experience	-.057	.044	.095	.526*	--

*p<.05**

The first NALO theme titled "Agriculture and the Environment" is focused on teaching students the ways natural and managed ecosystems provide for everyday needs (Spielmaker & Leising, 2013). Two questions addressed this theme. Education level and school involvement were statistically significant predictors of Theme 1 responses at $p < .05$ level. However, the R^2 values for each model indicate each predictor variable is a poor predictor of any change in the dependent variable. The model with all five variables is statistically significant $R^2 = .025$, $F(5, 409) = .365$, $p < .05$.

The second NALO theme "Plants and Animals for Food, Fiber and Energy" discusses the ways agriculture provides for daily life. Objectives focus on topics of animal and plant domestication, production practices, genetics, and harvest techniques to meet the needs of the global population (Spielmaker & Leising, 2013). Four questions addressed this theme. No individual factors were statistically significant in predicating any change in the dependent variable based on $p < .05$. The R^2 values for each of the models indicate the five factors are not good predictors of Theme 2 scores. The multiple regression model for all five variables $R^2 = .107$, $F(5, 409) = .097$, $p < .05$ is not statistically significant.

The third NALO Theme is titled "Food, Health and Lifestyle." This theme incorporates concepts from USDA's My Plate diagram, food safety, and food processing with agricultural production processes to build a complete farm to table picture for students (Spielmaker & Leising, 2013). Four questions addressed Theme 3. Like Theme 1, education level was a statistically significant predictor of change in NALO Theme 3 responses based on $p < .05$. In Theme 3, occupation was also a statistically significant indicator of change in the dependent variable. Despite this significance, R^2 in each model indicate a poor fit. The multiple regression model for all five variables $R^2 = .15$, $F(5, 409) = .729$, $p < .05$ was not statistically significant.

The fourth NALO Theme "Science, Technology, Engineering and Math" highlights the intersection of innovation with agriculture throughout history. From early inventions of simple machines to modern computer technologies, this theme builds understanding of the progress achieved in agricultural inventions and continued demand for technological innovations to feed the world (Spielmaker & Leising, 2013). Five questions addressed this theme in the survey instrument. Level of education remains the only statistically significant variable across all five models (Table 15). However, the R^2 values were also small. The multilinear regression model for all five factors indicate $R^2 = .144$, $F(5, 409) = .161$, $p < .05$ is not significant.

The final NALO Theme "Culture, Society, Economy, and Geography" focuses on social studies aspects of agricultural production. The outcomes emphasize historical inventions, agricultural practices of civilizations throughout history, and economic impacts of agriculture both in the U.S. and globally. Four questions addressed Theme 5. Again, the only statistically significant factor influencing parents' response to the Theme 5 questions was level of education (Table 16). Though this was statistically significant, $R^2 = .096$ indicates this factor is poor fit at predicting parents' responses. When looking at all five factors in a multilinear regression, $R^2 = .132$, $F(5, 409) = .659$, $p < .05$ was not statistically significant .

Conclusions

School learning is a large component of child development, second only to parental influence (Bronfenbrenner, 1974; McLeod, 2018a, 2022). Parent engagement in schooling is important to support child development, parent-teacher-student relationships, and the community as a whole (Epstein et al., 2019; Hoover-Dempsey & Sandler, 1997). In the 1980s the National Research Council highlighted the need to incorporate agricultural content into school lessons for all students (National Research Council, 1988). Since that time key agricultural literacy organizations have worked to increase the U.S. population's agricultural literacy through school-based outreach efforts. With Bronfenbrenner as the foundation, this study brought together child development and school engagement research with agricultural literacy outreach objectives to understand the level of importance parents place on their children learning about agriculture in school.

Results indicate 72% of parents believe it is very or extremely important that their children learn about agriculture in school. This provides agricultural literacy program leaders with data for approaching school district leaders to implement programming. Of the 19 questions based on NALOs, questions connected to Themes 1-3 had very low standard deviations, ranging from $SD = .852$ to 1.001, meaning most parents responded similarly on each question. These questions had high mean responses ranging from very important ($M = 3.88$) to extremely important ($M = 4.26$). Themes 1 and 2 connect topics such as managed and natural landscapes, the cultivation of plants and animals for food, fuel, fiber, and more. The concepts within the theme do scaffold in complexity as the grade levels increase, however, at their root, these NALO themes discuss the most basic of agricultural concepts. Theme 3 discusses food, health, and lifestyle topics. Arguably, this topic's content might be most relatable for teachers, students, and parents with little to no agriculture exposure. The theme addresses the USDA's My Plate nutritional diagram, food safety practices, and food labeling/marketing.

It could be argued Themes 4 and 5 take on more complex scientific topics in agriculture. Theme 4 is focused on Science, Technology, Engineering and Math (STEM). These themes directly address animal welfare and genetic modification concepts which have been sources of consumer consternation as ballot initiatives and legislation in recent years and cause consumers pause in grocery aisles (Hopkins et al., 2022; Peckman, 2020; Powers & Roberts, 2022). Theme 5 addresses the economic impact of agriculture and other social studies concepts. The U.S. Financial Literacy and Education Commission indicates Americans struggle to make the most basic decisions associated with these types of economic question (2020). These two themes saw slightly lower mean scores (M = 3.69 to 4.06) with slightly more deviation ranging from SD = .875 to 1.059. These differences in themes' scores are very slight. Mean scores still indicate parents felt each question was either very important or extremely important for their children to learn in school.

Recommendations

Further research is needed to understand what sources of information about agriculture parents see as credible and how this information is impacting their decision making. An initial next step might be to ask parents where they are receiving their information about the agricultural topics. This sourcing information could clarify what factors influence the level of importance indicated in this study. Based on the literature, parents' level of education, occupation, location, involvement in school activities, and agricultural exposure all were evaluated in this research, yet none proved to strongly influence parents' indicated level of importance of their students learning about agriculture. So, if not these factors, then what factors do influence the level of importance parents place on their children learning about agriculture in school?

Repeating this study using specific, more controversial terms such as GMO, animal welfare, and autonomous equipment, in a similar context to the questions asked in this study might provide insight into specific support or disapproval of agricultural practices. Would parents place the same high level of importance on their students learning about genetic modification, livestock antibiotic use, or autonomous tractors in school? Changing the vernacular describing agricultural practices in a study such as this might influence the level of importance parents place on certain topics. It also could add to the body of science literacy research by using more specific terms directly related to advancements in plant and animal science.

Additional research could also investigate ways agricultural literacy interventions are reaching parents as well as school children. Major entities conducting this type of outreach report hosting events where parents attend as chaperones or families come to public events, yet little research has been conducted with the parents at these events. A final recommendation would be to conduct an agricultural literacy assessment of a sample of the adult population in a similar manner to the way this study's population was sourced. The Logic Model for Agricultural Literacy indicates the long-term result of agricultural literacy programming is to create an agriculturally literate population (Spielmaker et al., 2014). While the literature suggests we have not reached this state of societal literacy, until such an assessment is provided to a sample of the adult population, the society's current level of agricultural literacy is unknown.

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Implementing Agricultural Literacy in Pennsylvania Elementary and Middle Schools: Perceptions of Principals

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From the beginning of the Industrial Revolution, the U.S. has witnessed a dramatic shift in individuals engaged in production agriculture. Subsequently, citizens have moved away from agricultural-related settings, and the population has become detached from its food and fiber systems, exacerbating an employment gap in the agricultural workforce. Exposing youth to agricultural literacy in elementary and middle schools could 1) lead to an interest in agricultural careers, mitigating an impending employment shortage, and 2) cultivate an agriculturally literate society capable of making informed decisions regarding agriculture. This study aimed to describe Pennsylvania elementary and middle school principals' perceptions of agriculture and agricultural literacy. The research questions that guided the study were: (1) What perceptions did K-8 principals have about agriculture? (2) What were principals' perceptions regarding implementing agricultural literacy? (3) What factors did K-8 principals perceive as barriers to implementing agricultural literacy? (4) How likely were principals to advocate for the adoption of agricultural literacy in their schools? This quantitative study yielded a response rate of 13.02% (n = 283), with results indicating that (1) principals hold positive perceptions of agriculture, (2) principals believe that agriculture can be implemented in their schools, and (3) principals' top perceived barriers to implementing agricultural literacy are lack of training, increased accountability through standardized testing, lack of time for teachers to learn about agricultural literacy, and lack of funding, respectively.

Introduction

Fewer citizens in Pennsylvania live and work in rural areas than in the past, with less than 2% of the population engaged in production agriculture (Doerfert, 2011; Team Pennsylvania, 2018). As society distances itself from agriculture, school curricula prioritize agriculture less. The lack of youth exposed to agriculture has helped to exacerbate an employment gap in the agricultural workforce (Burrows et al., 2020; Riedel, 2006; NAITC, n.d.b). In Pennsylvania, this workforce faces an employment shortage due to aging and a gap in skills and education, creating a need for widespread interest in agricultural jobs in today's youth (Team Pennsylvania, 2018). As Riedel (2006) stated, "Students are deserving of an opportunity to learn about agriculture and all of the career opportunities. They need to be given skills and inspiration to learn about and become a part of the agriculture industry" (p. 6). Implementing agricultural literacy in kindergarten through eighth grade would provide students with opportunities to learn about their potential in the agricultural industry. Moreover, prioritizing agricultural literacy in schools would help to cultivate a population that can make informed decisions on agricultural issues and provide the necessary support for challenges facing the agricultural industry (Kovar & Ball, 2013).

Implementing agricultural literacy in school classrooms involves using agriculture-based content as the context for teaching the core curriculum. This approach can be applied to many subjects, including science, social studies, language arts, and nutrition (NAITC, n.d.a). Given that children begin to shape their career aspirations before secondary school (Tai et al., 2006; Wyss et al., 2012), engaging in agricultural literacy in elementary and middle school could lead students to an

interest in pursuing agricultural careers. Greater interest in the agricultural industry could help prevent an impending employment shortage and cultivate an agriculturally literate society (Team Pennsylvania, 2018).

This study aimed to measure K-8 principals' perceptions of implementing agricultural literacy in their schools and identify their perceived barriers to its implementation. The success of educational change hinges greatly on the support of the school principal throughout the change process (Fullan, 2016; Reinhard,1980). Thus, principals were chosen as the target audience for this study due to their unique position of power in their schools (Hallinger, 1992). Moreover, this study addresses a gap in related agricultural literacy and education research. Most studies concerning principals' perceptions of agricultural literacy pertain to secondary school-based agricultural education (Doss & Rayfield, 2021; Kalme & Dyer, 2000; Rayfield & Wilson, 2009; Smith & Myers, 2012), whereas the present study focuses on agricultural literacy; a curriculum reform that uses agriculture as a context to teach core subjects (NAITC, n.d.a). Likewise, studies concentrating on agricultural literacy often examine teachers' perceptions of integrating agriculture into the curriculum. Principals are vital decision-makers in schools and have the unique ability to implement changes. For these reasons, understanding their perspectives provides valuable information for stakeholders of agriculture.

Literature Review

Agricultural Education in Pennsylvania

The most common way Pennsylvania youth can be involved in agriculture in an academic setting is through agricultural education, primarily offered at the high school level. Agricultural education provides students with experiences and skills that foster personal and professional development and educated decision-making regarding agriculture. The format in which agricultural education teaches students is through the three-component model, which includes classroom or laboratory instruction, leadership education, which typically involves engagement in FFA, and supervised agricultural experiences (NAAE, 2022). Students must be enrolled in agricultural education to participate in FFA, and Pennsylvania is an affiliate membership state (Pennsylvania FFA, n.d.). However, in Pennsylvania, many students do not have the opportunity to engage in agricultural education. Over 80% of Pennsylvania's secondary schools do not offer agricultural education sanctioned by Pennsylvania's Department of Education (PDE, n.d.). Additionally, participation in agricultural education is voluntary, suggesting that high school students already interested in pursuing a career in agriculture engage in agricultural education (Riedel, 2006). Thus, this study focuses on the need for students to gain exposure to agriculture at an earlier age to cultivate an interest in agricultural careers prior to secondary school.

Engaging Students in Agriculture at an Earlier Age

Research suggests that children begin to make choices regarding career paths in their primary and intermediate years (Tai et al., 2006; Wyss et al., 2012). Tran (2018) studied the effects of computer programming in elementary school on students' perceptions and career aspirations in science, technology, engineering, and mathematics (STEM). The results of this study suggest that early exposure to STEM led to students' development of positive perceptions and attitudes towards STEM and connecting it to their future careers (Tran, 2018). Likewise, STEM majors in

college were widely influenced by their academic preparation in math and science (Correll, 2001; Tai et al., 2006; Tran, 2018). By engaging K-8 students in agricultural literacy, more students might be interested in agricultural careers by the time they reach high school.

Current Uses of Agricultural Literacy

Implementing agricultural literacy into school classrooms involves using agriculture as a context to teach and learn core subjects in the K-8 curriculum. An agriculturally literate person can convey the value of agriculture on our quality of life (NAITC, n.d.a). Frick et al. (1991) defined agricultural literacy as "possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p. 52). In a school that has implemented agricultural literacy schoolwide, every teacher includes agriculture in their classroom. By embedding agriculture into the school curriculum, teachers can help increase awareness, knowledge, and appreciation of the food and fiber systems essential for our basic needs. In this context, every student engages in and learns about agriculture and the opportunities available to them in the industry. Moreover, prioritizing agricultural literacy in schools would help to cultivate a population that can make informed decisions on agricultural issues and provide the necessary support for challenges facing the industry and its stakeholders (Kovar & Ball, 2013).

Agricultural literacy differs from agricultural education because it lacks the structure of agricultural education described above. Currently, youth engagement in agricultural literacy is inconsistent throughout the state. The Pennsylvania Friends of Agriculture Foundation (PFAF), a subset of National Agriculture in the Classroom (NAITC), is the primary organization that promotes agricultural literacy in Pennsylvania. This organization runs three large programs designed to bridge the gap between agriculture and students: Mobile Ag Ed Science Lab, Ag Literacy Week, and Educator's Ag Institute. In 2023, PFAF reached approximately 120 schools in their Mobile Ag Ed Science lab, which travels across the state to deliver educational experiences for elementary and middle school students. Ag Literacy Week connects the agricultural industry with students through storytelling. The Educator's Ag Institute is designed for Pre-K-12th formal educators, pre-service teachers, and informal educators to equip them with educational resources, hands-on lesson topics, and experiences they can use to inform their classroom instruction. While PFAF's work to enhance agricultural literacy in the state is valuable, its limited reach identifies a need for this study.

K-8 Teachers' Perceptions of Implementing Agricultural Literacy

Previous studies have explored teachers' perceptions of agricultural literacy and integrating it into their curriculum. Knobloch et al. (2007) suggested three factors that impact the likelihood of teachers incorporating agriculture into their curriculum: the belief that they possess the ability and knowledge to teach agriculture, the belief that the integration will aid in the achievement of teaching and learning goals, and confidence that the benefits outweigh the costs. Teachers often deal with an overcrowded curriculum and high expectations for accountability due to standardized testing (Daggett, 2000; Linn, 2000), which also stand in the way of implementing agricultural literacy in the classroom. The literature on teachers' perceptions regarding agriculture helped inform the present study. Knobloch (2008) studied the factors of teachers' beliefs related to integrating agriculture in their classrooms. An instrument was created that

measured teachers' attitudes and school and teacher demographics and assessed how teachers integrated agricultural topics in their classrooms. The items were analyzed using exploratory factor analysis. Results yielded four factors regarding teacher beliefs around integrating agricultural topics in the classroom: (1) their contemporary view of agriculture, (2) their perceived value of integrating agriculture into the elementary school curriculum, (3) their beliefs related to the integration of agriculture into academic subjects, and (4) their attitude of agricultural careers and industry. This study discovered that the teachers had a contemporary view of agriculture, valued the educational benefits of integrating agriculture into their instruction, agreed that agriculture fit into academic subjects, and had a positive attitude toward agricultural careers and the industry. Further, Knobloch (2008) suggested that elementary teachers' cognitive and motivational beliefs explain the relationship between their behaviors to integrate agricultural topics and classroom activities. Additionally, the belief factors of 'fit in academic subjects' and 'value of integrating agriculture' were related to the extent to which teachers taught agriculture in their classrooms. Knobloch concluded that teachers are more likely to integrate agriculture if they perceive that it can be integrated into academic subjects and benefit students.

Secondary Principals' Perceptions of Agricultural Education

Kalme & Dyer (2000) collected literature suggesting that principals' perceptions regarding agricultural education have remained consistently positive in the three decades before 2000. Studies since then have revealed generally favorable perceptions toward agricultural education (Doss & Rayfield, 2021; Kalme & Dyer, 2000; Rayfield & Wilson, 2009; Smith & Myers, 2012). Because of these findings, Smith and Myers (2012) asserted that if principals' perceptions remain positive, agricultural education should continue to be represented in public education. However, Doss and Rayfield (2021) found that most principals lack experience in agricultural education. They highlighted a need to educate principals on agricultural education, as it might be challenging to understand what goes on in such a program without experience in one. While principals' perceptions of agricultural education are positive at the secondary level, research that explicitly focuses on elementary and middle school principals' perceptions of implementing agriculture in their schools' curricula is lacking.

Principals as Leading Decision Makers in Schools

According to Educational Leadership Theory (Pitner, 1988), principals can largely influence the implementation of agricultural literacy in their schools. Summak and Kalman (2020) asserted that school principals are considered to be the individuals who make the decisions that run their schools. Principals oversee all operations that ensure the school functions, including leading, monitoring, planning, and organizing (Lunenburg, 2010). Since the principal is on-site, at the center of communication lines, knows the context and setting of the school, and controls school resources, they are the individuals with the power base to make a difference (Hall & Hord, 1987). Supporting this study's theoretical framework, Reinhard (1980) found that the principals' contributions during stages of externally funded change processes were crucial to their success. During initiation, the principal's critical role was their agreement with the innovation, their input into the proposal, and the communication of their support and enthusiasm to others, including the superintendent. Throughout implementation, it was crucial that the principal remained interested and ready to problem solve if problems arose. In institutionalization, essential behaviors included

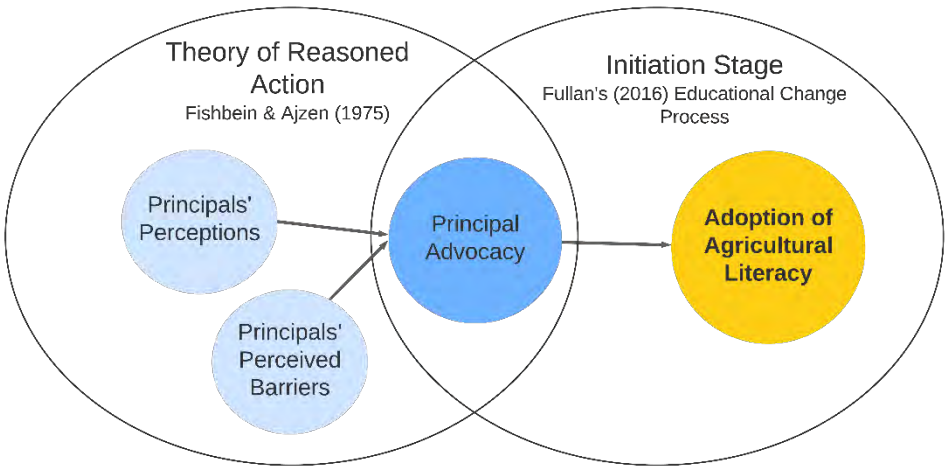
a continued commitment to the project and the ability to provide needed resources for the innovation's continuation (Hall & Hord, 1987). Fullan (2016) described the principal's role as that of a mid-level policymaker who bridges theoretical policy and its practice (Schechter & Shaked, 2016). This level of influence principals hold is why this quantitative study investigated principals' perceptions of and perceived barriers to implementing agricultural literacy in their schools. If principals can be convinced of the value and need for agricultural literacy, schools would be empowered in their ability to build an agriculturally literate generation of citizens and agricultural professionals who are competent in their ability to address agricultural issues.

Theoretical & Conceptual Framework

This study was conducted through the intersection of the theoretical lenses of Fishbein and Ajzen's (1975) theory of reasoned action and Fullan's (2016) theory of educational change (see Figure 1). Fishbein and Ajzen (1975) proposed that a person's behavior is consistent with their attitudes and behavioral intentions. This study focused on principals' attitudes and behavioral intentions during the initiation phase of Fullan's (2016) three-phase model. Initiation is the first phase of this model, followed by implementation and then institutionalization, and involves the process leading to the decision to adopt or proceed with the change. Several factors can contribute to the success of the initiation phase, including advocacy of central administration. Principals are identified as key educational change agents; without them, many changes may not progress past the initiation phase. Thus, principals' advocacy to adopt agricultural literacy in their schools is a pathway to its implementation (Fullan, 2016). The theories of reasoned action (Fishbein & Ajzen, 1975) and educational change (Fullan, 2016) informed the creation of a measurement to analyze principals' likelihood to advocate for adopting agricultural literacy.

Figure 1

Conceptual Framework Model (Fishbein & Ajzen, 1975; Fullan, 2016)



Purpose of the Study

This study aimed to describe Pennsylvania elementary and middle school principals' perceptions of agriculture and implementing agricultural literacy and their perceived barriers to implementing agricultural literacy. The research questions that guided the study were: (1) What perceptions did K-8 principals have about agriculture? (2) What were principals' perceptions regarding implementing agricultural literacy? (3) What factors did K-8 principals perceive as barriers to implementing agricultural literacy? (4) How likely were principals to advocate for adopting agricultural literacy in their schools?

Methods

This quantitative study employed survey methods using Qualtrics, contacting principals (N = 2,173) in Pennsylvania. The unit of analysis for this study was principals from Pennsylvania public schools which enrolled any grade from kindergarten through eighth grade. A list of these principals was downloaded from an online database by the Pennsylvania Department of Education. Email contacts were found through online searches and calls to individual schools. At the beginning of the data collection period, each principal was contacted directly via email from Qualtrics. Reminder emails were sent to nonrespondents throughout the month-long collection window to increase the response rate (Dillman et al., 2014). The researchers used a census approach to yield the highest possible response rate and sent the survey to the whole population. The survey aimed to identify principals' (1) perceptions of agriculture and implementing agricultural literacy in their schools, (2) perceived barriers to implementation, and (3) likelihood of advocating to implement agricultural literacy in their schools.

The researchers conducted a pilot study of principals and assistant principals (N = 113) of public elementary and middle schools in a seven-county area of central Pennsylvania. The results of the pilot (n = 24) informed changes made to the present study, including the choice to omit vice principals from the study and include additional measures that fully captured principals' perceived barriers in relation to Fullan's (2016) theory of educational change. Another addition to the analysis was the relation between principal demographics and their perceptions of agriculture and willingness to implement agricultural literacy.

Instrumentation

A questionnaire did not exist to capture all the research questions for this study. Thus, the researchers combined subscales from existing instruments. The questionnaire for this study contained three target areas: (1) principals' perceptions of agriculture (Hammack & Ivey, 2019; Knobloch, 2008), (2) barriers to implementing agricultural literacy as perceived by principals (adapted from Hammack & Ivey, 2019), (3) principals' likelihood of advocating to implement agricultural literacy in their schools, and (4) demographics.

A series of 5-point Likert scale questions (1 = Strongly Disagree to 5 = Strongly Agree) were used to measure principals' perceptions of agriculture and implementing agricultural literacy. Knobloch's (2008) constructs were used to illustrate (1) principals' perceptions of agriculture: contemporary view of agriculture ($\alpha = 0.99$) and attitudes of agricultural careers and industry ($\alpha = 0.91$), and (2) principals' perceptions regarding implementing agricultural literacy in their

schools: agriculture's fit in academic subjects (α = 0.97), and value of integration (α = 0.73). An example item from this section is "Agriculture would enhance the curriculum of my school." Hammack and Ivey's (2019) modified construct was used to assess the priority of agriculture in the broad community of the principals' schools. An example of a statement from this section is, "Agriculture is a high priority in my school." Principals' perceived barriers to implementing agricultural literacy were measured using ten-point slider-type questions. Respondents were asked to describe how strong eight provided barriers were to integrating agricultural literacy in their school. An example of the listed variables is "Lack of Teacher Knowledge" (Hammack & Ivey, 2019). The researchers created a Likert-type scale (1 = Extremely Unlikely to 5 = Extremely Likely) to measure principals' likelihood of advocating to implement agricultural literacy in their schools. Respondent demographics were measured using a collection of multiple-choice, single-select, and short-responses.

Analysis

The data collected from this study was analyzed using SPSS, and negatively worded items were reverse-coded before running results. Incomplete items from questionnaires were excluded from summative calculations, which resulted in varying sample sizes for each item. Measures of central tendency and frequency counts were calculated to describe the participants and their responses. Indices were created for constructs that measured principals' perceptions and grouped items in each construct (Babbie, 2016). A panel of experts and an evaluation of the pilot study established content and face validity.

The initial data collection window yielded 232 responses. Nonrespondents were contacted to achieve the targeted response number of 331, which yielded 51 more responses (Krejcie & Morgan, 1970). Independent-sample t-tests were conducted between initial and late responses for all scale items and constructs to test for nonresponse bias (Lindner et al., 2001). The only significant differences found were within barriers: "Lack of Funding" (p = .022) and "Increased accountability due to standardized testing" (p = .003). However, the effect sizes of these differences were small (d = .361 and d = .477, respectively). Accordingly, results from respondents and nonrespondents were combined for a total of n = 283.

Findings

This statewide census of 2,173 K-8 principals yielded 283 valid responses for a final response rate of 13.02%. Most respondents were white (92.2%) and female (48.8%), with an average age of 48.41 years (SD = 7.40). The average respondent has been in education for 23.82 years (SD = 6.44), at their current school for 9.75 years (SD = 7.98), a principal for 10.73 years (SD = 6.76) and was a teacher for 11.17 years (SD = 6.09).

Research Question 1: What perceptions did K-8 principals have about agriculture?

Means and standard deviations were calculated to analyze principals' perceptions of agriculture (Knobloch, 2008; Hammack & Ivey, 2019). The constructs used to answer this question were: (1) principals' contemporary view of agriculture (M = 4.17, SD = 0.59), (2) principals' attitude toward careers and industry (M = 3.98, SD = 0.51), and (3) principals' perceived priority of agriculture (M = 2.91, SD = 1.06). See Table 1 for statistics on the items in each construct.

Table 1

Principals' Perceptions of Agriculture

Item	*n*	*M*	*SD*	α
Contemporary View of Agriculture				
Agriculture includes horticulture and floriculture		4.20	0.66	
Agriculture includes processing food and fiber		4.18	0.72	
Agriculture includes forestry and woodlands		4.16	0.71	
Agriculture includes wildlife and natural resources		4.16	0.68	
Total	282	4.17	0.59	0.87
Attitude of Agricultural Careers & Industry				
Agriculture is a science-based industry		4.33	0.55	
Agriculture is a competitive business-operated industry		4.12	0.69	
Agriculture is a highly technological industry		4.08	0.66	
Agriculture has a lot of career opportunities		4.04	0.76	
Agriculture has a skilled, educated workforce		4.02	0.67	
Agriculture has a positive future for people and businesses		3.97	0.73	
Agriculture is an environmentally conscious industry		3.86	0.89	
Agriculture is America's largest employer		3.45	0.78	
Total	281	3.98	0.51	0.86
Perceived Priority of Agriculture				
Agriculture is a high priority in the community where my school is located		2.92	1.21	
Agriculture is a high priority in my school district		2.90	1.19	
Agriculture is a high priority for the parents in my school		2.82	1.11	
Agriculture is a high priority in my school		2.82	1.16	
Total	283	2.91	1.06	0.93

Note. Scale: 1 = Strongly Disagree; 5 = Strongly Agree

Research Question 2: What were principals' perceptions regarding implementing agricultural literacy?

The second research question was answered by identifying principals' perceptions of implementing agricultural literacy in their schools (Knobloch, 2008). Means and standard deviations were calculated to analyze the following constructs: (1) agriculture's fit in academic subjects ($M = 4.33$, $SD = 0.58$), and (2) the value of integrating agriculture into the curriculum ($M = 3.58$, $SD = 0.59$). See Table 2 for statistics on individual items in each construct.

Table 2

Principals' Perceptions of Implementing Agricultural Literacy

Item	*n*	*M*	*SD*	*α*
Agriculture's Fit in Academic Subjects				
Agriculture can be integrated into science		4.51	0.56	
Agriculture can be integrated into social science		4.39	0.62	
Agriculture can be integrated into math		4.33	0.63	
Agriculture can be integrated into language arts		4.27	0.68	
Agriculture can be integrated into art		4.25	0.66	
Agriculture can be integrated into any subject matter		4.25	0.70	
Total	282	4.33	0.58	0.95
Value of Integrating Agricultural Literacy				
Agriculture would enhance the curriculum of my school		3.87	0.71	
Basic knowledge of agriculture is important to make daily decisions		3.74	0.72	
Agriculture fits the needs of K-8 students		3.72	0.75	
Every elementary student should be taught agriculture no matter what career they want to pursue		3.67	0.77	
Every junior high/middle school student should be taught agriculture no matter what career they want to pursue		3.67	0.79	
Every high school student should be taught agriculture no matter what career they want to pursue		3.56	0.86	
There is no time to teach agriculture in my school's curricula		3.28	0.99	
My teachers are too busy to teach agriculture		3.11	0.94	
Total	283	3.58	0.59	0.86

Note. Scale: 1 = Strongly Disagree; 5 = Strongly Agree

Research Question 3: What factors did K-8 principals perceive as barriers to implementing agricultural literacy?

The third research question addressed principals' perceived barriers to implementing agricultural literacy in their schools (Hammack & Ivey, 2019). This question was answered through items on slider-type scales (see Table 3). In general, respondents reported that lack of training is their strongest perceived barrier ($M = 7.39$, $SD = 2.46$), followed by increased accountability through standardized testing ($M = 7.29$, $SD = 2.75$).

Table 3

Principal's Perceived Barriers to Implementing Agricultural Literacy

Item	*n*	*M*	*SD*
Lack of training	272	7.39	2.46
Increased accountability through standardized testing	258	7.29	2.75
Lack of time for teachers to learn about agricultural literacy	274	7.12	2.39
Lack of funding	262	7.01	2.90
Lack of teacher knowledge	273	6.70	2.49
Lack of flexibility in curriculum	260	6.23	3.01
Lack of teacher interest	253	5.48	2.61
Lack of administrative support	239	4.06	2.95

Note. Scale: 0 = Not a Barrier at All; 10 = Very Strong Barrier to Implementation

Research Question 4: How likely were principals to advocate for the adoption of agricultural literacy in their schools?

Research question four was answered by determining principals' likeliness to advocate for adopting agricultural literacy in their schools. Frequency counts and percentages were used to analyze the responses to this question (see Table 4). 51.3% of principals reported that they would be likely or extremely likely to advocate for adopting agricultural literacy in their schools. 14.5% of respondents reported that they would unlikely advocate for agricultural literacy's adoption. The remaining respondents (33.9%) reported feeling neutral regarding the question.

Table 4

Principals' Likeliness to Advocate for Adopting Agricultural Literacy

Item	*f*	%	*M*	*SD*
Extremely Unlikely	6	2.1		
Unlikely	35	12.4		
Neutral	96	33.9		
Likely	118	41.7		
Extremely Likely	27	9.6		
Total	282	99.6	3.45	0.91

Note. Scale: 1 = Extremely Unlikely; 5 = Extremely Likely

Discussion and Recommendations for Practice

Principals' Perceptions of Agriculture and Implementing Agricultural Literacy

The findings regarding principals' perceptions were consistent with Knobloch's (2008) and Hammack and Ivey's (2019) studies. Principals indicated that they hold positive perceptions of agriculture by exhibiting a contemporary view of agriculture and a positive attitude toward agricultural careers and the industry. Likewise, principals expressed positive attitudes toward

implementing agricultural literacy by indicating that they believe agriculture would fit in current academic subjects and valued the educational benefits of integrating agriculture into the curriculum (Knobloch, 2008). Knobloch's (2008) study helped explain why elementary teachers integrate agricultural content into their curricula and how they perceive integrating a non-required subject into existing curricula. This was accomplished by measuring teachers' beliefs regarding agriculture and integrating it into their classrooms. The study's results suggested that teachers' beliefs help to explain the relationship to their behavior to implement agriculture in their classrooms, which is consistent with Fishbein and Ajzen's (1975) theory of reasoned action. The data from the present study indicates that principals hold positive perceptions of agriculture. This suggests that they are likely to advocate for implementing agricultural literacy in their schools, a sentiment supported by the principals' reported willingness to advocate for adopting agricultural literacy.

Consistent with Hammack and Ivey's (2019) study on elementary teachers' perceptions of implementing engineering education, the current study found that principals do not perceive that agriculture is a priority in their schools, in their school districts, to the parents in their schools, or to the communities where their schools were located. These results identify a potential lack of education regarding agriculture and the agricultural industry in Pennsylvania citizens at large or a possible misunderstanding by the principals.

Principals' Perceived Barriers to Implementing Agricultural Literacy

Principals' top perceived barriers to implementing agricultural literacy are lack of training, increased accountability through standardized testing, lack of time for teachers to learn about agricultural literacy, and lack of funding, respectively. Principals' second strongest barrier speaks to state standards' influence on principals' decisions regarding curricula, and actions are needed to make agricultural literacy as relevant as other existing curricula. This would address the third strongest barrier, lack of time, as it would add priority to teaching agriculture. Funding was identified as the fourth strongest perceived barrier for principals, suggesting that principals are unaware of free agricultural literacy resources available by the National Agriculture in the Classroom and the Pennsylvania Friends of Agriculture Foundation. To address principals' top perceived barriers, state staff from the Pennsylvania Departments of Education and Agriculture, the Commission for Agricultural Education Excellence, and organizations like PFAF could: (1) facilitate connections between agricultural literacy organizations and schools, (2) advocate for including agriculture in state standardized testing to add priority to teaching agriculture, and (3) allocate funding for schools to implement agricultural literacy.

Principals' Likelihood to Advocate for the Adoption of Agricultural Literacy

The researcher included the question, "Indicate the likelihood you would advocate for adopting agricultural literacy in your school." to push respondents into the decision-making process on whether they would support the implementation of agricultural literacy in their schools. 41.7% (f = 118) of respondents are likely to advocate for adopting agricultural literacy, and 9.6% (f = 27) of respondents are extremely likely to advocate for the adoption of agricultural literacy. For proponents and stakeholders of agricultural literacy, these findings suggest promising intentions of principals, given that more than half of respondents would actively advocate for adopting agricultural literacy, and only 14.5% of respondents would not likely be advocates.

The conceptual model created for this study helps to describe principals' likelihood to advocate for adopting agricultural literacy by combining the theory of reasoned action (Fishbein & Ajzen, 1975) and Fullan's theory of educational change. Fishbein and Ajzen (1975) posited that people's perceptions and behavioral intentions are consistent with their actions. Fullan (2016) indicated that advocacy from principals can aid in the successful adoption of an innovation, leading to the implementation of said innovation. The current study found that principals perceive agriculture and agricultural literacy positively and would likely advocate for adopting it in their schools. Therefore, including this measurement in the study's questionnaire helped confirm that principals' positive perceptions would lead to actions that would positively affect the implementation of agricultural literacy. Furthermore, the behavioral intention of principals to advocate for adopting agricultural literacy suggests that adoption is likely, which is the pathway to implementing agricultural literacy.

This study adds to the body of literature surrounding agricultural literacy through a unique intersection of principals' perceptions and agricultural literacy. Overall, the findings suggest that Pennsylvania K-8 principals would advocate for implementing agricultural literacy in their schools if they were provided with the needed training, funding, and support. Furthermore, incorporating agriculture in state standardized testing would add priority to implementing agricultural literacy in K-8 schools. State staff should be made aware of these findings to help increase the adoption of agricultural literacy in public schools throughout the state.

Limitations

Due to potential reporting mistakes in the Pennsylvania Department of Education's database and potential errors made by the researchers in email searches, frame error is a possible limitation of the study (Zhengdong, 2011). In addition, the slider-type scales used to measure principals' perceived barriers to implementing agricultural literacy may have yielded a smaller response number than anticipated. If principals did not perceive an item as a barrier, they may have left the slider at 0; however, this was not labeled as a response in Qualtrics. Finally, the intention to conduct a census resulted in a low response rate of 13.02%. However, because nonresponse bias was addressed and yielded insignificant differences, the study is generalizable to the population of public K-8 principals in Pennsylvania.

Recommendations for Future Research

The researchers recommend replicating this study in other states after making the following adjustments: (1) incentivize respondents to complete the questionnaire to encourage a higher response rate, (2) incorporate respondents' geographical location in the discussion to provide depth to principals' perceptions of agricultural careers and their perceived priority of agriculture, (3) include qualitative elements, such as individual or focus group interviews, to account for more nuanced responses to survey questions, (4) survey different audiences, such as students, parents, or community groups, and (5) conduct additional research to determine how to address principals' perceived barriers, such as aligning agriculture to state standards.

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