American Association for Agricultural Education

SOUTHERN AAAE 2024

February 4th-6th – Atlanta, Georgia

HOSTED BY:

The Department of Agricultural Leadership, Education, and Communications
University of Tennessee

AGRICULTURAL LEADERSHIP, EDUCATION AND COMMUNICATIONS

CONFERENCE CO-CHAIRS:

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HELD IN CONJUNCTION WITH THE SOUTHERN ASSOCIATION OF AGRICULTURAL SCIENTISTS MEETING

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SCHEDULE AT A GLANCE

Saturday, February 3, 2024		
4:00pm–7:00pm	Registration - University of Tennessee	The Overlook (6th floor)
Sunday, February 4, 2024 (*University Logo Day*)		
8:00am–10:00am	Registration Breakfast on your own Coffee + Drink Bar – *Sponsored by the UT Center for Farm Management*	The Overlook (6th floor) Augusta Foyer
9:00am–10:00am	AAAE Opening Session	Augusta G
10:15am–11:45am	Research Session I	Augusta Rooms
12:00pm–1:30pm	Lunch on your own Graduate + Undergraduate Student Luncheon	 Tin Lizzy's (offsite)
1:30pm–3:00pm	Concurrent Research Session II	Chastain Rooms
2:45pm–4:00pm	Innovative Poster Session	Savannah Ballroom
3:00pm–4:00pm	UT ALEC Ice Cream & Cheese Snack Bar – *Sponsored by UTIA Extension, AgResearch, Herbert College, & Sweetwater Valley Farms*	9th Floor Terrace
3:00pm–4:00pm	SAAS General Business Meeting	Chastain 1/2
5:00pm	SAAS Opening Social	Grand Loft – Southern Exchange
Monday, February 5, 2024		
8:00am–10:00am	Registration Coffee + Tea Bar – *Sponsored by ChLOE*	The Overlook (6th floor) Chastain Foyer
8:00am–9:00am	Emerging Research Sessions	Chastain Rooms
9:15–10:45am	Concurrent Research Session III	Chastain Rooms
11:00am–12:00pm	AAAE Business Meeting Session I	Chastain F
12:00pm-1:30pm	Lunch & Distinguished Lecture	Grand Loft
1:45–3:00pm	Professional Development	Chastain D
3:15pm–4:30pm	Research Poster Session	Savannah Ballroom
5:00pm	Explore the City (on your own)	Across Atlanta
Tuesday, February 6, 2024		
8:00am-9:00am	AAAE Business Meeting Session II	Chastain E
9:15am–12:00pm	Brunch & Distinguished Manuscript Presentations Award Ceremony	Chastain F

FULL CONFERENCE SCHEDULE & PROCEEDINGS

Saturday, February 3, 2024		
4:00 – 7:00 p.m.	Registration	The Overlook

Sunday, February 4, 2024		
8:00 – 10:00 a.m.	Registration Breakfast on your own *University Logo Day*	The Overlook
	Coffee + Drink Bar – *Sponsored by the UT Center for Farm Management*	Augusta Foyer
9:00 – 10:00 a.m.	Agricultural Education Opening Session	Augusta G
10:15 – 11:45 a.m.	Concurrent Research Session I	

Session A — Augusta F

Discussant: Steven "Boot" Chumbley
Facilitator: Kayla Marsh

Self-Regulated Learning in Middle School Agricultural Education: Teachers' Perspectives on Facilitating Quality Student Learning in Supervised Agricultural Experiences
Jacob Englin, Richie Roberts, Kristin S. Stair, Michael F. Burnett

A Qualitative Study of Factors Influencing Teaching Self-Efficacy of EAE Teachers
Maria R. Helm, Nicholas E. Fuhrman, Jason B. Peake

Ag Beyond the Classroom: An Assessment of the Agricultural Literacy Proficiencies of Adult Consumers in Tennessee
Shelli Rampold, Tyler Granberry

How Are School Based Agricultural Education Teachers Implementing Agriscience Fair in Middle School?
Jillian C. Ford, Jason Dossett, Misty D. Lambert, R. G. (Tre) Easterly III

Session B — Augusta 3

Discussant: Blake Colclasure
Facilitator: Karissa Palmer

Entering the Professorate: Hiring Authorities' Perceptions of Tenure- Track Faculty Needs
Bradley Coleman, J.C. Bunch, Brian E. Myers

Sense of Belonging as a Predictor of Retention in a College of Agriculture
Sarah James, Christopher Estepp, Will Doss, Donald Johnson

The Opinion Leadership Paradox: Examining the Role of Opinion Leadership on Teachers' Intentions to Advocate for Agricultural Education
Benita Komunjeru, Whitney L. Figland-Cook, Richie Roberts, Kristin S. Stair

Session C — Augusta A
Discussant: Will Doss
Facilitator: Suzanna Browning

H.O. Sargent: A Founding Father of the NFA
Katlyn R. Foy, Wendy J. Warner, Joy E. Morgan, Barbara M. Kirby

An Assessment of Clemson University Cooperative Extension Agents' Perceptions of Work-Related Factors Leading to Burnout
Erika Hwang, Dale Layfield, Christopher Eck, Kristine Vernon

The FFA Girl: A Historical Examination of the Driving Forces Leading to Girls' Admittance into the National FFA Organization
Brooke Townsend Scott, Richie Roberts, Gary E. Moore, D. Barry Croom

Online Graduate Student Perceptions of Synchronous Virtual Reality Seminars
Caroline Brooks, Jamie Greig, Taylor Ruth, Bailey Watson

Session D — Augusta E
Discussant: Eric Kaufman
Facilitator: Rosemarie Somers

Future Teacher Academy Impact on Prospective Preservice Teachers' Intent to Pursue Agricultural Education as a College Major and Career Choice
Emily Sewell, Christopher J. Eck, Jon W. Ramsey

Critical Thinking and Personality Among Agricultural Undergraduate Students
Andrews Idun, Kevan Lamm, Jessica Holt, Alexa Lamm

Undergraduate Students' Attitude Toward Undocumented Migration: A Comparison Between Agricultural and Non-Agricultural Based Students from a Southern University
Pablo Lamino, Carlos Durán Gabela, Renzo Ceme Vinces, Amy Boren-Alpizar

Opportunities for Extension to Help Residents Ask Local Decision- Makers to Support Wildlife-Friendly Landscaping in Communities Sravani Pasula, Dharmendra Kalauni, Laura A. Warner, Emily Marois, John Diaz, Jaret C. Daniels, Adam G. Dale

12:00 – 1:30 p.m. — Lunch on your own
Graduate Student Orientation *(Tin Lizzy's – 121 Perimeter Center West)*

1:30 – 3:00 p.m. — Concurrent Research Session II

Session E — Chastain A

Discussant: Christopher Eck
Facilitator: Emily Sewell

Investigating Factors that Influence College Athletes' Use of Cannabidiol (CBD) Products
Zach Brown, Blake Colclasure

Use of Self-Directed Learning and Performance Based Assessment to Improve an Agriculture Cohorts Use of the Safe Farm Steward Application
Ruth Toole, Stacy Vincent, Kang Namkoong, A. Preston Byrd, Song Yongwook

Unearthing Agricultural Legacies: The Jesup Wagon's Impact on Black Heritage and Extension Services
Mikayla Daniels, Joy Morgan, Wendy Warner

Successful Programming for the Recruitment of Underrepresented Students 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

Session F — Chastain C

Discussant: Misty Lambert
Facilitator: Jason Dossett

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

Simulation in Agricultural Sciences: Innovations and Applications for Better Outcomes
Anjorin Adeyemi, Shuai Ma

Perceived Masculinity and Femininity Levels of Secondary Youth Leadership
Stacy Vincent, Tyler Newberry, Chris Cherry

Impact of Program Size on the Program Management and Planning Needs of Oklahoma School-Based Agricultural Education Teachers
Emily Manuel, Ryan W. Best, Bradley M. Coleman, Christopher J. Eck

Session G — Chastain E

Discussant: Tre Easterly Facilitator:
Emily Fuller

Needs Assessment of Georgia Elementary Agriculture Education Teachers
Hannah Bailey, Jason Peake, Barry Croom, Eric Rubenstein

Determining Instructional Design Effects on Self-Efficacy, Interest, and Knowledge in a Small Engines Course
Will Doss, Christopher Estepp, Donald Johnson, Kobina Fanyinkah

Tasks Associated with Teaching School-Based Agricultural Education: Supervised Agricultural Experiences
Ryan Best, J. Shane Robinson, M. Craig Edwards, Robert Terry, Jr., Ki L. Cole

Climate Variability Education Programs: Targeting Receptive Alabama Agricultural Producers
Tegan Walker, James Lindner

Session H — Chastain 1
Discussant: Kevin Lamm
Facilitator: Mary Kate Lanier

Uncovering the Past: Minority Contribution and Early Start of Black American Students 4-H Program in North Carolina
Joy Morgan, Andrew Waaswa, Wendy Warner

Evaluating Elementary Agriculture Teacher Workshops on Pedagogical Content Knowledge
Jessica Boone, Jason Peake, Jade Davidson

Exploring the Influence of Cooperative Based Learning in an Undergraduate Agricultural Leadership Course
Jodie Spivey, Bradley Coleman

Living in the Borderland: An Examination of the Work-Family Borderland of Dual Agriculture Teacher Couples in North Carolina Alyssa Ramsey Spence, Travis Park, Wendy Warner, W. Greg Cope

2:45 – 4:00 p.m.	Innovative Poster Session	Savannah Ballroom
3:00 – 4 p.m.	UT ALEC Ice Cream & Cheese Snack Bar *Sponsored by UTIA Extension, AgResearch, Herbert College, & Sweetwater Valley Farms*	9th Floor Terrace
4:00 p.m.	SAAS General Business Meeting	Chastain 1/2
5:00 p.m.	SAAS Opening Social	Grand Loft

Monday, February 5, 2024

8:00 – 10:00 a.m.	Registration Breakfast on your own	The Overlook
	Coffee + Tea Bar – *Sponsored by ChLOE*	Chastain Foyer

8:00 – 9:00 a.m. Emerging Research Sessions

Emerging Session I — Chastain I

Discussant: Will Doss
Facilitator: Tyler Price

A Co-Curricular Undergraduate Research Program Evaluation
Logan Layne, Donna Westfall-Rudd, Hannah Sunderman, Tiffany Drape

Emerging Results of a Systematic Review: The Impacts of School-Based Agricultural Education in Low and Lower-Middle Income Countries
Carmen Benson, Robert Strong, Theresa Murphrey, Sophia Wegeng

An Assessment of The Inner Working Relationships of School Based Agriculture Educators In Multi-Teacher Departments
Andra Collins, Jason McKibben, Garrett Hancock

The Effects of Educational Technology on Students' Academic Achievement in Agricultural Education: A Meta-Analysis Shuai Ma, Anjorin Ezekiel Adeyemi, Zhihong Xu, Qing Wang

Emerging Session II — Chastain J

Discussant: Christopher Eck
Facilitator: Ryan Best

Adoption of a Cooperating Teacher Support Program in University Teacher Preparation Programs: A Diffusions of Innovations and Concerns-Based Adoption Model Exploration
Heather Nesbitt, Debra Barry, JC Bunch, Paul Monaghan, Haun Chen

Empowering Tomorrow's Science Communicators: A Case Study in Integrating Cooperative Extension into Science Communication Education
Lauri Baker, Anissa Mattox, Cheng-Xian Yang, Heather Young

Developing Evidence-Based Messages to Encourage Sustainable Cattle Production: A Sequential Exploratory Approach to Message Design Using Q Sorts and Interviews
Ginger Orton, Laura Fischer, Courtney Meyers, Matt Raven, David Doerfert

STEM Teaching for All Online Certificate Program
Katie Stofer

9:15 – 10:45 a.m. Concurrent Research Session III

Session I — Chastain F

Discussant: Shane Robinson
Facilitator: Sharon Wagner

Identifying Relationships and Differences Related to Arkansas FFA Chapter Success in Career Development Events
Hiliary Rodgers, Will Doss, Christopher Estepp, Donald Johnson

Validation of the School-Based Agricultural Education Model of Support Instrument
Kayla Marsh, Christopher J. Eck, William Doss

Emerging Trends for Middle School Agricultural Education in the United States: A Scoping Review
Jacob Englin, Richie Roberts, Kristin S. Stair, Michael F. Burnett

Cooperating Teacher's Perceptions of Their Roles as Mentors: An Exploration Using Theory of Planned Behavior
Jessica Switzer, Heather Nesbitt, Debra Barry

Session J — Chastain I

Discussant: Donna Westfall-Rudd
Facilitator: Emily Manuel

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

Mental Health Awareness: SBAE Teachers' Perspectives
Eric Rubenstein, Anna Scheyett, J. Renee Martin, Taylor Bird, Ian Marburger

Utilizing the Land-Based Learning Model for the Clemson University Cooperative Extension Service Agricultural Safety Program
Maryann Mishelle Lovern, Catherine A. DiBenedetto, Aaron P. Turner, Hunter F. Massey

An Analysis of Thwarted Belongingness and Perceived Burdensomeness Among a State-Wide Agriculture Youth Essay Contest
Katrina Clontz, Kelly McFarland, Stacy Vincent

Session K — Chastain J

Discussant: Dale Layfield
Facilitator: Cassie Goff

STEM Immersion in School-Based Agricultural Education
Christopher J. Eck, Kristopher Rankin III, Ryan Best, Kayla Marsh, Emily Sewell, Bradley Coleman, J. Shane Robinson

Understanding Concerns of New North Carolina SBAE Teachers Participating in an Induction Program
Jillian C. Ford, Misty D. Lambert, Wendy J. Warner

Empirical Exploration of Communication Channel Use for Prospective Graduate Students in a College of Agricultural Sciences
Allison Byrd, Alexa J. Lamm, Jessica Holt, Kevan Lamm, Rochelle Sapp

Exploring Participants' Perspectives During an Agriculturally Focused Short-Term Study Abroad: A Q-Methodology Study
Newlin Humphrey, Bradley Coleman, Angel Riggs, Lauren Lewis Cline

11:00 a.m. – 12:00 p.m.	AAAE Business Meeting Session II	Chastain F
12:00 – 1:30 p.m.	Luncheon and Distinguished Lecture	Grand Loft
1:45 – 3:00 p.m.	Professional Development	Chastain D

QPR Training for Ag Ed Professionals
Chaney Mosely, Middle Tennessee State University

In a recent study of school-based agricultural educators in the southern region, 1 in 5 teachers had contemplated suicide, leading to the recommendation of offering suicide prevention professional development where agricultural education professionals convene. A frequent prevention strategy is QPR - question, persuade, refer – three simple steps anyone can learn to help save a life from suicide. People trained in QPR learn how to recognize the warning signs of a suicide crisis and how to question, persuade, and refer someone to help. Mental health concerns are rising, so join us in this session as we explore suicide warning signs and learn how to intervene.

***Attendees will become a certified QPR Gatekeeper and receive a credentialing certificate.*

3:15 – 4:30 p.m.	Research Poster Session	Savannah Ballroom
5:00 p.m.	Explore the City (on your own)	Across Atlanta

Tuesday, February 6, 2024

8:00 – 9:00 a.m.	AAAE Business Meeting Session II	Chastain E
9:15 a.m. – 12:00 p.m.	Distinguished Manuscript Presentations	Chastain F
	Brunch & Award Ceremony	

Discussant: Jason Peake
Facilitator: Jillian Ford

Growing Together with Wheat: Evaluation of the Norman Borlaug Youth in Agriculture Program
Sarah Sprayberry, Xin Li, Dottie Goebel, Billy Zanolini, Jun Wang

Characteristics and Leadership Identity Development of CALS Leadership Institute Graduates
Sarah A. Bush, Carrie N. Baker, Kiera Packer, Natalie Coers, H. Charlotte Emerson

Tasks Associated with Teaching School-Based Agricultural Education: Advising an FFA Chapter
Ryan Best, J. Shane Robinson, M. Craig Edwards, Robert Terry, Jr., Ki L. Cole

An Agricultural Assessment of Social Studies Teachers in South Carolina
Walker Reid, Dale Layfield, Christopher J. Eck, Dara Park

Living as an Imposter: An Exploration of the Lived Experiences among Multiracial Youth in Secondary Agricultural Education
Juliana D. Markham, Stacy K. Vincent, Sophia V. Jaramillo-Vasconez

Self-Regulated Learning in Middle School Agricultural Education: Teachers' Perspectives on Facilitating Quality Student Learning in Supervised Agricultural Experiences

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Self-Regulated Learning in Middle School Agricultural Education: Teachers' Perspectives on Facilitating Quality Student Learning in Supervised Agricultural Experiences

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). At its inception, SBAE programs limited participation to males aged 14 years or older. It was not until years later that middle school agricultural education programs emerged, with the first reported program 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. (Rossetti & McCaslin, 1994). Finally, in 1988, FFA membership was officially granted at the middle school level (National FFA Organization, 2022). The adoption of middle school agricultural programs and membership into the National FFA Organization created a need for a expanded middle school curricular resources, FFA award programs, and SAEs.

SAE programs have become a required educational experience for all SBAE students – from middle to high school (The National Council for Agricultural Education, 2015). One 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 (The National Council for Agricultural Education, 2012). Many students, especially at the middle school level, begin with a Foundational SAE. Eventually, as students advance, they can engage in Immersion SAEs to "enrich their agricultural education" (The National Council for Agricultural Education, 2017, p. 5). As such, 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, some previous research (Eck & Davis, 2023; Retallick, 2010; Wilson & Moore, 2007) has suggested that SBAE teachers experienced challenges integrating SAEs into their programs.

Nevertheless, student participation in SAE programs has been reported to influence communities, build human capital, and lead to employability skill development (Haddad & Marx, 2018; Hanagriff et al., 2010; Ramsey & Edwards, 2012; Thiel & Marx, 2019). 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 SAEs" (p. 4). These quality factors, however, may not be appropriate for students at the middle school level. On this note, Roberts (2003) suggested that middle school students often pursue foundational-type SAE programs that focus on career exploration and agricultural literacy. Despite this, limited empirical evidence has been reported that supports such a claim. Consequently, the following question has persisted: Is the structure and philosophy guiding SAE programs 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 – (a) forethought, (b) performance, and (c) 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). 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, which can influence their success in the second phase of the cycle, called performance (Zimmerman, 2008). Finally, in the self-reflection phase, self-regulated learners employ self-evaluation techniques to assess their learning and outcome attainment and analyze strategies to meet their goals through self-assessment (Zimmerman, 2008). In the current investigation, self-regulated learning emerged as a useful theory to help interpret the findings, establish themes, and assign meaning to the beliefs espoused by middle school agricultural education teachers. Framing the themes through self-regulated learning appeared to provide insight into teachers' effective teaching and learning strategies and to establish educational value for SAEs to middle school students.

Purpose of the Study

The purpose of this study was to explain how middle school agricultural education teachers have successfully facilitated student learning in SAE programs. One research question guided this study: 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). 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. Therefore, we perceived it was critical to acknowledge that each researcher in this study was a former SBAE teacher and valued SAEs as critical experiences to enhance their students' learning.

We implemented a combination of purposeful and snowball sampling procedures to select participants, which allowed us to assess 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: Georgia, Florida, Virginia, Missouri, Delaware, Oklahoma, and Wisconsin (Jones et al., 2020). State leaders of agricultural education from these seven states were asked to nominate middle school agricultural education teachers who they considered exemplary regarding the facilitation of middle school student learning through SAEs. Despite multiple communication attempts, the nominated teachers from Florida 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 10 participants of this study, two from each of the remaining states, were all middle school teachers who taught from two to 35 years.

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 a transcription of video and audio 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 (d) other relevant learning artifacts.

Saldaña (2021) explained that the coding process allows researchers to attribute meaning to data to make sense of participants' experiences. For this study, we employed two methods of first-cycle coding: (1) in vivo coding, which utilized words or phrases from the participant, allowing us to draw connections from the participants' language throughout each transcript, and (2) values coding, a procedure that allows researchers to consider a participants' values, beliefs, and attitudes about a particular topic. After reducing the first-cycle codes, axial coding was employed to categorize the first-cycle codes based on similarities. Through a team negotiation our findings emerged resulting in five themes (Saldaña, 2021).

Findings

After a thorough analysis of the data, five themes emerged: (1) an eye toward the future, (2) competition as a method of instruction, (3) goal-driven learning outcomes, (4) accountability for student learning, and (5) challenges to facilitating learning in middle school SAEs. 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, when students assign value to learning tasks, it can enhance their understanding of concepts (Zimmerman, 2008). Therefore, to improve students' motivation to achieve a goal, educators can help their students understand how a learning task directly impacts their lives and future. The middle school agricultural education teachers in this investigation understood the importance of helping their students find value in their learning through SAEs. For example, Participants #1, #2, #7, and #10 indicated that most of their middle school students' SAEs were "foundational" to help prepare them for deeper learning in high school 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]." The middle school teachers also explained that as students progressed to upper grades, they intended to increase the rigor and scope. 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. Consequently, by helping students understand what they could achieve in the future through their SAEs, the middle school agricultural education teachers 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). 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. All of the middle school teachers in this study articulated that they were more likely to encourage students to conduct an SAE project if it aligned with a proficiency award area. 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 level for SAE programs, except for the National FFA Agriscience Fair program. However, multiple participants reported that their states have begun recognizing high-quality SAE programs. In addition, multiple teachers reported the use of competition guidelines as a basis for classroom instruction. 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

The middle school teachers voiced multiple positive learning outcomes for their students. 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. On this note, Participant #6 explained that students' confidence in public speaking grew through presentations of agriscience research SAEs. 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. It was noted by multiple participants that participation in livestock projects yielded the greatest student growth. Multiple middle school teachers reflected on current and former students whose middle school SAE programs launched their future careers.

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 had achieved their goals, mastered the required content, and adjusted 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 ensure 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. Further, middle school students were held accountable by Participants #1, #6, #7, #8, #9, and #10, who indicated that SAEs were a graded component of their agricultural curriculum. Participants #1, #7, #9, and #10 facilitated learning through exploratory career research projects. Further, the teachers reported assessing their students' SAE projects through regular site visits.

Theme #5: Challenges in Facilitating Learning for Middle School SAEs

Despite the benefits of SAE programs, the middle school teachers in this investigation experienced several challenges that they perceived affected their ability to facilitate quality learning for middle school students engaged in SAEs. A significant reason underpinning these challenges was varying instructional time with the students, ranging from nine weeks to a full year. On this note, Participant #2 indicated: "I don't have a lot of time, considering we are on a marking period schedule." To maximize classroom time, Participant #8 incorporated a group SAE project. Further, the middle school agricultural education teachers struggled to decide when to begin students on their SAE journey. Participant #8 shared: "We really don't even talk about it as a unit until their 8th-grade class." Middle school has historically been the entry point for students entering the agricultural education program; therefore, these students "don't have the skillset" or "ability" to meet the learning demands required for Immersion SAEs (Participants #4 and #8). Nevertheless, the middle school agricultural education teachers believed that SAEs had value and encouraged their students to engage in them through self-regulated learning.

Conclusions, Discussions, and Recommendations

Self-regulated learning (Zimmerman, 1998, 2008) appears to have been intimately intertwined with SAE programming for the middle school teachers in this investigation. Perhaps self-regulated learning could serve as a foundation that middle school teachers use to guide learning experiences for students in all three components of agricultural education's comprehensive three-circle model. As such, we recommend that researchers explore the utility of the theory for guiding middle school learning experiences, especially in SAEs, in agricultural education. We also conclude that SAE has been an integral component of student learning for the exemplary middle school teachers. To achieve this, they used a future-oriented mindset toward SAEs to provide a foundation for their students' learning trajectories. The middle school teachers also scaffolded student experiences to help them advance into more complex SAE programs as they progressed academically.

Corroborated by the findings of Rubenstein and Thoron (2014), the teachers included goal

setting as a critical learning component in SAEs. Because the teachers expressed that middle school SAEs were primarily foundational, we recommend that an evaluation be conducted regarding the importance of career exploration versus agricultural literacy and skill development in SAEs, as outlined by *SAE For All* (The National Council for Agricultural Education, 2017). Future research should also explore establishing indicators of high-quality SAE programs to elucidate best practices at the middle school level.

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 this, the middle school teachers in this study reported using the National FFA Proficiency Award Program to expose students to the diverse opportunities available in SAE programs. Further, the teachers used varied competitive events to illuminate the value of SAE programs. However, because of the lack of recognitional programs for middle school students, we recommend that the National FFA Organization and state associations consider expanding ways to recognize and celebrate exemplary middle school SAE projects and programs. In the third theme, goal-driven learning outcomes, the middle school teachers in this investigation discussed the learning attributes and personal growth that students achieved through setting goals to achieve positive outcomes. 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). To build upon this notion, future research should examine the diverse SAE project types that middle school teachers could use to facilitate quality student learning and how they build upon personal learning experiences.

This investigation explored how teachers held students' learning accountable through their SAE projects. For instance, the teachers in this study employed various methods to have students document their SAE program, such as SAE record books and AET. 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 middle school teachers also reported completing on-site or in-class supervision to evaluate their students' experiences. However, based on the findings of this investigation, we recommend that the AET and other SAE data management systems explore creating a developmentally focused data management and record-keeping option for middle school students. Similar to Eck and Davis (2023), who examined barriers to the successful implementation of SAEs at the middle school level, the teachers in this investigation expressed challenges concerning successfully facilitating student learning in SAEs. In particular, time was a major factor regarding whether SAEs would be successful for many middle school teachers. The middle school teachers in this study also expressed concerns regarding when to begin their middle school students with SAE projects to not confuse students on future award applications and competitions in FFA. These teachers also reported that SAEs were hard to conceptualize at the middle school level. Perhaps emphasizing projects, last less than one year, rather than programs, a expand over multiple years, 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 SAEs while still focusing on high-quality instruction and other duties. Examples could include in-class, cooperative, independent, or service-learning projects. Future research should also examine the diverse SAE project types that middle school teachers could use to facilitate quality student learning.

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A Qualitative Study of Factors Influencing Teaching Self-efficacy of EAE Teachers

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Introduction

The Elementary Agriculture Education (EAE) program was launched as a pilot between 2019 and 2021, facilitated through Georgia Senate Bill 330 (Georgia Agricultural Education, 2021). In March 2022, it transitioned into a permanent program under [State] House Bill 1303 (HB 1303 Georgia House, 2022). Every elementary school in Georgia now has the authorization to establish an agricultural program and hire an agricultural education teacher to educate students from kindergarten through fifth grade. With the EAE program in its nascent stage, it is anticipated to undergo multiple evaluations to glean insights into its features and impact on student outcomes. A key challenge facing these EAE teachers is the delivery of effective, sustainable, and evidence-based instruction, balancing this with their broader professional responsibilities to positively impact students' academic outcomes. Martinez (2022) argued that a critical determinant of the success of any new initiative is the confidence individuals have in their competencies throughout the implementation process.

As explored by Albert Bandura (1986, 1997), self-efficacy is defined as an individual's belief in their capacity to produce desired results, thereby influencing events shaping their lives and, by extension, their ultimate success. Perceived self-efficacy plays a pivotal role in determining an individual's confidence, emotional well-being, successes, and failures. Without self-efficacy, individuals tend to withhold effort, perceiving their endeavors as unfruitful (Tschannen-Moran & McMaster, 2009). Teacher Self-Efficacy (TSE) has garnered significant attention in research due to its profound influence on students' knowledge, values, behavior, and academic performance (Tschannen-Moran & Woolfolk Hoy, 2001; Delinger et al., 2008). Furthermore, a teacher's self-efficacy, grounded in their beliefs about their teaching competencies, is intrinsically tied to effective classroom management (Dibapile, 2012). Supporting this, Bruce et al. (2010) highlighted a direct relationship between high teaching efficacy, supportive workplaces, rigorous academic standards, and positive teacher-student interactions. Elevated levels of teacher self-efficacy have been linked to teaching effectiveness and student achievement (Klassen & Tze, 2014). Hence, the success of EAE teachers is pivotal for agricultural education, especially considering that such courses are often elective and optional in many schools (Talbert et al., 2022).

This study sought to explore the EAE teachers' experience, perceptions and beliefs on the factors that influence their teaching self-efficacy and how it influences their teaching perceptions. This study aligned with Research Priority 4: Meaningful, engaged learning in all environments of the American Association for Agricultural Education National Research Agenda (Roberts et al., 2016). The purpose of this research was to explore the factors that influence teaching efficacy and outcome expectancy which will attempt to better understand the concept of EAE teaching self-efficacy. The following questions guided the study and provided the research framework:

1. What are the factors that contribute to the EAE teaching self-efficacy?
2. How do these factors influence an EAE culture?

Conceptual Framework and Literature Review

This study is anchored in Bandura's (1986) triadic reciprocal determinism (TRD) within the broader context of social cognitive theory (SCT). TRD provides a lens to understand the interplay among environmental factors, agricultural beliefs (personal determinants), and agricultural practices (behavioral determinants) in the context of enhancing the teaching self-efficacy of EAE teachers.

Bandura (1986) posited that human behavior emerges from a dynamic interaction among the individual, their environment, and their actions, forming a reciprocal and interconnected relationship. Each of these influences interplays and mutually impacts the others. Specifically, individual thought processes shape behaviors and influence environmental contexts, while actions and environments reciprocally influence individual cognition (Schunk & DiBenedetto, 2020). This intricate relationship is pivotal for individuals in setting aspirations and predicting outcomes. Integral to this concept is the inclusion of self-efficacy, emphasizing proactive individual agency in controlling their thoughts, emotions, and behaviors influenced by past experiences and environmental contexts (Rowston et al., 2021). Bandura (1997) outlined multiple sources contributing to self-efficacy, including:

1. Mastery experiences, where personal achievements bolster self-efficacy.
2. Vicarious experiences enhance self-efficacy by observing successful role models in challenging contexts.
3. Verbal persuasion, where others' reassurances amplify an individual's self-confidence.
4. Psychological and affective states, which underscore the absence of anxiety in challenging situations as a marker of heightened self-efficacy.

Teachers with robust self-efficacy exhibit superior instructional quality (Holzberger et al., 2013) and elevated teaching performance (Klassen & Tse, 2014), coupled with enhanced job satisfaction (McKibben et al., 2021). Such educators are adept at tailoring their teaching methodologies to cater to diverse learners (Bandura, 1986). Consequently, students are more engaged, achieve better academically, and perceive their educators as genuinely invested in their success. Additionally, empirical evidence suggests that teachers' encouragement and behavior can steer students toward STEM career choices (Faitar & Faitar, 2013).

Methods

Teachers' beliefs regarding their personal and professional efficacy significantly influence their self-perception. This study aims to elucidate the factors influencing Elementary Agriculture Education (EAE) teaching self-efficacy using a constructivist lens. Embracing a phenomenological approach, we posit that individuals' lived experiences shape their interpretation of reality (Baker, 2022).

Data were gathered from the Georgia agricultural website and consultation with an agricultural education professor at the University of Georgia (personal communication, August 2022) to ensure a representative and comprehensive sample. We approached 30 EAE educators

from diverse backgrounds and teaching experiences to minimize non-response bias. From this cohort, 18 educators agreed to participate, ensuring a robust and varied sample for analysis. Central to the study's design were the focus group sessions. Participants were categorized based on self-efficacy scores using a stratification method. The thresholds for FG 1 (scores ≤ 7) and FG 2 (scores ≥ 8) were determined based on a preliminary analysis of score distributions, ensuring equitable representation (Tschannen-Moran & Woolfolk Hoy, 2001). While these sessions were primarily conducted via Zoom, due to its accessibility and participants' preference (Archibald et al., 2019), measures were taken to mitigate potential limitations of online discussions, such as ensuring stable internet connections and enabling video to capture non-verbal cues. The semi-structured interview guide was rooted in a rigorous literature review on teachers' self-efficacy. It comprised open-ended questions designed to facilitate rich discussions and elicit profound insights into participants' experiences, perceptions, and beliefs regarding EAE. The guide was piloted initially with a small group of educators to ensure clarity and relevance. With participants' explicit consent, focus group sessions were audio and video-recorded and transcribed verbatim. In addition to acquiring consent for audio and video recording, measures were implemented to protect participants' identities. Pseudonyms replaced real names in transcriptions, and all identifying details were redacted. Audio files were securely stored and destroyed post-transcription to safeguard participants' confidentiality.

Two researchers independently coded the data to ensure data fidelity, promoting inter-coder reliability. Any discrepancies in coding were resolved through discussions. Utilizing MAXQDA 2022 (VERBI Software, 2022; Ramos & Mesquita, 2013), a thematic approach was employed, grounded in Braun & Clarke's (2006; 2012) validated six-step thematic methodology: a. familiarizing with data, b. generating initial codes, c. searching for themes, d. reviewing for themes, e. defining themes and f. writing up.

Findings

This study acknowledges the diversity of human capabilities and situational differences. Various factors affect different individuals' beliefs and motivations to do what one should do under a variety of circumstances. A teacher's perceived self-efficacy is an important contributor in initiating the performance and putting effort into fulfilling different levels of tasks, whatever the underlying knowledge and skills might be. The participants in this study shared their experiences, beliefs, and perceptions about EAE and how they used their self-efficacy in designing their own class experiences and how it affected interactions with their students, parents, administrators and community that promote successful outcomes.

Research Question 1: *What factors contribute to EAE teaching self-efficacy?*

Personal Values

Personal values motivate and inspire teachers to demonstrate tasks and overcome problems in their professional responsibilities and dedication. Schwartz (2012) defines personal values as situational goals that vary in relevance and guide people's lives. All but one participant said their passion for agriculture came from their family and environment, where they were

exposed to farming, gardening, and/or rearing farm animals. According to Bob, he has always been involved with agriculture, as it was part of his upbringing. Leo said, “I've been raised around it all my life so when I got to college, I really wanted to do something with agriculture.” Participants believe early agriculture education will promote healthy eating and give pupils real-world applications. Tanya stated that “the earlier you do it in elementary, those habits become embedded and become part of who they are.” Ruby stated that “when we reach the kids at this young age, we're opening up so many more doors for them in life as they go through.” Joey said, “It fits into any subject, there's lesson for plant, space, how to take tape measure and read the numbers on it.” Kids learn from food resources to farm mechanics. Participants said they always teach soft skills in daily encounters with pupils because they help them work and interact with others. Sheila said she starts with soft skills with her students, such as how they shake hands. Face someone when they talk and ask how they communicate and take responsibility. Tanya also complained about how science "gets pushed to the wayside" in elementary school, and Joey said, “people have to put pressure on all elementary school to start this program (EAE).”

Boundary-breaking Behaviors

Teachers have always been described as agents of change. They facilitate transfer of knowledge and should encourage innovation. Participants shared that effective EAE teaching requires teachers to break down boundaries that may hinder collaboration and perseverance. Nadia said, “It will not be going to be a successful day everyday…make those disappointing occurrences be a teachable moment.” Ruby mentioned “don’t let it ruffle your feathers” referring to those times that did not work out as planned and added “it’s good realizing the importance of being flexible.” Judith also shared that because “EAE is a new program, it is expected to have visitors regularly and so make sure you have plans set for all the unexpected.” They stipulated the importance of always trying things out and resilience on those plans that did not work out. Participants agreed that disappointments and challenges are part of life that needed to be overcome and used to make them better and stronger for their students and for their well-being.

Positive School Culture

A strong relationship between EAE teachers and all stakeholders in the school community assesses the progress of the program. Fane shared “establishing relationships with those academic teachers, parents, and administrators can make your life easier.” Nadia confirmed and added that building a relationship with the students “means a lot more than you think.” Bob also shared that communicating with everyone involved in the student’s education is very important.” Leo admitted “you do not have to be a hero or know everything, do not be afraid to ask for help because you are not in this alone.” Bob finalized by stating “develop support with your community, to reach out to your Georgia Farm Bureau, to reach out to the different businesses in the community … building those relationships with academic teachers and teaching your class as a support to academic classes is something that will really help you have an enjoyable and effective experience.”

Research Question 2*: How do these factors influence an EAE culture?*

Affective Actions

Teachers are required to successfully accomplish specific tasks and cover contents in every class experience. Participants shared that they must plan well enough those lessons and believe that those activities will increase students' competencies and performance not only in agriculture or even cross-curricular but most especially life and soft skills that students will use in their everyday life. Judith responded, "if they are engaged in working together, getting along, and getting stuff done, those are the good days." Tanya added, "when students use tools they've never used before, build anything that finds it cool, and when they take pride of what they do, that is success." Perhaps as EAE teachers increased their self-efficacy, they become more concerned on affective learning. They value more on making sure that students get experiences that they can connect with what they can use in their everyday life. Participants agreed that it is not the number of concepts that students can repeat or worksheets they can complete but they prioritize more in making sure that students are having fun, participating and engaging in the activities.

Contagious Behaviors

Teachers planned activities that will transfer information to their students. What is interesting about this study's participants is that they talked passionately about the contagious effect of their classes on other people around their students. Judith shared "what's great about this program is that you start to see your students have these conversations outside of your classroom with other students and teachers, you will hear them talked about ag (agriculture) activity in the hallway or in the cafeteria...it is fulfilling." They shared the excitement they feel when other parents approached them and asked questions like "how did you get my child to try good squash?" Fane proudly shared her story that Nadia emotionally remembered when a former student's family shared that "they made a traditions of planting sunflowers in the yard because that was one of the assignments we did in class." It is the fulfillment that they feel when they realize that the lessons, they shared with their students become shared as well with everyone else in the community as their students become agriculture ambassadors because they are.

Constructive Attitude

Agriculture lessons are mostly hands-on activities, so it was not a surprise when participants discussed activities that promote sensory. What is unique about conversation is the enthusiasm when they observed their students' connected objects or situations to previous lessons they had. Judith shared "when we we're wearing masks and I have a few students that don't speak a lot and one of these kids point at my mask and talked about bees because she sees honeybees on my mask, and she correlate that in agriculture." Kelsey also excitedly shared "one of our yearlong projects is to develop and maintain our school farmer's market so they will be in charge of building a business plan...they came up with best ideas and used previous lessons that I thought they were not interested but they remembered and that made me proud." It seems that EAE teachers' self-efficacy impact student's attitude to use information presented and connects it to previous knowledge they had. The participants also agreed that it is not just the concepts,

knowledge and skills that their students were building, it is also their enthusiasm to learn and use agriculture in their everyday lives because "they realized that it affects them as well that is why they become on board on ideas and activities they weren't on board at the start", Bob explained.

Conclusions, Implications & Recommendations

Elementary Agriculture Education (EAE) goes beyond just curriculum enhancement, profoundly shaping teacher-student interactions and outcomes. Central to EAE is self-efficacy, a belief in one's abilities, pivotal for behavior and resilience. Albert Bandura's works highlight this connection between past experiences and performance. Teachers, anchored in agricultural values and personal experiences, as emphasized by Sheehan & Moore (2019) and Dishon-Berkovits (2019), are driven to create engaging learning environments. This is echoed in findings by Jensen et al. (2016), illustrating that such experiences enhance pedagogical efficacy. This study's participants, aligned with Pearman et al. (2021) and Bandura's Triadic Reciprocal Determinism, highlight the synergy between personal factors, supportive environments, and proactive teaching behaviors.

Recommendations for Additional Research in EAE

The continuous and iterative assessment of EAE program deserves paramount attention within the realm of educational research. In addition to assessing the impact of EAE on academic achievement, it is crucial to explore its implications for students' non-cognitive abilities, encompassing areas such as problem-solving, teamwork, and communication aptitudes. Harnessing these competencies is essential for holistic student development within the context of the contemporary period. Future research attempts should comprehensively investigate the long-term effects of EAE on students' academic achievements and future trajectories. Scholarly endeavors should aim to elucidate potential avenues for educational enhancements and innovative developments in this field.

Recommendations for Practice - Teacher Preparation Programs

The results underscore the need of prioritizing teacher education focused on self-efficacy and the early integration of agriculture into the curriculum to promote holistic student development. In addition, it is imperative for institutions to actively promote platforms that facilitate educators in sharing their personal experiences, so cultivating a strong feeling of community and encouraging collective learning. Furthermore, a consistent feedback mechanism and reflections can bridge the gap between theoretical knowledge and practical application, enhancing the overall effectiveness of EAE. Recognizing and addressing the challenges faced by EAE teachers, together with providing proactive interventions, will play a crucial role in ensuring the ongoing success of the program.

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Ag Beyond the Classroom: An Assessment of the Agricultural Literacy Proficiencies of Adult Consumers in Tennessee

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Introduction

Society must have the capacity to craft and actualize evidence-based measures that support an affordable, efficient, and sustainable food system. However, given the declining rate of farming as a primary form of employment over the past fifty years, each American generation continues to be further removed from the sources of their food and fiber products than the previous generation (Goetz et al., 2018). From a "bottom-up" perspective of positive change, it is logical to approach the goal of informed decision-making about our food system through the development of an agriculturally literate society. National Agriculture in the Classroom (2014) defined an agriculturally literate person as someone who "understands and can communicate the source and value of agriculture as it affects our quality of life." This definition served as a foundation for developing national agricultural literacy benchmarks and concordant K-12 educational initiatives over the past decade.

While targeting youth in agricultural programming is necessary, failure to also consider adult audiences excludes members of society who are currently engaging with and impacting the agricultural system through purchasing and policy decisions (Kovar & Ball, 2013). Existing research with adult audiences suggests a general lack of understanding of the modern food system and practices that support it (Hand, 2020; Lewis, 2018), which supports the need to expand agricultural literacy initiatives beyond K-12 classrooms. To date, summative assessments of agricultural literacy have primarily been conducted with K-12 populations or post-secondary students. In contrast, little research has incorporated measures aligned with nationally recognized benchmarks to assess adult audiences outside formal educational settings.

In its most direct application, examining the agricultural literacy proficiency of adult consumers based on standardized benchmarks, as well as factors that may explain variance in their proficiency levels, can provide direction for community programming through Extension services. Although most of the K-12 agricultural literacy initiatives center around formal classroom learning, adult consumers are likely to acquire agricultural information and engage with agricultural practitioners in non-formal (e.g., Extension programming) and informal (e.g., farmers' markets, agritourism, etc.) learning settings (Mars & Ball, 2016). As such, it may be beneficial to examine characteristics pertinent to learners and those settings to better understand adult consumers' agricultural literacy (Hand, 2020; Lewis, 2018; Judd-Murray, 2019; Whitehead & Estepp, 2016).

Purpose and Research Questions

This study examined the agricultural literacy proficiency of Tennessee adult consumers. Specifically, we sought to measure proficiency using an existing instrument designed for post-secondary audiences to describe those considered proficient and how their proficiency levels impact perceptions and behaviors related to agriculture. Five research questions guided this study:

1. What are the key characteristics of respondents in each of the three agricultural literacy proficiency levels?
2. Does proficiency level affect respondents' attitudes toward agriculture?
3. Does proficiency level affect respondents' engagement with agricultural information?

4. Does proficiency affect respondents' degree of concern about issues associated with agriculture?
5. Do respondents' self-perceived knowledge of agricultural topics differ based on their agricultural proficiency levels?

Conceptual Perspective

Spielmaker and Leising (2013) developed the National Agricultural Literacy Outcomes (NALO) Framework to foster continuity in research, programming, and assessment around agricultural literacy. By design, NALO serves as the confluence of seminal agricultural literacy frameworks, which resulted in a set of outcomes aligned with national K-12 benchmarks across five thematic areas: (1) agriculture and the environment; (2) plants and animals for food, fiber, and energy; (3) science, technology, engineering, and mathematics; and (5) culture, society, economy, and geography (Spielmaker & Leising, 2013). The Judd-Murray Agricultural Literacy Instrument (JMALI; Judd-Murray, 2019) was developed in accordance with these five thematic areas to provide a summative assessment of agricultural literacy on a proficiency scale. Proficiency scaling is based on the premise of a learning continuum, and assessment scores should reflect a spectrum of exposure to proficiency (Judd-Murray, 2019). Summative evaluations that rely upon proficiency scales allow us to examine what learners can do within stages of development. The JMALI was modeled after the Programme for International Student Assessment (PISA, 2016) framework. In the PISA framework, skills are determined for each domain, with skills ranging from very low to very high proficiency levels. Low proficiency items are primarily concerned with content knowledge, whereas more complex items reflect comprehension of events and processes to connect interrelated concepts (PISA, 2016). The proficiency scale approach within the JMALI thus allows us to evaluate learners' abilities across the five NALO themes, as well as consider their assessment scores on a spectrum of exposure to proficiency (Judd-Murray, 2019).

Methodology

We utilized Qualtrics services to obtain a non-probability opt-in sample of adult consumers in 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 4,434 people across Qualtrics' panels had access to the survey link. Parameters on the population frame included state residency, an age of 18 or older, and select socio-demographic characteristics (e.g., race, income, region) based on state census data. We also embedded attention filters and minimum completion time requirements within the survey flow. When data collection concluded, we obtained 494 usable responses from adult residents in Tennessee.

The data collection instrument for this study consisted of existing and newly developed items. Four sections of the questionnaire were used for primary data analyses: (1) agricultural literacy, (2) attitudes toward agriculture, (3) interest in information about agriculture, (4) information search frequency, (5) concern about agriculture issues, (6) self-perceived knowledge of agriculture, and (7) demographic characteristics. Face and content validity was established through a review of relevant literature and a panel review by agricultural educators and practitioners. Post hoc reliability estimates for the instrument's constructs were calculated using Cronbach's alpha, all of which exceeded an acceptable threshold of .70 (Field, 2013).

Agricultural literacy was measured using the JMALI (Judd-Murray, 2019). This section of the instrument consisted of 15 total items, with one item for each of the three proficiency levels across each of the five NALO themes. A composite score of total correct responses was computed to determine each respondent's proficiency level, with scores ≥ 12 considered proficient, scores ≥ 8 considered factually literate, and scores ≤ 7 considered at the exposure level (Judd-Murray, 2019). We assessed attitudes using seven items on a 5-point semantic differential scale. Interest in agriculture topics was assessed by asking respondents how interested they would be in receiving information about agricultural topics. Responses for interest were measured using a 5-point Likert-type scale (1 = *very uninterested*; 5 = *very interested*). Information search frequency was measured using a 5-point Likert-type item, for which we asked respondents to indicate how frequently they had searched for information about agriculture topics within the past year. Similarly, we assessed concern about agriculture topics using 10 items measured on a 5-point Likert scale (1 = *Very unconcerned;* 5 = *very concerned*). These 10 items reflected those presented to respondents regarding their interest in agricultural topics. Lastly, self-perceived knowledge was assessed using 10 items reflective of the primary agricultural production areas in Tennessee. Responses for this section were collected using a 5-point Likert scale (1 = *very unknowledgeable;* 5 = *very knowledgeable*).

Data were analyzed using the SPSS software package. Data analyses for research question one consisted of descriptive statistics. Research questions two through five were analyzed using one-way ANOVA. A statistical significance level of .05 was established *a priori* for all statistical tests. Levene's test was utilized to ensure the assumption of equality of error variances and was not violated. Multiple comparisons employed included Tukey's HSD (Field, 2013). The number of respondents (n = 494) allowed for a statistical power of .99 for medium effect sizes in the ANOVA tests.

Results

Research Question One

Research question one sought to describe the key socio-demographic characteristics of Tennessee adult consumers at each agricultural literacy proficiency level. Based on composite scores for total correct answers, 248 respondents (50.2%) were at the exposure level, 242 (49%) were considered factually literate, and only 4 (0.8%) were at the proficient level. The demographic findings for each proficiency group are summarized in Table 1.

Table 1

Key socio-demographic characteristics of respondents by agricultural literacy proficiency level

	Proficiency level					
	Exposure (n = 248)		Factual literacy (n = 242)		Proficient (n = 4)	
Characteristic	*f*	%	*f*	%	*f*	%
Gender						
Male	105	42.3	89	36.8	1	25
Female	142	57.3	149	61.6	3	75
Race						
White	194	78.2	207	85.5	4	100
Black	42	16.9	22	9.1	0	0
Asian or Pacific Islander	3	1.2	6	2.5	0	0

	Proficiency level					
	Exposure (n = 248)		Factual literacy (n = 242)		Proficient (n = 4)	
Characteristic	f	%	f	%	f	%
American Indian	3	1.2	1	0.4	0	0
Multiracial	2	0.8	2	0.8	0	0
Other	4	1.6	4	1.7	0	0
Age category						
18-19	5	2.0	9	3.7	0	0
20-29	56	22.6	28	11.6	0	0
30-39	65	26.2	42	17.4	1	25
40-49	45	18.1	44	18.2	1	25
50-59	36	14.5	41	16.9	0	0
60-69	24	9.7	50	20.7	2	50
70-79	14	5.6	28	11.6	0	0
80+	3	1.2	0	0	0	0
Education level						
Less than 12th grade	16	6.5	3	1.2	0	0
High school graduate	94	37.9	59	24.4	0	0
Some college, no degree	52	21	60	24.8	0	0
2-year college degree	31	12.5	31	12.8	1	25
4-year college degree	37	14.9	58	24	3	75
Graduate or professional degree	18	7.3	31	12.8	0	0
Income						
$ $49,999 or less	138	55.6	115	47.5	0	0
$50,000 to $74,999	47	19	56	23.1	2	50
$75,000 to $149,999	47	19	58	24	1	25
$150,000 to $249,999	13	5.2	9	3.7	1	25
$250,000 or more	3	1.2	4	1.7	0	0
Agriculture involvement						
Currently involved for a living	32	12.9	5	2.1	0	0
Currently involved as a hobby	45	18.1	62	25.6	1	25
Were involved in the past but not anymore	33	13.3	34	14	1	25
Not involved but someone in immediate family is	30	12.1	24	9.9	0	0
Have never been involved/have no family involved	108	43.5	117	48.3	0	0

Research Question Two

Our second research question asked if respondents' agricultural proficiency level affected their overall attitude toward agriculture. No significant differences were observed in attitudes between respondents at Exposure (M = 1.17; SD = .74), Factually Literate (M = 1.31; SD = .61), and Proficient (M = 1.21; SD = 1.24) levels of proficiency, F (2,491) = 2.44, p = <.09, η^2 = .01.

Research Question Three

Research question three was concerned with the impact of agricultural proficiency level on respondents' engagement and interest in agricultural information. We used a one-way ANOVA with the dependent variables *interest in agriculture topics* and *information search frequency*. No significant differences were observed in interest in information between respondents at each proficiency level (Exposure $M = 3.55$, $SD = 3.56$; Factually Literate $M = 3.50$, $SD = .94$; Proficient $M = 3.41$, $SD = .91$), $F\ (2,491) = .26$, $p = .77$, $\eta^2 = .001$. Similarly, no differences were observed between the information search frequency of respondents in each proficiency group (Exposure $M = 2.51$, $SD = 1.15$; Factually Literate $M = 2.29$, $SD = 1.15$; Proficient $M = 2.25$, $SD = .96$), $F\ (2,491) = 2.35$, $p = 10$, $\eta^2 = .009$.

Research Question Four

Research question four asked if respondents' agricultural literacy proficiency impacted how concerned they are about issues often associated with agriculture. Results of the ANOVA revealed no significant differences in respondents' concern about agriculture issues based on their proficiency levels (Exposure $M = 3.92$, $SD = .77$; Factually Literate $M = 3.90$, $SD = .71$; Proficient $M = 3.73$, $SD = .90$), $F\ (4,491) = .163$, $p = .85$, $\eta^2 = .001$.

Research Question Five

Lastly, as an exploratory measure, we examined if respondents' self-perceived knowledge of agricultural production areas varied based on their agricultural proficiency levels. A one-way ANOVA was used to determine if these differences were present, the results of which are summarized in Table 3.

Table 3

One-Way ANOVA for Proficiency Level Effects on Self-Perceived Knowledge of Agriculture Production Areas

	SS	*df*	*MS*	*F*	*p*	Eta (η^2)
Self-perceived knowledge						
Between Groups	16.37	2	8.19	9.99	<.001	.039
Within Groups	402.02	491	.82			
Total	418.39	493				

Significant differences were observed in respondents' self-perceived knowledge of agricultural topics based on their literacy proficiency level, $F(2,491) = 9.99$, $p = <.001$. Post-hoc multiple comparisons to identify where significant differences existed between proficiency groups on self-perceived knowledge revealed significant differences between the Exposure and Factually Literate proficiency groups (see Table 4).

Table 4

Comparison of Self-Perceived Knowledge by Proficiency Level

	Proficiency Level					
	Exposure ($n = 248$)		Factually Literate ($n = 242$)		Proficient ($n = 4$)	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Self-perceived agricultural knowledge	3.29	.91	2.94	.91	2.6	.72

Conclusions, Discussion, and Recommendations

We assessed Tennessee adult consumers' agricultural literacy using a previously developed summative assessment and determined their proficiency levels. Very few respondents in this study demonstrated proficiency in agricultural literacy. Rather, roughly one-half of respondents were at the Exposure proficiency level, and the other half were at the Factually Literate level. Based on the description of these levels provided by Judd-Murray (2019), consumers at the Exposure level should be able to recognize terms and recall singular facts, particularly facts that resonate with their personal experiences. Those at the Factual Literacy level should be able to transfer knowledge from one area of application to another, identify the relevancy of facts in context, and draw upon facts to construct explanations. Having roughly half of this sample past the Exposure level of proficiency is encouraging, especially when considering this as a summative assessment of a population sample with diverse educational attainment and experience with agriculture. Future research in this area should examine the specific thematic areas within NALO where adult consumers demonstrate greater or lesser proficiencies to help inform community-based programming.

After determining respondents' proficiency levels, we examined the key descriptive characteristics of respondents in each proficiency group. Although all proficiency groups were majority female, the Factually Literate and Proficient groups were more heavily represented by female respondents. This finding contrasts with Lewis (2018), who found adult males more agriculturally literate. Conversely, Lewis' (2018) finding that older adults are more agriculturally literate than their younger counterparts coincides with our findings, as the Factually Literate and Proficient groups are noticeably older than the Exposure group. Based on higher percentages of respondents with post-secondary degrees in the Factually Literate and Proficient groups, we observe a connection between higher education and agricultural literacy in adult consumers in Tennessee. Although it appears that some agricultural involvement improves agricultural literacy, a large representation of those with no involvement was present in both the Exposure and Factually Literate groups, which aligns with employment rates in the food and agriculture sectors (Economic Research Service [ERS], 2023).

The push behind fostering agricultural literacy among the general populous is based on the premise that we can significantly impact society through informed-decision making, attitudes, and perceptions of current and emerging consumers (Funk & Kennedy, 2016; Judd-Murray, 2016; Specht et al., 2014; Spielmaker & Leising, 2013). However, our findings revealed no significant impacts of agricultural literacy proficiency on respondents' attitudes toward agriculture, engagement with and interest in information about agriculture, or their degree of concern around commonly discussed issues generally connected to agriculture in public discourse (e.g., GMOs). As there is limited research with adult audiences using standardized assessments of agricultural literacy, we recommend future research continue in this area. The current study indicates few beneficial outcomes associated with "agricultural literacy proficiency" as operationalized by NALO and the JMALI assessment method. We should continue to examine what consumers need to know and be able to do to effectively participate in the agricultural sector through informed decision-making with purchases, voting, and other practices. We should also continue to examine methods of assessing agricultural literacy proficiency to help practitioners identify key areas for objective-driven community programming.

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How Are School Based Agricultural Education Teachers Implementing Agriscience Fair in Middle School?

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Introduction, purpose, and objectives

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 through the balance of 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). It also provides an opportunity for the application of scientific principles that promote meaningful learning for students (Thoron et al., 2011). The FFA Agriscience Fair 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. The Agriscience Fair award program has the largest amount of middle school members at the national level (M. Young, Personal communication, September 13, 2023). Despite this involvement, little has been done to examine how middle school teachers implement research-based SAEs in their classroom or how the FFA Agriscience Fair is structured for middle school participants. The research was guided by the following research question: How do middle school teachers implement the Agriscience Fair award into their program?

Theoretical/Conceptual Framework/Perspective

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). 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 for adoption. According to Hall et al. (1974), 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.

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. Semi-structured interviews were conducted

between October 2022 and June 2023 with invited participants representing the various FFA regions and with varying levels of observed success in the awards structure of Agriscience Fair. 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 and all interviews were audio or audio/video recorded to allow for transcription in addition to researcher notes. Transcripts were sent to participants to ensure accuracy. The researchers originally coded individually. After this first round coding, we met for triangulation and a chance to discuss constructed themes and clarify the terminology. Another round of coding occurred where the team looked for clear supporting quotes for the themes as well as to identify any recurring items that were not represented in the constructed themes.

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. Participants were given pseudonyms and are presented below (see Table 1) with additional information about their experience with the Agriscience Fair.

Table 1
Description of the participants experience with Agriscience Fair and their level of use in the Concerns Based Adoption Model

Participant Pseudonym	Experience with Agriscience Fair	Level of Use
Gabriella	4 years, some success but learning from co-teacher	Routine use
Samantha	8 years, some success at the state and local level	Routine use
Katie	4 years, extremely successful with several national winners each year	Refinement
Hannah	4 years, success at national level but limited classroom integration	Refinement
Riley	9 years, had success on the state level and a few top 10 at national level	Integration
Carly	12 years, long track record of success at the national level and high levels of classroom integration	Integration
Emily	10 years, 3 years with middle school, national winners and all students implementing in the classroom	Renewal

Results/Findings

Three themes were constructed as a result of the open coding process. These themes were: Agriscience Fair was a tool to help strengthen the total program, these teachers are learning to *play the game,* and teachers 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 saw Agriscience Fair as a valuable tool to enrich their programmatic offerings and provide hands-on experiences for students. Teachers used 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 was 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.” Similarly, Agriscience Fair was a way to “beef up the curriculum” for Carly. She 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 Agriscience Fair and making it “a culminating project.” Agriscience Fair is used to teach students using the three-component model. According to Hannah, “I’m calling [Agriscience Fair] the SAE Projects.” Carly stated they are a class requirement, but students can receive recognition through FFA.

Teachers noted that embedding Agriscience Fair into their classes allowed students to build 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 ask 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.” 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 the math class to do data analysis to that level.”

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”

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 must 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.’”

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.”

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.”

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. The 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.” 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.”

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.”

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 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.”

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.”

Theme 3: Teachers 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 recognized 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."

Some teachers have experienced 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.

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." 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 fairs usually promote science literacy, hands-on learning, and critical thinking. 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/Discussion/Implications/Recommendations

There was consensus between the participants that Agriscience Fair added value to their programs and could be incorporated into their classes. Instead of asking our middle school teachers to modify or create resources, pre-made lessons should be created to incorporate

Agriscience Fair into middle school classrooms. 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. To increase the proliferation of Agriscience Fair, states should offer workshops specifically directed toward middle school teachers to build self-efficacy to incorporate Agriscience Fair into their programs. To increase participation, sponsors and organizations supporting Agriscience Fair should 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 should consider providing 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.

The innovation configuration map, which is a key part of the CBAM process, for the implementation of Agriscience Fair for middle school programs is beginning to crystalize as a result of this study. 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. The innovation configuration map development is an iterative process. Future studies could provide clarity in developing this tool to guide adoption.

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Entering the Professorate: Hiring Authorities' Perceptions of Tenure-Track Faculty Needs

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Introduction & Framework

Career advancement and educational development are often the primary proposes of obtaining a graduate degree in agricultural education settings (Bowen & Miller, 2010). It is the philosophy of many graduate programs that their overarching purpose is to produce scholars, and at the doctoral level, future faculty (Shinn & Baker, 2010). While the purpose of graduate education may remain consistent across programs, approaches may vary. With a potential looming faculty shortage in agricultural content settings (National Academies of Sciences, Engineering, and Medicine [NASEM], 2021), it is imperative that programs of agricultural education and related specializations (i.e., teacher education, agricultural communication, Extension education, agricultural leadership) produce graduates who meet the needs of the tenure-track faculty role. Therefore, a national study to determine such needs, from the perspective of faculty hiring authorities, is warranted.

This study was framed with the theory of human capital (Becker, 1964; Schultz, 1971) and Tyler's (1949) four fundamental questions. Human capital theory (HCT) is the process of developing personal characteristics, such as specific knowledge and skills, that leads to individuals' (often employees) increased productivity. Investing in human capital through preparation programs (i.e., graduate education) or on-the-job training can lead to increased returns for employers and the larger social, economic, and environmental systems (Schultz, 1971). Tyler (1949) purported that when developing educational programming, it is important to consider the overarching purpose of the program, and the experiences necessary to achieve said purpose.

Purpose and Objectives

The purpose of this Delphi study was to identify the competencies needed by first-year, tenure-track faculty of agricultural education and its related disciplines (teacher education, extension education, leadership development, and agricultural communications). The objectives were:

1. Describe the comprehensive list of non-duplicated competency statements identified by the panel of hiring authorities.
2. Describe the competencies that were endorsed by the panel of hiring experts.

Methodology

The Delphi technique can be used to facilitate a group of individuals in prioritizing values and goals (Linstone & Turoff, 2002; Skulmoski et al., 2007). Witkin and Altschuld (1995) suggested three steps for conducting a Delphi: (a) planning and panel formation, (b) carrying out the questionnaire rounds, and (c) summarization and dissemination. The expert panel was composed of individuals who were hiring authorities of tenure-track faculty of agricultural education and its related specializations. This included department chairs, heads, directors, program leaders, and deans of colleges, who have the authority to hire tenure-track faculty of agricultural education. To obtain a comprehensive list of post-secondary institutions at which agricultural education faculty are employed, we used the electronic list of agricultural education institutions offered by

the American Association for Agricultural Education (AAAE, n.d.). This resulted in a total of 103 possible institutions with departments that included faculty of agricultural education. After reviewing the websites for each institution, it was determined that 90 of the 103 institutions had active departments or faculty of agricultural education. An initial email invitation was sent to the listed hiring authority (head, chair, etc.) at each of the 90 institutions or to a representative who then put us in contact with the appropriate individual. In total, hiring authorities from 31 institutions across 25 states agreed to participate.

The first questionnaire round included open-ended questions (Witkin & Altschuld, 1995) which asked participants to list the competencies that were needed and lacking by first-year, tenure-track, faculty members in their department. In total, 490 competency statements were provided by the panel ($N = 31$). Open, inductive coding via the constant comparative method (Corbin & Strauss, 2015; Creswell, 2013) was used to analyze the statements by one researcher. A list of 90 condensed statements were presented to the research team, and a round of open code negotiation occurred, where the statements were compared again to the raw data. The team agreed to condense the data further to 67, non-duplicated, representative competency statements. These statements were then situated into three overarching themes: (a) professional skills, (b) technical skills, and (c) personal attributes. The 67 statements were used to develop the round two questionnaire, and panelists were asked to indicate their level of agreement using a six-point scale (1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, 6 = strongly agree). Eighty-one percent ($n = 25$) of the panel participated in round two. The consensus level was established *a priori* by the researchers to be 75% of participants who indicated either agree or strongly agree. Seventy-five percent is consistent with other research in the profession (Lundry et al. 2015; Ramsey & Edwards, 2011; Ramsey & Edwards, 2012), but consensus level for Delphi studies can vairy based on particular need (Hsu & Stanford, 2007). Further, at the end of the round two questionaries, panelists were asked if they agreed that the statements in the round were representative of their input from the first round, and 96% of the respondents agreed.

Per the recommendation of Witkin and Altshuld (1995), round three included sharing with the panel the results of round two, which included the individual item means, item measures of spread, and the panelist's own individual round two responses. In this consensus-building round, panelists were asked to "examine the results and the degree to which their own responses [were] similar to or different from those of the group" (Witkin & Altschuld, 1995, p. 197). Panelists then rerated each of the items and were given the opportunity to provide reasons for any ratings upon which they wished to elaborate. Seventy-seven percent ($n = 24$) of the panel participated in round three. In some cases, a fourth round of a traditional Delphi is recommended (Linestone & Turoff, 2002); however, others consider it to be optional (Skulmoski et al., 2007; Witkin & Altshculd, 1995). In this study, there was a high level of consensus among the panel, so there was "little benefit in developing and sending [a fourth round]" (Witkin & Althschuld, 1995, p. 197). Reminder emails were sent for each of the three rounds to increase the response rate (Dillman et al., 2014).

Results

Three rounds of questionnaires were completed by the Delphi panel to identify the competencies needed by first-year, tenure-track faculty of agricultural education and related specializations. The 67 non-duplicated competency statements, and their accompanying agreement ratings, are presented alphabetically by round in Table 1. The results of the third-round questionnaire were used to determine if each competency statement reached consensus (≤ 75% agree or strongly disagree) or not. At the completion of the third round, there were a total of 52 competencies that reached consensus by the panel of hiring authorities.

Table 1

Agreement Percentages for Round Two and Round Three of the Delphi Questionnaire

Item	Round 2 (n = 25)		Round 3 (n = 24)		Endorse
	Agree %	Strongly Agree %	Agree %	Strongly Agree %	
Accept and implement feedback	44.0	48.0	41.7	58.3	Yes
Advising and mentoring doctoral students	24.0	12.0	12.5	16.7	No
Advising and mentoring master's students	48.0	20.0	50.0	25.0	Yes
Advising and mentoring undergraduate students	32.0	44.0	45.8	41.7	Yes
Advising students for career preparation*	36.0	36.0	41.7	50.0	Yes
Advising student organizations	32.0	16.0	37.5	8.3	No
Analyze research data	40.0	40.0	50.0	41.7	Yes
Assessing student learning	40.0	56.0	25.0	70.8	Yes
Classroom management	48.0	44.0	70.8	29.2	Yes
Collect research data	40.0	40.0	54.2	37.5	Yes
Communicating one's expertise*	32.0	40.0	50.0	45.8	Yes
Composing timely and professional written correspondence	60.0	20.0	83.3	8.3	Yes
Demonstrates empathy	60.0	20.0	87.5	8.3	Yes
Demonstrates professionalism	20.0	76.0	4.2	95.8	Yes
Departmental citizenship	48.0	40.0	54.2	37.5	Yes
Develop a research program/agenda	28.0	56.0	12.5	83.3	Yes
Developed teaching philosophy	40.0	44.0	45.8	45.8	Yes
Disseminate research to practitioners*	44.0	28.0	62.5	16.7	Yes
Disseminate research to scholarly audiences	28.0	48.0	29.2	58.3	Yes
Encourages high levels of student performance	60.0	36.0	58.3	41.7	Yes
Encourages student critical thinking	40.0	56.0	29.2	66.7	Yes
Enthusiastic	52.0	36.0	70.8	29.2	Yes
Extension and outreach program delivery	48.0	8.0	54.2	8.3	No
Extension and outreach program development	48.0	8.0	54.2	4.2	No

Item	Round 2 (n = 25)		Round 3 (n = 24)		Endorse
	Agree %	Strongly Agree %	Agree %	Strongly Agree %	
Extension and outreach program evaluation	36.0	8.0	29.2	8.3	No
Foundational knowledge of diverse teaching methodologies	40.0	40.0	58.3	37.5	Yes
Grant and project management*	52.0	8.0	70.8	4.2	Yes
Incorporate diversity and inclusion competencies*	48.0	24.0	79.2	16.7	Yes
Innovative*	40.0	20.0	58.3	29.2	Yes
Instructional delivery	40.0	56.0	12.5	83.3	Yes
Instructional design	40.0	44.0	45.8	41.7	Yes
Interpersonal communication	52.0	40.0	70.8	29.2	Yes
Interpersonal skills (i.e., collegiality, tactfulness, approachable, etc.)	32.0	60.0	20.8	79.2	Yes
Implementation of experiential learning	44.0	32.0	58.3	33.3	Yes
Knowledge of appropriate specialization's theory	56.0	28.0	70.8	20.8	Yes
Knowledge of broader disciplinary theory beyond one's specialization	40.0	4.0	37.5	4.2	No
Knowledge of diverse research methodologies	32.0	20.0	41.7	8.3	No
Motivates and supervises direct reports	36.0	20.0	54.2	8.3	No
Networking with stakeholders	52.0	36.0	66.7	25.0	Yes
Organized	48.0	44.0	58.3	37.5	Yes
Participates in international programs	24.0	8.0	4.2	4.2	No
Participates in professional societies*	32.0	40.0	50.0	29.2	Yes
Personal resiliency	36.0	60.0	33.3	66.7	Yes
Plan and design research	32.0	52.0	25.0	66.7	Yes
Positive supervisor-subordinate relationship	36.0	48.0	50.0	41.7	Yes
Possesses sound moral character	32.0	64.0	25.0	75.0	Yes
Practices attentive and active listening	72.0	20.0	70.8	25.0	Yes
Prioritize competing demands for attention	40.0	52.0	33.3	66.7	Yes
Proactive and strategic relationship building with colleagues	28.0	68.0	29.2	70.8	Yes
Produces journal publications	36.0	48.0	37.5	50.0	Yes
Program and course assessment/evaluation	48.0	28.0	70.8	20.8	Yes
Provides service to the profession	8.0	24.0	8.3	12.5	No
Provides timely and appropriate student feedback	44.0	52.0	25.0	70.8	Yes
Recruit students*	44.0	24.0	54.2	20.8	Yes

Item	Round 2 (n = 25)		Round 3 (n = 24)		Endorse
	Agree %	Strongly Agree %	Agree %	Strongly Agree %	
Scholarly writing abilities	24.0	64.0	12.5	83.3	Yes
Securing external funding to support their program	32.0	16.0	29.2	12.5	No
Securing internal funding to support their program	32.0	16.0	33.3	12.5	No
Self-care	44.0	48.0	45.8	54.2	Yes
Self-directed	44.0	56.0	20.8	79.2	Yes
Specialization's specific skills (Ag education, communication, extension, and/or leadership)	40.0	36.0	58.3	25.0	Yes
Supervises internships	24.0	24.0	41.7	12.5	No
Teaching in an online setting	32.0	36.0	33.3	37.5	No
Teamwork and collaboration	40.0	52.0	20.8	75.0	Yes
Time management	44.0	52.0	37.5	62.5	Yes
Uses research to inform one's own practice*	44.0	28.0	58.3	25.0	Yes
Understanding of student services and ethical responsibilities*	40.0	32.0	75.0	16.7	Yes
Understanding of the land-grant mission	20.0	24.0	29.2	12.5	No

Note. *Indicates item had a change in endorsement from round two to round three.

Conclusions, Implications, and Discussion

We conclude that the hiring-authority endorsed competencies are situated into three overarching categories: (a) professional skills, (b) technical skills, and (c) personal attributes. Professional skills were those employability skills that may span multiple dimensions of an individual's role as faculty. However, technical skills were those that best aligned with research, teaching, or extension. Lastly, personal attributes, sometimes referred to as soft skills, were the skills that are somewhat innate and often indirectly learned or acquired.

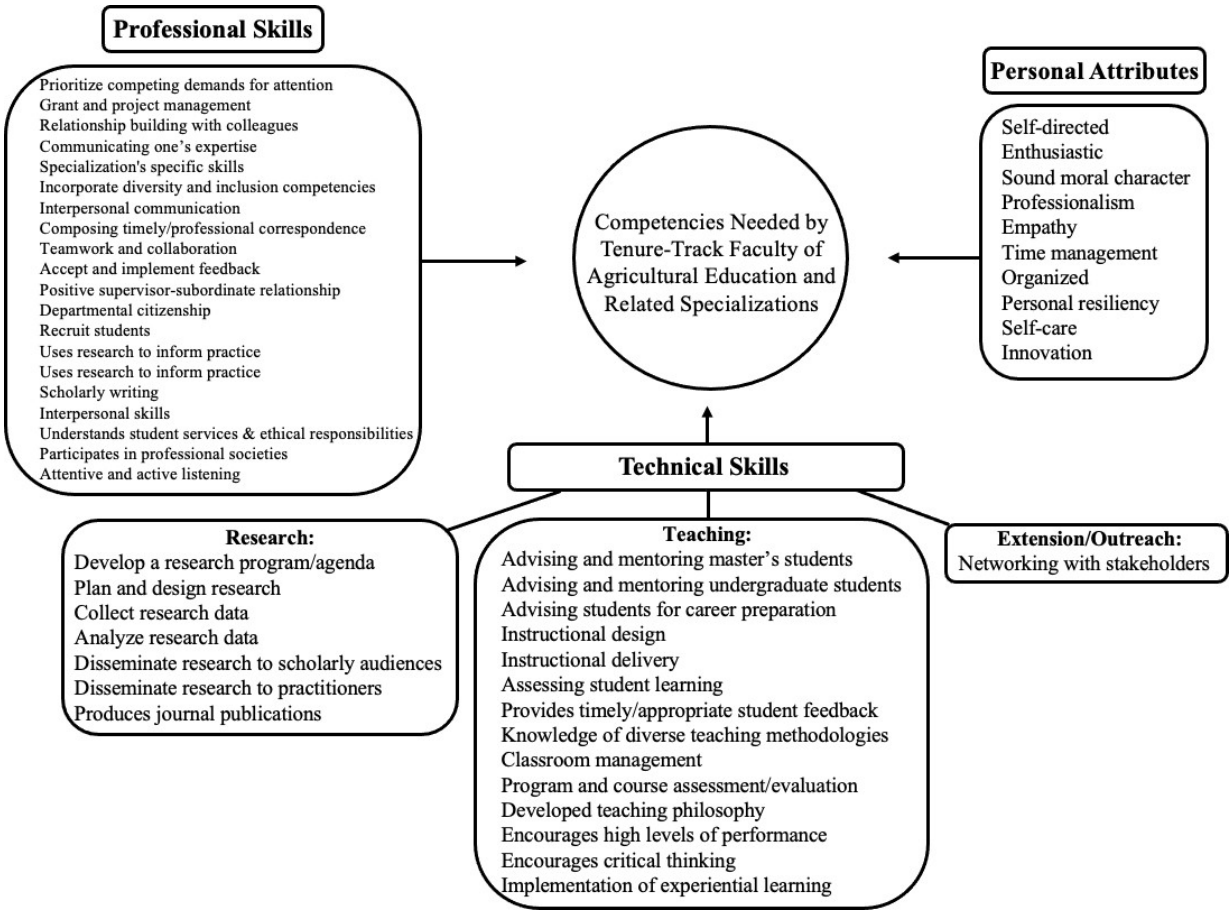
Bowen and Miller (2010) suggested that graduate programs in agricultural education and related specializations should develop individuals' career readiness and progression, their research experience, and the skills needed to be a productive member of society. The competencies that emerged through this study are in direct alignment with Bowen and Miller's (2010) suggestions. The endorsed competencies, situated into categories and subcategories, are presented as Figure 1.

We recognize that the competencies that emerged through this Delphi panel may not be an exhaustive list of those skills needed to be a tenure-track faculty member. For example, the item *specialization specific skills* is encompassing of numerous skills that may be necessary for faculty of a specific programmatic focus (i.e., teacher education, agricultural communication, etc.). Moreover, it is noteworthy that the subcategory, Extension/Outreach, only had one item emerge: *networking with stakeholders*. Faculty who are Extension experts, or even those who

maintain an Extension/outreach appointment, may need additional competencies to fulfill their role. However, those may be competencies that are learned on the job, and this panel was asked to identify the skillsets needed by tenure-track faculty at the point of hire.

Figure 1

Model of Competencies Needed by Tenure-Track Faculty in Agricultural Education and Related Specializations



We recommend that this list of competencies be used by graduate programs of agricultural education and related specializations as a potential framework for evaluating their programming. In line with Tyler's (1949) recommendations, it is important for educational programs to identify a purpose, then plan and organize appropriate experiences needed to obtain said purpose. As such, this framework could serve as a tool to accomplish this. Those who are seeking tenure-track faculty roles, or those who advise such students, may use this framework as an individual development tool for preparing the future workforce within the agricultural education professorate.

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Sense of Belonging as a Predictor of Retention in a College of Agriculture

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Sense of Belonging as a Predictor of Retention in a College of Agriculture

Scholars have predicted an impending shortage of workers for the agricultural industry (Alston et al., 2019; Fernandez et al., 2020), and accordingly, colleges of agriculture have been tasked with increasing the supply of graduates. To produce the needed graduates, colleges of agriculture must increase retention rates among undergraduate students (Alston et al., 2019) as student attrition from colleges of agriculture has impacted the number of available agricultural graduates (Codallo, 2019). Research has shown a variety of demographic and cognitive factors can predict student retention (Huang et al., 2017), but Sommerfeld (2011) suggested researchers also focus on students' 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). However, this line of inquiry has not focused on students within colleges of agriculture.

Literature Review

Various institutional, financial, and individual factors have contributed to student retention rates (Millea et al., 2018; Seidman, 2012; Smathers et al., 2022). Institutional characteristics, such as the type of institution, programming, student-faculty ratios and a designated first-year course have all influenced whether a student is retained (Dunn et al., 2013; Millea et al., 2018; Seidman, 2012). 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; resultantly, financial factors have also contributed to students' retention. Millea et al. (2018) discovered retention of low-income students was affected by the type of financial aid received, with grant recipients more likely to persist than loan recipients. Likewise, individual characteristics affecting students' academic preparation and motivation have tended to impact student success and perseverance in college (Millea et al., 2018; Peddler et al., 2022). Additionally, other individual non-academic factors, including student sense of belonging, have been shown to influence student retention (Bentrim & Henning, 2022; Hausmann et al., 2007; Peddler et al., 2022; Rhee, 2008; Strayhorn, 2018). This study specifically examined the role 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 variables, including students' demographics, 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 identified as influencing students' sense of belonging (Alston et al., 2019; Dunn et al., 2013; Freeman et al., 2007; Johnson et al., 2018). Moreover, sense of belonging can increase academic engagement, confidence, motivation, enjoyment, and other positive behaviors and emotions (Freeman et al., 2007; Peddler et al., 2022). Factors such as student-faculty interactions, student-advisor interactions, and extracurricular involvement, which have been shown to increase academic achievement and retention, have also been shown to affect students' sense of belonging (Dunn et al., 2013; Xiao et al., 2019). Peddler 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.

Conceptual Framework

The conceptual framework guiding this study was Strayhorn's (2018) Model of College Students' Sense of Belonging. This framework (Figure 1), rooted in Maslow's (1954) hierarchy of needs, posits that belonging is an essential human need and motivator. Strayhorn's model suggests that students must realize a sense of belonging before they can satisfy higher-order needs such as knowledge-seeking and self-actualization. Thus, belonging must be met before students can achieve their full academic potential and the institution can achieve its educational mission.

Figure 1

Model of College Students' Sense of Belonging (Strayhorn, 2018)

Purpose

Undergraduate students' sense of belonging has been related to increased student retention; however, little research has been conducted examining sense of belonging within colleges of agriculture. Therefore, the purpose of this study was to investigate the relationship between freshmen to sophomore retention, student sense of belonging, and demographic 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 (UA) and the College of Agricultural, Food, and Life Sciences (AFLS).
2. Determine the relationships among students' perceived sense of belonging to UA and AFLS, demographic variables, and freshmen to sophomore retention.
3. Determine if a linear combination of students' perceived sense of belonging to UA and AFLS and demographic 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. 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 those who responded. 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 (α = .91) community and to the UA (α = .90) community. A sample item measuring sense of belonging to campus community 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 demographics. To track freshmen to sophomore retention, fall 2023 enrollment data was requested from the UA 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 included descriptive statistics such as frequencies and summated means, correlations, and logistic regression.

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 UA 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 UA and AFLS

Unit	*n*	Very Low (%)	Low (%)	Neutral (%)	High (%)	Very High (%)	*M*	*SD*
UA	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 of 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, 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.

Table 2

Freshmen-to-Sophomore Retention in UA and AFLS

	Retained		Not Retained	
Unit	*f*	%	*f*	%
UA	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 demographic variables (measured on nominal and interval scales) and the dichotomous categorical variables of freshman-to-sophomore retention in UA 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 to UA had significant, low (Davis, 1971), positive correlations with retention at the university level. 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 Selected Demographics, Belonging, and Intent Variables with Sophomore Retention in UA and AFLS

	Retention[g]	
Variable	UA	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 UA[f]	.14*	.00
Sense of belonging to AFLS[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, predicting sophomore retention in the university and AFLS for all 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 UA) were used as potential predictors. The resulting model was statistically significant, $\chi^2(3) = 10.48$, $p = .01$, $R^2 = .10$. High school GPA and sense of belonging to UA were the only statistically significant predictors (Table 4) of returning to the university as a sophomore. The odds ratio of 1.73 indicated each one-point categorical increase in GPA was associated with a 73% increase in the odds of returning to the university as a sophomore, while each increase of one standard deviation in sense of belonging to UA was associated with a 47% increase. Major was not a significant predictor of sophomore retention.

Table 4

Logistic Regression Model Predicting Freshman-to-Sophomore Retention at UA

				CI95 for Odds Ratio	
	β	*SE*	Odds Ratio	L. Limit	U. Limit
Intercept	2.11	0.26	--	--	--
Major[a]	-0.36	-0.79	1.32	0.57	3.14
High school GPA[b]	0.51*	0.22	1.73	1.08	2.56
UA sense of belonging	0.38*	0.18	1.47	1.03	2.09

[a]HESC = 0, agriculture = 1. [b] Coded as 1 = 2.50 – 2.99 to 5 = >4.00. [c]Measured on a 1 (*very low*) to 5 (*very high*) scale and converted to *z* scores. *$p \leq .05$.

Six variables (attendance at athletic and 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, $\chi^2(3) = 22.16$, $p < .01$, $R^2 = .32$. 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 five times (*OR* = 5.04) more likely to be retained in AFLS than returning sophomores majoring in HESC as freshmen. Students who reported attending a UA athletic event were also approximately four times (*OR* = 4.36) more likely to be retained in majors within AFLS. Males were three and one-half times (*OR* = 3.52) more likely to be retained in AFLS compared to females. Finally, each one standard deviation increase in intent to change majors outside AFLS was associated with a 51% (*OR* = 0.49) 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 as Sophomores.

				CI95 for Odds Ratio	
	β	*SE*	Odds Ratio	L. Limit	U. Limit
Intercept	-1.27	0.74	--	--	--
Athletic event attendance[a]	2.16***	0.66	8.63	2.40	31.05
AFLS welcome event attendance[a]	0.86	0.54	2.35	0.88	6.72

Gender[b]	1.26	0.86	3.52	0.64	19.14
Major[c]	1.47*	0.61	4.36	1.32	14.38
AFLS sense of belonging	0.01	0.23	1.01	0.65	1.59
Intent to switch to major outside of AFLS[c]	-0.72**	0.27	0.49	0.29	0.82

[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, with over 65% reporting they were unlikely to switch majors outside of the AFLS. Intent to switch majors was a negative predictor of retention in AFLS indicating students' initial commitment to the college can predict retention (Bentrim & Henning, 2022). Attending athletic events, attending the AFLS welcome event, identifying as male, having a higher sense of belonging, and having an agricultural major rather than HESC were all variables related to retention at the college level, which aligned with previous findings (Bentrim & Henning, 2022; Freeman et al., 2007; Peddler et al., 2022; Xiao et al., 2019). Nevertheless, when these characteristics were used to predict retention at the college level, attending athletic events, intent to switch to a major outside of AFLS, and major were the only significant predictors; sense of belonging was not a significant predictor of retention as expected (Bentrim & Henning, 2022; Hausmann et al., 2007; Pedler et al., 2022; Rhee, 2008; Strayhorn, 2018). Conversely, sense of belonging to UA and high school GPA were significant predictors of retention at the university level.

We observed several predictors of retention 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, as nonrespondents plausibly possess a different level of perceived belonging to the college than respondents. Approximately one in four students left AFLS, mostly HESC students. HESC degree programs include apparel, human nutrition, and other non-traditional agriculture programs, which might explain why these students were not as connected to AFLS. To improve retention, faculty members and administrators in AFLS should identify why these students are more likely to leave the college and focus more effort on retention. Future studies should attempt to gain more representative samples and test other levels of Strayhorn's (2018) model at the college level to evaluate its ability to predict on the college level and compare results to the university level.

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COMPLETED PROJECT: INTERNATIONAL AGRICULTURE

The Opinion Leadership Paradox: Examining the Role of Opinion Leadership on Teachers' Intentions to Advocate for Agricultural Education

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The Opinion Leadership Paradox: Examining the Role of Opinion Leadership on Teachers' Intentions to Advocate for Agricultural Education

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).

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 & Roberts, 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 considered 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 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. Three 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.

Methods and Procedures

To achieve the purpose of this study, we facilitated a census ($N = 219$) of Louisiana agricultural education teachers. This was achieved using the Louisiana Agriscience Teachers' Association (LATA) membership directory as the investigation's respondent 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 not have chosen to become members of LATA. 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 respondents, 74 (68.5%) were male and 34 (31.4%) were female. Further, most respondents had either taught agricultural education for more than 21 years (f = 36; 33.3%) or between one and five years (f = 26; 24.0%). The respondents 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 most respondents (f = 88; 81.4%) had not served in an elected position for the LATA.

The instrument used for this investigation included three 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 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 respondents 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 respondents' overall opinion leadership score. In the second section of the instrument, we used a researcher-developed scale to measure respondents' intentions to advocate for agricultural education. The scale asked respondents 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. The final section of the instrument asked the respondents to provide their personal and professional characteristics.

After surveys were completed and compiled into an SPSS file, the data were cleaned to remove 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 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.

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, respondents 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 respondents 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, the majority of respondents 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 respondents' 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%
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	9.3%	47.2%	4.6%	32.4%	6.5%

Statements	1	2	3	4	5
affecting agricultural education you are[f]					

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, most 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 respondents 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%
Run for an elected position.	23.1%	76.9%

Objective #3

For the final 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.

Conclusions, 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 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 an opinion leader (Lazarsfeld et al., 1948).

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. This finding appears 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 and through professional development opportunities for in-service teachers.

Finally, due to 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. Additional research should also examine how agricultural education teachers can better communicate the profession's importance to decision-makers at the local, state, and national levels. Finally, we call for greater investigation of the various approaches that teachers can use to effectively champion issues and causes that may affect their local agricultural education programs.

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

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

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 of Evolve, Engage, and Empower which all are interwoven with elements of diversity, equity, inclusion, and belonging. However, to make strides towards these stated goals, it would benefit the organization to recognize some of the problematic issues occurring throughout its history regarding the acceptance of underrepresented groups and make an effort to more fully recognize the contributions of individuals working to promote opportunities and inclusion for minority students.

Before the establishment of the New Farmers of America organization, African-American students were eager to get involved with vocational agriculture. In the late 1920s, the idea of the NFA began as a local entity in Virginia to provide African-American boys the opportunity 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 to draft 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. 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) both provide an overview of FFA history which are commonly used by school-based agricultural education teachers in their classroom instruction. When exploring the leadership and opportunities for African American students these documents provide a brief explanation of the NFA and a quick overview of the organization's history. With the FFA Student Handbook and the Official FFA Manual, students and teachers alike are left speculating about key 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. For the service he rendered them and how he rendered it, he has received the acclaim of both races. To the Negro he was in life a friend, in death a hero” (NFA Guide, 1948, p.8). At the 1936 NFA Convention, the H.O. Sargent loan fund was established to make loans to deserving NFA members, both active and former (Moore, 2019b). The second action taken by the NFA was the establishment of the H.O. Sargent Award. This award was created in his honor

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, 2019b). After the NFA and FFA merger, the H.O. Sargent Award was no longer recognized. In 1995, the H.O. Sargent Task Force was created to establish criteria, application, and parameters for the revival of 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 as to why the award was discontinued in any past FFA records (Moore, 2019a). 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 of the many discrepancies that is overlooked when it comes to the NFA and its rich history.

Purpose & 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 document 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 important contributions of specific individuals such as George Washington Owens (Callaghan & Hock, 2019) and S. B. Simmons (Jones et al., 2021). There is limited information on H.O. Sargent and his efforts to provide African-American students with a quality education 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?

Theoretical /Conceptual Framework

Albert Bandura’s Social Learning Theory was used to guide this historical research study. With Bandura’s Social Learning Theory, observation and modeling play an important role in the way that people learn. Bandura explains that "most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions, this coded information serves as a guide for action” (Bandura, 1977, p. 22). Going beyond the perception that learning must take place from prior experience alone, Bandura exemplified that learning can occur simply by observing others. Learning can be effectively achieved in the classroom by the simple observation and modeling of desired behaviors by a teacher, educator, or other students.

To tie Bandura’s Social Learning Theory into the complete learning of the NFA and the valuable history that it encompasses, students need to observe behavior that promotes this idea. How are

students going to learn about the true history of the FFA when important individuals such as H.O. Sargent have such limited information on their contribution and success in agricultural education? How are students going to learn about agricultural education when so much history about the NFA is left out of resources such as The FFA Student Handbook and the Official FFA Manual? With this lack of information, it is difficult for teachers to provide detailed instruction on the NFA and promote the importance of learning about all aspects of FFA history, both favorable and challenging. The absence of a full and accurate history may also promote a perception to agriculture students that the NFA was not an important contributor to the scope and development of the National FFA Organization, downplaying the importance and value of underrepresented students.

Methods

As noted by Fraenkel et al. (2015), historical research utilizes the systematic collection and evaluation of data to provide context and understanding of actions or events occurring in the past. The use of this research methodology encourages individuals to examine the past to learn from prior successes and failures, consider the 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 study, historical research methods were utilized and involved in the search for credible sources and historical documents 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 in the collection of 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 any and all sources (Fraenkel et al., 2015). Therefore, it is important 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 documents. Additional external criticism was established by utilizing resources that had been 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.

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). 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, 2019b). Later on, H.O. Sargent proceeded to graduate 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).

After graduating from Alabama Polytechnic Institute, H.O. Sargent remained at the school and served as a senior horticulturist (Moore, 2019b). Shortly after in 1904, he was elected president of the West Alabama Agricultural School at Hamilton, where he served for 12 years (Moore, 2019b). After his 12-year tenure as the president of the West Alabama Agricultural School at Hamilton, H.O. Sargent went on to serve as a director for club work and a supervisor for agricultural high schools in Walker County, Alabama (Moore, 2019b). Shortly after in 1917, H.O. Sargent was 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 eighteen years as a vocational trainer for African American schools (Alston & Wakefield, 2022). During this time, H.O. Sargent's contributions led to arrangements being made 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, 2019b).

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, 2019b). Much of his success in African-American schools was attributed to his unique personality and him being widely accepted by African-American agricultural educators (Alston & Wakefield, 2022). Being 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 better prepare and support African American agricultural educators (Norris, 1993). Through his extensive work as a federal agent, he believed that the time had come for an organization of Black agricultural 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 expressed the desire to formulate an organization with a firm foundation for African-American students (Fields, 1959). During this time, 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 made a recommendation for the New Farmers of America to be officially established.

In 1935, H.O. Sargent made arrangements for the first meeting of the NFA to take place 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 organization and permanent organization, oratorical contests, committee work, the first national judging contest, and entertainment (Norris, 1993). At that meeting on August 4th, 1935, the New Farmers of America was established and recognized as a national organization**.**

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 was an organization that had achieved many accomplishments and held a rich history of being a thriving organization (Wakefield & Talbert, 2003). The NFA provided value to African-American rural youth in four areas: the individual, school, home, and community (Jones et al., 2021). The organization promoted many opportunities for students to achieve individual values such as improving morals and citizenship, teaching cooperation, and working with others, as well as, teaching by experience (Jones et al., 2021). The NFA supported initiatives for African-American students to learn various approaches to engage in their local communities. The NFA taught members community values such as providing a source of leadership, generating new ideas, and improving the appearance of the community (Jones et al., 2021).

Smith (2022) expanded on the numerous contributions of the NFA beyond its role as an organization for rural African-American boys stating, "It was an incubator for the early twentieth-century Black youth farm movement that began in the South. This movement shaped the minds of Black boys and their communities (p. 11). The NFA played an important role in building community spirit, self-determination, economic vitality, and food security. Also, the NFA served as a pipeline, connecting African-American males with interests in agriculture to related programs of study at Historically Black Colleges and Universities (HBCUs). During this time, numerous African-American professionals including farmers, college professors, federal USDA agents, cooperative extension personnel, and state agriculture officials had prior involvement in the NFA (Smith, 2022).

Conclusions/Discussion/Implications/Recommendations

The development of the New Farmers of America organization 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 were able to take part in the NFA benefited by being able to learn important skills, develop leadership qualities, and network 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 were able to come together to create an organization where African Americans could pursue vocational agriculture freely. In today's society, it is important to remember and reflect upon the contributions and advancements of African-American students who were members of the NFA. These members, along with many others, had a strong impact on 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 important 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 play an important role in the recruitment and retention of diverse students enrolled in agricultural education programs. Small actions and recognition across local chapters and student organizations can start a larger movement to ensure that the past is not forgotten and that the NFA can finally celebrate a true merger.

After conducting this historical research study, it is suggested that the contributions of H.O. Sargent and the NFA are further examined from a closer standpoint to understand the history of each entity better. There are limited resources on both of these entities and further research could open up more knowledge and understanding into 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 incorporated into the FFA. During the NFA/FFA merger, many components 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). Due to these losses, many of the traditions, history, and culture of Black agricultural education 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.

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 National events such as the National FFA Convention, as well as in agricultural education curricula across the United States. Activities might include an evaluation of NFA artifacts in which students are given documents such as brochures from NFA camps and conventions, a picture of the emblem, and/or photos from different competitive events to analyze. Or students might have the opportunity to interact with different components of NFA history by completing options provided on an NFA choice board (Jones & Warner, 2023). 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 organization and how their contributions have changed the face of modern-day agriculture.

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An Assessment of Clemson University Cooperative Extension Agents' Perceptions of Work-Related Factors Leading to Burnout

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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 back to 1984, with many concluding that similar factors, such as low pay, lack of work-life balance, and long hours contribute to burnout (Chandler, 2005; Harder et al., 2014; Harder et al., 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. This study's results will provide Cooperative Extension employees with the knowledge needed to develop and implement effective measures to combat workplace burnout on the individual level.

The purpose of this research is to identify Clemson University 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 University Cooperative Extension agents.

2. Describe Clemson University 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 demographic characteristics of Clemson University 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 described as similar 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 within their positions.

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 will be used to identify intrinsic and extrinsic work factors that contribute to employee burnout. Intrinsic work factors include achievement, work itself, responsibility, recognition, and advancement. Extrinsic work factors include supervision, salary, policy and administration, interpersonal relationships, and working conditions. Combining which work factors contribute to burnout will help serve the purpose of describing relationships, if any, between the six work constructs leading to burnout and demographic characteristics of Clemson University 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 University 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 University Cooperative Extension Service (UCES). An initial email and three contact points were used to invite UCES 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 X 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 (i.e., workload, control, reward, community, fairness, and values) 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 University 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

The primary purpose of this study was to examine Clemson University Cooperative Extension agents' perceptions of work-related factors leading to burnout. Specifically, this study investigated relationships, if any, between the demographic characteristics of Clemson University Cooperative Extension agents and burnout risk.

To satisfy research objective one, participants were asked demographic questions related to their personal and professional characteristics. Of the 90 complete 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%). All respondents had some degree of higher education with 29 (32.2%) reporting a bachelor's degree, 49 (54.4%) reporting a master's degree, and 8 (8.9%) reporting a doctorate.

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 Rural Health program team had 9 (10%) respondents, while Livestock and Forages and Agribusiness had 7 (7.8%) respondents each. Program teams with the least amount of representation included Natural Resources and Water (n = 4, or 4.4%), Agronomy (n = 3, or 3.3%), and Expanded Food and Nutrition Education Program (n = 1, or 1.1%). The years of service with Clemson University Cooperative Extension of the respondents ranged from five or below to over 30 years or more. The number of Extension agents with five years of experience or less was the largest group of respondents (n = 37, 1.1%), while 17 (18.9%) agents responded that they had between six and ten years of experience. There were 6 (6.7%) agents who reported having between 11 and 15 or 21 and 25 years of experience each. Ten (11.1%) respondents reported having between 16 and 20 years of experience, and 11 (12.2%) respondents had 26 or more years of experience.

For research objective two, the mean scores for each question in the survey and work construct were calculated. The mean scores for individual questions ranged from M = 2.82 to M = 3.48. The highest mean score was in the values construct with a score of M = 3.48 (SD = 0.70), indicating this as the construct with the highest positive perception from Clemson University Extension agents. The lowest mean score came from the workload construct with a score of M = 2.82 (SD = 0.77), suggesting there may be some negative feelings towards this construct from Clemson University Extension agents.

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."

For research object 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 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.

Point-biserial correlations were used to determine relationships between the six constructs leading to burnout and generational cohort. Of the six constructs, only one construct, fairness was related to the generational cohort. A low significant negative correlation (r = .22, $p < .10$)

was found between fairness and generational cohort. The 1946-1976 generational cohort group rated fairness slightly higher than the 1977-2010 generational cohort group ($M = 3.38$ vs. $M = 3.07$), respectively.

Conclusions/Discussion/Implications/Recommendations

From the survey findings, it can be concluded that the personal characteristics of the average Clemson University Extension agent is a white/Caucasian female born between 1977 and 2010 with some degree of higher education (i.e., master's or PhD). It can be further concluded that the Clemson University 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 University 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 there are negative perceptions of this construct regardless of generational cohort affiliation. 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 brings to light that in the Clemson University Cooperative Extension System, workload and a healthy work-life balance is 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. This correlation means that the younger a Clemson University 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 like years served (Gaidhani et al., 2019). A 2022 study found that Millennials and Generation Z's highest priority when looking for employment were the fair treatment of employees across all genders and ethnicities (Kelly, 2022). Millennials and Generation Z have also been cited as valuing organizations that place an emphasis on 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 University 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 affiliation 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, writer Vemparala speculates that Millennials change jobs because they feel underpaid, agreeing with previous Extension retention studies. With more employees from Generation Z (Gen Z) entering the workforce, Vemparala (2023) also writes 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, 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 paired with Vemparala's (2023) observations suggests that employees leaving jobs is not the fault of the employer or an inherently bad thing.

A 2018 review by Goler and colleagues 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 benefit 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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The FFA Girl: A Historical Examination of the Driving Forces Leading to Girls' Admittance into the National FFA Organization

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The FFA Girl: A Historical Examination of the Driving Forces Leading to Girls' Admittance into the National FFA Organization

Introduction and Review of Literature

Women have fought for equal rights for generations, and up until 1920, did not even have the constitutional right to vote in elections (United States Constitution, 1919). In 1920, the 19th Amendment to the U.S. Constitution was ratified and declared that "the right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of sex" (United States Constitution, 1919, H. J. Res. 1). Finally, women could make their own political decisions and have a voice in national and local leadership. The 19th Amendment did not, however, erase bias in the workplace. Women have struggled to obtain employment and work comparable hours for similar pay to their male counterparts (Yellen, 2020). Most of the milestones that have been achieved in women's rights have come as a result of the work of activists, through the Women's Rights Movement, who championed issues such as access to jobs, equal pay, and other relevant issues (Bunch, 1990). Eventually, the Civil Rights Act (1964), signed by President Lyndon B. Johnson, granted women equal opportunity in the workplace in the U.S. Although *glass ceilings* were still a significant issue, this legislation was a landmark victory because it made discrimination in the workplace illegal based on "race, color, religion, sex, or national origin" (The Civil Rights Act, 1964, H. R. 7152). Consequently, the historical record points to two concurrent movements in the 1960s – *civil* and *women's* rights that coalesced to make progress in the fight against the discrimination of women (Bunch, 1990, 2012). Despite this, the National FFA Organization (FFA) took five additional years after the adoption of the Civil Right Act to admit girls into its membership.

A study by Kanter (1966), the Ohio FFA Executive Secretary, revealed insight into why girls might have been delayed admission into the organization. For example, respondents were asked to rate their agreement on the following item using a five-point Likert-type scale: "[should FFA] allow girls who are enrolled in vocational agriculture full membership in the FFA?" (Kanter, 1966, p. 17). The respondents who were least in favor of girls being admitted were state FFA executive secretaries and state agricultural teacher presidents. On the contrary, teacher educators were the most agreeable. As such, an important implication from the study was that individuals who held more political power in FFA deemed girls' membership undesirable (Kanter, 1966). Perhaps the resistance of leaders in agricultural education regarding this issue was one reason why it took several more years before girls were finally granted formal membership in the organization.

Although girls were welcomed to join as members over 50 years ago, the struggle for equal representation has continued. For example, Bowen (2002) argued that "we have extreme difficulty discussing this topic (ethnic and gender diversity) with meaningful dialogue…" (p. 1). Historically, women have also struggled to be entirely accepted to teach agriculture, evidenced by the suggestion that if a female were to teach, they should teach in a multi-teacher department and be responsible for horticulture-related courses (Bradley, 1971). To illuminate this issue, Kelsey (2006) studied women's experiences in preservice agricultural education programs in Oklahoma. The findings revealed that recent graduates planned on moving out of state "due to the provincial attitudes experienced during early field experiences" (Kelsey, 2006, p. 127). Such findings suggested that gender bias has remained an issue in agricultural education in recent decades and, perhaps, in the FFA as well. Therefore, a need emerged to examine the forces that

opened the door for women to join FFA and tell the story of individuals responsible for championing this cause (Moore, 2019, 2020).

Theoretical Perspective

When conducting this investigation, we used the feminist theoretical perspective to ground our interpretation of historical artifacts regarding how girls' membership came to be in the FFA (Crotty, 1998). The feminist lens can help critique gendered biases and draw implications that seek to initiate social change and improve the experiences of girls and women (Bailey, 2012). For example, although traditional research approaches seek to generalize knowledge, feminist researchers invoke change by calling into question gendered norms and traditions that preserve systems of power and oppression (Bailey, 2012). To accomplish such, Fonow and Cook (2005) advocated for five principles that feminists should uphold: (1) openness to critique, (2) a rejection of the view that objectivity can exist in research, (3) awareness that gender has influenced beliefs and thoughts in society, (4) ethical and equitable practices, and (5) a desire to positively change norms that limit women's opportunities. Therefore, we embedded these principles throughout our historical inquiry. It should be noted that the use of a feminist lens requires researchers to employ a critical examination *of* and reflection *on* how women have been marginalized by organizations and in the greater society (Crotty, 1998). Further, feminists should seek to understand how the "invisibility of women has permeated the everyday commonsense notions of leadership" (Smyth, 1989, p. 66). In this investigation, we sought to illuminate how women's participation in FFA was hindered over multiple decades before they were allowed to become members and ascend to leadership roles.

Purpose and Research Questions

This study aimed to describe how girls were granted membership in the FFA. One research question guided the study: What were the driving forces that led to the admittance of girls into FFA at the 42nd National FFA Convention?

Methods and Procedures

The historical approach was most appropriate for this investigation (Salevouris & Furay, 2015). Historical research aims to provide detailed accounts of how ideological, social, legal, and systematic issues impact discourse and change on an issue. When using this approach, contextually situated sources can aid in telling the story of a historical event (Salevouris & Furay, 2015). The historical narrative included a compilation of primary and secondary sources, including artifacts, documents, interviews, legislative policies, and other relics from the past, all of which were used to weave together the actions that led to the striking of the word *male* from Article IV of the National FFA Constitution at the 42nd National FFA Convention.

Primary sources included direct quotes from historical figures, proceedings from National FFA Conventions, correspondence with the FFA officials, the National FFA Manual, *FFA New Horizons* articles, and official letter correspondence. Secondary resources included online resources and journal articles from scholarly works. All resources were vetted against the objectives to ensure relevance, accuracy, and precision (Salvorious & Furay, 2015). Each data

source was subjected to internal and external criticism (McDowell, 2002). For instance, we externally criticized each document by analyzing it to authenticate its authorship. The internal criticism process allowed us to assess the documents and determine whether each source was relevant to the purpose of this investigation. Sources that did not meet this aim were deemed irrelevant; therefore, they were not used in this investigation (McDowell, 2002).

Data analysis included the discernment of quality resources and cross-examining those primary resources with one another to ensure accuracy. Using this approach, data analysis and synthesis occurred simultaneously (McDowell, 2002). After analyzing each source carefully, we compared them to the research question to reveal their credibility and relevance. Triangulation of resources provided a fuller explanation of the richness and complexity of human behavior by studying it from more than one standpoint (Cohen & Manion, 2017). Ultimately, the sources were outlined chronologically to identify and illuminate the driving forces of girls' admittance into FFA.

Findings

The FFA has impacted millions of students across the United States since its beginning in 1928. In 2022, there were a reported 850,823 FFA members (National FFA Organization, 2022a). FFA was intended to be for farm boys, with a mission to "prepare future generations for the challenges of feeding a growing population" (National FFA Organization, 2022a, para. 6). It should be noted, however, that the National FFA Constitution did not initially read that only boys could join the organization. Rather, Article 1, Section B, Item 4 read: "students in vocational agriculture" (Future Farmers of America, 1929, p. 30). In fact, in its manual, the Future Farmers of America (1929) explained that "any student of vocational agriculture, who is enrolled in a part-time, day-unit or all-day class is entitled to active membership" (p. 31).

There was no ambiguity in the original constitution; instead, the distinction of *boys-only* membership was amended and ratified in 1930 (National FFA Board of Trustees, 1930). Rufus Stimson, supervisor of agricultural education in Massachusetts, advocated for all people, regardless of race, gender, or ethnicity, to have equal access to the Massachusetts FFA Association (Stimson, 1931a). When Massachusetts originally applied for a State FFA Charter in 1929, it was noted that Massachusetts would allow for girls to join FFA at the local and state level, and was accepted by National FFA Adviser, C. H. Lane, so long as they did not participate at the regional or national levels. A few years later, Dr. C. H. Lane took a firmer opposition to girls' membership in the organization by stating: "there is only one line drawn in the FFA organization, and that is, it is a boy and man organization" (Lane, 1931a, para. 1).

Once this issue was brought to Stimson's attention through official correspondence with C. H. Lane, he proposed that Massachusetts amend its constitution to read "... only male members shall be proposed for office, honors, or participation in contests, controlled by the National Association of Future Farmers of America" (Stimson, 1931b, para. 3). After criticism from the Massachusetts FFA Association, Dr. Lane softened his position and recommended an amendment to the National FFA Constitution to ensure that male membership did not interfere with state affairs, so long as *only* boys were permitted access to FFA privileges at the national level (Lane, 1931b). As a result of the passage of this amendment, state and local programs could allow girls to be involved; however, they were not permitted to partake in national events.

Despite these changes, the issue of girls' participation in FFA continued to spark heated discussion and action. For example, in 1933, the Essex FFA Chapter in Massachusetts qualified for a National FFA Contest. However, because there were girl names on the roster, their participation at the national event would have violated the National FFA Constitution. Stimson promptly wrote a letter to W. A. Ross, the National FFA Executive Secretary, where he acknowledged the violation and offered a solution of erasing the "names of two or three girls which appear on some of the sheets" (Stimson, 1933, para. 4). Stimson's proposal led to contentious debate amongst FFA members and adult leaders across the country because it would still allow girls to participate in a national level event. As an illustration, Vernon Howell (1933), the National FFA President from 1932-1933, threatened Stimson that:" … no girl, [sic] student in vocational agriculture will be allowed active membership in the Future Farmers of America… and unless Massachusetts complies… drastic action by the National Board of Trustees will be necessary" (para. 4).

It was further decided on the delegate floor that Massachusetts would be suspended from affiliation with the FFA should they not comply within three months (Weaver, 1933). Further, Lester Pollom (1933), the Kansas Supervisor of Vocational Agriculture, agreed that the boys at the convention made the right call by threatening Stimson and the Massachusetts FFA Association because "thousands of Future Farmer boys would lose their respect for the organization if girls are admitted" (para. 3). Stimson worked tirelessly to keep the peace with national level officials. Nevertheless, his colleagues considered disassociating with him because of his call to allow girls to become FFA members.

Arthur Getman (1933), member of the National FFA Board of Trustees, reported that a constitutional change to admit girls into the organization had been proposed and further explained the Massachusetts situation with the delegates during the 1933 National FFA Convention. However, the FFA Board of Trustees and the delegates at the National FFA Convention struggled to understand "the desirability of females as members of the FFA… and the right of any state to determine upon its own procedure" (Getman, 1933, para. 4). Despite hurdles, Massachusetts proved to be the pioneer in leading the discussion on girls' membership in FFA. W. J. Weaver, State Vocational Agriculture Supervisor of New York, explained: "Probably the chief item that was discussed at the time was the matter that is up at the present time concerning the status of the Massachusetts organization in connection with girls in its membership" (Weaver, 1935, para. 2).

For example, in 1935, Massachusetts delegate Alfred Vaughan discussed inviting women to join FFA membership during a business session at the National FFA Convention. As a result, J. A. Linke, who served on the National FFA Board of Trustees, was appointed to explore female involvement in FFA in Massachusetts (Future Farmers of America, 1935). After his thorough investigation, he recommended that "our interest in the boys of Massachusetts should be the guide in whatever action the convention would take" (Future Farmers of America, 1935, p. 12). On October 24, 1935, the first order of business was to reconsider female membership in FFA. Davis of Montana and Hebert of Louisiana moved and seconded that the discussion be had behind closed doors (Future Farmers of America, 1935). Records indicated that not only was the

discussion not entertained, but Vaughan's request was deeply opposed, and delegates even voted to fight against female membership with the following constitutional amendment:

> When officially found that any State Association in a Future Farmers of America has girl members on its rolls, such State Associations shall be denied participation in all national Future Farmer of America contests and national F.F.A. awards. And no funds from the national treasury shall be available to such State Associations for the purpose of transporting delegates to the national conventions until such time as the names of the girl members are removed from the official rolls (*rosters*) of the State Association and local chapters in accordance with the constitution. (Future Farmers of America, 1935, p. 14)

Little conversation was had after the constitutional amendment until 1964 at the 37th National FFA Convention. Delegates from Connecticut and Puerto Rico made a motion, and it was seconded that female membership be considered (Future Farmers of America, 1964). The minutes recorded that a discussion was held, but the motion ultimately failed (Future Farmers of America, 1964). Ironically, one of the guest speakers at the same convention was A. D. Pinson, the New Farmers of America President (Future Farmers of America, 1964). The New Farmers of America (NFA) was an organization that largely paralleled the FFA in values, goals, and tradition. Aside from minor differences, the primary distinction between the two agricultural organizations was that the NFA was for only negro male students, while the FFA was for white male students. The FFA *absorbed* the NFA the next year in 1965, mainly due to public school desegregation laws (Riebel, 2022; Wakefield & Talbert, 2003;).

The call for equitable treatment of girls enrolled in agricultural education courses finally became a reality on October 15, 1969, when Paul Blankhead of California moved, and Robert Craig of Michigan seconded to strike the word male from the National FFA Constitution (Future Farmers of America, 1969). The attempts initiated by Rufus Stimson nearly 40 years prior and after multiple conversations by leaders across the nation, the motion finally carried. In the morning session on October 17, 1969, Johnny Holland from Tennessee stood before the delegate body and declared the following resolution, which ultimately passed by a two-vote margin:

> Whereas we, the delegates, to the [42nd] Annual Convention have voted to allow all student[s] of vocational agriculture to become members of the FFA;
>
> Whereas, we therefore have expressed our belief that all individuals are created equal and should have equal opportunities.
>
> Whereas we also feel that only those who have competed on an equal basis and earned national recognition should be highly honored at our national convention; be it therefore
>
> …resolved, that we, the delegates, gathered here today, feel that the introduction of the first active female members to participate in the national FFA activities and the atmosphere and publicity thus associated with these events, be recognized as over-dramatized presentations and should not be taken as precedence set for following female participation, that instead FFA members, girls and boys, should be treated and honored equally. (Future Farmers of America, 1969, p. 25)

Almost two decades later, in 1988, the organization officially changed its name from FFA to the National FFA Organization to reflect the ever-growing scope of the agricultural industry (National FFA Organization, 2022a, 2022b, 2022c). Students from traditional and non-traditional backgrounds were encouraged to find their place in FFA, as the name change's purpose was to "reflect the growing diversity and new opportunities in the industry of agriculture" (National FFA Organization, 2022a, para. 1). As a result of such changes, members of all backgrounds, races, and genders were officially welcomed into the FFA.

Conclusions, Implications, and Recommendations

In recent years, the National FFA Organization (2022a) has prided itself on being accessible to students of *all* backgrounds and abilities. However, access to membership for girls came much later than some members wanted, partly due to gender bias (Bailey, 2012; Fonow & Cook, 2005). Several leaders (Howell, 1933; Lane, 1931a, 1931b; Pollom, 1933; Weaver, 1933) in agricultural education opposed allowing girls in FFA. Despite this, multiple actors in the organization's early years fought for the rights and privileges to be extended to girls. One prominent figure who should be credited with championing girls' membership in FFA was Rufus Stimson (1931a, 1931b, 1933). Stimson faced criticism and threats to the Massachusetts FFA Association's standing within the national organization because of his advocacy for girls' inclusion (Howell, 1933; Pollom, 1933). Ultimately, it took pressure from the Women's Rights Movement and the signage of the Civil Rights Act (1964) to force the hand of the FFA and admit girls' membership at the national level (Moore, 2019). Despite the progress made regarding gender equality, more work is needed to understand the attitudes, experiences, and forces that have limited opportunities for girls in the organization and agricultural education more broadly (Bowen 2002; Kelsey, 2006).

Moving forward, research should seek to aggregate data regarding girls' impact on FFA over time. Additionally, personal witnesses and testimonies of girls involved in FFA from 1969 to the present should also be captured to determine their perceptions of gender equality in the organization. This data could help determine whether such has improved in meaningful ways. We also recommend that the history and achievements of girls in FFA be celebrated more through the organization's official communication, documents, and marketing. We also call for creating activities, resources, and professional development to teach about the historical events that led to girls' admittance into the FFA, including the advocacy of historical figures such as Rufus Stimson. Perhaps with these resources, agricultural educators can tell the story of girls' struggle for equal rights in FFA in more meaningful and impactful ways. Further, these resources could also create opportunities for teachers to create a space for discussions about gender bias so that girls and women in agricultural education feel more comfortable about sharing their experiences and seeking resources if they encounter gender inequalities in the future.

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Online Graduate Student Perceptions of Synchronous Virtual Reality Seminars

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Introduction

Virtual Reality (VR) is an emergent media source that allows users to be fully immersed in a digital world. In educational and communication contexts, VR is typically described as a headset device that presents viewers with 360-degree video or imagery, sometimes allowing interaction. The headset blocks out other visual and auditory distractions, allowing for a fully immersive learning experience (Belisle & Roquet, 2020). While VR has been primarily used for gaming and entertainment, there are new adaptations bringing VR to the business, education, and communication sectors.

Few studies have examined the adoption and perception of VR technology use in agricultural education. One such study, conducted in Germany, utilized VR technology and handheld tablets for virtual farm tours to analyze the promotion of transparency and information transfer on animal husbandry conditions. VR technology was favored over tablets for higher realistic and entertainment value, and tablets were favored for usability purposes (Schütz & Busch, 2022). In the United States of America, most VR research in agricultural education has focused on training for technical skills, like welding (Wells & Miller, 2020a), tractor safety (Pulley et al., 2023), and agricultural mechanics (Wells & Miller, 2022). Much of this research has also centered around the teachers' experiences using VR in the classroom (Pulley et al., 2023; Wells & Miller, 2020b), with limited studies exploring students' experiences with VR in educational settings (Wells & Miller, 2020a). There is a need to explore students' perceptions of using VR in agricultural education beyond skill development and to understand how this tool can be used to connect students in online environments and create immersive, classroom-like experiences at a distance.

VR Seminars

This research explored VR use in online classes to simulate in-person learning, specifically with online graduate seminar discussions. During an online graduate course at the University of Tennessee, Knoxville (UTK), VR was used to facilitate four 60-minute virtual seminars on the topic of leadership communication with invited industry leaders speaking to the class in a VR environment. Students were provided a Meta Quest 2 to help facilitate this experience and were provided initial onboarding for how to use the VR headset. The VR seminars were conducted using the program, Horizon Workrooms, using digital avatars and a 3D modeled conference room environment, it simulated the immersive experience of an in-person seminar. Through VR, students learned from industry experts about their practical experience while using leadership communication strategies, providing a unique and engaging learning experience. The use of VR in these seminars allowed for a more dynamic and interactive approach to teaching and learning, with students being able to explore and engage in 360-degree environments that were not possible in a traditional online setting.

Theoretical Framework

This study's foundation is the Diffusion of Innovation (DOI) Theory, which describes the factors that influence how an innovation is adopted within a particular group (LaMorte, 2022). Here, the innovation is VR technology, applied to a Graduate-level online course at UTK. Five characteristics influence its adoption rate: relative advantage, compatibility, complexity, trialability, and observability (LaMorte, 2022).

DOI's applications span various educational contexts. A Saudi study on Open Educational Resources (OER) adoption highlighted the influence of relative advantage, observability, and complexity on faculty adoption (Menzli, L.J. et al., 2022). Another 2022 study pinpointed attitude as a strong predictor of science teachers' intentions to adopt VR (Al Breiki et al., 2022). While some students see the benefits of VR for skills like welding, they caution against it substituting hands-on training, suggesting a limited perceived relative advantage in certain skill development scenarios (Wells & Miller, 2022). However, more research around students' perception of VR in education is needed to better understand their willingness to adopt this technology.

Purpose & Objectives

The purpose of this research was to explore the student's willingness to adopt VR in online graduate education. The following objectives guided this study:

1. To identify and describe online graduate student's perceptions of the five DOI characteristics.
2. To describe how these perceptions influence adoption of VR in online graduate education.

Methods

Qualitative methods were used to fulfil the purpose of this study, and data were collected from a purposive sample of graduate students enrolled in an online class at UTK. At the end of the Spring 2023 semester, five of the seven students completed interviews, designed to gather their perspectives on the experience (Kvale, 2007). An interview guide was developed based on the five DOI factors (Rogers, 2003) to obtain perspectives on the students perceived relative advantage, compatibility, complexity, trialability, and observability. Two researchers conducted a thematic analysis of the interview transcripts (Braun & Clarke, 2006) using *a priori* coding (Crabtree & Miller, 1999) to identify themes based on the five DOI factors. Within these themes, emergent sub-themes were identified.

Findings

Theme 1: Relative Advantage

Three sub-themes were found related to relative advantage: *engagement and focus, interactivity and social comfort,* and *personal experience.*

The codes within the *engagement and focus* sub-theme highlight the participants' experience in terms of engagement and focus during VR seminars. Participants found VR to be a notably immersive learning environment, which possibly enhanced their engagement with the content. For example, R3 described being "more immersed compared to Zoom or other online methods" and compared the experience to "actually being in the classroom." They also described the potential of VR to capture and sustain attention compared to traditional online methods such as Zoom. R1 stated that they did "not lose my focus [like] on a Zoom...when you're in Zoom, you know you can see everything around you...I didn't feel myself being distracted at all...in this setting."

Under the theme of *interactivity and social comfort*, the participants' indicate a positive perception regarding the social aspects of VR seminars. It appears that VR facilitated a comfortable and interactive environment for social interactions, enabling conversations among participants. R2 explained, "You kind of feel like you're making friends and not just responding to random asynchronous … conversations that kind of feel like bots … because you have no idea who you're talking to." This might also denote the potential of VR to foster connections among participants, possibly enriching the learning experience by promoting discussions and collaborations.

The *personal experience* sub-theme suggests that participants found VR seminars offer a more personalized or tailored learning experience. R4 stated, "If we were in a Zoom call with thirty other people, ... I don't think it would be as personal and I don't think it would be as casual [compared to VR]. I think that casual learning environment helps me learn better." The participants mentioned the ease and comfort felt in the VR environment, which could contribute to a positive personal experience.

Theme 2: Compatibility

Sub-themes of *user engagement and learning* along with *technological appreciation and usability* were found under the theme for compatibility.

User engagement and learning primarily revolved around how VR technology aligns with participants' expectations and needs in terms of engagement and learning. A perception of personalized learning experiences within VR seminars hinted at an interactive and conducive learning atmosphere facilitated by VR. For example, R2 states, "The type of learning that I prefer is interactive, and I learn from [VR] because I'm physically experiencing the content."

The *Technological appreciation and usability* sub-theme explored the participants' appreciation for the technological aspects of VR and its usability. This sub-theme indicated a recognition and appreciation of the technological advancements that VR offers. R2 stated, “It's … teaching me to keep up with those trends in tech, which I would never as an [agriculture] student I never thought I could bring the two together, but it's now necessary.” Participants described VR’s ease of use or setup, which might contribute to its compatibility with the users’ needs. However, physical discomfort stands out as a notable concern, possibly indicating a barrier to VR's compatibility with some participants. R1 recalled, “I could definitely feel my face getting a little tired or [my eyes getting] blurry. I would have to take a couple of breaks, taking my headset off because it might get to be too much light or too much weight on my face.”

Theme 3: Complexity

Analysis of the complexity themes led to the identification of two emergent sub-themes: *technical challenges* and *user interface and control.*

The sub-theme for *technical challenges* addressed the technical issues that participants encountered while using VR. Internet connectivity posed a significant challenge for participants, potentially affecting the seamless use of VR technology. R4 recalled, “a couple of the other people in the VR group seemed like they had a little bit of trouble with their internet connection, and a little bit of trouble getting the technology set up to work the first time.” Updating the headset, charging, and app freezing are other technical challenges mentioned, which could reflect concerns about software stability and the necessity for regular updates to ensure optimal functionality.

The codes under this sub-theme for *user interface and control* hinted at the participants' experiences with the user interface and controls of VR technology. App interface, use with glasses, controls, and headset use collectively suggest that there might be areas of improvement in making the user interface more intuitive or user-friendly, which could subsequently reduce the perceived complexity of VR technology. R5 shared, “Sometimes it was hard for [the headset] to adjust to my face because … I had [glasses] on. I even tried it without [my glasses] to just see if I could, and I cannot. But I felt like it fit better when I did it that way.”

Theme 4: Trialability

Two sub-themes were identified related to trialability and included *sharing the experience* and *learning period.*

The codes under the sub-theme of *sharing experiences* included sharing experience with others and trialing with others, underline the communal aspect of trialing VR technology. R1 talked about sharing the experience with friends and peers, “They just think it's really cool. Usually they ask, ‘How did you get to do that?’ And then … I tell them about this class, … they think it's very interesting. I think there's a lot of students who would really be interested in [a VR

classroom].” The ability to share and trial the VR experience with peers could enhance the understanding and appreciation of the technology, potentially motivating further adoption. This communal trialability might offer participants a supportive environment to explore VR's features and benefits together, making the experimentation phase less daunting and more enjoyable.

The sub-theme of *learning experience* reflected a crucial aspect of trialability. It suggests that participants acknowledge the need for a certain amount of time to become accustomed to VR technology, learn its functionalities, and practice using it effectively. R3 shared, “I feel like I needed a tutorial with the VR setup … I felt like I needed more time to learn more about the whole VR setup in the room and using the seminar.” The mention of time might reflect a learning curve that could initially pose a challenge but is part of the process of acclimatizing to the new technology.

Theme 5: Observability

The sub-themes of *skill development* and *engagement* were identified under observability.

The codes in the sub-theme for *skill development* reflected the skills participants developed or enhanced through VR technology. Skills with VR and transferable skills indicate that participants not only gained skills specific to VR but also skills that are transferable to other areas. R2 shared, “I found it to improve my learning style and to make me feel healthier about my communication in my classes. I liked that it was a small group setting. I feel like that was really helpful for me.”

The codes under the sub-theme *for engagement* highlighted the degree of engagement participants experienced. Interactivity and class engagement are prominent codes, suggesting that VR facilitates a highly interactive and engaging learning environment. R3 stated, “I would say that it enhanced my learning … to learn in a different environment, be a part of a different environment, and engage with my classmates and … with the teacher as well.” Instructor engagement and engaged learning further reinforce this notion, indicating that both instructors and students are actively engaged in the learning process through VR. R4 said, “I feel much more in touch with what this course is trying to teach me.”

Discussion & Recommendations

The relative advantages of VR seminars emerged, emphasizing their immersive, interactive, and individualized learning potential. Notably, participants felt VR's benefits surpassed other online delivery tools like LMS or Zoom. This contrasts with previous research on in-person classes (Wells & Miller, 2022), showing a distinct advantage for VR in online environments. The immersive VR aspect stood out, alluding to its potential widespread acceptance in enhancing learning experiences.

Compatibility showed VR's alignment with participants' learning needs and aspirations. However, specific improvements, such as addressing discomfort, could elevate its fit in educational contexts. Subsequent research could focus on the long-term physical effects of using VR in educational settings, providing insights into the design or time limits conducive to a comfortable learning experience. The participants conveyed a distinct appreciation for VR's interactive and individualized features, hinting at potential adoption if it aligns with users' requirements (Belisle & Roquet, 2020).

Complexity identified certain VR challenges, from technical hitches to physical logistics. By addressing these aspects by providing guidance and support for technical challenges such as updating software, VR's perceived complications could be decreased, making it more accessible and boosting its acceptance. The identified barriers, much like past research in agricultural education (Wells & Miller, 2022; Pulley et al., 2023), are crucial as overcoming them can significantly influence adoption intentions.

Trialability underscored the role of collective exploration and time for VR training and familiarity. Structured group sessions and peer-learning resources could bolster VR's trialability, enhancing its potential acceptance. The collective trial nature and recognized learning curve indicate that with proper support, much like earlier indications from teacher experiences (Pulley et al., 2023; Wells & Miller, 2020b), VR's adoption likelihood increases. Future studies could assess the effectiveness of various support mechanisms, such as peer-led tutorials, instructor-led sessions, or module-guided onboarding in VR, in enhancing user proficiency and confidence.

Observability revealed tangible VR benefits, from skill enhancement to immersive learning. These observable values, consistent with the advantages identified by LaMorte (2022) and Menzli, L.J. et al. (2022), present a solid case for VR's potential in education. The tangible advantages identified in this theme could drive a broader willingness to adopt VR. It would be worthwhile to investigate which skills (cognitive, motor, social) are most enhanced by VR instruction and how this varies across different disciplines or topics.

Conclusions

Throughout the themes, the potential of VR to enrich online graduate education was evident. From boosting learning experiences and engagement to facilitating skills and interactive learning, participants described a willingness to adopt VR beyond this experience. Their willingness seems influenced by VR's benefits, its alignment with needs (Belisle & Roquet, 2020), and its observable outcomes. Addressing its complexities and ensuring an optimal trial phase, in line with the principles of DOI (LaMorte, 2022), can further increase its likelihood of adoption. When properly utilized, VR has the power to improve online graduate education, rendering it more immersive and participatory. While this study focused on graduate education. Expanding the research to different age groups, educational levels, or cultures might offer insights into VR's universality as an educational tool.

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Future Teacher Academy Impact on Prospective Preservice Teachers' Intent to Pursue Agricultural Education as a College Major and Career Choice

Introduction, Purpose and Objectives

Given school-based agricultural education (SBAE) teaches rich, agricultural contexts to develop agriculturally literate citizens and a skilled agricultural workforce (Roberts & Ball, 2009), continual efforts to increase recruitment and retention of SBAE teachers are needed to fill the demand within our discipline (Eck & Edwards, 2019; Hillison, 1987; Ingram et al., 2018; Smith et al., 2022). SBAE programs are dependent on qualified and available teachers (Smith et al., 2022); therefore, it is critical we as a profession understand that "[m]aintaining an effective teaching force requires that qualified teachers regularly enter the ranks and that practicing teachers are kept abreast of changes in the profession" (Anderson et al., 1992, p. 43). Identifying a solution to the teacher shortage in agricultural education is essential to meeting the agricultural workforce demands of this century (Ingram et al., 2018). Moser and McKim (2020) explored the influence of teacher connectivity on career commitment, finding four levels of teacher connectivity: 1) community, 2) curricular, 3) school, and 4) fellow SBAE teachers. Thus, a need exists to examine and create opportunities to increase connectivity on these four levels throughout SBAE programs. Further, increased connectivity throughout the discipline fosters opportunities for preservice and in-service teachers to master concepts, observe effective teachers in action, and receive positive reinforcement (McKim & Velez, 2017). Recommendations for mastery and vicarious experiences, social persuasion to build self-efficacy, and opportunities to create mentoring experiences exist within the literature as solutions to the deficiency in the SBAE teacher workforce (Lamm et al., 2017; McKim & Velez, 2017).

In Oklahoma, recruitment and retention programs targeting secondary and post-secondary students to the SBAE profession are available regionally and statewide. Programs such as a Teach Ag Day, Future Agricultural Education Teacher Academy (FAETA), and various professional development conferences provide an existing structure to offer vicarious experiences that increase connectivity and self-efficacy. Specifically, the FAETA or the Academy provides a week-long immersive experience into agricultural education as a college major and career choice for high school juniors and seniors. Structured experiences are included for participants to experience mastery and vicarious opportunities relating to all components of the three-component model and are supported by social persuasion delivered via guidance and support from the teacher facilitators. The structure of the academy affords participants the opportunity to develop mentoring relationships and their connectivity within the profession. Although this experience seeks to address the deficiencies outlined in the literature, little research exists on its influence.

In an attempt to contribute findings from the Academy to the literature base, the purpose of this study was to determine if the Academy is influencing its participants toward a career as an SBAE teacher. Three research objectives guided this study: 1) Describe level of satisfaction for experiences, clustered by theme, during the Future Agricultural Education Teacher Academy, 2) Determine the impact of the Academy on participants' intention to pursue Agricultural Education as a college major, and 3) Determine the impact of the Academyon participants' intention to teach Agricultural Education as a career choice.

Theoretical Framework

Human capital theory (Becker, 1964; Schultz, 1971), specifically teacher human capital (Myung et al., 2013), and the theory of planned behavior (Ajzen, 1991) serve as the frameworks for this study. Teacher human capital operates by acquiring, developing, sustaining, and evaluating teachers' career specific education, skills, and experiences, aiming to produce a strong teacher workforce (Myung et al., 2013). This framework guided the evaluation of the Academy experience, which was further supported by the theory of planned behavior (TPB). Ajzen's work served as the lens to evaluate prospective teachers' intent to pursue a degree in agricultural education and teach SBAE after completing a week-long immersive experience at the Academy. TPB allows the researchers to determine if the Academy is acquiring and developing prospective teachers through its attempt to explain an "… individual's intention to perform a given behavior" (Ajzen, 1991, p. 181). Therefor the behavior in our study is determined to be the participants intentions to pursue agricultural education as a college major and career choice. Considering TPB with a human capital lens provides a theoretical frame to guide the research objectives and obtain a clear understanding of the experiences and impact associated with the Academy.

Methods

This non-experimental survey research study was conducted at the 2021, 2022, and 2023 Academy as a part of the evaluation form. Instruments were distributed to all participants (N = 42) during the *check-out* phase of each Academy, resulting in an 88.1% response rate. Thirty-seven participants completed the digital questionnaire through Qualtrics, serving as the sample population for this study. Four participants did not complete the 2021 instrument due to unknown reasons and one student departed the 2022 Academy early and did not complete the questionnaire. All participants applied and were selected to attend based on their interest in agricultural education as a college major and career choice and their recommendation from their current SBAE teacher and FFA Advisor. Personal demographics and characteristics of all participants included 31 (73.8%) females, 11 (26.2%) males, 39 (92.9%) high school seniors (grade 12), and two (4.8%) high school juniors (grade 11).

Instrumentation

The questionnaire was developed by a graduate student at Oklahoma State University to collect four sections of information: a) satisfaction level for all activities during the Academy, b) qualitative responses for participants to write in any additional information and/or further explain their satisfaction and review of the Academy, c) participants intent to major in agricultural education both prior to the Academy and after completion, d) participants intent to teach both prior to the Academy and after completion. Faculty and staff at [University] reviewed the questionnaire for face and content validity prior to distribution. Adjustments to the instrument were made for clarity and general readability prior to the 2021 distribution, but the instrument remained consistent across the three years of data collection.

Data Analysis

All data were exported from Qualtrics into an SPSS file where they were analyzed using SPSS Version 28. Descriptive statistics, means and standard deviations, were analyzed for satisfaction

level of Academy activities. The Paired-Samples t-test analysis in SPSS was implemented to seek comparisons between pre/post responses on participants intent to major in agricultural education and teach SBAE. To further understand potential differences prior to and after the Academy, effect size was calculated using Cohen's *d*.

Results/Findings

Research Objective 1: Describe level of satisfaction for experiences, clustered by theme, during the Future Agricultural Education Teacher Academy.

Objective 1 sought to describe the level of satisfaction (i.e., 1=Poor, 5=Excellent) for the experiences within the Academy. Given the variations in years and activities, themes were developed, and descriptive statistics were derived collectively. Ten categories were derived from the three schedules to include: Teacher preparation (i.e., student role, introduction to the agricultural education model, curriculum resources, and parts of a lesson plan), practice teaching (i.e., lesson planning, lesson delivery, banquet preparation), cohort development (i.e., social time for participants, cookout and pool party), collegiate experiences (i.e., university farm tours, advising, recruitment visit, campus tour scavenger hunt), professional networking (i.e., structure social time during meal functions and roundtables with stakeholders, current SBAE teachers, current pre-service teachers, Academy alumni, faculty and staff), tour - production agriculture (Department of Agriculture visit, SAE visit at students family pecan grove, Agritourism visit at a local flower farm), tour – agricultural education programs (i.e., program visits with current SBAE teacher and active students), skill-based instruction (i.e., wooden planter box construction for succulent arrangement, flower arrangement using harvest from flower farm, electricity and trailer hitch assembly), nightly reflections (i.e., daily reflections and *real talk* with teacher facilitators) and the overall Academy experience.

Each category scored between *good* and *excellent* for level of satisfaction (i.e., all participants scored the categories as a 4 or 5). However, it is relevant to acknowledge the highest levels of satisfaction were found in the production agriculture tours, skill-based instruction, and the overall experience categories. These rankings indicated on a Likert-type scale ranged from 4.78 to 4.95 (see Table 1). When asked *What would you add to the Academy*, this participant supported the production agriculture components by saying "I would add a tour of more vegetable gardens/active farms/greenhouses. Those opened my eyes more than anything." When asked *What elements do you think are most important to keep at the Academy* in the additional text boxes, one participant responded,

> I think the most important element to keep would be the working suppers and lunches because being around those people helped me truly understand this career. From the dinner at Hideaway, to all the lunches with current ag teachers and future ag teachers, I answered so many questions I may have never gotten answered if I didn't come here. It also helped me build connections and make me feel more comfortable going into this career. I also loved all the tours because it helped me realize how much they do at Oklahoma State University] and the possible jobs and career paths here at this campus.

Another participant also stated, “The different activities we did such as floral arrangements or the electrical stuff and touring the chapters I thought were very important. It introduced many of us to new things in ag.” Overall, participants indicated their Academy experience was 4.95 on a 5-point Likert-type scale indicating near excellence (see Table 1).

Table 1

Participants’ Level of Satisfaction toward Academy *Experiences by Category (n = 37)*

	M	*SD*
Overall Experience	4.95	.23
Tour – Production Agriculture	4.81	.50
Skill-based Instruction	4.78	.42
Professional Networking	4.69	.57
Collegiate Experience	4.67	.59
Tour – AGED Programs	4.63	.64
Cohort Development	4.63	.69
Nightly Reflections	4.62	.64
Practice Teaching	4.56	.69
Teacher Preparation	4.48	.61

Note. Academy activities were individually ranked, thematically grouped, and categorized to determine category descriptive statistics. A 5-point Likert-type scale (1 = Poor, 2 = Fair, 3 = Average, 4 = Good, 5 = Excellent) for their level of satisfaction toward the experience.

Research Objective 2: Determine the impact of the Academy **on participants’ intention to pursue Agricultural Education as a college major.**

Objective 2 sought to determine the impact of the Academy on participants’ intent to pursue agricultural education as a college major. Participants were asked to indicate their intent to pursue agricultural education as a college major in a then/now format based on their intent prior to the Academy and their intent after the Academy. Prior to Academy intent to major produced a mean score of 6.64 (*SD* = 2.34) on a 10-point scale of agreement. After completing the Academy intent to major produced a mean score of 6.75 (*SD* = 1.67). The change in intent to major was analyzed using a paired samples test resulting in a statistically significant difference (t = -8.13, $p < .001$; see Table 2).

Table 2

Impact of Academy *on Intent to Major in Agricultural Education* (n = 37)

	M	*SD*	*Correlation*	*Sig.*	*Cohen’s d*
Prior to Academy	6.64	2.34			
After Academy	6.75	1.67			
Major Prior & Major After			.738	<.001	1.58

Note. Participants were asked to indicate their intent to major in agricultural education on a 1 (not at all) to 10 (absolutely) Likert-type scale. The paired-sample test was used to evaluate the difference using a then/now format between pre-Academy and post-Academy experience. Cohen (1969) was utilized to determine the effect size reporting a significant difference in intent to major in agricultural education with a large effect size (r = 1.58).

Research Objective 3: Determine the impact of the Academy **on participants' intention to teach Agricultural Education as a career choice.**

Objective 3 sought to determine the impact of the Academy on participants' intent to teach agricultural education. Participants were asked to indicate their intent to teach agricultural education in a then/now format based on their intent prior to the Academy and their intent after the Academy. Prior to Academy intent to teach produced a mean score of 6.82 (SD = 2.42). After completing the Academy intent to major produced a mean score of 8.76 (SD = 1.59) on a 10-point scale of agreement. The change in intent to major was analyzed using a paired samples test resulting in a statistically significant difference (t = -7.47, p < .001) (see Table 3).

Table 2

Impact of Academy *on Intent to Major in Agricultural Education* (n = 37)

	M	*SD*	*Correlation*	*Sig.*	*Cohen's d*
Prior to Academy	6.82	2.42			
After Academy	8.76	1.59			
Teach Prior & Teach After			.765	<.001	1.58

Note. Participants were asked to indicate their intent to major in agricultural education on a 1 (not at all) to 10 (absolutely) Likert-type scale. The paired-sample test was used to evaluate the difference using a then/now format between pre-Academy and post-Academy experience. Cohen (1969) was utilized to determine the effect size reporting a significant difference in intent to major in agricultural education with a large effect size (r = 1.58).

Participants' written responses indicated their change in intent when asked "*Has the Academy better prepared you to become an agricultural education teacher?" "Has it changed your perception of Agricultural Education?"* One participant responded, "The academy has prepared me to be a better ag teacher because I got to see into the occupation and how situations actually happen and turn out. My perception has changed because I think I am more likely to become an ag teacher now." Similarly, another student stated, "Yes it has. Coming in I felt that I wasn't so sure I would be an Agricultural Education Teacher, going out I feel that I can do this and that this is where I'm meant to be." Lastly, another student shared, "Yes, I feel a lot more comfortable with my ability to teach ag."

Conclusions/Discussions/Implications/Limitations

The Academy served as an impactful experience for students considering agricultural education as a major and a career as an SBAE teacher. This was evident by the statistically significant difference found prior to and after the Academy experience, intent to major in agricultural education (t = -7.47, p < .001), intent to teach SBAE (t = -8.13, p < .001). Both differences also resulted in a large effect size (Cohen, 1969). While students participating in the Academy were selected based on an application process, it should be noted that those who applied and participated showed an interest in agricultural education prior to attending the weeklong immersive experience. While this is a limiting factor, the impact of Academy demonstrated through data collected and written responses highlights the potential to increase students entering the SBAE pipeline. Ultimately, these intentions should align with future behavior based on the TPB (Ajzen, 1991). It is recommended that other states consider this model as a potential for increasing interest in agricultural education as a degree program and SBAE as a viable career.

While the findings of this study are limited to three years' worth of program data in [State], the model implemented, and experiences provided are transferable to other states and teacher preparation programs considering the implementation of something similar. Participants were satisfied with the Academy experience at large (M = 4.95, SD = .23), but the most impactful components were production agriculture tours, skill-based instructional, and professional networking. These experiences created opportunities for participants to learn and apply technical agricultural skills to curriculum content while learning from experts in the field. Although hosting a week-long immersive experience for high school juniors and seniors may be less feasible for some, these three impactful experience areas should be considered as an integral part of any recruitment programming. Production agriculture tours should focus on local and state-wide commodities that showcase production agriculture in a given state. Then connecting these tours to skill-based instruction allows program participants to clearly connect production agriculture to classroom or laboratory instruction through hands on practicums. The combination of industry exposure and classroom practicums helps to build agriculturally literate citizens and a skilled agricultural workforce (Roberts & Ball, 2009).

In addition, allowing potential SBAE teacher aspirants to begin building their professional network is pivotal to meeting the recruitment and retention demands of SBAE teachers (Eck & Edwards, 2019; Hillison, 1987; Ingram et al., 2018; Smith et al., 2022). Combined, these three priority areas align with existing research indicating the need for vicarious experiences, social persuasion to build self-efficacy, and opportunities to create mentoring experiences to offset the need within the SBAE teacher workforce (Lamm et al., 2017; McKim & Velez, 2017). Overall, the Academy helped to begin the development of SBAE teacher human capital through career specific education, skills, and experiences, aiming to produce a strong teacher workforce (Myung et al., 2013). Programs such as the Academy become a critical factor as the SBAE profession continues to demand qualified and effective teachers to enter classrooms nationwide (Anderson et al., 1992). It is recommended that the limitations of this study be considered, but the potential replication of such a program be considered by SBAE teacher preparation institutions, state FFA associations, or state level teach ag initiatives. Future research must further evaluate the impact of such programing and track participants through college and into their chosen careers. Such an inquiry would help to solidify the impact college and career intentions have on college and career behaviors.

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Critical Thinking and Personality Among Agricultural Undergraduate Students

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Critical Thinking and Personality Among Agricultural Undergraduate Students

Introduction

Critical thinking (CT) is an essential cognitive process that involves analyzing, evaluating, and synthesizing information to inform judgments and make reasoned decisions (Akgül & İzmirli, 2021). CT has been identified as one of the pivotal skills of the 21st century that enables individuals to ask questions and make reasonable decisions (TAŞTI & Yildirim, 2022) and accept statements as accurate, even when these statements contradict their position (Merma-Molina et al., 2022). On the other hand, personality refers to the unique set of enduring traits, characteristics, and patterns of behavior that distinguish individuals from one another (Chartrand et al., 1993). Research shows that the relationship between CT and personality has gained considerable attention in psychological research (Clifford et al., 2004). Understanding how personality traits influence an individual's CT abilities can provide valuable insights into the cognitive processes underlying effective decision-making and problem-solving (Elliott et al., 1994). However, according to Merma-Molina et al. (2022), while numerous studies have examined the relationship between CT and personality, few studies have examined CT and personality in the context of undergraduate students in agricultural classes. Also, limited studies have explored personality dispositions to understand individual differences in CT (Clifford et al., 2004).

Conceptual Framework

Critical Thinking

CT involves contemplating deeply how to solve problems, communicate, collaborate, and innovate more effectively in personal and organizational contexts (Halx & Reybold, 2006). According to Moon (n.d.), CT starts with an expectation that the received wisdom may not be correct or the only valid view; therefore, there is a need to make comparisons of possible explanations, theories, and models. The University of Florida Critical Thinking Inventory (UFCTI) suggests that individuals either have an engaging CT style, called engagers, or a seeking information CT style, called seekers (Lu et al., 2021). A seeker recognizes every problem as complex and investigates every aspect of the issue to find different possible solutions to address the issue (Putnam et al., 2017). However, an individual who practices engagement with others to think critically is known as an engager (Putnam et al. (2017).

Personality

Several research has examined the role of personality among undergraduates in agricultural education contexts (Lamm et al., 2019; Lamm et al., 2014). The Five-Factor Model of Personality (McCrae & Costa, 1987) is one of the most prominent personality models within literature. The model is composed of five personality factors: openness, characterized by inventiveness, creativity, and curiosity and is often the most difficult to recognize; conscientiousness, characterized by dependability, perseverance, hard work, and setting goals; extraversion, or surgency, including activeness, talkativeness, and assertiveness; agreeableness includes, trust, cooperation, good nature, courtesy, and compliance; lastly, neuroticism is characterized as anxious, angry, and insecure, the opposite of an emotionally stable person.

Critical Thinking and Personality

The five-factor model described by McCrae & Costa (1992) has a unique characteristic that either supports or hinders individuals' performance in class (Lamm et al., 2014). Knowledge of students' CT dispositions provides insights (Akins et al., 2019) to instructors who intend to integrate case studies into students' learning experiences. This is because they could organize students into groups representing the various points on the CT disposition continuum to help them utilize each other's strengths (Lamm & Irani, 2011). As a cognitive process, the underlying interaction between CT and personality is assumed to be non-redundant (Lamm & Irani, 2011). However, the empirical connection between CT and personality remains unclear.

Purpose & Research Questions

This study examined how undergraduate students' personalities predicted their critical thinking styles. The following research objectives informed the study:

1. Describe undergraduate students' personality characteristics using the five-factor personality model.
2. Describe the critical thinking styles of undergraduate students.
3. Identify the relationship between personality and critical thinking in undergraduate students.
4. Identify how personality predicts critical thinking in undergraduate students.

Methods

The population for this study was undergraduate students taking a course in the College of Agriculture. A descriptive and correlational research design was employed to address the research objectives. Data were collected in a single course using a convenience sample. Eighty-one responses were obtained for the study, representing a 100% response rate. Demographic data were obtained through respondent self-reports. The sample was 28.4% (n = 23) male, 67.9% (n = 55) female, and 3.7% (n = 3) those who preferred not to answer. Respondents represented all undergraduate classifications within the university: 37.0% (n = 30) freshman, 28.4% (n = 23) sophomore, 24.7% (n = 20) junior, 9.9% (n = 8) senior. A paper-based questionnaire composed of previously developed, valid, and reliable instruments was used to collect participant responses. Using previously established measures has increased observed data validity and reliability (Ary et al., 2010). Before data was collected, a panel of experts knowledgeable in survey design, personality, and undergraduate instruction reviewed the instrument for face and content validity.

Respondent personality was measured using the IPIP-NEO, specifically the version developed by Johnson (2011). Individuals responded to 44 personality statements indicating their response on a five-point Likert-type scale. Possible responses to each item included: 1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neutral*, 4 – *Agree*, 5 – *Strongly Agree*. The emotional stability index was found to have a Cronbach's α of 0.74, the conscientiousness index was found to have a Cronbach's α of 0.69, the agreeableness index was found to have a Cronbach's α of 0.85, the extraversion index was found to have a Cronbach's α of 0.74, and the openness index was found to have a Cronbach's α of 0.71.

Respondents critical thinking was measured using the UF Critical Thinking Inventory (Lamm & Irani, 2011). Individuals responded to 20 items, each scored 1 to 5 as follows: 1 – *Strongly Disagree,* 2 – *Disagree*, 3 – *Neutral*, 4 – *Agree*, and 5 – *Strongly Agree*. Scores for the seeking and engagement constructs were independently calculated and summed up to create an overall critical thinking style score. The seeker index was found to have a Cronbach's α of 0.81, while the engager index was found to have a Cronbach's α 0.77. Results were analyzed using SPSS version 29. Descriptive statistics were calculated to determine respondents' personality and CT dispositions. Pearson product-moment correlations were calculated to examine the relationship between variables (Ary et al., 2010). Simple linear regression was conducted to examine how personality predicts critical thinking.

Results

Personality

Respondent personality scores were calculated using the IPIP-NEO scoring key. IPIP-NEO. Respondents had the highest mean score in Agreeableness (M = 3.91, SD = .44) and the lowest mean score in Extraversion (M = 3.19, SD = .76). The mean, standard deviation, minimum, and maximum scores for each personality factor are presented in Table 1.

Table 1

Personality Scale Scores

Personality Scale Scores	*n*	*M*	*SD*	*Min*	*Max*
Agreeableness	79	3.91	0.44	2.33	4.67
Openness	81	3.83	0.63	2.40	5.00
Conscientiousness	81	3.48	0.67	1.60	5.00
Emotional stability	81	3.27	0.74	1.20	5.00
Extraversion	80	3.19	0.76	1.80	4.80

Critical Thinking

Respondent CT scores were calculated using the UFCTI. Scale scores are based on a one to five scale. The mean, standard deviation, minimum, and maximum scores for each are presented in Table 2.

Table 2

Critical Thinking Scale Scores

Critical Thinking Scale Scores	*n*	*M*	*SD*	*Min*	*Max*
Overall CTI Score	78	78.47	4.54	69.50	88.49
Seeker Score	78	52.29	5.67	38.00	65.00
Engager Score	81	26.14	6.53	12.83	40.33
Valid N	78	-	-	-	-

Relationships between Personality and Critical Thinking

Correlation coefficients and statistical significance between variables are provided in Table 3. Seeker Scores have positive and statistically significant correlations with Conscientiousness, Agreeableness, and Extraversion. Also, Engager Scores have negative and statistically significant correlations with Conscientiousness, Agreeableness, Extraversion, and Openness.

Table 3

Intercorrelations between Personality and Critical Thinking

	1	2	3	4	5	6	7
1. Emotional Stability	-						
2. Conscientiousness	.36**	-					
3. Agreeableness	.17	.08	-				
4. Extraversion	.24*	.10	.22	-			
5. Openness	-.31*	-.16	.09	.21	-		
6. Seeker Score	.27*	.30**	.09	.27*	59*	-	
7. Engager Score	.31	.42**	.16	.38**	.54**	.74**	-
8. Overall CTI Score	-.10	-.25*	-.13	-.22	-.05	.18	.54**

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

Personality Predicting Critical Thinking

Unstandardized regression coefficients in the form of variable-level effects, along with statistical significance on the Seeker Score, are provided in Table 4. Openness was the only statistically significant predictor of the Seeker Score. Approximately 40% of the variance was predicted by the model.

Table 4

Predicted Impact of Personality Factors on Seeker Score

	b	*p*
Constant	4.38	.00***
Emotional Stability	0.16	.13
Conscientiousness	0.11	.31
Agreeableness	-0.04	.71
Extraversion	0.12	.22
Openness	0.52	.00***

Note. ***$p < .001$, $R^2 = 0.40$

Unstandardized regression coefficients in the form of variable-level effects and statistical significance on Engager Score are provided in Table 5. Within the model, Openness, Conscientiousness, and Extraversion were all statistically significant predictors of Engager Score. The model predicted a total of 49% of the variance.

Table 5

Predicted Impact of Personality Factors on Engager Score

	b	*p*
Constant	63.34	.00***
Emotional Stability	-0.12	.20
Conscientiousness	-0.25	.01**
Agreeableness	-0.03	.73
Extraversion	-0.25	.01**
Openness	-0.44	.00***

Note. ***$p < .001$, **$p < .01$, $R^2 = 0.49$

Unstandardized regression coefficients in the form of variable-level effects and statistical significance for the Overall CTI Score are provided in Table 6. Overall, the model was non-significant, therefore non-interpretable.

Table 6

Predicted Impact of Personality Factors on Overall CTI Score

	b	*p*
Constant	1.94	.10
Emotional Stability	0.04	.74
Conscientiousness	-0.25	.05*
Agreeableness	-0.08	.50
Extraversion	-0.22	.07
Openness	0.03	.82

Note. *$p < .05$, $R^2 = .123$

Conclusion, Implications, and Recommendations

The study's findings underscore the diversity of personality traits within the undergraduate agricultural student population. Understanding this diversity can guide educators in creating inclusive learning environments (Chartrand et al., 1993). The study revealed that the seeker thinking style is prevalent among students. The prevalence of this style underscores the importance of encouraging curiosity, exploration, and a problem-solving orientation in educational programs. This aligns with the idea that CT involves evaluating different perspectives and adding value to knowledge (Halx & Reybold, 2006). The correlations between personality traits and CT styles provide insights into how individual traits may impact students' thinking patterns. For example, the positive correlation between Conscientiousness and Seeker suggests that students with a strong sense of responsibility may excel in exploring and solving complex problems.

Educational institutions should adopt personalized learning approaches to cater to undergraduate agricultural students' diverse personality traits and thinking styles. This may involve tailoring teaching methods, assignments, and assessments to better suit individual preferences and

capabilities (Chartrand et al., 1993). While Seeker thinking is prevalent, institutions should not overlook the importance of the Engager thinking style. Encouraging collaborative and demonstrative thinking styles can foster teamwork, communication, and compelling explanations of thought processes. This study has provided a foundation for understanding how personality traits and CT styles intersect among undergraduate agricultural students. By implementing the recommended strategies and conducting further research, educational institutions can better cater for students' individual needs and promote practical critical thinking and problem-solving skills in diverse contexts (Chartrand et al., 1993).

While this study has provided valuable insights into the relationship between personality and CT, it is essential to acknowledge its limitations. The study's sample size was small and limited to a single class of undergraduate agricultural students. Therefore, our findings may not necessarily reflect broader populations. The study also relied on self-report measures to assess personality traits and CT styles. Self-report measures are subject to response bias and social desirability effects. This study employed a cross-sectional research design, capturing data at a single point in time. However, a longitudinal approach would provide a more comprehensive understanding of the stability of personality traits and CT styles over time.

Despite the limitations associated with the study, there are nevertheless recommendations for practice and future research. From a practical perspective, the current study provides data to serve as a methodological benchmark when working with future undergraduate students in agricultural courses. We recommend that similar personality and CT instruments be administered to students at the beginning of a course to understand their innate preferences and dispositions better. This approach may help to inform instructional learning. From a theoretical perspective, the study provides empirical data which examines the relationship between personality and CT.

The results indicated that Seeker scores may be most strongly correlated with Openness, whereas Engager scores are a composite, with correlations across Emotional Stability, Conscientiousness, Extraversion, and Openness. These findings indicate the potential for future research to examine the nature of CT and personality relationships in various contexts. For this reason, a replication study in other agricultural course environments is recommended. Additionally, data collection among agricultural professionals outside the classroom may provide insights into the stability and predictability of cognitive processes across various life stages. A more robust understanding of the CT and personality nexus will help agricultural educators create effective learning environments and interventions that actively engage learners in various contexts.

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Undergraduate Students' Attitude Toward Undocumented Migration: A comparison between agricultural and non-agricultural based students from a Southern University

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Introduction

Migrant workers, particularly those who are undocumented, play a significant role in the U.S. agriculture workforce, making up nearly 25% of the industry (Matthew et al., 2021). This population comprises approximately 50% of farmworkers without authorization to work in the United States (Matthew et al., 2021). Despite their crucial contributions to the U.S. economy and food supply, the challenges faced by these undocumented migrant workers remain underexplored in research and are often not well understood by the general public (Becerra, 2019).

Ongoing migration processes have transformed the U.S. agricultural workforce, introducing greater linguistic, cultural, and educational diversity, particularly in the southern states (United States Department of Agriculture [USDA], 2022; Martin, 2017; Minkoff-Zern & Sloat, 2017). In Texas, an estimated 4,350,000 documented and undocumented immigrants make up 20% of the active workforce, with a significant economic impact (American Immigration Council [AIC], 2020). They contribute to about 27% of Texas employment in agriculture, forestry, fishing, and hunting (AIC, 2020).

Despite the U.S.'s historical identity as a nation of immigrants and the undeniable contributions of undocumented migrants, not all segments of society have embraced new waves of immigration. This has created a hostile environment for migrant workers and generated negative attitudes toward immigrants (Domínguez, 2019; Martin, 2017). Globalization has generally improved the perception of migration, but cultural differences can still fuel xenophobia and racism (Abramitzky & Boustan, 2017). In response to these challenges, Texas has initiated programs like the Dallas Truth, Racial Healing & Transformation (DTRHT) and the Young Leaders Strong Cities (YLSC) to change young people's perspectives on immigration and emphasize the value of diversity (DTRHT, n.d; YLSC, n.d).

Recognizing the potential positive impact of education on shaping younger generations' attitudes toward immigrants (Qu et al., 2018), the government has established Hispanic-Serving Institutions to enhance the academic achievement of Hispanic students, a group closely tied to immigration (Boessen et al., 2018). An R1-Southwestern University, part of the Hispanic Serving Institution group since 2017, has invested in agricultural projects due to its reliance on documented and undocumented Hispanic workers (Boessen et al., 2018). Recently, this university has secured funding for agricultural-related programs focused on providing Spanish-oriented skills for undergraduate students (NIFA, 2021a) and promoting agricultural-related experiential learning in Hispanic students (NIFA, 2021b).

This research aims to assess undergraduate students' attitudes toward undocumented migration (UM) and compare the attitudes of students with agricultural and non-agricultural-related academic backgrounds. Young people play a vital role in shaping societal perceptions and beliefs (Jaén & Barbudo, 2010). This study aims to inform university programs, especially those related to agriculture, about the factors that influence undergraduate students' attitudes toward undocumented migration. The findings can help develop educational curricula to reduce discrimination against undocumented migrants, including undocumented students studying at universities (Cavaille & Marshall, 2019).

Theoretical Framework

According to Myers (2013, p.36), attitude is "a favorable or unfavorable evaluative reaction toward something or someone, exhibited in one's beliefs, or intended behavior." Attitude could be considered a learned predisposition to respond to something favorable or unfavorable (Ajzen & Fishbein, 2000). Three components shape attitudes: cognitive, affective, and conative (Albarracin et al., 2005; Dennis et al., 2013). The cognitive component focuses on the thoughts, beliefs, and ideas about something (Stangor et al., 2014). When the human being is the object of attitude, the cognitive component is frequently a stereotype (Bessenoff & Sherman, 2000). The affective component is the emotions that something or someone causes (Arriaga & Agnew, 2001). Lastly, the conative attitude is the tendency or disposition to act in specific ways toward something or someone (Dennis et al., 2013)." The focus is on the intent to act, not the actual acting; what someone intends to do and what he does could be different.

Attitudes could also be classified depending on the context in which they are evaluated (Albarracin et al., 2005). Explicit attitudes are the results of thoughtful and conscious-level reflections about the evaluation of the attitude and are influenced when the individual is under observation. Socially controversial issues like undocumented migration may make participants likely to avoid their genuine opinions. On the other hand, the implicit attitudes on the unconscious level are involuntarily formed and are unknown to the individual. Implicit attitudes are less used to being fake and may be especially important when assessing attitudes toward controversial topics, such as undocumented migration (Albarracin et al., 2005).

Multiple repeated experiences with the same intention could generate an implicit attitude. When the individual repeats the situation with the object, they may have a positive, negative, or natural attitude, depending on which associations are activated (Stangor et al., 2014). When a stereotype is negatively perceived, the attitude will follow the same shape (Fishbein, 2008). For this study, we intended to evaluate the implicit attitude by using an anonymous survey to reduce any social norm that could influence students' responses.

Purpose and objectives

The study evaluated and compared undergraduate students pursuing a degree in agricultural science and natural resources [CASNR], and students pursuing other major degrees [OM] attitudes towards undocumented immigration. Three research questions were used to explain this study. (1) to describe undergraduate students' attitudes toward issues of undocumented immigration; (2) to compare AGNR and non-AGNR undergraduate students' attitudes toward

issues of undocumented immigration based on the cost-benefit, free flow, and human rights variables. (3) to compare AGNR and non-AGNR students' predictors (gender, political belief, ethnicity, migration familiarity, state of origin, and year in school) of the attitudes toward human rights (Model 1), free flow (Model 2), and cost-benefit (Model 3). (4) To compare AGNR and non-AGNR students' predictors (gender, political belief, ethnicity, migration familiarity, state of origin, and year in school) of the attitudes toward undocumented immigration issues (Model 4).

Methodology

In this quantitative study, a two-group model was employed to investigate undergraduate students' attitudes toward undocumented migration. The research collected data from a convenience sample of 520 undergraduate students at an R1-Southwestern University in the United States, utilizing an online survey administered through Qualtrics. Before data collection, the survey instrument underwent pilot testing to ensure its reliability and validity, with face validity confirmed by a panel of experts. A pilot study involving 20 undergraduate and 10 graduate students was also conducted to field-test the questionnaire.

The data collection started after receiving approval from the Texas Tech University Human Research Protection Program, IRB 2019-805, and was carried out during various class periods, with the requisite permissions from professors. The online survey was voluntary, and students' responses were treated anonymously. The data collected were transcribed and coded in Excel and subsequently analyzed using Statistical Package for Social Sciences (SPSS) version 27 and R version 4.2. Surveys with more than 10% missing values were excluded from data analysis (Raaijmakers, 1999). Missing values in surveys with less than 10% missing data were addressed through multiple imputation procedures (Enders, 2017). After data cleansing, 68 outliers and extreme values were eliminated from the analysis using Cook's distance (Fox, 2015).

The study analyzed 452 surveys, categorized into Agricultural and Natural Resources (AGNR) students (64.6%, n = 292) and non-AGNR students (35.4%, n = 160). The non-AGNR students represented various colleges, including Arts and Sciences, Human Sciences, Business Administration, Media and Communication, Engineering, Education, and School of Law.

The research instrument included demographic information and the Attitude Toward Illegal Immigration Scale (Ommundsen & Larsen, 1997). The original 27-item scale was adjusted for this study, with item 9 removed due to multicollinearity issues and a new item added to assess attitudes toward undocumented jobs. The final questionnaire featured 20 questions rated on a 5-point Likert-type scale (1 = strongly disagree, 2 = agree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree). Confirmatory factor analysis (CFA) supported a three-factor model, measuring Cost/Benefit, Free flow, and Human Rights dimensions (Ommundsen et al., 2002; Van Der Veer, 2004). The three dimensions were operationalized as follows: **Cost Benefit:** Examining the economic costs and benefits of immigration, measured with nine items. **Free flow:** Evaluating attitudes toward immigrants' free movement into the United States, assessed with four items. **Human Rights:** Focusing on immigrants' human rights, including access to jobs and health assistance, measured with seven items.

Data analysis considered the non-normally distributed data and non-probabilistic sampling. Descriptive statistics were employed for the first objective. For objective two, a Mann-Whitney U test compared the differences in attitudes between AGNR and non-AGNR students for each of the three dimensions and the overall attitude toward undocumented migration. For the third objective, three regression models were constructed to predict and compare the influence of key variables on attitudes toward migration, considering AGNR and non-AGNR students. Pearson's correlations were first employed to identify relationships between variables and assess collinearity. Each model included gender, ethnicity, year in school, political beliefs, migration familiarity, and state of origin variables predicting the respective dimensions (Free flow, Cost/Benefit, and Human Rights). Lastly, the fourth objective involved creating an overall attitude toward undocumented migration variable by averaging the responses to the 20 items. This variable was predicted using gender, year in school, ethnicity, political beliefs, migration familiarity, and state of origin in the regression model. The significance level was set at .05.

Results

Demographic characteristics of both AGNR (n = 292) and non-AGNR (n = 160) students were similar. Most students were female, AGNR (68.3%, n = 198); non-AGNR students (49.4%, n = 79). In AGNR, most of the participants were first-year students (57.5%, n = 168), while for non-AGNR students, most were sophomores (32.5%, n = 52) and juniors (29.4 %, n = 47). Regarding ethnicity, most considered themselves non-Hispanic (AGNR 82.5%, n = 241; non-AGNR 74.7%, n = 118). Most AGNR students had a conservative political inclination (62.0%, n = 181). Non-AGNR students' political belief was distributed more equally, where 38.8% had a conservative inclination (n = 62), moderate (31.9%, n = 51), liberals (18.8%, n = 30), and other (10.6 %, n = 17). Most AGNR participants had little familiarity with undocumented immigrants (63.4 %, n = 185), similar to the non-AGNR group (57.5 %, n = 92). Most AGNR and non-AGNR students came from a border state, 72.9% (n = 213) and 70.0% (n = 112), respectively.

Participants generally agreed with statements such as "undocumented migrants should not benefit from tax dollars" (M = 3.71, SD = 1.17), "undocumented migrants cost the US millions of dollars each year" (M = 3.57, SD = 1.09), and "undocumented migrants should be excluded from social welfare" (M = 3.49, SD = 1.13). However, they also acknowledged the rights of undocumented migrants, agreeing with statements like "undocumented migrants have rights too" (M = 3.54, SD = 1.10), "undocumented migrants should not be discriminated against" (M = 3.52, SD = 1.12), and "undocumented migrants provide the US with a valuable human resource" (M = 3.22, SD = 1.05). On the other hand, most participants disagreed with the idea of their taxes being used to assist undocumented residents (M = 2.31, SD = 1.13), believed that international borders should be open (M = 2.06, SD = 1.14), and disagreed with the government paying for undocumented migrants' care and education (M = 2.21, SD = 1.11). They also disagreed with statements suggesting that undocumented migrants who give birth in the US should be granted citizenship (M = 2.88, SD = 1.13) and that undocumented migrants should be eligible for welfare (M = 2.32, SD = 1.12). While participants generally felt that undocumented migrants were burdening the country's resources (M = 3.40, SD = 1.21) and that they should not have the same rights as US citizens (M = 3.50, SD = 1.16), they did not consider undocumented migrants to be a nuisance to society (M = 2.54, SD = 1.13).

A Mann-Whitney U test was conducted for objective two to compare the perspectives on undocumented migration between students in AGNR and non-AGNR programs. The results showed that the distributions of scores were not the same for all the dependent variables, as determined by visual inspection. There was a significant difference in undocumented migration scores ($U = 30836.50$, $z = 5.63$, $p < .001$), with AGNR students having a slightly negative view (Mean Rank = 200.90, $M = 2.61$, $Mdn = 2.60$, $SD = 0.79$) compared to non-AGNR students who were undecided (Mean Rank = 273.23, $M = 3.10$, $Mdn = 3.03$, $SD = 0.84$). The Mann-Whitney U test revealed significant differences for all other dependent variables: cost-benefit ($U = 29663.50$, $z = 5.01$, $p < .001$), free flow ($U = 31701.0$, $z = 6.58$, $p < .001$), and human rights ($U = 28428.50$, $z = 4.18$, $p < .001$). In each case, AGNR students had a slightly negative view compared to non-AGNR students who were undecided. These results suggest that AGNR students have different perspectives on undocumented migration than non-AGNR students.

For objective three, three regression models were run to compare the human rights, cost-benefit, and free-flow prediction models from AGNR and non-AGNR groups. For the three regression models, assumptions analysis revealed independence of residuals assessed by Durbin-Watson statistics. Data were homoscedastic, as evaluated by visual inspection of studentized residuals versus unstandardized predicted values. There was no multicollinearity, as evaluated by tolerance values greater than .1. No studentized deleted residuals were over ±3 standard deviations, and no leverage values greater than .2 or values for Cook's distance above 1.

Model 1 used gender, ethnicity, political belief, familiarity with undocumented migration, and school year as predictors for free flow. The free flow attitude among AGNR females was .35 higher than that of males. Hispanic AGNR students had a .44 higher attitude than non-Hispanics. Liberal AGNR students had a 1.20 higher attitude than students with other political beliefs; moderate AGNR students had a .54 higher attitude than students with different political beliefs. AGNR students with little familiarity with migration had a .22 higher attitude towards free flow than students with different migration familiarity experiences. For non-AGNR, Hispanic students had a .35 higher attitude than non-Hispanic students, and conservative students had a .57 lower attitude than students with other political beliefs.

For undocumented migration cost-benefit attitude, Hispanic AGNR students had a .33 higher attitude than non-Hispanics; conservative AGNR students had a .63 lower attitude than students with other political beliefs; liberals CASNR students had a .97 higher attitude than students with different political beliefs. AGNR Border state students had a .20 lower attitude than non-border states; AGNR students with little migration familiarity had a .23 higher attitude than students with another migration familiarity. For non-AGNR, female students had a .33 higher attitude than males; Hispanic students had a .40 higher attitude than non-Hispanics, and conservative students had a .65 lower attitude than students with other political beliefs.

For AGNR students' attitude toward equal human rights, female students had a .28 higher attitude than males; Hispanic students had a .26 higher attitude than non-Hispanic; conservative students had a .39 lower attitude than other political beliefs; liberal students had a .61 higher attitude than those with different political beliefs. For the non-AGNR group, female students had a .41 higher attitude than males. Hispanic students had a .28 higher attitude than non-Hispanic.

For objective four, two multiple regressions, one for AGNR and non-AGNR students, were run to predict attitudes towards undocumented migration from gender, ethnicity, undocumented migrants' familiarity, political beliefs, and year in school. For the undocumented migration prediction model, assumptions analysis results showed independence of residuals assessed by Durbin-Watson statistics of 1.54 for AGNR and 1.72 for non-AGNR. Data were homoscedastic, as evaluated by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity. No cases were reported with studentized deleted residuals greater than ±3 standard deviations, no leverage values greater than 0.2, and values for Cook's distance above 1.

For the AGNR group, female AGNR students had a .22 higher attitude than men; Hispanic students had a .46 higher attitude than non-Hispanic students; conservative students had a .52 lower attitude than other political beliefs; liberal students had a .96 higher attitude than those different political beliefs. For the non-AGNR group, female students had a .36 higher attitude than males; Hispanic students had a .38 higher attitude than non-Hispanic; conservative students had a .58 lower attitude than other political beliefs; liberal students had a .49 higher attitude than different political beliefs.

Discussion and Implications

This research addresses a crucial gap in understanding undergraduate students' attitudes towards undocumented migration, recognizing their role as future decision-makers in shaping migration policies (Cavaille & Marshall, 2019). The study utilized the Attitudes Towards Undocumented Immigration Scale to measure these attitudes, emphasizing the need for future research to distinguish between attitudes towards documented and undocumented migration and among different student groups.

Noteworthy differences in attitudes were observed between agricultural (AGNR) and non-agricultural students. Non-AGNR students generally exhibited more positive attitudes, potentially influenced by their academic backgrounds in fields with migration-related content (Richter, 2021). The study applied the conceptual framework of implicit attitudes, using migration familiarity as a predictor. Findings suggested that incorporating migration-related courses into agricultural programs could enhance students' knowledge and shape their attitudes.

Political inclination was a significant factor influencing attitudes, with AGNR students with moderate and liberal beliefs displaying more favorable attitudes towards free flow, linked to their awareness of the agricultural sector's reliance on undocumented labor (AIC, 2020). Conversely, non-AGNR students with conservative beliefs showed less favorable attitudes. The complexity of students' migration familiarity impact on attitudes highlights the importance of enhancing students' understanding of migration issues.

Year in school did not significantly predict attitudes, emphasizing the need for experiential learning programs to provide deeper insights into immigrant communities (Borgonovi & Pokropek, 2019). Gender played a role, with female students showing more favorable attitudes towards undocumented migration. Further research is needed to understand the reasons behind these gender differences and uncover underlying factors.

This research sheds light on the multifaceted factors influencing undergraduate students' attitudes towards undocumented migration. It emphasizes the role of education, political beliefs, and gender in shaping perspectives, suggesting the importance of targeted interventions, curriculum adjustments, and deeper experiential learning to foster informed decision-making among future policymakers. Policymakers can benefit from these insights to develop migration policies aligned with public opinions.

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Opportunities for Extension to Help Residents Ask Local Decision-makers to Support Wildlife-Friendly Landscaping in Communities

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Opportunities for Extension to Help Residents Ask Local Decision-makers to Support Wildlife-Friendly Landscaping in Communities

Introduction

Residential landscapes serve as the principal context for day-to-day interactions between people and nature (Bhatti & Church, 2001).Wildlife-friendly gardening benefits not only a wide variety of species and habitats (Baldock, 2020; Larson et al., 2022; Lowenstein et al., 2015) but also helps people by exposing them to nature and fauna like butterflies, birds, and bees (Mumaw & Mata, 2022). However, the survival and success of many species are in jeopardy due to the disruption and fragmentation of wildlife habitats brought on by growing urbanization and infrastructure development (McClerry et al., 2014). Concern has been expressed that urban dwellers are becoming more estranged from nature (Miller, 2005; Turner et al., 2004), which can result in a loss of interest in more general conservational goals (Dunn et al., 2006). Hence, conservation experts encourage the creation of more diverse urban landscapes that provide a variety of advantages, including habitat for wildlife (Larson et al., 2020; Nilon et al., 2017; Larson et al., 2022). Public land managers may be pressured to avoid the adoption of more naturalistic landscapes due to the public desire for well-kept grounds and sizable open areas, which presents an opportunity to improve public demand for wildlife-friendly public green spaces (Hofmann et al., 2012; Özgüner et al., 2007; Shams & Barker, 2019).
On the other hand, the public desires opportunities to interact with nature to promote biodiversity and the diversification of plants to support wildlife species (Shams & Barker, 2019). In their study, Larson et al. (2022) reported that the presence of local institutions increased the likelihood of managing yards for wildlife, suggesting that neighborhood associations or homeowner associations might be good local organizations to work with when implementing programs to increase wildlife habitat in residential areas. Thus, residents' active communication with decision-makers in support of wildlife-friendly landscaping is a behavior of interest for agricultural and Extension education who work in this context. The research described here was designed to capture perceptions surrounding the demand for wildlife-friendly public green spaces to inform Extension programming on this topic.

Purpose and Objectives

The study aimed to determine Florida residents' intentions to support wildlife by asking local decision-makers to increase wildlife friendly landscaping in communities. Specific objectives were to 1) Examine residents' attitudes, perceived behavioral control, subjective norms, and behavioral intention to ask local decision-makers to support wildlife-friendly landscaping in communities and 2) Evaluate the relationship between residents' attitudes, perceived behavioral control, subjective norms, and their behavioral intention to ask local decision-makers to increase wildlife-friendly landscaping in communities.

Theoretical Framework

The Theory of Planned Behavior (TPB) was used as a framework to evaluate residents' intentions. TPB states that when attitude, perceived behavioral control, and subjective norms are favorable in relation to a specific behavior, behavioral intent will also be favorable, and ultimately, the behavior will be more likely (Ajzen, 1991). In TPB, behavioral intention refers to a person's willingness to engage in a particular behavior. In this study context, it refers to the residents' intention to ask local decision-makers to support wildlife-friendly landscaping in their communities. Attitude refers to people's subjective assessments of behavior, the attitude of residents' toward asking local decision-makers to support wildlife-friendly landscaping. If the residents exhibit a positive attitude toward the behavior, they are more likely to engage in it. Perceived behavioral control refers to the individual's perception of how easy or difficult it is to carry out a specific behavior. It pertains to residents' confidence or competence in approaching local decision–makers to support wildlife friendly landscaping. Higher perceived behavioral control is linked to a higher propensity to engage in the behavior. Subjective norms refer to the societal pressures and expectations residents' feel about a particular behavior. It refers to residents' perceptions of what their friends, community and family members think about their involvement in advocating for wildlife-friendly landscaping. Residents are more likely to have favorable subjective norms if they believe influential people in the society approve of this behavior (Ajzen, 1991).

Methods

Purposive and quota sampling was used to recruit the participants ($N = 681$) throughout the state to target the age, race, and ethnicity that reflect the state population. Two three-item, five-point Likert scales were used to measure subjective norms and behavioral intent, and six- and five-item, five-point semantic differential scales were used to measure attitude and perceived behavioral control. A panel of experts reviewed the survey questionnaire to ensure its reliability, and pilot testing was done to ensure its validity. IRB approval was secured before the data collection. Descriptive statistical analyses (means and standard deviations) were used to interpret residents' attitudes, perceived behavioral control, subjective norms, and behavioral intent. A multiple linear regression model was employed to evaluate the relationship between TPB variables (attitude, perceived behavioral control, and subjective norms) and behavioral intent.

Results and Conclusion

Descriptive analyses showed that attitude ($M = 1.000$, $SD = 0.911$), perceived behavioral control ($M = 0.143$, $SD = 1.070$), and subjective norms ($M = 0.063$, $SD = 0.873$) were all positive and subjective norms were approaching neutral. Behavioral intent ($M = - 0.399$, $SD = 1.116$) was also close to neutral but negative. Analysis of the multiple linear regression model revealed that TPB variables predicted a 33.3% variance in behavioral intent ($F(3, 677) = 112.737$) $p < 0.001$, $R^2 = 0.333$). Out of the three variables, attitude (B = 0.024, $t(680) = 0.559$, $p = 0.577$) was not a significant predictor, but both perceived behavioral control (B = 0.339, $t\ (680) = 8.998$, $p < 0.001$) and subjective norms (B = 0.442, $t(680) = 9.582$, $p < 0.001$) were significant and subjective norms had a slightly larger effect. Our significant predictors were similar to Samus et al.'s (2023) reported predictors in a study of factors influencing engagement in gardening

practices that support biodiversity. However, the strongest association was discovered between perceived behavior control, perceptions of information and knowledge, and time.
Our findings also align with (Goddard et al., 2013), who reported that social norms were considerable to the uptake of wildlife-friendly activities.

Recommendations and Implications

The study results showed that attitude is the most positive of the three TPB variables, followed by perceived behavior control and subjective norms among residents' intention to ask local decision-makers to increase wildlife-friendly landscaping in communities. However, the attitude was not a significant predictor of intent. Among the TPB variables, perceived behavioral control and subjective norms significantly predict residents' intention to ask local decision-makers to increase wildlife-friendly landscaping in communities. Therefore, future Extension interventions should focus on increasing residents' perceived behavioral control and subjective norms to enhance their behavioral intentions to ask local decision-makers to support wildlife-friendly landscaping.

- To build on the positive attitudes that exist, Extension educators should focus on educational programs to increase residents' and local decision-makers knowledge of wildlife-friendly landscaping, the conservation of insects, and the importance of wildlife-friendly landscaping in communities.
- Extension educators should also work to increase knowledge of the positive impacts wildlife-friendly landscape has on the individual. Extension educators can also teach their audiences how to also effectively communicate with their community leaders. Increasing confidence in the subject matter can increase the likelihood of them speaking on the topic.
- Educational Extension programs should focus on residents' perceived behavioral control and subjective norms to enhance behavioral intentions.
- Perceived behavioral control may be improved by increasing residents' awareness about the availability of resources to enhance their knowledge of wildlife conservation, and its importance may increase their behavioral intention to ask local decision-makers to support wildlife-friendly landscaping.
- It is recommended to prioritize Extension educational interventions that help elevate technical knowledge and self-efficacy among residents. Providing a toolbox of resources that can guide residents through the process of contacting decision-makers and help them articulate their support for wildlife-friendly community greenspaces would potentially facilitate these conversations. Also, providing resources, inputs, and training will help to increase their controllability over landscaping practices that support wildlife.
- Extension educators should integrate social opportunities and conduct group discussions among residents and local decision-makers to familiarize them with terminologies related to wildlife conservation and wildlife-friendly landscaping in communities, which may help to strengthen their subjective norms.

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Investigating Factors that Influence College Athletes' Use of Cannabidiol (CBD) Products

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Introduction

Agricultural hemp has expanded globally as a crop used to produce fiber, grain, and cannabinoids (Jeliazkov et al., 2019). Since the 2018 Farm Bill declassified hemp as a schedule 1 drug, it has gained considerable attention as an alternative crop for American farmers (Johnson, 2018). In fact, the United States Department of Agriculture (2022) valued industrial hemp at 824 million dollars in 2021. Over 75% of this value was reported within the cannabinoid/floral market, rather than fiber or grain (USDA, 2022). The psychoactive compound, Tetrahydrocannabinol (THC), is one of the most recognized major cannabinoids found in cannabis. However, hemp is required by law to contain no more than 0.3% THC on a dry-weight basis (Johnson, 2018). The major cannabinoid sought through floral hemp production is cannabidiol or CBD. Unlike THC, CBD does not cause a euphoric effect when consumed and is legal across the United States. CBD is primarily marketed and consumed for health purposes, despite not being regulated by the U.S. Food and Drug Administration (Hahn, 2020).

Claims on the use of CBD for a wide variety of health and wellness benefits, ranging from relieving stress and anxiety to reducing muscle inflammation, are rampant online (Leas et al., 2020; White, 2019). However, clinical research on the effectiveness of CBD as a medical therapeutic is still progressing. The expansion of the CBD market has been particularly visible within the sports industry (Barnett, 2022), where star athletes (e.g., Mike Tyson) have launched their own CBD brands or have endorsement deals with CBD companies (e.g., Rob Gronkowski). According to Burr et al. (2021), the use of CBD is becoming more evident amongst the athletic community, in part, due to its reputation for having a positive impact on athletic performance and recovery. Zeiger et al. (2019) investigated age related differences for CBD use by athletes and found that younger athletes consumed edibles, smokables, and vaporizers more than older athletes. Younger athletes were also found to consume cannabinoids more often for both recreational and medical purposes, as opposed to older athletes consuming them for mostly medical purposes (Zeiger et al., 2019).

As CBD is the leading agricultural product from industrial hemp (USDA, 2022), understanding public perception and use of CBD is important for the long-term vitality of the hemp industry. Additionally, as CBD branding expands in the sports industry with claims to improve sport performance and recovery, despite CBD being unregulated by the FDA, it is essential to understand its current use/misuse in the athletic community. The purpose of this study was to explore college student athletes' perceptions and use of CBD products. This research expands across several values of the American Association for Agricultural Education, including "examining social dynamics in human and life sciences," "fostering healthy living," and "promoting personal responsibility and safety in AFNR systems" (AAAE, 2023). This study was guided by the following objectives: (1) Identify college athletes' previous use of CBD products; (2) Identify reasons college athletes have used CBD products, and source of information used to inform purchase(s); (3) Describe college athletes' attitudes toward CBD consumption, subjective normative beliefs toward CBD, perceived ability to purchase CBD products, and future intention to consume CBD products; and, (4) Determine factors that predict college athletes' future intention to consume CBD products.

Theoretical Framework

Ajzen and Fishbein's (1980) Theory of Planned Behavior (TPB) was used to guide this study. According to TPB, individual behavior toward a specific activity is highly influenced by their intention to complete that behavior. Furthermore, the TPB asserts that an individual's behavioral intention can be predicted by their attitude toward the behavior, their subjective normative belief toward the behavior, and their perceived behavioral control (Ajzen, 2011).

Due to the controversial nature of cannabinoid consumption, in part, due to its association with marijuana, wide variability in perceptions toward CBD may exist. Although CBD consumption is federally legal and does not cause euphoric effects when consumed, misconceptions between marijuana and hemp have been reported (Colclasure et al., 2021; Rampold et al., 2021). The TPB can provide context to how variability of perceptions (attitude, subjective norm, perceived behavior control) influence intention to consume CBD. Prior research on CBD consumption is limited, however Brenan (2019) reported that 14% of Americans have tried CBD oil to relieve pain, anxiety, and insomnia. This number has been reported to be much higher in college students, as Wheeler et al. (2020) reported 55% of college students having used CBD products. However, Zeiger et al. (2020) reported that athletes' attitudes and other perceptions toward CBD is not clear. Obtaining baseline data for college student athletes' use of CBD products, as well as factors that likely influence its use, is a good first step to begin to understand the current scope of CBD within the college athlete population.

Methods

Quantitative survey methodology was used for this study and all data were collected in March of 2023. Prior to data collection, the study was approved by Doane University's Institutional Review Board (S23 001 DC IRB HS). Due to the potentially sensitive nature of the survey data, which includes reporting of substance use by student athletes, this study was reviewed by the athletic director at Doane University and the National Association of Intercollege Athletics' (NAIA) Director of Student-Athlete Experience and Development to ensure student athletes would not be negatively impacted by participating in this study. A disclaimer provided by NAIA was added to the end of the study stating that the NAIA does not support or condone the use of CBD products.

The population for this study was all student athletes at Doane University who were part of 20 athletic teams competing in the Great Plains Athletic Conference (GPAC) during the 2022-2023 season. A total of 597 student athletes were determined as the population via team rosters. All 597 student athletes were invited to participate in the study either through in-person contact or email communication, and therefore a census was sought. We determined that in-person contact would improve participant response rates over email communication. Therefore, all coaches were contacted via email with a request for us to survey their athletes at the beginning or end of a team practice or meeting. All but three coaches agreed to this request, and therefore most respondents were recruited in-person and voluntarily participated in the survey at the time of recruitment. These students were provided a paper copy of the survey. To reduce coercion in survey participation, coaches were asked to leave the room and students were told that individual responses would not be shared with anyone beyond the research team. Student athletes from remaining teams were contacted individually via an email that requested their voluntary

participation and included a digital survey link through Qualtrics. Informed consent was collected from each participant prior to them taking the survey.

The survey instrument developed included 32 questions. Four scales were used to measure the four constructs within the Theory of Planned Behavior (attitude, perceived behavioral control, subjective normative belief, future intention). Attitudes toward purchasing and using CBD products were collected through an eight-item, five-point, bipolar, semantic differential scale. The scale consisted of eight sets of adjectives (e.g., Good/Bad, Beneficial/Not Beneficial, Important/Unimportant, etc.) and respondents selected the point between each set of adjectives that best aligned to their opinion toward purchasing and using CBD products. The same scale was used in similar studies measuring attitudes toward purchasing industrial hemp products (Ruth et al., 2022).

Perception of ability to purchase and use CBD products was assessed by a scale containing six statements (e.g., I would easily be able to find CBD products if I wanted to, I would easily be able to afford to purchase CBD products if I wanted to, etc.). For each statement, respondents indicated their extent of agreement using a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). Perspectives toward how other individuals' view purchasing and consuming CBD products was assessed through a five-item, five-point, Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). Example statements include "most people who are important to me think that I should purchase and use CBD products" and "most people who are similar to me purchase and use CBD products." Future intent to purchase CBD products was determined by four statements (e.g., I expect to purchase CBD products, I want to purchase CBD products, etc.). For each statement, respondents indicated their extent of agreement using a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). These scales were modified from prior studies (Ruth et al., 2018; Ruth et al., 2022).

Consumption of CBD products was assessed by one yes-or-no question, which asked respondents if they had consumed CBD products in the last 90 days. Respondents who indicated having consumed CBD in the last 90 days were then directed to three follow up, select-all-that-apply matrices. The first matrix asked participants to indicate the CBD product-type(s) consumed. Eight options (e.g., oils or tinctures, capsules or pills, gummies, etc.) were provided based upon product-types found on extensive web searches, in addition to the option of "other." The second matrix asked participants to indicate their reasoning to have consumed the CBD product(s). Eight options (e.g., stress relief, muscle recovery or inflammation, etc.) were provided based on prior literature (Brenan, 2019) and web searches, in addition to the option of "other." The third, select-all-that-apply matrix asked participants to indicate their source of information used to inform their CBD purchasing decision (e.g., medical doctor, friends or family members, etc.). The last section of the survey asked respondents to indicate their gender, race and ethnicity, and year of academic standing (Freshman, Sophomore, Junior, Senior, 5th-year). Each participant also indicated their sports team at the conclusion of the survey.

A panel of three experts, who were not a part of the research team, reviewed the full survey for face and content validity. The experts included a director of a university health and human performance program, a medical doctor with extensive knowledge of CBD, and an assistant professor of agricultural communication with survey design experience. After expert

review, a pilot test was conducted with approximately 30 students who were not student athletes to inform final survey development. After the full survey was administered to student athletes, post-hoc, internal scale reliability was analyzed for each of the four constructs and Cronbach's alphas greater than .70 were found (α = .90; .84; .84; .98), and therefore all scales were considered reliable (Field, 2013).

Paper surveys were converted to an electronical format through Qualtrics. Data were then transferred to and analyzed in SPSS Statistics version 26. Frequencies were used to address Objectives 1 and 2. Means and standard deviations were used for Objective 3, and a multiple linear regression was used for Objective 4. Significance was established *a priori* at Cronbach's alpha of $p < .05$. Twenty athletic teams consisting of 597 student athletes at Doane University were asked to participate in the study. A total of 284 responses were received, a 47.6% response rate. Of the 272 responses received, 12 respondents dropped the study, resulting in 272 usable responses and a 98% survey completion rate. Respondents were mostly male (n = 178; 65.4%) and identified as White (n = 236; 86.8%). Thirty student-athletes (11%) identified having a Spanish, Hispanic, or Latino ethnicity. Most respondents (n = 73; 27.3%) held a Junior academic standing, followed by Freshman (n = 70; 26.2%), Sophomore (n = 70; 26.2%), Senior (n = 42; 15.7%), and athletes who had 5th-year eligibility (n = 9; 3.4%).

Results

For Objective 1, we sought to identify college athletes' previous use of CBD products. We described "previous use" as being consumed in the last 90 days from the time of survey completion. Of the 272 responses received, 157 (57.5%) college athletes indicated not having consumed CBD products in the last 90 days, and 115 (42.3%) indicated having consumed them. A follow-up question on the types of CBD products consumed in the last 90 days was asked for students who had indicated CBD use. Over half of these respondents indicate consuming CBD in the form of CBD gummies (68; 59.1%) and in the form of vaporizers or smokeable products (64; 55.7%). Table 1 illustrates the frequency of CBD products consumed by student athletes who have used CBD products in the past 90 days.

Table 1. *Frequency of CBD product-type consumed by student athlete CBD users (n=115)*

CBD Product-Type Consumed	*f*	*%*
Gummies/similar edibles	68	59.1
Vaporizers or smokable products	64	55.7
Topicals for muscle recovery	33	28.7
Oils or tinctures	27	23.5
Infused foods/beverages	13	11.3
Capsules or pills	2	1.7
Sublingual sprays	2	1.7
Makeup or cosmetics	1	0.9
Other	1	0.9

For Objective 2, we sought to identify reasons college athletes have used CBD products and the source of information used to inform their purchase. Respondents who selected using CBD products in the last 90 days were asked to identify the reason CBD products were

consumed. Over half of CBD consumers indicated using CBD for stress relief (*n* = 79; 68.7%), sleep improvement (*n* = 64; 55.7%), and muscle recovery or inflammation relief (*n* = 62; 53.9%). Frequencies of reasons for use by CBD consumer can be seen in Table 2.

Table 2. *Frequency of reasons for use by student athlete CBD consumers (n = 115)*

Reasons for Use	*f*	*%*
Stress relief	79	68.7
Sleep improvement	64	55.7
Muscle recovery / inflammation relief	62	53.9
Anxiety and/or depression relief	48	41.7
Acute / temporary pain relief	33	28.7
Chronic/long-term pain relief	15	13.0
Reduce nausea	8	7.0
Improve skin appearance and/or health	4	3.5
Other	9	7.0

Respondents who selected using CBD products in the last 90 days were also asked to identify sources of information they used to inform their purchasing decision. The most common source of information was a friend or family member (*n* = 73; 63.5%). Internet websites were the second most common source of information (*n* = 32; 27.8%). Interestingly, only 10 respondents (8.7%) indicated a doctor or medical professional as a source of information used to inform their purchasing decision. Frequencies of source of information by CBD consumers can be seen in Table 3.

Table 3. *Frequencies of sources of information by student athlete CBD consumers (n = 115)*

Source of Information	*f*	*%*
Friend or family member	73	63.5
Internet websites	32	27.8
Non-advertisement (social media, magazine, TV)	29	25.2
CBD and/or health and wellness sales representative	23	20.0
Advertisement (social media, magazine, TV)	12	10.4
Doctor or medical professional	10	8.7
Information on CBD product label	9	7.8
Other	4	3.5

To answer Objective 3, four constructs (attitude toward CBD consumption; subjective normative belief toward CBD consumption; perceived ability to purchase CBD products; and future intention to purchase and consume CBD products) were measured using scales. Overall, respondents' attitude toward CBD consumption was found to be 3.08 (*SD* = 0.79), which is interpreted as neutral. Respondents believed that others held slightly negative beliefs toward purchasing and consuming CBD (*M* = 2.48, *SD* = 0.86), but they believed they had high control to whether they could purchase and use CBD products (*M* = 4.18, *SD* = 0.72). Lastly, on average, respondents' future intent to purchase and use CBD products was neither likely nor unlikely (*M* = 2.67), however, a large variance was found (*SD* = 1.21).

Lastly, for Objective 4, we determined factors that predicted college athletes' future intention to consume CBD products. Independent variables found in the TPB, in addition to gender and athletic year in school, were used as variables to predict the dependent variable, future purchasing intention of CBD products. A statistically significant model was produced via multiple linear regression that explained 53% of the variance in future intent to purchase CBD products ($R^2 = .530$, $F(5,249) = 56.17$, $p < .001$). Of the independent variables in the model, attitude, subjective normative beliefs, and perceived behavior control were found to be significant predictors. As noted by the beta values, more favorable attitudes ($\beta = .447$, $p < .001$), higher subjective norms ($\beta = .305$, $p < .001$), and higher perceived behavioral control ($\beta = .130$, $p = .005$) led to higher future intentions to purchase CBD. Gender and athletic year were not significant variables. Table 4 depicts the model variables.

Table 4. *Predictors of college athletes' intention to purchase and consume CBD (n = 272)*

Predictor Variable	*B (coefficient)*	*SE β*	*β*	*t*	*p*
Constant	-1.639	.368		-4.456	<.001
Attitude	.693	.085	.447	8.117	<.001
Subjective Norm	.433	.079	.305	5.463	<.001
Perceived Behavior Control	.229	.080	.130	2.857	.005
Gender	.016	.114	.006	.141	.888
Athletic Year	.052	.046	.049	1.125	.261

Conclusions and Recommendations

The findings from this study show that approximately 40% of college student athletes at Doane University had recently (prior 90 days) consumed CBD products. These rates are much higher than the average adult population in the U.S. (Brenan, 2019), but are comparable to CBD consumption rates of other studies focused on college students (Wheeler et al., 2020). The most frequently consumed products were gummies/similar edibles (59.1%), smokables/vaporizers (55.7%), and topicals for muscle recovery (28.7%). The high use of smokables and vaporizers may be concerning, as these product-types are typically consumed in a recreational context, and therefore could indicate damaging use or misuse of CBD. The CBD consumers in this study also indicated using CBD to relieve stress (68.7%), improve sleep (55.7%), and reduce muscle inflammation (53.9%). Nearly 70% of student athletes who were consuming CBD products were using friends or family members to inform their decision about purchasing CBD products, while less than 10% sought advice from a medical doctor or professional. Lastly, all independent variables within the TPB (attitude, subjective normative belief, perceived behavioral control) were significant predictor variables in a model that can be used to explained 53% of the variance in future intention to purchase CBD products.

Due to the high use of CBD by college student athletes, we recommend educational programs be designed for this population on the safe use and potential risks of CBD. These programs should discuss the importance of consulting with medical professionals prior to consuming unregulated substances. When designing such programs, we recommend that program developers consider participants' attitudes toward CBD, subjective normative belief, and perceived behavioral control, due to the large influence of these variables on future purchasing intention.

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Use of Self-Directed Learning and Performance Based Assessment to Improve an Agriculture Cohorts Use of the Safe Farm Steward Application

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Introduction

An integral part of any form of education is whether students have truly learned and can apply what has been taught. The primary form of determining student progress is collecting and evaluating their responses to an educational task, commonly known as assessment (Harlen et al., 1992). Regardless of the format, assessments have several roles in the educational setting. Harlen and collaborators (1992) identify four common roles of assessment in education: (1) to determine the ongoing progress of student learning and level of achievement, (2) to determine student achievement at several points in their educational journey, (3) to summarize learning achievement toward selection or qualification, and (4) to evaluate the effectiveness of an educational institution or system. These roles demonstrate the multifaceted use of assessment in education in evaluating student learning and the effectiveness of a particular educational setting.

A specific form of assessment that can be found in modern-day education is performance-based assessment (PBA), otherwise known as performance assessment. PBA "requires students to demonstrate or apply their knowledge, skills, and strategies by creating a response or product or doing a task" (New York State Education Department, 2023, p. 1). When considering PBA, one may initially think about it in terms of a traditional classroom setting. Conducting a science experiment, engaging in an artistic performance, or creating and testing a computer program are all examples of how PBA may be present in a traditional classroom setting (Guha et al., 2018).

A typical example of PBA in adult education is the National Board Certification. The assessment for this certification requires participants to compile evidence of their teaching practice and performance into a portfolio that includes videos of their teaching along with commentaries, lesson plans, and evidence of student learning (Darling-Hammond, 2010). Teachers who undergo this assessment and certification process have reported that it enabled them to improve their practice as a teacher in terms of knowledge, design, delivery, classroom management, and student support (Darling-Hammond, 2010). An additional example of PBA in an adult setting is the National External Diploma Program (EDP), which is an alternative to a GED diploma that assesses adults' competence they've gained through life experiences and self-directed learning through demonstrations (Askov et al., 1997). Adults participating in the EDP must be directed through activities that exhibit their ability to apply literacy skills in typical real-life situations, such as renting an apartment (Askov et al., 1997). Learners who participate in this PBA often find it meaningful since they can see objective evidence of what they have learned (Askov et al., 1997). These two contemporary examples demonstrate the effectiveness of PBA to accurately assess adults through exhibiting their learning of relevant knowledge and skills by application.

One area of adult education that is relevant and active with limited evidence of taking advantage of PBA is the agricultural education of adults. Adult-focused agricultural education began with the passing of the Smith-Lever Act in 1914, formally establishing the United States Cooperative Extension system (Ward, 1929). The Cooperative Extension system was designed to work with land-grant universities to apply research and delivery of education specifically related to rural and agricultural obstacles (United States Department of Agriculture, n.d.). Agricultural extension programming and activities are classified as a non-formal learning setting (Mars & Ball, 2016).

Non-formal learning settings are those characterized by taking place outside of schools, knowledge being demonstrated by performance, having a current and practical application, and voluntary participation (Kleis et al., 1973). Non-formal adult education by extension programming and activities are still prevalent today in the U.S., despite the decline in farming Americans and rural households, with an office in or near most of the nation's counties (United States Department of Agriculture, n.d.). Within these Extension programs and activities, PBA or other forms of more formalized assessment are limited, despite its effectiveness in other adult education programs, as previously discussed. Therefore, what is the effectiveness of PBA in assessing adult learning in non-formal environments?

Theoretical Framework

Self-Directed Learning (SDL) served as the guiding theory for program development and data interpretation associated with this study. According to Knowles (1980), adults generally have a deep need to be self-directed. Within andragogy, self-directedness is a core principle (Knowles et al., 2020). Self-directed learning can be described as "a process in which individuals take initiative with or without the help of others, to diagnose their learning needs, formulate learning goals, identify resources for learning, select and implement learning strategies, and evaluate learning outcomes," (Knowles, 1975, p.18). Specifically, we focused on the Self-Directed Learning Theory model that was developed by Garrison (1997). His model involves the interaction of three dimensions: motivation, self-monitoring, and self-management, to guide one's self-directed learning.

Motivation often has an immense effect on the cognitive activity that drives learning processes in humans (Howe, 1987). Within Garrison's (1997) model, the influence of motivational factors, one of the three dimensions of SDL, is involved with the decision to participate, *entering motivation*, and the effort needed to persevere and stay on task, *task motivation*. Entering motivation involves committing to a goal and initiating action toward that goal. Corno (1989) suggests that motivation not only powers involvement in a task but also shapes the intentions behind it. If an individual is highly motivated to engage in SDL, they most likely have the perception that the learning goals are attainable, valuable, and will meet their personal needs (Garrison, 1997). Once involved in SDL, task motivation is maintained by active learning and intrinsic motivation, which can be developed by giving opportunities for responsibility, shared control, and collaboration during the learning process (Dollisso & Martin, 1999; Garrison, 1997).

After entering SDL, self-monitoring is another dimension in Garrison's (1997) model which students engage in during the learning process. Garrison (1997) describes self-monitoring as taking responsibility for constructing personal meaning by integrating new and existing knowledge to meet learning goals through critical reflection and both internal and external feedback. According to Bandura's (1986) self-regulated learning processes, students can self-monitor their learning by observation, judgment, and reaction to their learning tasks and activities. Both internal and external feedback are important following learning tasks. Internal feedback is important for the metacognitive processes of one's progress and learning, however, may lack precision and direction (Butler & Winne, 1995; Garrison, 1997). Efficient and effective external feedback from the instructor can fill this gap and build awareness of student learning progress quality and areas for improvement relative to learning goals (Garrison, 1997).

In addition to self-monitoring, students engage in the third dimension, self-management, during the learning process. According to Garrison (1997), self-management involves collaborative external control management of learning activities, which is linked to both motivation and self-monitoring. External task control in SDL can include collaboration and continual assessment and negotiation of goals, methods, and support between the student and facilitator (Garrison, 1997). Sharing control during the learning process increases the probability of students successfully reaching learning goals, which then increases student learning abilities, intrinsic motivation, and self-directedness (Garrison, 1992). To enable self-management, facilitators should make resources available, give opportunities for questioning and feedback, and provide flexible pacing, support, and direction necessary for success (Garrison, 1997). All three dimensions of Garrison's model, motivation, self-monitoring, and self-management, work together to create a learning experience for students to engage in meaningful self-directed learning experiences.

Purpose and Objectives

This study aims to evaluate the effectiveness of a three-day instructional training program to develop post-secondary faculty and Extension agents' ability to accurately complete and prepare students to complete the Safe Farm Steward (SFS) Application PBA. This study aligns with the American Association for Agricultural Education National Research Value of "promoting personal responsibility and safety in AFNR systems" (AAAE, 2023). From this purpose, the following objectives were created:

1. Determine the participants' accuracy in evaluating farm equipment items using a PBA following an agricultural education safe farm program.
2. Determine the constructs where 75% agreement was not obtained by the participants.
3. Describe the Safe Farm Steward application PBA score given by the participants following an agricultural education farm safety training program.

Methods

The research study was conducted as part of an evaluation of the SFS Project, funded by the National Institute for Occupational Safety and Health (NIOSH), a branch of the Center for Disease Control and Prevention (CDC). The project encompasses nine states, primarily in the Southeast region of the United States. The SFS Project aims to bring awareness to the current state of safety on farms and encourage those farmers to become better stewards of farm safety. Within the SFS Project, the Safe Farm Steward application serves as an evaluative tool to recognize farm families who adequately maintain and update the safety features and/or risk areas on their equipment and facilities. Throughout the nine-state region, post-secondary faculty and agricultural Extension agents are providing educational services to assist in the SFS project. Prior to providing the service, each agent and faculty member must attend an initial training followed by an annual update meeting.

At the first cohort three-day training meeting, 12 individuals representing six postsecondary institutions and six Cooperative Extension programs were in attendance. The adult learners attended a full day of lectures and exercises developed by the agricultural education SFS research team, which consisted of faculty and graduate students who have a combined 27 years of research and publications in the field of Farm Safety and Injury Prevention. Three of the researchers have practical knowledge and experience with the daily operations on a farm, while another individual has a career in instrumentation and evaluation. On the second day, the

participants engaged in two farm site visits where they completed the application side-by-side with the research team to assist in understanding, efficiency, and inquiry. In the afternoon, the participants completed a mock farm assessment at an area farm that had nine pre-selected farm implements that the researchers considered to be common farm equipment within the service region and were of various difficulty levels.

SFS Application

The Safe Farm Steward Application serves as the PBA for the participants. The application is located on an online website and involves a series of 60 different agricultural implements and 23 farm shop hazards for a total of 83 farm-associated items. Each item has five to 20 safety constructs that are measured on one of three levels: 0 = *Replace*, the item is considered unsafe and should be replaced before use; 1 = *Fair,* the item should be replaced within the next 12 months; and 2 = *Good*, the item is considered safe and effective. The number of constructs evaluated is dependent upon the number of items present on any given farm. A calculated formula was designed and adapted from the Certified Safe Farm program (Storm et al., 2016; Storm et al., 2018) and provides a passing/failing score for each farm implement and an overall acceptance/denied decision on the farm. Based on previous programs similar in nature (Rautiainan et al., 2010), the researchers determined a farm acceptance score to be $\geq$ 70%.

Table 1 includes the implements present and the number of constructs to be evaluated for the mock farm assessment that participants reviewed for the SFS application. *Due to page limitations, Table 1 showcasing the constructs was omitted. To evaluate the effectiveness of the training program in preparing participants to accurately complete the SFS application for a farm, the participants' scores for each implement as well as the total acceptance farm score were compared to a developed Expected Core Evaluation Score (ECES). The ECES standard was developed through a determined evaluation score by three farm implement experts who assisted in facilitating the training. One expert had 20+ years in agricultural mechanization, one expert had 12+ years in agricultural safety and injury prevention, and one expert worked with a rural first responder organization. All three were connected to public education and operated farm implements and show equipment on a weekly basis. An ECES score was developed for each farm implement as well as for the overall farm score. To determine if the participants were meeting the expectations of the ECES, a 75% agreement score was set for each implement and the participants' combined farm score. Scholars determine that a score of 75% to 90% is considered an acceptable level of agreement (Hartmann, 1977; Stemler, 2004).

Results

Objective 1 sought to determine the participants' accuracy in evaluating farm equipment items using a PBA following an agricultural education farm safety training program. The participants were engaged in a two-day training that was accompanied by a day of PBA. Of the equipment selected to evaluate, the researchers compared the participants' farm implement score, which was composed of the construct assigned, to the farm implement and compared to the ECES (see Table 1). Based on the participants' combined scores, the highest agreement occurred with the hay mower/conditioner (97.4%) followed by the skid steer (91.8%) and the rotary mower (91.7%). A discrepancy existed among the second tractor (71.9%), the baler (51.7%), and the combine (55.1%) where the participants did not reach the ECES set by the farm safety experts.

Table 2

Participants' Percent Agreement Score Per Implement on the Safe Farm Steward PBA

Implement	ECES	Participant Average	% Agreement Score
Tractor 1	93	86.9	89.2
Tractor 2	75	63.2	71.9
Skidsteer	80	75.4	91.8
Rotary Mower	17	20.3	91.7
Baler	69	63.0	51.7
Combine	66	69.7	55.1
Box Drill	94	93.9	75.1
Farm Truck	77	84.2	69.5
Hay mower/conditioner	86	97.5	97.4

When reviewing the constructs where the percent agreement threshold was not met, hydraulic lines, tires, guards, and lights/flashers became common constructs where a disconnect existed between the experts and the participants. Reflective on the scores in Table 2, Tractor 2, the baler, and the combine had the largest number of constructs not meeting the percent agreement threshold with the combine having 11 construct areas being deficient. Although the participants maintained an average farm application score of 72.4, the overall farm score assessed by the participants held a 77.0% agreement with the ECES score resulting in a moderate acceptability (Hartmann, 1977). See Table 3.

Table 3

SFS Assessment Farm Score

	ECES	Participant Average	% Agreement Score
Assessment Farm Score	73.0	72.4	77.0

Conclusions, Discussion, Recommendations

The study utilized typical pedagogical approaches within an andragogical platform. Education continues to evaluate the impact and if the lessons learned are impacting second-generation learning. The researchers sought to determine if the training delivery that utilized the self-directed learning model (Knowles et al., 2020) and the use of problem-based assessment, could adequately prepare participants to train others on the Safe Farm Steward application.

Of the farm implements selected, six of the nine items were assessed accurately in comparison to the ECES. The three farm implements that did not meet the threshold set by the researchers were larger items that entailed more physical activity (e.g., climbing, stretching, etc.), and entailed more familiarization with the location of constructs. Tappura (2017) echoed these sentiments noting that awareness was a major hindrance in safety preparation. As a result, the researchers are already orchestrating the first of two recommendations through the purchase of a 3-D scanner that allows the training to include multiple variations of the same farm implement (i.e., make, model, year, etc.) and provide through virtual, digital, and augmented exploration. The research team believes that by providing the participants with multiple examples, they will gain familiarity with where to view the constructs. In addition, participants are recommended to

explore multiple farm implements and familiarize themselves with how the styles and models developed by different manufacturers may create similar and different locations for many of the constructs. In addition, we encourage post-secondary faculty participants to engage students in repetitious exercises so that awareness improves.

In terms of percentage agreement of the implement constructs, many constructs fell below the 75% threshold. Several of these constructs lacked agreement across more than two separate implements, including tires, hydraulic lines, lights/flashers, and Slow-Moving Vehicle signs. Based on this observation, there are discrepancies among participants' understanding of distinguishing the conditional levels of the constructs compared to the ECES. Therefore, the researchers recommend that future training provide participants with tangible examples of the constructs previously listed with the greatest number of discrepancies. These examples should be provided visually while in attendance but also when they are back in their home domain. For example, providing a demonstration board containing pieces of tires that fall within the *Replace*, *Fair*, and *Good* range to demonstrate acceptable condition. Providing such resources and references would further enable participants to engage in self-management to direct their learning according to the SDL model (Garrison, 1997).

Although the participants maintained an average farm application score of 72.4, which is close to the ECES of 73.0, the percent agreement score (77.0) reflected a more moderate acceptability. This is discouraging for the researchers, but it exposes the importance of addressing the constructs of the equipment items. The training time was spent addressing farm safety issues and concerns, rather than the universal areas where safety items need to be addressed, such as the tires, lights/flashers, guards, and the hydraulic lines. Future evaluations of the progress learned by the participants should include certification for individuals who meet the expectation threshold set or are matching the ECES rather than placing them with an entire cohort. Overall, the majority of the 12 participants maintained a high percent acceptance rate; however, the participants who failed to meet the threshold were largely different from the group. In return, played a role in the group's score. A pre-assessment may need to be utilized to determine if outliers exist within the group to create differentiated instructional delivery during the training.

The researchers believe that Garrison's (1997) model of self-directed learning, provides a clear guide for amendments to the training delivery. For example, the participants were not given an opportunity to self-monitor their progress; thus, in the future, the researchers plan to provide a farm PBA where they already know the ECES prior to their own evaluation. Using the research team's new digital application scoring system, the participants can monitor how closely their own evaluation is mirroring that of the experts. Furthermore, the researchers aim to provide ongoing monitoring and feedback which is also reflective of the self-directed learning model.

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Unearthing Agricultural Legacies: The Jesup Wagon's Impact on Black Heritage and Extension Services

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Abstract

This historical research study sought to use the invention of the Jesup Wagon to emphasize the role of African American Extension agents. The following guided the study: purpose of the Jesup wagon, how the Jesup wagon worked, key individuals involved, immediate and lasting impacts, and the impact on future programs. Through collaborative efforts between Booker T. Washington, George Washington Carver, Thomas Campbell, and Seaman Knapp, the Jesup Wagon would become a revolutionary movement that improved the lives and homes of Blacks in the rural South. Equipped with an agriculturalist, home economist, architect, and nurse, the Jesup Wagon would provide lessons on a variety of topics including but not limited to farming techniques, food preservation, and animal care. The wagon was even equipped with games for the children. Today, modern-day Jesup Wagons are utilized throughout the country for educational programming and allow for a greater transfer of knowledge and interaction between agents and communities,

Introduction

After the emancipation of enslaved peoples in the 1800s, many Black Americans were left to figure out how to live independent lives free of the White man. This would prove difficult, as many of the newly freed slaves had little educational background and no land, let alone a working knowledge of cultivation practices (Jones, 1975). This pushed many to become sharecroppers, once again working land owned by White men. However, the innovation of Black visionaries would help to disseminate knowledge, eradicate agricultural ignorance, and promote land ownership amongst Blacks, shaping the significant contribution of African Americans in the construction of extension-based agriculture (James, 1971; Jones, 1975).

The ideals of renowned Booker T. Washington led to the formation of the Tuskegee Institute in 1881, bringing about the collaboration of individuals such as Seaman A. Knapp, Booker T. Washington, George Washington Carver, and Thomas M. Campbell to name a few. Many of these leaders were prominent Black pioneers of their time and helped implement innovative technologies, practices, and concepts that advanced the practical knowledge of Blacks around the country. Examples included the "Annual Negro Conference, the Farmer's Institute, Negro County fairs, the Short Course, and most notably, the invention of the Jesup Wagon" (Jones, 1975, p. 261).

It was the creation of the Jesup Wagon in 1906 that influenced and informed Blacks and Whites alike around the country with a new movement for agricultural demonstration work within its Extension Program for Black Americans (North Carolina Agricultural and Technical State University, 2023). The invention was so popular that it even impacted international practices (Mayberry, 1991). This mobile wagon brought agricultural skills to the front doorstep of otherwise inaccessible, Black farmers living in rural outskirts and quickly became one of the most purposeful and long-lasting contributions of Black Americans to agricultural initiatives.

Purpose and Objectives

The purpose of this historical research study is to use the invention of the Jesup Wagon to emphasize the role of African Americans in extension services. Taking note of historical contributions made by Black individuals in agricultural work is a responsibility that must be carried out to accurately represent, motivate, and influence agricultural perceptions amongst minorities (Akins, 2013). The “Movable School” (along with its many other names) illustrates the active and participative stance African Americans took in disseminating the science of agriculture (Akins, 2013).

The objective of this study is to identify key elements of the wagon and explore how it led to future applications. To analyze its important contributions to the cooperative extension system, the following questions will be addressed:

1. What was the purpose of the Jesup Wagon and how did it work?
2. Who were the key individuals involved?
3. What was the impact, both immediate and lasting?
4. How has this intervention led to other programs and/or ideas?

Historical Framework

It was the goal of Booker T. Washington to “enable the race to follow agriculture with intelligence and diligence" upon noticing the lack of education, land, and finance amongst Black farmers of the South (Jones, 1975, p. 252). However, Washington noticed that the "natural sense” of Black farmers would allow them to be “led to do a great deal towards their own elevation” (Jones, 1975, pp. 253-254). This prompted the establishment of the Division of Agriculture in 1896 at the Tuskegee Institute in Alabama. A year later, Washington would extend the school’s division, introducing a new branch, the Agricultural Experimentation Station, with George Washington Carver as its head (Jones, 1975). The aim was to provide the colored race a chance to engage in the pragmatic approach and scientific knowledge of agriculture (Jones, 1975).

Initially, training and instruction offered by the institution sought to draw in uneducated Black farmers to receive an education, however, there were many rural Blacks who could not travel to receive instruction (Jones, 1975). With this in mind, Booker T. Washington proposed the idea of an outfitted wagon to serve the agricultural needs of the rural communities in Alabama. The idea was presented to George Washington Carver who would later go on to operate the invention. It took on the name “Jesup Agricultural Wagon” in honor of Morris K. Jesup (Jones, 1975, p. 263). The wagon was later replaced by modernized versions of the invention including the Knapp Agricultural Truck and the Booker T. Washington School on Wheels (James, 1971). It was the innovative idea of Blacks to mobilize education that would serve as a catalyst for extension work.

Methodology and Procedures

Fraenkel and Wallen (2006) describe historical research as a "systematic collection and evaluation of data to describe, explain, and understand actions or events that occurred sometime in the past" (p. 545). Through the examination of artifacts, documents, records, and oral statements, researchers seek to gather information that assists in completing the purpose of the study and gaining a stronger understanding of the past. Primary sources of information such as manuscripts, books, extension publications, and data collected by state and federal agencies were used for this study as well as secondary sources such as journal articles and institutional information. To evaluate the historical sources, the researcher adopted a critical attitude to critique the genuineness of the document and the accuracy of the information (Fraenkel & Wallen, 2006). The primary and secondary sources were compared in an effort to triangulate data and address the accuracy of the sources (Creswell, 2012).

At the conclusion of data collection, the researcher utilized content analysis methods to organize the information and draw conclusions related to the four research questions of the study. In historical research, many often note that personal bias can play a role in the selected content, however, the researcher sought out a variety of sources to address the internal validity of the study. Additionally, other researchers were consulted to ensure that the findings were supported by the content analysis while also acknowledging any bias that could have impacted the analysis.

Results/Findings

Question One - ***What was the purpose of the Jesup Wagon and how did it work?***

The Jesup Wagon offered room for Black farmers living countryside to experience agricultural advancement. It helped to highlight the idea of independence for Black farmers just as Booker T. Washington had envisioned (Jones, 1975). Blacks would be able to learn and apply practical knowledge gained from the tours to their own fields to strengthen their self-sufficiency. In turn, this would create economically stable conditions for the Black man to buy land, support his family, and make beneficial contributions to agricultural work.

The original buggy was a means of transport for demonstration agents that carried agricultural equipment useful for demonstrating improved farming methods and machinery (Atkins, 2013). The buggy could open and dock at one farmer's house (which would be called the demonstration house for the entire community) for a duration of one week (Atkins, 2013). During this period, farmers would be instructed how to do things such as, "repair steps, whitewash the home, file saws, terrace land, and remodel poultry houses" (Atkins, 2013, p. 22). Women would be taught to "cull chickens, sew curtains, mend, and refinish furniture"(Atkins, 2013, p. 22). The use of the Jesup Wagon aimed to improve both the farmer and the workings of the home (Atkins, 2013).

By 1930, the wagon (later the motorized truck known as School on Wheels), brought attention to the way households could be maintained not only by the farmer but by the wife and children as well. Along with an agriculturalist who demonstrated improved farming techniques and tools, a home economist, an architect, and a nurse would also travel on the vehicle to inform the family

of improved ways to operate the home (James, 1971). The economist would show wives how to prepare food, upkeep the home, clothe children, and even care for animals (James, 1971). Nurses would emphasize the importance of cleanliness and demonstrate proper home health and personal hygiene care (James, 1971).

Even children were able to take part in the action. Often, recreational games were carried aboard the vehicle and used to show children how to play. Though kids got to experience the enjoyment of such activities, the fun was not limited to them alone. Men, women, and elders alike were invited to experience games such as dodgeball, sack races, and tug-of-war (James, 1971). This was used to "stimulate the interest of the Black farmer in his home" while also strengthening "his attachment to it" (James, 1971, p. 209).

The Jesup Wagon was purposeful in emancipating Black farmers from "agricultural ignorance" to "improve the conditions of the masses… and to give them lessons in self-help" (Jones, 1975, p. 267). The moveable school enabled Blacks to experience land ownership and generated more modernized, healthy, and hard-working homes (James, 1971; Jones, 1975). Due to the contribution of key individuals, the Jesup Wagon was able to extend education beyond the classroom, opening a world of opportunities for Blacks across the South.

Question 2 – ***Who were the key individuals involved?***

It was the collaborative effort of key individuals such as Booker T. Washington, Seaman A. Knapp, Thomas M. Campbell, and George Washington Carver that made the idea of the Jesup Wagon a reality. The ideologies of Booker T. Washington inspired the plan for the Jesup Agricultural Wagon. Booker would frequently ride to rural communities and assess the agricultural capabilities of Black farmers. He found that many of these isolated farmers had no means of advancing themselves, and thus the idea of an outfitted wagon to serve these rural communities began (Jones, 1975). Washington would later bring his idea to the attention of George Washington Carver, who would draw up a plan and later carry out its execution.

The wagon was named for Morris K. Jesup, a banker and philanthropist, who supplied the financial support for the construction of the wagon, purchase of mules, materials for harnesses, and demonstration materials (USDA, 2009). The Jesup Wagon would serve as the first act of an extension service in the United States (National Park Service, 2000). Carver began with weekend trips conducting demonstrations and spreading knowledge to otherwise inaccessible Black farmers of the south (Jones, 1975). However, as the impact of the wagon spread, the demand would increase, calling Carver to serve White and Black communities alike (Jones, 1975).

The increase in popularity drew the attention of Seaman A. Knapp, head of the Farmers' Cooperative Demonstration work for the U.S. Department of Agriculture, who would present Booker T. Washington with an opportunity that would allow the wagon to reach beyond the outskirts of Alabama where it originated (Jones, 1979). Seaman would share the expenses of operating the Jesup Wagon if Carver's department agreed to initiate "a co-operative demonstration program for the Negros of the South" (Jones, 1975, p. 263). This expanded the

wagon's travel to surrounding counties. When Carver accepted new responsibilities at the Tuskegee Institute, a recent Tuskegee graduate Thomas M. Campbell would lead the efforts (Jones, 1979).

In 1906, Thomas Campbell began what would be a 50-year journey, serving as the first Black extension agent for the United States Department of Agriculture (Jones, 1979). Thomas Campbell toured rural counties of Alabama, Mississippi, and parts of Georgia giving practical demonstrations and spreading modern agricultural knowledge amongst his Black counterparts (Jones, 1975). Campbell's long and effective career of expanding the improved knowledge and practices of agriculture "established him as one of the most effective and highly recognized Black agricultural leaders in the United States" (Jones, 1979, p. 44). In 1910, Campbell would be promoted to district agent, and later state agent, instructing and supervising onboarding farm agents (Jones, 1975). Campbell continued his work for the federal government and his office, housed at Tuskegee Institute, became the center of Black American Agricultural Extension work in the South (Jones, 1975).

Question 3- ***What was the impact, both immediate and lasting?***

As Booker T. Washington prioritized the outreach mission, the Jesup Wagon and its predecessors were instrumental contributors. Moore (2019) highlighted the impact describing the two to three-day events that often drew more than 100 people daily and would leave a home and farm that had been "completely renovated and fixed up" and would "serve as a visual reminder to the community of what was possible." These outreach efforts supported local engagement and allowed for the dissemination of information from Tuskegee to the community.

Campbell would become known for his efforts in adding the first home demonstration agents and nurses to the moveable school initiative in 1915, replacing the horse-drawn wagon with the Knapp Agricultural Truck in 1918, and working with counterpart John. B. Pierce to increase the reach of extension agents from Alabama (Jones, 1975; Jones, 1979). John B. Pierce, the United States' second appointed Black extension agent, would help propel the work of Black agriculturalists in the South, just as much as Campbell. He would be responsible for supervising agents across state lines from North Carolina to Maryland so that by the passing of the Smith-Lever Act of 1914, Black extension work would already be well established in the South. (Jones, 1975; Jones, 1979). The number of Black extension agents would stand at 846 by 1953 due to the efforts of Campbell and Pierce in furthering the cause to emancipate and enable Blacks for success (Jones, 1975). This would spark a revolutionary movement for extension as news of the moveable school's impact traveled both nationally and internationally.

The revolutionary idea of a movable school influenced the creation of other "specialty mobile units" (Mayberry, 1991, p. 96). Kentucky State University began one of its cooperative extension services with a truck equipped with a garden as a means of teaching gardening techniques to urban home gardeners, Tuskegee's School of Veterinary Medicine pioneered a mobile laboratory for the examination and study of swine diseases and later employed a mobile unit of health workers, while Lincoln University designed a van to deliver a six-week course of agricultural

education to “persons of limited education” (Mayberry, 1991, p. 98). From the “Black Maria”, Massachusetts’ first moveable farming school, in 1914 to Pennsylvania’s “Nutrition-Van-Go” in 1990, variations of the original 1906 Jesup Wagon influenced the emergence of mobile resources all over the nation and all across time (Mayberry, 1991, p. 101). Even international visitors from places like China, India, Poland, and Russia would come to see the impact of moveable schools, implementing for themselves “the form of a school on donkey back" (Mayberry, 1991, p. 104). While the Jesup Wagon itself is no longer in operation, its influence on agricultural extension services can be seen in a number of ways.

Question 4- ***How has this intervention led to other programs and/or ideas?***

The Tuskegee Movable School as an educational instrument imparts knowledge about both history and science. It was an early example of bringing science and education directly to Blacks in their own communities and allowing them to make significant contributions in the field of agriculture. Atkins (2013) describes the challenges faced by minorities in today’s time as they “are often intimidated by the study of STEM courses (p. 20).” However, young minorities are now able to establish historical links in the field of agricultural science and ultimately build their confidence and interest in the subject (Akins, 2013). The historical narrative of the Jesup Wagon challenges the fears faced by minorities to partake in STEM-based curriculum by highlighting the ties between heritage and STEM-related disciplines (Akins, 2013). This model laid the foundation for the modern extension service approach, which continues to emphasize outreach and education at the grassroots level.

The Jesup Wagon fostered community engagement and enlightenment amongst Blacks by providing practical, hands-on demonstrations of farming techniques and innovations. This approach has carried over into modern-day extension services which often use field days, workshops, and on-farm demonstrations to educate farmers about new technologies and practices. While it is a historical artifact, the Jesup Wagon’s pioneering approach to agricultural education continues to shape the way Extension services operate today. It was this very invention that influenced and informed the practices of agricultural extension services in order to bridge the gap between agricultural education and the community.

Furthermore, modern-day Jesup Wagons are utilized throughout the country for educational programming and allow for a greater transfer of knowledge and interaction between agents and communities, emphasizing the three foundational missions of a land grant. Today, in the same areas where the Jesup Wagon originated, Alabama Extension uses three modern-day wagons that provide a laboratory setting focused on water, STEM, and nutrition (Williams, 2022).

Conclusions and Recommendations

After examining the impacts of the Jesup Wagon, it is the researcher's recommendation that extension agents implement programs that highlight the heritage and historical contributions of Blacks. Leveraging historical heritage can be a meaningful approach to recruit, retain, and empower Black youth in the agricultural realm. These programs should place a spotlight on the

narratives and experiences of Black community leaders, educators, and professionals, who can serve as positive examples for youth. One promising avenue involves actively involving youth in projects designed to document and preserve local Black history. Additionally, these initiatives should provide hands-on experiences, mentorship opportunities, and interactive workshops to help youth gain a practical understanding of their true potential. To culminate such programs, extension agents can arrange community-wide events or exhibitions full of performances, presentations, and displays where participants can proudly showcase what they've learned and accomplished throughout their journey. By taking these deliberate and inclusive steps, extension agents can create programs that not only pay homage to the valuable contributions of Black individuals both past and present, but also ignite a profound sense of cultural identity and inspire Black youth to reach their full potential. In doing so, they become the leaders their ancestors demonstrated they could be, carrying forward a legacy of excellence and resilience.

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COMPLETED PROJECT: OTHER

Successful Programming for the Recruitment of Underrepresented Students in Agriculture: A Case Study of a Diversity Initiative at an 1862 Land-Grant University

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Successful Programming for the Recruitment of Underrepresented Students in Agriculture: A Case Study of a Diversity Initiative at an 1862 Land-Grant University

Introduction and Review of Literature

Limited research has been conducted on the recruitment of underrepresented populations for 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 sociocultural distribution of students populating public schools in the U.S. over the last two decades (Aud et al., 2012). As a result, the makeup of the agricultural industry has been predicted to have an influx of individuals identifying as an underrepresented population (Alston et al., 2019, 2020).

Efforts to recruit underrepresented populations will be critical, considering that by 2050, the global population has been predicted to exceed nine billion people (Food and Agriculture Organization [FAO], 2017). 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, 2017). On this point, the FAO (2015) estimated that 40% of the global workforce was involved in agricultural labor. However, the 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 have different backgrounds than themselves (Platt, 2004).

The USDA (2020) reported that although the educational attainment of underrepresented groups increased over the last two decades, they remained only half as likely as White citizens to have a bachelor's degree or higher. Many students from underserved communities, especially racial minority students, have historically held negative connotations about the agricultural industry (Bullock et al., 2021; Talbert et al., 1997). 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 (Soler et al., 2022). Despite the benefits of attracting more diverse students, a problem has persisted regarding the lack of knowledge about successful programming strategies that colleges of agriculture can use to attract these populations. In response, the current investigation examined a strategy implemented by Louisiana State University (LSU) College of Agriculture (CoA), an 1862 land-grant university, that aimed to attract underrepresented students 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, (d) first-generation college students, and (e) students with documented learning, physical, psychological, or other disability.

Conceptual Framework

This study was guided by Chapman's (1981) model of student success. 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 LSU CoA based on their inclusion in a diversity initiative for underrepresented student populations. By identifying potential factors influencing enrollment decisions, colleges of agriculture could better design recruitment strategies for these populations.

Background of Study

The LSU CoA created the Ag Fellows Program to provide underrepresented students with the knowledge and resources to help them navigate the LSU matriculation process. This study analyzed outcomes from the Fall 2021 and 2022 cohorts. Students accepted into the Ag Fellows Program were invited to attend in the fall semester of their senior year of high school. The program consisted of (a) keynote messages from the CoA administrators, (b) personal visits with faculty from each of the agricultural academic departments, (c) interactions with current LSU students, (d) meetings with admissions representatives, and (e) formal tours of the university campus. After completing the program, participants received a scholarship on the caveat that they enrolled in the CoA at LSU. The participants' prior experiences in agriculture and agricultural youth organizations, such as 4-H and FFA, ranged from no experience to highly experienced. In both years of the program, $14,000 in scholarships were awarded to Ag Fellows Program participants.

Purpose of Study

The purpose of this study was to describe the Ag Fellows' perceptions of the program's effectiveness in recruiting and preparing them to navigate the LSU matriculation process. One research question guided this study: How did the LSU Ag Fellows Program support students identifying as an underrepresented population?

Methodology

Throughout this investigation, we used an instrumental case study approach (Stake, 1995) to examine the experiences of Fall 2021 and Fall 2022 Ag Fellows Program participants. In this study, the case was bounded by time and place; for example, the participants were all members of the Fall 2021 or Fall 2022 cohorts and identified as belonging to an underserved student population. 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. Table 1 provides an overview of the participants' academic and personal characteristics.

Table 1

Participants' Academic and Personal Characteristics

Pseudonym	Race	Gender	Hometown	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	Agricultural Education	Heterosexual
Amy	White	Female	Rural	Lower Class	Agricultural Business	Heterosexual

Note. We used the U.S. Census Bureau's (2020) 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.

In qualitative research, researchers must be conscious of how their biases, values, and experiences influence their ability to collect and interpret data. As a result, we must acknowledge and disclose our relevant backgrounds. The lead researcher identified as a white, cisgender female. Additionally, she was a graduate assistant in the LSU CoA Agriculture Office of Recruitment and Retention, where she helped facilitate recruitment events and initiatives, including the Ag Fellows Program. The other researchers assisted with the analysis of data and were faculty at LSU. We were all proponents of advancing effective diversity, equity, and inclusion (DEI) recruitment initiatives.

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 CoA Diversity Council selected students who met the academic and demographic qualifications. In total, six program participants agreed to participate in this study. Interviews were conducted individually through Zoom video conference software based on participants' availability. The interviews were transcribed via Sonix transcription software to ensure clarity. We also used the following sources of data to triangulate the findings of this investigation: (a) participants' application and essay responses, (d) open-ended responses to feedback surveys, and (e) official communication about the Ag Fellows Program.

After completing data collection, we implemented Saldaña's (2021) qualitative coding procedures. To analyze each data source, we performed the first cycle of coding through the use of attribute, in vivo, and values coding approaches (Saldaña, 2021). Attribute coding features a

descriptive approach to analyzing data. Meanwhile, in vivo, coding refers to examining verbatim dialog (Saldaña, 2021). For the final first-cycle coding approach, we employed values coding, which allowed us to analyze participants' attitudes, beliefs, and perspectives. In total, 284 unique codes emerged after completing the first cycle of coding. We then employed axial coding to reduce codes into categories to explore existing relationships of first-cycle codes. This helped emerge patterns in data and assisted in distilling meaning. After employing our second-cycle coding, we met as a research team to negotiate findings using thematic analysis, which ultimately helped emerge the study's three themes.

Findings

The findings for this investigation emerged through three themes, representing the Ag Fellows' perceptions of the program's effectiveness and how it influenced their decision to pursue a degree in the LSU CoA. 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 reported that the personalized departmental meetings with faculty "clarified" their academic pathway or "solidified" their decisions. On this point, Sam reported: "[Departmental visits] pretty much just solidified my decision. I obviously had been accepted, but I was continually getting acceptances from other degree options. So, I was just like, 'No, LSU is where I want to be.'" 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 reported that they felt they needed more experience in the industry to major in agriculture before their involvement in the Ag Fellows Program. "I have never had any experience with agriculture in my entire life. This was completely new to me," said Ashley. However, the participants expressed optimism in adapting to the challenge of having limited exposure to agriculture after the program. Li stated: "I don't really have much background in [traditional] agriculture. But the Ag Fellows Program helped me realize I could have a place in agriculture" In fact, half of the study participants reported that they "were not involved" or "had not heard of" agricultural youth programs such as FFA and 4-H during high school, which they perceived served as a barrier to them enrolling in an agricultural-related degree. However, the Ag Fellows Program opened Anne's eyes to the idea that "not having that 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 CoA 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

Familiarity with other program participants, current students, and the LSU CoA administration allowed the Ag Fellows to grow more comfortable in the campus environment. Each of the study participants revealed feelings of anxiety and nervousness prior to attending the Ag Fellows Program. Sam stated, "I was a little nervous. It's not really common for me to see programs that are this open [to underrepresented students] about their acceptance." Participants also reported that they were met with a "welcoming" and "accepting" attitude from the LSU CoA 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 saw 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 program, students began to engage in conversation with peers and faculty. All of the Ag Fellows reported that they also learned about resources and student organizations offered by the LSU CoA, which helped them feel like they were part of something bigger.

Conclusion, Implications, and Recommendations

Through our analysis of the data, we determined that the findings of this investigation could be beneficial to assisting colleges of agriculture with the strategic planning and the advancement of future recruitment initiatives for underrepresented student populations. In this study, half of the participants reported little to no agricultural industry experience. The remaining participants reported having some exposure to traditional agriculture. Therefore, we conclude that before participating in the Ag Fellows Program, the participants viewed agriculture as a space in which they largely did not belong – a concept supported by the work of Bullock et al. (2021) and Talbert et al. (1997). However, after participation in the program, the participants appeared to become inspired to pursue a degree in the CoA– a notion that has been under-explored in the literature on the recruitment of underrepresented students in agriculture.

We also concluded 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 CoA. Through these interactions, the participants were able to plan their academic journey better 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 CoA staff and administration, promoted a sense of belonging amongst the program's cohort. Before the Ag Fellows Program, the participants reported being nervous. However, introducing the participants to the campus environment and resources available to underserved student populations contributed to developing their feelings of support. As such, some participants reported feeling at home and welcomed. Such sentiments support the work of Alston et al. (2019, 2020).

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 participants' decision to engage in the Ag Fellows Program and enroll in the LSU CoA. Data from participants supported Chapman's (1981) model regarding the importance of significant persons and the college's atmosphere in 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 perhaps could lead to the refinement of Chapman's (1981) model.

Moving forward, we recommend that LSU CoA 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 to support students identifying as an underrepresented population. To achieve a wider reach, we recommend that the LSU CoA make communication of event details and advertisement of the Ag Fellows Program application more accessible. The dissemination of the program information could be achieved through sponsored social media advertisements, a dedicated website, an email campaign, and letters to students in school districts that historically serve underrepresented populations. This investigation also revealed 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 administrators may better prepare students for personal and academic development before their freshman year. Because familiarity with faculty and staff was found to influence underserved students' decisions, we recommend that networking opportunities be created with these individuals so that high school students may ponder a degree in agriculture earlier. Finally, we recommend that administrators, faculty, and recruiters in colleges of agriculture more clearly articulate scholarship and funding opportunities associated with agricultural degree programs to potential underrepresented student populations since this has been reported as a barrier to recruitment and retention efforts in colleges of agriculture (Soler et al., 2022).

As the global population expands and the demand for food and fiber increases, the agricultural industry and U.S. colleges of agriculture must further investigate effective recruitment approaches for underrepresented student populations (Alston et al., 2019, 2020). Additional research will be needed to examine whether the Ag Fellows Program can lead to an influx of educated, diverse employees into the agricultural workforce. Future studies should also examine the effect of increased outreach to parents/guardians of underrepresented students interested in agriculture. Researchers may also consider the effect of including alumni who identify as an underrepresented population in recruitment initiatives. The inclusion of these individuals may help underrepresented students perceive they belong in agriculture.

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

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

Introduction and Review of Literature

In recent decades, a growing body of evidence has suggested that graduates must have adequate knowledge and skills to work in a globalized society (Goecker et al., 2015; 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 thrive in today's competitive workforce (Goecker et al., 2015). Consequently, it has become crucial for students to enhance their global competence to be successful in their future careers (Roberts et al., in press). On this point, the Longview Foundation (2008) suggested that globally competent students should have (a) knowledge about international geography, cultures, economy, and issues, (b) the ability to communicate across cultures, and (c) ethical citizenship. To foster the development of these competencies for students, Conner et al. (2017) called for agriscience teachers to integrate global concepts into their curriculum more profoundly. However, many agriscience teachers have reported lacking the global knowledge and skills needed to teach such competencies to their students (Roberts et al., in press)

A globally competent teacher should possess (a) international knowledge of their subject matter, (b) skills to teach students about multiple viewpoints, and (c) a commitment to help students be responsible global and local citizens (Longview Foundation, 2008). To help promote the acquisition of these skills, 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).

Nevertheless, 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). Despite these benefits, 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., in press). 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 (1978) 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). 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.

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 (USDA-NIFA #092345). 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 the 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. Two research questions guided this study: (1) How have the SBAE teachers' perspectives changed one year after

participating in an international experience? and (2) How have the agriscience teachers' lived experiences in Costa Rica inspired them to instill global competence in their students?

Methodology

Phenomenological research guided this study (Moustakas, 1994). 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. The participants for this study were agriscience teachers who participated in an international experience in Costa Rica. In total, five participants agreed to participate. 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.

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 important 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. It is important to note that 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).

To gain a deep understanding of the phenomenon, we dedicated an immense amount of time to collecting and synthesizing the data (Tracy, 2010). Therefore, the primary source of data collected was individual, semi-structured interviews, 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, written statements, and other artifacts collected during the international experience.

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 by utilizing 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 discussed in the findings section.

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 demonstrate the essence of the phenomenon – one year after an international experience in Costa Rica, the Louisiana agriscience teachers underwent growth 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. 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. Also, the experience abroad led the participants to become more culturally aware. On this point, Participant #4 revealed that he "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 the global news more to understand how various issues affected the agricultural industry.

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. 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." 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 [landscape] look pretty." Another participant articulated the need to adopt some of the practices of Costa Rica in terms of their eco-friendly mindset. She stated: "We need to adopt some harvest methods…better utilize our water structures" (Participant #5).

Theme 3: Professional Growth

Throughout their time in Costa Rica, the teachers were asked to process their experiences. To achieve this, they journaled and captured photographs and videos. The agriscience teachers reported that they drew 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." 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." Participant #5 echoed a similar sentiment: "[We] have started to recycle and reuse items more since I have returned." 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).

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. Similarly, Participant #5 explained: "Until you have been there and seen something like that, you can't really connect to those experiences." Participant #2 reiterated the importance of travel to experience new ideas. She explained: "Traveling is good…. helps us to relate and reference how things are done in different places." The impact of this international experience led these teachers to feel a sense of responsibility in making sure that their students were also becoming globally aware. This notion was expressed by Participant #4, who stated: "Our job as teachers is to be able to share that global perspective" and "[I] encourage all teachers and students to take the opportunity to travel abroad."

Conclusions, Discussion, 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 key 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 the way the participants reevaluated their personal assumptions and gained a more holistic understanding of global agriculture; specifically, regarding cultural awareness. For example, the teachers reported watching global news and trying to stay up to date with issues more 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 they were exposed to concepts that were 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. This finding also was 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 theme, *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 not only with their peers but also with their students. Further, the teachers reported using their experience abroad to talk about global issues while incorporating the curricular 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. Our findings also suggested that the teachers were working to establish a globalized curriculum and held positive beliefs about incorporating such concepts into the agriscience curriculum. This concept was supported by Mezirow's (1991) TLT, which postulated that perspective changes occur after individuals experience a disorienting dilemma, i.e., the international experience in this investigation, which leads to actionable change. 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. However, further research should 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. It should also be noted that a limitation of this study was that the international experience was only one week. Perhaps a longer experience would 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.

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Simulation in Agricultural Sciences: Innovations and Applications for Better Outcomes. A Systematic Literature Review

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Simulation in Agricultural Sciences: Innovations and Applications for Better Outcomes. A Systematic Literature Review

Introduction

In agricultural sciences, educators are increasingly using simulation as an effective tool to recreate real-life situations in a controlled learning environment. This enables students to better comprehend complex concepts, navigate various scenarios, and make informed decisions (Basche et al., 2021; Grzybowski, 2013; Lee et al., 2022). Simulation has been utilized in various educational fields, but its specific application in agricultural education needs more research.

Studies have shown the positive impact educational technology in general can have on learning outcomes. For example, virtual reality and immersive learning technology have been found to be effective in experiential and architectural education (Asad et al., 2021; Ummihusna & Zairul, 2021). Mobile computer-supported collaborative learning and digital games have also shown promise in science education (Amara et al., 2016; Ullah et al., 2022). In teacher education, simulations have been found to improve classroom management and teaching skills (Theelen et al., 2019). However, assessments should go beyond the cognitive domain to accurately measure learning outcomes. Moreover, the use of simulation technology in agricultural sciences remains relatively underexamined, creating some levels of uncertainties as to the impact the technology could make when narrowed down to this discipline.

Our systematic literature review analyzed the effectiveness and practicality of simulation as an educational technology in agricultural education. By examining research papers, we sought to establish a comprehensive understanding of integrating simulation into agricultural curricula and identify its strengths and weaknesses. Ultimately, our review sought to contribute to the knowledge about how simulation technology can enhance agricultural education and ensure that students are better equipped to face the ever-evolving agricultural landscape. The aim of this literature review was to evaluate the effectiveness of simulation technology in agricultural education, specifically in terms of learning outcomes. The research questions that guided the study were:

1. What are the publication details, research methods, and data collection techniques used in the included studies?
2. What are the benefits and challenges of using different types of simulation technology in agricultural education, considering factors such as duration and intensity?
3. How does simulation technology affect students' academic performance?

Theoretical Framework

Kolb's (2014) experiential learning theory provides a solid foundation for the use of simulation technology in agricultural education. This technology allows students to gain hands-on experience through immersive and realistic virtual farm environments, crops, and livestock, while minimizing risks. Students are encouraged to reflect on their actions, critically analyze their decisions, and identify areas for improvement. By connecting these experiences with theoretical knowledge, they develop conceptual frameworks that enhance their understanding.

Through active experimentation and analysis of outcomes, students can improve their critical thinking skills and practical expertise in a safe environment.

Methods

Search Strategy

We conducted a comprehensive search of five databases (CAB Abstracts, AGRICOLA, ERIC, Education Source, and Web of Science for Collection) for articles on simulation technology and agricultural education published from January 2000 to September 2022. After screening for eligibility, we found only 17 articles suitable for coding.

Inclusion Criteria

To be included in this literature review, studies must analyze the impact of simulation on agricultural education and be published from 2000 to 2022 in a journal, conference proceeding, or thesis. They must also provide details on the assessment method used, sample size, experimental design, and specific results, as well as include measurable learning outcomes such as academic performance and final scores.

Coding Scheme

We developed a comprehensive coding system to efficiently extract data from studies. Our coding form covers substantive and methodological aspects, including subjects (agricultural sciences- practical sciences in agriculture; agricultural engineering; agricultural leadership, education and communications (ALEC); agricultural economics and finance, and mixed subjects), educational levels, research methods, data collection approaches, instruments used, and sample sizes. It also includes information on the types of simulation used in agricultural education, intervention characteristics, and the effects of simulation on learning outcomes. A summary of the included studies is shown in Table 1.

Table 1.

Summary of Included Studies

Article	Subject	Educational level	Research methods	Effect of Simulation on learning outcome
Boyd et al. (2002)	ALEC	Undergraduate	Quantitative	Positive
Garza et al. (2022)	Agricultural engineering	Undergraduate	Quantitative	Mixed
Briggeman et al (2012)	Agricultural economics & finance	Undergraduate	Quantitative	Positive
Heibel et al. (2022)	Agricultural engineering	Undergraduate	Quantitative	Positive
Heibel et al. (2021)	Agricultural engineering	Undergraduate	Quantitative	Positive
Bunch et al. (2014)	ALEC	Secondary	Quantitative	No statistically significant impact
Davis et al (2012)	Agricultural science	Undergraduate	Quantitative	Positive
Klit et al. (2018)	Agricultural science	Undergraduate	Quantitative	Positive
Hasselquist et al. (2021)	ALEC	Undergraduate	Qualitative	Mixed
Garza et al. (2022)	Agricultural engineering	Undergraduate	Quantitative	Mixed

Perry & Smith (2004)	Agricultural science	Undergraduate	Quantitative	Positive
Strong et al. (2022)	Agricultural science	Undergraduate	Mixed	Positive
Trifan (2011)	Agricultural science	Undergraduate	Quantitative	Positive
Wells & Miller (2022)	Agricultural engineering	Undergraduate	Qualitative	Mixed
Wells & Miller (2020)	Agricultural engineering	Mixed	Quantitative	No significant impact
Wery & Lecoeur (2000)	Agricultural science	Undergraduate	Quantitative	Positive
Witt et al. (2011)	ALEC	Graduate	Quantitative	No significant impact

Results and Discussions

Substantive and Methodological Features of the Studies

Subjects

Out of the 17 studies analyzed, simulation technologies were most used in agricultural sciences (n = 7, 41.2%), followed by agricultural engineering (n = 6, 35.3%) and ALEC (n = 3, 17.6%). Only one study (5.9%) reported the use of simulation in agricultural economics and finance. These results suggest that agricultural sub-disciplines inclined towards the sciences, which involve experimentation and practical application, may be more likely to utilize simulation technologies compared to social sciences like ALEC, agricultural economics, and finance. For example, studies by Klit et al. (2018), Perry & Smith (2004), and Webb et al. (2015) focused on simulation use in animal science.

Educational level

Out of the studies conducted, 76.47% (n = 13) were at the undergraduate level, while 11.76% covered two different educational levels. Only 5.88% of the studies were conducted at the secondary and graduate levels each.

Research methods

The study found that the quantitative method was used in fourteen (82.4%) studies, while two (11.8%) used the qualitative approach and only one (5.9%) used the mixed-method approach. The importance of research methods and design to outcomes was well documented. Various research designs were identified, including three-arm cohort studies (Klit et al., 2018), pre-posttests (Briggeman et al., 2012; Witt et al., 2011), randomized post-test only (Wells & Miller, 2020), and quasi-experimental designs (Bunch et al., 2014). One of the two qualitative studies used a case study approach. Advocacy for the increased use of mixed-methods research approach was identified, but how this can become more integrated into simulation researchers in the field of agricultural education could be a subject of interest in the future.

Characteristics of Simulation in Agricultural Education

Types of simulation

Virtual and augmented reality (n = 9, 52.94%) were the most common types of simulations used in our 17 studies. Computer-based simulation (n = 3, 17.65%) and digital games (n=3, 17.65%) followed, while interactive/online simulation (n = 2, 11.76%) was the least utilized. These results

suggest that virtual/augmented reality is ideal for agricultural education, as seen in six studies that used it for welding in agriculture.

Effects of simulation

Most studies (n = 11, 64.71%) showed positive effects of simulation, followed by non-significant (n = 4, 23.53%) and mixed (n = 2, 11.76%) results. These findings suggest that simulation/digital games are effective and have a positive impact on learners in the majority of studies.

Benefits and Challenges

Benefits

Acquiring knowledge through active engagement and real-world application is emphasized by educational technology based on constructivism (Jumaat et al., 2017). Previous studies demonstrate the benefits of simulations and digital games, including increased motivation, cognitive learning skills, critical thinking, problem-solving abilities, cooperative communication skills, feedback provision, and improved learning achievement (Dunleavy et al., 2009; Sotiriou & Bogner, 2008; Zhou et al., 2008; Xu et al., 2022).

Simulation and digital games can replicate real-world problems using multimedia replicas such as images, video, 3D environments, and animations. These technologies target higher-order cognitive skills, including critical thinking, problem-solving, and application of knowledge, fostering creative thinking skills. For example, educational technology can present intricate information, enhancing students' creativity by integrating technology into various creative processes (Liu et al., 2022).

In our included studies, some provided evidence of improved knowledge and skills. Trifan (2011) demonstrated that virtual laboratories helped students better understand topics in soil science. Davis et al. (2012) highlighted the role of educational technology in providing lifelike experiences in realistic environments. As Bloom et al. (1964) suggested, experiential learning can enhance students' cognitive learning). Hence, simulations can promote cognitive skills by simulating real-world learning experiences. For instance, a game-based virtual reality simulation for farrowing management aided low-performing Danish agriculture students in developing essential pig farming skills, reducing piglet mortality (Klit et al., 2018). and Briggeman et al. (2012) also investigated an internet-based agricultural bank simulation game, which improved students' understanding of finance, economics, and banking concepts in a virtual environment. Computer-based simulations enhanced students' leadership concepts and enabled the real-world application of knowledge (Boyd & Murphrey, 2002).

Simulation and digital games can positively influence students' psychological factors, including motivation, attitude, and engagement. These technologies actively engage learners through sensory interactions, leading to improved knowledge retention, a better understanding of abstract concepts, and memory retention (Garzón et al., 2019). Firstly, simulations and digital games can increase motivation by providing competitive and fun experiences. This, in turn, helps students reach their optimal psychological states by maintaining an appropriate level of anxiety, self-efficacy, and comfort.

Scholars have previously indicated that educational computer games effectively mimic motivational aspects (Gee, 2003; Virvou et al., 2005). Digital games have proven to increase students' motivation, with interpersonal competition promoting positive attitudes (Byun & Young, 2018; Ke & Grabowski, 2007). Our included studies also showed that games were enjoyable and fun and enhanced student participation and interest (Briggeman et al., 2012). Trifan (2011) mentioned that virtual labs in agronomy made learning enjoyable and motivating. Perry & Smith (2004) indicated that a competitive atmosphere was created through the reproductive simulation exercise, increasing students' enthusiasm and desire for deeper understanding through competition.

Effective teaching encompasses four factors: the quality of instruction through clear and well-organized lessons, the proper level of instruction tailored to individual learners' difficulty level and learning rates, incentives that motivate students, and sufficient time for adequate instructional sessions (Cheung & Slavin, 2012). Simulation and digital games actively improve teaching by incorporating these four aspects of learning. Computer technology allows for sufficient practice and feedback, which enhances learning quality (Cheung & Slavin, 2012). Our findings reveal three common themes in incorporating simulations and digital games in education: providing instant feedback, promoting student engagement, and offering personalized learning for better instructional quality.

Simulation and digital games offer instant feedback. In our included studies, Klit et al. (2018) pointed out that game-based learning is active, experiential, and problem-based, providing immediate feedback. Several studies explored the instant feedback function in welding. Heibel et al. (2022) revealed that personalized feedback from virtual welding simulators enhances learners' skill acquisition (Heibel et al., 2022). Wells & Miller (2022) suggested that virtual reality welding provided adequate feedback using visual cues. Another study investigated welding processes using an Augmented Reality Welding system, where arc-on mode provided instant prompts/feedback, facilitating meaningful learning (Garza et al., 2022). Simulation and digital games, with personalized feedback, scaffold visual and auditory cues, help learners develop welding performance skills (Heibel et al., 2021).

Challenges

Agricultural education faces challenges with simulation and digital games, including time-consuming decision-making (Briggeman et al., 2012; Wery & Lecoeur, 2000) and potential physical discomfort like cybersickness. Practical exercises are also time-consuming, and VR simulations can lead to negative experiences like headaches and nausea (Strong & Palmer, 2022). Simulation is a supplement to good teaching (Bunch et al., 2014) and may pose additional challenges like game addiction or financial costs.

Conclusions and Recommendations

Agricultural professionals face growing incidence and complexity of agricultural challenges that must be resolved to maintain and increase the production of agri-food systems (Talbert et al., 2022). Therefore, agricultural educators continue to seek educational innovations that aid young professionals' skills and knowledge development, aiming to prepare a competent and efficient agricultural workforce. Some of the most exciting and emerging educational innovations that

have shown interesting effects on agricultural professionals are simulation technologies. This systematic review explored the learning outcomes of simulation technologies in agricultural education. Our results offer timely and relevant insights for agricultural education, remarkably when many programs increase their academic offerings through digital education (Joshi et al., 2022).

The study indicates that simulation technologies in agricultural education have two main educational outcomes: (1) higher-order cognitive skills, including critical thinking, problem-solving, and knowledge application, and (2) creative thinking skills. Similar outcomes have been observed in other teaching disciplines such as medicine, nursing, and business education. However, implementing simulation technologies in agricultural education poses new challenges such as their time-consuming nature and users' physical discomfort.

Our study highlights the potential of simulation technologies in agricultural education and identifies gaps in the literature. To further advance this field, future research should focus on exploring simulation technologies in both academic levels and knowledge domains, while integrating pedagogical reasoning. Agricultural education leaders must also promote simulation technologies as a resource by providing adequate resources, professional development opportunities for teachers, and tailored lessons for students. It is crucial to consider the available resources and characteristics of the student communities when implementing simulation technologies in teaching and learning.

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Perceived Masculinity and Femininity Levels of Secondary Youth Leadership

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Perceived Masculinity and Femininity Levels of Secondary Youth Leadership

Introduction

Reaching gender equity in the classroom is prevalent in US legislature and politics since the late 19th century when the likes of Susan B. Anthony and Jane Addams started to encourage women to become more educated. Another prominent moment in the history of achieving gender equity in the classroom that cannot be ignored is the passing of Title IX in 1972. Since Title IX, participation in high school athletics is nearly evenly split between male and female enrollment and girls are no longer prevented or discouraged from taking classes previously only thought to be suitable for boys. As a result of Title IX and movements for further access to education for all, girls now outnumber boys in college enrollment in the United States (Terrier, 2020).

The discrepancy between the performance of boys and girls in the classroom continues to be a researched phenomenon, often referred to as the "gender achievement gap." Studies not just in the US but throughout the world have highlighted findings of academic performance and achievement in girls compared to boys (Doornkamp et al, 2022; Downey & Vogt Yuan, 2005; Fortin et al., 2015; Jones & Dindia, 2004; Meichenbaum & Bowers, 1969; Terrier, 2020; Voyer & Voyer, 2014, Yu et al., 2020). What is contributing to these differences? Why are boys falling behind? Some theorize that teachers are creating self-fulfilling prophecies in their classrooms (Rosenthal & Jacobson. 1968) and just outright expecting more of girls, or less of boys.

Another complexity in gender achievement gap is potential teacher gender bias as well as the typically associated masculine or feminine stereotypes some school subjects seem to have, such as the "masculine" science and math, and more "feminine" languages. Teachers may reinforce these stereotypes in their classrooms leading to the success of one gender, or perhaps the discouragement of another. For example, one study by (Doornkamp et al., 2022) examined gender bias in teachers in a traditionally masculine math class and feminine languages class, Dutch, and found that male math teachers expected more out of boys even though girls had better marks by the end of the year. Female Dutch teaches had less of a gender bias, but still were found to expect girls to succeed more in the subject than boys. A study conducted in Beijing middle and high schools found that girls outperform boys at most subjects on end of year achievement tests, even in subjects that boys initially scored well in at the beginning of the year (Lai 2010). And it is not just on standardized tests that girls outperform. Girls, on average, get better grades overall even despite the stereotypes that may be ascribed to certain subjects (Voyer & Voyer, 2014). This isn't to say that boys cannot succeed in school, in fact certain populations of boys outperform certain populations of girls (Yu et al., 2020), but perhaps a myriad of factors that are contributing to the gender achievement gap.

Something that may compound this issue further is what makes the ideal student. Teachers have noted that girls often volunteer in class, participate in activities, and leave their comfort zone more often than boys seem to (Ricketts et al., 2004). Boys are less motivated, only doing what they think is necessary to pass the class and move on. The less motivated boys (Fortin et al., 2015) have already decided career goals that do not require good grades. In addition, girls often exhibit better classroom citizenship (Downey & Vogt Yuan, 2005) and thrive in the academic environment that schools have today.

There exists a lack of literature in school-based agricultural education [SBAE] relating to the gender achievement gaps and what it means for the career and technical student organizations [CTSO] associated with SBAE. Recent trends such as most new agricultural educators being female, and the existing gender achievement gap has not been thoroughly explored either. One study investigated evaluating the effectiveness of single-sex classrooms in Kentucky SBAE (Wasden, 2020) programs found that the academic performances of both boys and girls in single-sex classrooms were higher than those in control classrooms.

Theoretical Framework

The way people grow up, experience culture, and create expectations for what is stereotypically acceptable reflect how we view men and women in leadership roles. The differences and similarities in sex reflect gender role beliefs (Wood & Eagly, 2010), which then represents a society's perception of men's and women's social roles. Social Role Theory seeks to explain how societal expectations and norms shape and influence the behavior, roles, and attitudes of individuals. Individuals' roles and positions in society, especially with gender in mind, impact their behaviors, perceptions, and beliefs.

Role expectations and acquisitions start early in life as parents, caregivers, and peers model the assigned roles and associated expectations with those roles. Media, cultural influence (Wood & Eagly, 2010), and educational institutions (gender achievement citation) play a crucial role in both reinforcing and challenging these traditional roles and norms. An individual adhering to or distancing themselves from these stereotypically behaviors may find varying levels of success or obstacles whether in classrooms (Yu et al., 2020) or in jobs.

Individuals are expected to exhibit certain traits or behaviors in accordance with their gender and position. For most of history, leadership and authoritative positions have been a man's job and women could be seen as ineffective in those roles just for the expectations the then-society had for women. That they couldn't possibly hold those roles because they did not have what it takes. As culture continues to progress and develop, these social gender roles can change. Women can now possess these leadership roles, but what behaviors can be expected of their newfound positions? Are women expected to display solely feminine traits or solely masculine traits? A combination of them?

We have seen changes in gender makeup of various leadership bodies from the small local level to the 118th Congress of the United States. A record number of women hold seats in this Congress, up to a total of 28.7% (Center for American Women and Politics, 2023). Youth organizations have also seen an unprecedented rise of female leadership, with student organizations like the FFA often reporting that chapter officer teams are featuring more and more girls stepping into officer roles, with some teams reporting half or a majority girl officer team (Ricketts et al., 2005).

Purpose

The purpose of this descriptive research design was to explore the relationship between elected youth leadership officers, gender identity, and the perceived traits the selected officers exhibit in STATE schools with agricultural education and associated FFA chapter. The following objectives were set to help achieve the study's purpose:

Objective 1: Describe the demographics of chapter FFA officers in STATE public schools by leadership role held.
Objective 2: Describe the masculinity levels of each chapter officer as perceived by the chapter advisor.
Objective 3: Describe the femininity levels of each chapter officer as perceived by the chapter advisor.
Objective 4: Describe the differences between masculinity and gender by the office held.
Objective 5: Describe the differences between femininity and gender by the office held.

Methods

To reach the expectations and provide clear explanations of the research objectives, the researchers implemented a descriptive research design. Descriptive research is used to obtain information concerning the current status of the phenomena and to describe "what exists" with respect to variables or conditions in a situation (Erickson, 2017).

Agriculture teachers have a close interaction with their FFA officer teams and are engaged in multiple events that engage the individual leaders in a variety of roles (Clemons & Lindner, 2019; Ingram et al., 2018); thus, the teacher is knowledgeable regarding each student's characteristic and personality traits (Rausch et al., 2016). Because of the teacher/officer relationship within agricultural education, the researchers selected secondary agriculture teachers throughout the Commonwealth of Kentucky. All teachers (N = 280) were asked, through an email list serv to complete a questionnaire regarding the six constitutional officers associated with the FFA chapter at their school. A teacher did not qualify to complete the questionnaire if they were entering their first year of teacher at the school (n = 52) due to the lack of knowledge in the officer cohort. Three emails were sent over a 3-month period requesting teachers to participate. To address frame error, the researchers utilized the most recent email database provided by the state department of education. Late responders were compared to the overall group to address non-response error (Lindner et al., 2001). A total of 127 teachers completed the questionnaire.

The questionnaire consisted of two parts: 1) the sexual identity of the officers; and 2) the masculine and feminine traits from a Rasch adapted version of the 20-item Bem Sex Role Inventory [BSRI] (Geldenhuys & Borsch, 2020). After multiple test and retest, Geldenhuys and Borsch (2020) determined the BSRI to be a valid and reliable instrument in evaluating perceived masculinity and femininity. The data was analyzed and used measures of central tendencies and descriptive statistics were selected to describe the findings.

Results

Research objective 1 sought to describe the chapter officers in the chapters throughout Kentucky. Although 127 teachers completed the questionnaire, over half did not participate in identifying the sexual orientation of their officers. Table 1 displays that females served as the largest population for each office with the exception on the office of Sentinel.

Table 1
Sexual Identify of Chapter Officers in Kentucky

Office	Male	Female	Nonbinary

	(*f*, %)	(*f*, %)	(*f*, %)
President	17 (28.3%)	43 (71.7%)	0
Vice President	19 (31.7%)	41 (68.3%)	0
Secretary	11 (18.6%)	48 (81.4%)	0
Treasurer	28 (46.7%)	32 (53.3%)	0
Reporter	9 (15.3%)	50 (84.7%)	0
Sentinel	30 (50.0%)	27 (45.0%)	3 (2.2%)

Teachers perceived that their chapter president exhibited the greatest amounts of masculinity (*m* = 4.18; *SD* = 0.89) followed by the chapter Vice President, Secretary, Treasurer, Sentinel and Reporter.

Table 2

Perceived Masculinity Levels of Chapter Officers in Kentucky

Office	*m*	*SD*	Range	Minimum	Maximum
President	4.18	0.89	4.10	1.60	5.70
Vice President	4.06	0.98	4.40	1.30	5.70
Secretary	4.03	0.94	3.70	2.30	6.00
Treasurer	3.84	1.05	3.90	2.10	6.00
Reporter	3.66	0.96	4.20	1.20	5.40
Sentinel	3.78	1.08	4.50	1.50	6.00

Teachers perceived that their chapter Reporter exhibited the greatest amounts of femininity (*m* = 4.44; *SD* = 1.01) followed by the chapter Secretary, President, Vice President, Sentinel, and Treasurer.

Table 3

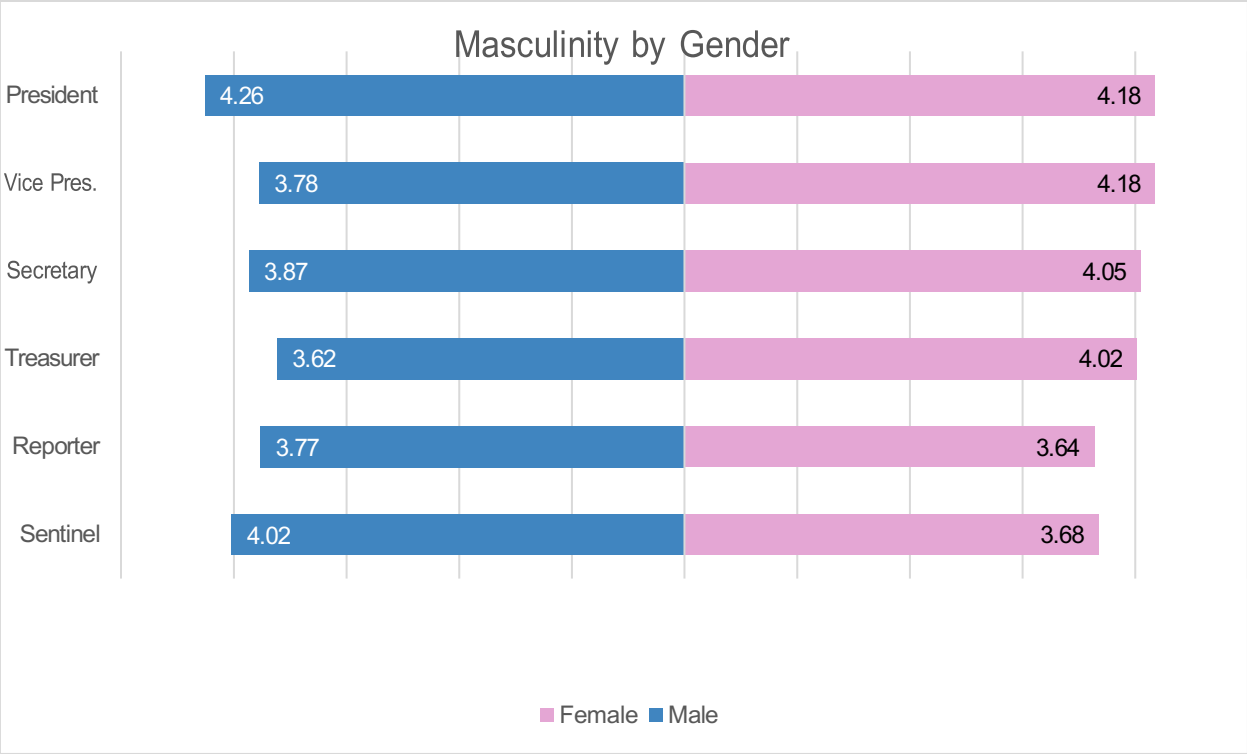
Perceived Femininity Levels of Chapter Officers in Kentucky

Office	*m*	*SD*	Range	Minimum	Maximum
President	4.01	0.96	3.60	2.40	6.00
Vice President	4.00	0.98	4.30	1.70	6.00
Secretary	4.10	1.04	3.90	2.10	6.00
Treasurer	3.76	1.28	5.00	1.00	6.00
Reporter	4.44	1.01	3.70	2.30	6.00
Sentinel	3.94	1.21	4.60	1.40	6.00

Objective four sought to describe the differences in masculinity in each chapter office by the sexual identity. Due to the minimal number (*n* = 3) of non-binary students, measures of central tendencies were not calculated for this group, with respect to objective four. Male chapter Presidents were perceived to exhibit the highest levels of masculinity (*m* = 4.26; *SD* = 0.79) followed by female chapter Presidents, Vice Presidents, Secretaries, and Treasurers. Male Treasurers were perceived to exhibit the least masculinity of all officers by gender.

Table 4

Perceived Masculinity of Chapter Officers by Gender

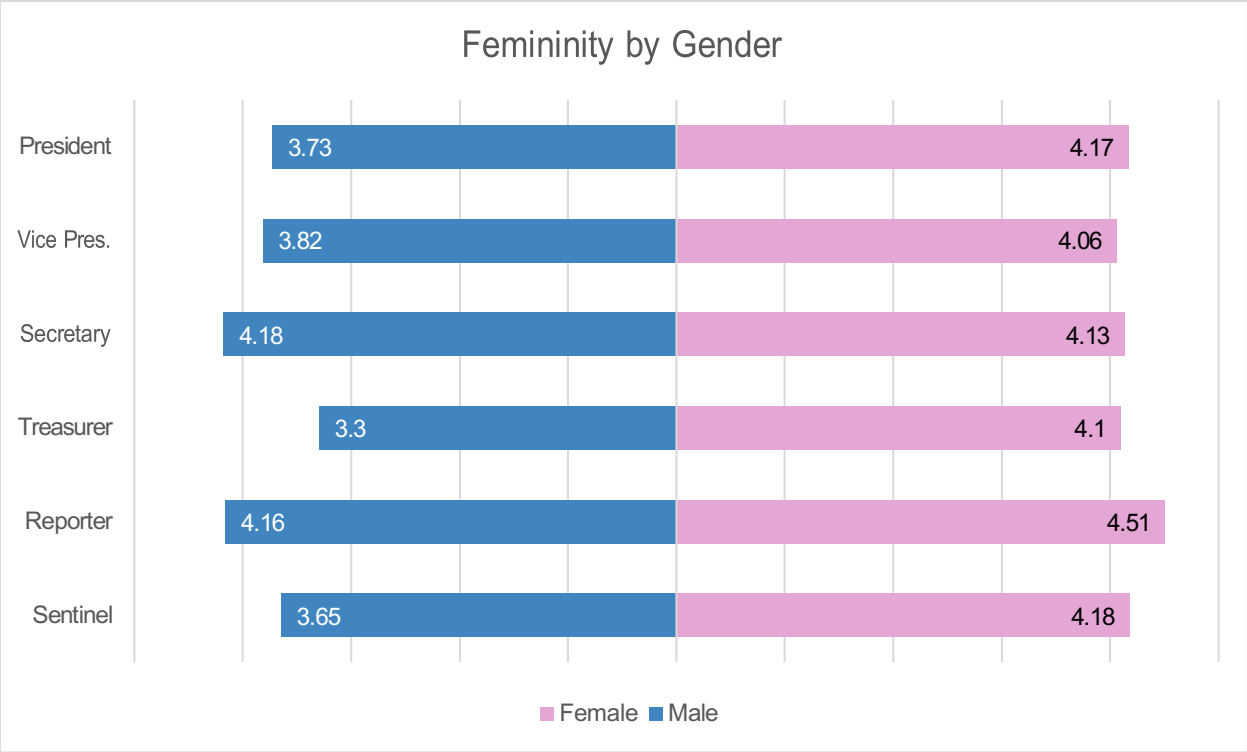


NOTE: Standard deviation for the variables are as follows: male presidents; .79, female presidents; .91; male vice presidents; .82, female vice presidents; 1.04, male secretaries; .84, female secretaries; .97, male treasurers; .93, female treasurers; 1.14, male reporters; .87, female reporters; .99, male sentinels; .98, female sentinels;

Objective five sought to describe the differences in femininity in each chapter office by the sexual identity. Due to the minimal number ($n = 3$) of non-binary students, measures of central tendencies were not calculated for this objective. Female chapter Reporters were perceived to exhibit the highest levels of femininity ($m = 4.51$; $SD = 0.96$) followed by female chapter Sentinel and the male chapter Secretary. Male Treasurers and female Vice Presidents were perceived the lowest in femininity.

Table 5

Perceived Femininity of Chapter Officers by Gender



NOTE: Standard deviation for the variables are as follows: male presidents; .91, female presidents; .95, male vice presidents; 1.10, female vice presidents; 1.27, male secretaries; 1.13, female secretaries; 1.03, male treasurers; 1.28, female treasurers; 1.13, male reporters; 1.46, female reporters; .96, male sentinels; 1.14, female sentinels;

Conclusions, Implications, and Recommendations

Masculinity and femininity is a discussion across public schools and in society. In 2019 the American Psychological Association, in an effort to help practitioners assist their patients and improve lifestyles, removed four traits from training and counseling practices (Chu & Gilligan, 2019; Pappas, 2019). At one point, researchers assumed that masculinity and femininity were two different ends of a pendulum and that individuals should identify strongly with the gender roles that were conferred by one's biological sex; however, psychosocial and, more specifically, Social Role Theory tells us that societal expectations and preferences shape and influence behaviors. In this study, we see evidence that the majority of student leaders in an agricultural youth organization throughout Kentucky, are females, which is a shift from the norms that once were held by males (Ricketts et al., 2004).

Although the shift in the officer roles exist, the shift from masculinity to femininity did not occur as female officers maintained the overall highest perceived scores in masculinity. In a state where the majority of the chapters come from rural backgrounds where conservative traditional gender roles are present in the communities, one may assume that the levels of masculinity would decline among the female leadership and femininity would increase. Nevertheless, the implications, as described by Social Role Theory that the teacher, parents, peers, school, and community expects leaders within the youth organization to exhibit a level of masculinity and femininity and the students, whether male or female are working to exhibit these expectations. More information is to be desired, thus a longitudinal study tracking officer teams over the next 10-years is needed in order to determine if a shift occurs in the masculinity and femininity

dynamic. Teachers should examine their own expectations of their officer teams to determine if they lean toward more masculine or feminine characteristics.

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Comparing Program Management and Planning Needs of Oklahoma Agricultural Educators between Single and Multiple Teacher Programs

Introduction and Framework

Needs assessments have served as a tool for identifying the needs of in-service school-based agricultural education (SBAE) teachers for many years (Barrick et al., 1983; DiBenedetto et al., 2018). The program planning and management category of effective teaching characteristics for SBAE teachers includes effectively managing, operating, and evaluating the agricultural education program (Roberts & Dyer, 2004). SBAE teachers have consistently identified these program management characteristics and tasks as a professional development need (DiBenedetto et al., 2018; Figland et al., 2019). While needs assessments have been conducted across SBAE (Coleman et al., 2020; DiBenedetto et al., 2018; Figland et al., 2019; Roberts & Dyer, 2004), few have focused on the number of teachers and the management of a total SBAE program, even though maintaining these aspects is an expectation of SBAE teachers.

For the purposes of this study, a multiple teacher program consists of two or more SBAE teachers who share responsibility in leading the same program, whereas single teacher programs have only one SBAE teacher. Multiple teacher programs can be considered a team which shares leadership of the program. Teachers are empowered when they are put in a position to share in leadership to make decisions for themselves and the success of their students (Vernon-Dotson & Floyd, 2012). The teamwork approach of distributive leadership leads to more lateral decision-making within an organization (Northouse, 2022). This shared leadership can produce a more effective team as multiple individuals are investigating and providing potential solutions to team problems (Northouse, 2022).

Additionally, Vernon-Dotson and Floyd (2012) contended that "teachers feel a sense of value when they have a voice in the type of professional development opportunities in which they participate" (p. 47). This idea is consistent with the Theory of Andragogy (Knowles et al., 2020), which served as the theoretical framework for this study. Teachers are adult learners in professional development situations; therefore, determining learning needs is a first step in the learning process (Knowles et al., 2020). The six principles of andragogy include (1) the need to know, (2) the learners' self-concept, (3) the role of the learners' experiences, (4) readiness to learn, (5) orientation to learning, and (6) motivation (Knowles et al., 2020). In addition to these principles, adult education should consider the goals and purposes for learning which are individual growth, institutional growth, and societal growth (Knowles et al., 2020). Individual learner differences, subject matter, and situational differences should also be accounted for when instructing adults (Knowles et al., 2020). This holistic approach to adult education is used when assessing and planning adult education such as teacher professional development (Figland et al., 2019; Knowles et al., 2020).

Purpose and Objectives

The purpose of this study was to compare the program management and planning needs of Oklahoma school-based agricultural education teachers in single and multiple teacher programs. Two research objectives guided this study:

Identify the program management and planning needs of Oklahoma SBAE teachers.

Compare the professional development needs between single and multiple teacher programs according to their program management and planning needs.

Methodology

This research was part of a larger study (Rankin et al., 2023). This non-experimental, descriptive research study employed a census approach to reach all Oklahoma SBAE teachers (N = 462). To achieve this goal, data were collected in-person at 25 regional State 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 329 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 FFA 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 cancellations or travel limitations. This effort resulted in five non-respondents completing and returning the survey instrument to the research team.

Most of the teachers were traditionally certified in agriculture (79.2%) with other certifications held including alternative certification (15.2%), traditional certification in a subject other than agriculture (2.1%), and emergency certification (3.3%) while two teachers did not indicate their teacher certification route. Two hundred and thirty (69.9%) teachers identified as male, 92 (28.0%) teachers as female, and 7 chose not to answer. Ethnicity was reported with 242 teachers identifying as white (73.6%), 54 as American Indian (16.4%), 1 as Hispanic, 23 as two or more races, and nine did not indicate their ethnicity. Of the 329 responses in the program planning and management section, teaching in a single teacher department was designated by 196 (59.9%) respondents and 131 (39.8%) respondents identified teaching in a multiple-teacher department with two respondents not indicating their program's number of teachers.

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 school-based agricultural education (SBAE) teachers. Oklahoma does not emphasize industry-based certifications, so this section, which included 13 items, was removed. 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. As a result, two items (*Completing the FFA Quality Chapter Planning Guide* and *Developing an agricultural academy*) were removed due to irrelevance to Oklahoma, five of the items were adjusted because of their double-barreled nature, three of the items were re-worded for clarity, and general readability edits were made. Three items were added to the instructional practice section: (a) *Highlighting technology in agricultural education courses*, (b) *Highlighting engineering in agricultural education courses*, and (c) *Highlighting connections to workforce in agricultural education course*.

In total, the questionnaire included 21 items related to program management and planning. Each of these items used two five-point Likert-type scales (i.e., *1 = low agreement*, *5 = high agreement*). On the first scale, participants were asked to rate their current knowledge level of the item (perceived ability). On the second scale, participants were asked to rate the degree of relevance the item had to their job (perceived importance). The final section of the questionnaire allowed participants to indicate their personal and professional characteristics (e.g., years of experience, number of teachers in their department, pathway to teacher certification, sex, ethnicity, and so forth.

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). To address the purpose of this study, participants were divided into two categories based on the number of teachers in the program: (a) single teacher programs, and (b) multiple teacher programs.

Findings

Program management and planning needs were assessed for two groups: single teacher (n = 196) and multiple teacher program (n = 131). Rank discrepancy scores (RDS) were calculated for each of the 21 items. Table 1 shows the rank and RDS for each item in each of the two groups.

Table 1

Program Management and Planning Needs by Number of Teachers

	Single Teacher (n = 196)		Multiple Teacher (n = 131)	
Rank	Item	RDS	Item	RDS
1	Completing FFA proficiency award application	-26.020	Completing FFA proficiency award application	-31.298
2	Completing FFA national chapter award application	-19.898	Completing FFA agriscience fair award application	-27.481
3	Completing FFA agriscience fair award application	-17.857	Completing FFA online membership roster	-21.374
4	Chapter Fundraising	-14.286	Chapter Budgeting	-19.847
5	General strategies for coaching Career Development Events (CDEs/LDEs)	-11.224	Supervising SAE programs	-18.321
6	Using a local advisory committee	-10.714	Developing business and community relationships	-18.321
7	Preparing reports for administrators	-10.714	Completing FFA national chapter award application	-16.794
8	Chapter Budgeting	-10.204	Chapter Fundraising	-15.267
9	Collaborating with teachers in other subjects	-10.204	Developing a complete agricultural education program (3 circle model)	-15.267
10	Developing a complete agricultural education program (3 circle model)	-9.694	Repairing agriculture tools and equipment	-15.267
11	Organizing program support groups (FFA Alumni, booster club, etc.)	-9.184	Developing SAE opportunities for students	-12.977
12	Supervising SAE programs	-8.673	Conducting parent/teacher conferences	-12.214
13	Utilizing Ag Experience Tracker	-8.673	Utilizing Ag Experience Tracker (AET)	-11.450
14	Evaluating the local program	-8.673	Organizing program support groups (FFA Alumni, booster club, etc.)	-11.450
15	Completing FFA online membership roster	-7.143	Developing FFA Program of Activities	-10.687
16	Developing SAE opportunities for students	-7.143	Using a local advisory committee	-9.924
17	Repairing agriculture tools and equipment	-7.143	Preparing reports for administrators	-6.107
18	Developing business and community relationships	-6.633	General strategies for coaching Career Development Events (CDEs/LDEs)	-4.580

	Single Teacher (n = 196)		Multiple Teacher (n = 131)	
Rank	Item	RDS	Item	RDS
19	Conducting parent/teacher conferences	-5.612	Collaborating with teachers in other subjects	-4.580
20	Selecting course offerings/content to fit the needs of students and the community	-5.612	Evaluating the local program	-4.580
21	Developing FFA Program of Activities	-5.102	Selecting course offerings/content to fit the needs of students and the community	3.053

There was a need indicated for each of the 21 items by those in single-teacher programs. *Selecting course offerings/content to fit the needs of students and the community* was the only item with a positive RDS by those in multiple teacher programs.

Conclusions, Implications, and Recommendations

Completing FFA proficiency award application was the top-ranked item for both groups, indicating a professional development need in this area. Additionally, the top three program management needs for all teachers were related to completing FFA award records or applications. These needs may indicate an emphasis on the value of FFA over other components of SBAE programs in Oklahoma. Teachers in M\multiple-teacher programs reported a greater need for supervising SAEs when compared to single-teacher programs, which may indicate multiple-teacher programs have less capacity to manage SAEs. *Collaborating with teachers in other subjects* was a greater need for those in single-teacher programs, which could be a result of not having additional SBAE teachers with whom to collaborate within their school. In addition, *Using a local advisory committee* was a higher priority need for single-teacher programs, indicating the programs with fewer teachers may also need advice from outside sources more often than those with more teachers in their program. *Developing FFA Program of Activities* was shown as a lower-priority need for single-teacher programs. The autonomy in planning and management of a single-teacher program could be a benefit to teachers in this aspect of their program.

Multiple-teacher programs may function as a team to distribute program management responsibilities. In these teams, there may or may not be a formal team leader (Hill, 2019; Northouse, 2022). This leads to a need for more research comparing single and multiple teacher SBAE programs as well as the leadership structure within those programs to determine if the number of teachers in a program impacts the capacity of teachers to manage and plan their program. It is recommended that future research include follow-up interviews to explore teachers' reasoning when ranking program planning and management needs as it is unclear if program management and planning needs were indicated due to a genuine lack of knowledge or capacity. These results were shared with Oklahoma SBAE supervisors and SBAE teacher association to encourage professional development offerings for teachers. As such, it is recommended that tailored professional development opportunities be offered for teachers of

different program sizes and capacities. Teachers should be willing to participate in this professional development as they were involved in the decision-making process by identifying needs (Figland et al., 2019; Knowles, 2020).

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A Needs Assessment of Georgia Elementary Agriculture Education Teachers

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Introduction, Purpose, and Objectives

In 2022, the Georgia Elementary Agriculture Education three-year pilot programs transitioned to the status of ongoing programs (Georgia House Bill 1303, 2022). During this time, the prevalence of EAE programs in Georgia's elementary schools steadily increased (Georgia Agriculture Education, 2023). Knobloch (2008) found an elementary teacher's extent to incorporate agriculture activities and content into curriculum was based off their belief and value of agriculture integration into the classroom and its ability to fit into current academic subjects. A teacher's perceptions and beliefs regarding agriculture are crucial not only to determine if they add agriculture into their classes, but also how. For elementary education student teachers, the higher level of knowledge about agriculture correlated to a positive perception, and those with agriculturally-based experiences were more confident teaching science content regarding agriculture (Humphrey et al., 1994).

The level of knowledge about agriculture for preservice elementary teachers had a wide variation (Humphrey et al., 1994). Mabie and Baker (1996) raised the question: "are elementary teachers prepared to teach science in such a manner?" (p.6) referring to incorporating agriculture experiential activities. For fourth grade teachers in Texas, a majority were teaching agriculture concepts, but had both finite knowledge and a wrong perception towards agriculture (Terry et al., 1992). In order to help prepare elementary teachers to teach agriculture, a network between agricultural educators and elementary teacher educators should be established (Humphrey et al., 1994). Those teachers that had some exposure to agriculture through a program or course have a truer perception and higher level of knowledge about agriculture (Terry et al., 1992). Trexler and Hikawa (2001) found that agriculture curriculum development for the elementary and middle school level can be hindered because of a lack of knowledge regarding agriculture and an unfamiliarity with teaching differently.

There were clear benefits to incorporating agriculture into an elementary classroom (Knoblock et al., 2007; Mabie & Baker, 1996), but a lack of teacher capability which is mostly based off their perception and level of knowledge (Knobloch, 2007). It is crucial to incorporate agriculture into education for everyone at young age because "educating the general public, including youth, about agriculture is an important aspect in shaping and changing attitudes towards agriculture's important role in our everyday lives" (Burrows et. al, 2020, p.359).

The purpose of the study is to identify in-service needs of elementary agriculture teachers in Georgia.

Theoretical/Conceptual Framework/Perspective

The conceptual framework for this study comes from Shulman's 1986 paper Those who understand: Knowledge growth in teaching, which outlines three different categories of knowledge a teacher should possess. First is content knowledge, "the amount and organization of knowledge per se in the mind of the teacher," (Shulman, 1986, p. 9). In the classroom, this knowledge involves defining and explaining facts, outlining materials' importance, and relating to other covered material (Shulman, 1986).

Second is pedagogical content knowledge, known as PCK, and is a teacher's understanding of content for teaching (Shulman, 1986). This involves the combination of subject matter knowledge and pedagogy (Shulman, 1986). Teachers must understand what makes information easy or hard for students to grasp, how a students' background will impact their learning, and successful teaching strategies (Shulman, 1986). Just merely knowing information or possessing teaching skills is not sufficient, the two must be combined.

Lastly, curricular knowledge is "the full range of programs designed for the teaching of particular subjects and topics at a given level, the variety of instructional materials available in relation to those programs, and the set of characteristics that serve as both the indications and contraindications for the use of particular curriculum or program materials in particular circumstances," (Shulman, 1986, pg. 10). This category of knowledge includes a teacher's ability to relate or connect content to other ideas and information outside of their subject. Similar to Pedagogical Content Knowledge, content knowledge is being applied at a deeper level.

Methods

Population and Sample Size

The population of this study was all elementary agriculture teachers across the state of Georgia during the 2020-2021 school year, which is a total of twenty-nine (N=29). This population was selected because of their direct involvement in teaching agricultural education and their ability to provide perceptions on teaching Georgia elementary agriculture standards. The sampling method used includes voluntary electronic response of teachers to a questionnaire distributed at the beginning of the school year, in September. All communication with teachers was done through email except for a phone call to participants that had not completed the survey five weeks after initially sent out. The total number of teachers that completed the questionnaire was sixteen (n=16).

Instrumentation

The instrumentation used to gather data was an electronic questionnaire facilitated using the online data collection service Qualtrics. A Borich needs assessment model was developed to determine elementary agriculture teachers' perceived level of importance and competency (Borich, 1980). This approach incorporates survey methodology to collect educational needs data (Garton & Chung, 1997). Completion of the needs assessment allows for the priority ranking of standards teachers need professional development in, which can then be used to design professional development or certification programs.

The first seven questions of the questionnaire address different subject areas and list the corresponding standards, put forth by Georgia FFA (Georgia FFA & Agricultural Education, n.d.). These questions measured perceived level of importance and perceived

level of competence teaching using a Likert scale with five options. For importance the options were not important, of little importance, somewhat important, important, and very important. Similarly, options for competence were not competent, little competent, somewhat competent, competent, and very competent. A third measure, suitability, was added to help gain an understanding on the appropriateness of the standards, from a teacher's viewpoint, specifically for employability skills. Suitability used a Likert scale with the five options being: not suitable, little suitability, somewhat suitable, suitable, and very suitable.

While the standards were organized by grade level, the questionnaire organized the standards by subject to reduce the number of sections in the survey. The first questions addressed employability skills and contained four items, the second was agricultural system and contained 24 items, third was foundations of agriculture with 19 items, fourth was leadership and career readiness with 18 items, and last was natural resource systems with 19 items. For the last section of standards, experiential learning, and leadership development, which complete the agricultural education three-circle model, the seven items were developed using Georgia's elementary school-based agricultural education school-based model (Georgia FFA & Agricultural Education, n.d.).

The next 11 questions gathered information about the demographics of the group of teachers, including years teaching, agriculture experience, and education. The final question was a ranking system to determine what forms of in-service professional development would be preferred. The question regarding teachers' previous agriculture experience was adapted from Bellah & Dyer (2006). The demographic information was placed at the end of the questionnaire to follow the tailored design method (Dillman et al., 2014).

Data Analysis

According to the Borich (1980) needs assessment model, the mean weighted discrepancy score (MWDS) was calculated for each item, or standard, in the survey. This was done using SPSS 27. The MWDS was determined by first finding the discrepancy score, calculated by taking the importance score of the standard and subtracting the competency score. The weighted discrepancy score was calculated by taking the discrepancy score for each individual and each standard and multiplying by the mean importance rating. MWDS was then calculated by adding all weighted discrepancy scores and dividing by the number of participants (Borich, 1980).

The MWDS allows for an understanding on the relationship between importance and competency for each item in the survey. These were organized numerically, from highest to lowest, to create a prioritization list of what standards need attention. The highest MWD scores shows participants believe the standard to be important but are not competent. Similarly, low MWDS shows participants to believe the standard to be unimportant and are competent.

A descriptive statistics test was performed to determine frequency and mean for the suitability and demographic data. The mean suitability was calculated for each standard

and then ranked from lowest to highest with lowest being not suitable. Demographic data was analyzed using means and frequency counts when appropriate. This data analysis provided an idea on general demographics of the group of teachers teaching elementary agricultural education in Georgia.

Results/Findings

Inservice Needs of Elementary Agriculture Teachers

In order to determine in-service needs of elementary agriculture teachers in Georgia, Mean Weighted Discrepancy Score (MWDS) were calculated (Borich, 1980). A larger MWDS means elementary agriculture teachers believe the individual standard is important, but they themselves are not competent, which would categorize the standard as a professional development need. Negative MWDS shows teachers believe the standard to be not important and they have a high level of competency. Table 3, displayed below, shows the MWDS for each standard listed from largest to smallest.

Table 1

MWDS sorted from largest to smallest for each elementary agriculture standard

Standard	*MWDS*
Integrate agriculture experiential learning techniques into your teaching	1.89
Teach hands-on activities that encourage problem solving	1.62
Analyze the importance of animals in agriculture and examine the role they play in the lives of consumers	1.56
Discuss and cite examples of the way agricultural products address human needs for food, clothing/fiber, and shelter	1.54
Analyze household and daily used items to determine how they were made (Georgia Commodities)	1.43
Investigate the origin of certain by-products	1.39
Compare and contrast the past and present importance of agriculture products and by-products in your community and around the world	1.35
Teach lessons where students explore effective communication	1.35
Teach lessons where students explore setting goals	1.35
Explore and cite examples of agricultural history, economics, and inventions	1.33
Investigate how agricultural biotechnology is used in Georgia agriculture.	1.29
Connect the role of pollinators in agriculture	1.25
Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities	1.20
Identify agriculture commodities, business, and industries in your area.	1.17
Differentiate and understand parts of plants and how they are utilized in	1.16

agriculture	
Collect, display and explain the parts of a production animal and the importance of each part	1.13
Teach hands-on activities that encourage decision making	1.08
Teach lessons where students explore teamwork	1.08
Teach lessons where students explore making good choices	1.08
Demonstrate career awareness through the appropriate use of various technologies to learn about opportunities available in the national career clusters	1.05

*The top 20 items received MWDS above 1.0.

MWDS ranged from 1.89 to -2.74, it is important to note that the MWDS are utilized primarily to determine the teacher training priorities in rank order. The top two standards determined as highest need were pedagogy related and not content related. Other topics that were a high need focused on agricultural products, including commodities and by-products, goal setting, and communication. Standards that addressed subjects like animal science, agriculture mechanics, and natural resources were seen with a large range of MWDS.

Georgia elementary agriculture standards determined as the lowest need for professional development include FFA related content, which is not included in the elementary agricultural education model, which may indicate this should be removed as a standard. Other standards that were ranked low, but not lowest, have topics focused on communication, work ethic, leadership, and soft skills.

Conclusions/Discussion/Implications/Recommendations

The MWDS was used to determine the in-service needs of elementary agriculture teachers in Georgia. The items with the highest MWDS are those that will become the largest priority in future professional development programs. This study is the first needs assessment for elementary agriculture teachers, and the literature available for comparison is nonexistent. Needs assessments have been done for middle and high school agriculture teachers and can be examined to see if there are similarities and differences. Due to the differences in age, thinking capabilities, standards, and teacher requirements, connections made with the literature will be for context and should be examined critically.

The top five standards for in-service needs contained words or phrases that call for higher order thinking from students like “integrate,” “analyze,” and “problem solving.” In contrast, Comparability, Davis and Jayaratne found that agriculture teachers need “application of problem-based learning” and “planning and delivering lessons to utilize higher order thinking skills” to be effective educators in the 21st century (2015, p.51). At the middle school level, teachers want standards to reach those higher order thinking skills (Rayfield & Croom, 2010).

Standards determined as a high service need must have content and pedological method addressed equally for teachers to have a full understanding (Shulman, 1986). In order to reach these standards that require higher level thinking from students, teachers must combine both the age appropriate pedological knowledge and subject specific content knowledge. As these teachers are not formally trained in both agriculture and elementary education, a gap in knowledge could exist that prevents the two from being combined, causing teachers to struggle with these specific standards.

Overall, there was no emerging theme or specific area of agriculture content for the lower rated in-service needs. Previously, it was found that middle school agriculture teachers in Georgia rated student field trips, parent teacher conferences, filling out taxes and the development of procedures for the classroom as least important for in-service needs (Golden et al., 2014). Also in Georgia, agriculture teachers felt most confident in teaching horticulture topics (Peake et al., 2007). Similarities were seen between low MWDS and low suitability scores.

Implications

In-service needs for elementary agriculture teachers were outlined in this study and should be incorporated into future professional development. Teachers have shown what they believe to be suitable for their students and standards they need the most help with, therefore EAE teacher professional development and pre-service training should strive to meet these needs to better teachers and their school programs. Standards that were deemed as a lower suitability are not getting the attention in the classroom required or taught to the specific level and should be reconsidered to prevent this in the future.

While the data shows a majority, 75%, of elementary agriculture teachers are either certified to teach elementary education or agricultural education, it is important to determine what components from each are essential for future teachers to possess. Should teachers have more of an elementary pedological background knowledge and combine it with agriculturally based content knowledge? How will a teacher use key components from both elementary and agricultural education to develop their own pedagogical content knowledge?

Recommendations for Future Research

This study determined in-service needs of elementary agriculture teachers in Georgia. While multiple educational aspects were examined, there are still others that should be considered to further understand the professional development needs of teachers. This includes determining what standards teachers are incorporating in their classroom, how long they spend on specific agriculture topics, and what teaching methods are most used. Teacher educators need to be preparing EAE teachers to teach in a manner that allows for students to reach a higher level of thinking (Bloom, 1956). Similarly, future research should determine if the education of teaching methods for higher order thinking allows teachers to become more comfortable with standards requiring it and if they implement this into the classroom.

Further research is needed on effective methods used by elementary agriculture teachers when it comes to experiential learning and personal and leadership development on the elementary

school-based agricultural education three-component model. The original three-circle model for middle and high school agriculture has been sound for as long as agricultural education has been around, but studies show middle school, high school, and now elementary teachers need help implementing it properly (Garton & Chung, 1997; Golden et al., 2014; Layfield & Dobbins, 2002; Smalley et al., 2019; Sorensen et al., 2010).

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Determining Instructional Design Effects on Self-Efficacy, Interest, and Knowledge in a Small Engines Course

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Introduction

Quality of instruction is an important element of student learning and ultimately career-readiness (National Research Council [NRC], 2000), particularly for preservice school-based agricultural education (SBAE) teachers (Shoulders et al., 2013). Small engine maintenance and repair is a subject many SBAE teachers are expected to teach; however, it is the least taught agricultural mechanics subject at the post-secondary level (Clark et al., 2021). Due to this lack of instruction, small engine maintenance and repair has been an area where current SBAE teachers have lacked technical skills (Wells & Hainline, 2021), and was identified as a topic where SBAE teachers need professional development in instructional planning and evaluation (Hainline & Wells, 2019). Because of expectations placed on SBAE teachers to teach small engines and the minimal instruction received, the need exists to maximize the quality of instruction in this area. A critical evaluation of procedures used to teach small engine concepts at the post-secondary level is needed to identify best practices for increasing the quality of instruction preservice SBAE teachers receive in small engine courses.

Literature Review/Theoretical Framework

This study examined three important factors regarding instruction in a small engines course: increases in student knowledge, interest, and self-efficacy. Scholars have suggested that using diverse instructional methods impacts the effectiveness of teachers, quality of instruction, and students' knowledge gains (NRC, 2000; Rosenshine & Furst, 1971). In an agricultural mechanics context, Pate et al. (2004) found that students in a small engines course increased their knowledge of engine troubleshooting after using a think-aloud protocol. However, while instruction in agricultural mechanics has historically relied upon varying hands-on, student-centered methods taught in the classroom or laboratory (Newcomb et al., 2004; Talbert et al., 2022), few studies have examined student learning in agricultural mechanics using experimental designs. More studies have examined students' perceptions, and when tasks are perceived as difficult, student knowledge gains, student interest, and self-efficacy can be negatively affected (Niemivirta & Tapola, 2008). Conversely, knowledge gains and increased student performance have been related to higher self-efficacy (Bailey et al., 2017). Interest, however, is not necessarily always related to task performance or knowledge gain (Hackett & Campbell, 1987; Nuutila et al., 2021). While related, studies have shown that knowledge gains are not substantially impacted by either student interest or self-efficacy, rather it is likely the instructor who plays a larger role through quality instruction (Guo et al., 2020).

Situated Learning Theory (SLT; Bell et al., 2013; Green et al., 2018) served as the theoretical model for this study. According to SLT, the learning environment can be composed of

three different areas: the use of a constructivist learning approach, teaching and evaluation in an authentic context, and the use of social interaction to enhance learning (Bell et al., 2013; Green et al., 2018). SLT highlights the need for all these areas to be present to increase long-term learning (Bell et al., 2013; Green et al., 2018). To achieve the purpose of this study, we used a constructivist approach by designing lessons where students' pre-lesson knowledge was assessed and then built upon using varying instructional methods. Laboratory activities served as an authentic context for learning and evaluation to occur. As part of evaluation in an authentic context, students used a reflection video to self-evaluate their knowledge on lesson topics. These videos allowed students to evaluate their own performance and recall what they did during a task by providing real-time, vivid, and physical evidence of their performance (Arikan & Bakla, 2011; Borg & Al-Busaidi, 2012). Social interaction was incorporated in the learning environment by pairing students to work together on various activities and videos. The use of cooperative learning has the potential to deepen understanding of course materials, and hence was chosen as a key component in instructional design (Gregg & Bowling, 2023).

Purpose and Objectives

The purpose of this study was to assess the effectiveness of an instructional treatment using video reflection on student learning. The objectives that guided the study were:

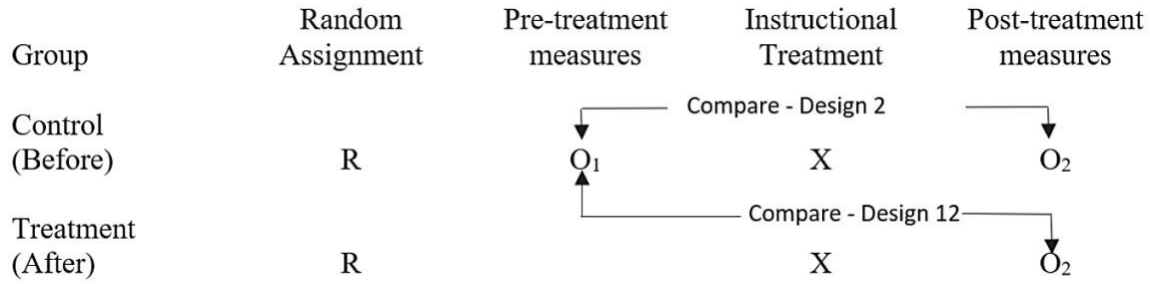
1. Compare pre and post knowledge levels, perceived self-efficacy, and subject matter interest of participants on the topic of precision measurement.
2. Compare pre and post knowledge levels, perceived self-efficacy, and subject matter interest of participants on the topic of carburetor part identification and function.

Methods

The population of this study was undergraduate students in the Small Power Units/Turf Equipment course at the University of Arkansas ($N = 32$) in the spring 2023 semester. After IRB approval was granted, two course topics were selected for assessment: precision measurement and carburetor part identification and function. This quasi-experimental study utilized two Campbell and Stanley (1963) designs (Figure 1) including a one-group pretest-posttest (design 2) and a separate-sample pretest-posttest (design 12). Design 2 compared pretest (O_1) and posttest (O_2) scores for control group participants only. Design 12 compared pretest scores (O_1) of the control group to posttest scores (O_2) of the treatment group. According to Campbell and Stanley (1963), design 12 controls for all threats to external validity and all threats to internal validity except for history, maturation, and the interaction of the two; design 2 served as internal replication. The entire study was replicated by completing the process with the topic of precision measurement and then with carburetor part identification and function.

Figure 1

Research Design with Statistical Comparisons for Designs 2 and 12 (Campbell & Stanley, 1963)



The 20-item instrument used for pretest and posttest measures for both instructional topics included three sections: perceived subject matter self-efficacy (nine items), subject matter interest (11 items), and subject matter knowledge (5 items). We chose to use the self-efficacy scale from the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich & De Groot, 1990) because it was designed to measure subject-specific self-efficacy and had a reported reliability of $\alpha = .89$. A sample item was "I expect to do very well on this topic". Items were rated from 1 = *not at all true of me* to 7 = *very true of me*. Subject matter interest was measured with the general interest scale from the Gable-Roberts Attitude Toward School Subjects (GRASS) instrument and had a reported reliability of $\alpha = .94$ (Gable & Roberts, 1983). A sample item was "The subject fascinates me". Items for the general interest scale were rated from 1 = *strongly disagree* to 5 = *strongly agree*.

The measure for subject matter knowledge was a 5-question, multiple choice, quiz developed by the research team with possible scores ranging from zero to 100. Questions were created to assess instructional objectives for each topic. For the topic of precision measurement, a sample question was "Which tool would be most appropriate for measuring piston ring gap?" For the topic of carburetors, a sample question was "Which of the following carburetor parts is the arrow pointing to in the illustration below?" Pretests were administered one class day before the instructional treatment, followed by two periods of classroom/laboratory instruction, and then a posttest the class day after treatment was completed.

The instructional treatment for precision measurement included a short demonstration and discussion of precision measurement tools, a laboratory hands-on guided practice activity measuring engine components, a homework sheet to practice reading micrometers, and a video reflection where students worked in pairs to explain the purpose, identify parts, and demonstrate how to use micrometers, telescoping gauges, and feeler gauges. The instructional treatment for carburetor part identification and function consisted of a one-hour class lecture on fuels and combustion chemistry, a one-hour class lecture on carburetor components, functions, and theory, one lab activity with a complete carburetor tear down, inspection, and reassembly, and a video reflection where students worked in pairs to explain the overall function of a carburetor, identify carburetor parts and their specific functions, and explain how fuel and air flow in the carburetor.

To establish validity for the knowledge scales, two members of the research team familiar with course content and assessment design created questions aligned with content learning objectives. The team worked together to ensure all questions were written at the "remember" level of Bloom's Taxonomy (Anderson et al., 2001). To determine reliability of both the precision measurement and carburetor instruments, *post hoc* reliability coefficients were

calculated for pretest (n = 16) and posttest (n = 32) scores (Table 1). Alpha coefficients for the self-efficacy and interest constructs were acceptable (Taber, 2018). The reliability of the knowledge construct was low but acceptable, except for the posttest reliability for precision measurement. According to Paek (2015) low reliability coefficients on knowledge scales can be associated with guessing, a possibility with students in the course.

Table 1
Construct Scale Reliabilities by Topic

	Precision Measurement		Carburetors	
Variable	Pretest	Posttest	Pretest	Posttest
Self-efficacy[a]	.89	.94	.91	.97
Interest[a]	.92	.96	.90	.94
Knowledge[b]	.59	.41	.77	.50

[a]coefficient alpha, [b]KR-20.

Data from this study were collected through paper copies of the pretests and posttests administered in class. A member of the research team scored knowledge sections and entered all data for each student into a spreadsheet. Frequencies and percentages were used to describe participant demographics while means and standard deviations were used to describe self-efficacy, interest, and knowledge. Paired-samples t-tests were used to compare pretest and posttest scores for Design 2. To compare pretest and posttest constructs for Design 12, a MANOVA was conducted with *post hoc* comparisons in SPSS v.28. Significance was established *a priori* at $p \leq 0.05$.

Results

Participants in this study identified as mostly male (f = 30, 93.75%). Three participants (9.38%) indicated they were freshman, nine (28.12%) sophomores, 10 (31.25%) juniors, and 10 (31.25%) seniors. For objective one, design 2: participants indicated positive perceptions of their self-efficacy and agreed they were interested in precision measurement on the pretest; mean scores on their knowledge pretest were 43.75 (SD = 30.3) (Table 2). As required by design 2, paired-samples t-tests were conducted to detect significant differences between the control group's pretest and posttest scores. A Bonferroni correction was used to adjust for Type I error with significance of 0.0125 established *a priori*. Results from t-tests indicated there were no significant differences in perceived self-efficacy [$t(15) = 1.40$, $p = .182$] or interest [$t(15) = 2.19$, $p = .045$]. There was a significant increase in knowledge scores [$t(15) = -3.58$, $p = .003$, $d = -.89$].

Table 2
Precision Measurement Pretest and Posttest Construct Scores for Design 2

	Pretest (n = 16)		Posttest (n = 16)	
Variable	*M*	*SD*	*M*	*SD*
Self-Efficacy	5.38	0.96	5.03	0.85
Interest	4.22	0.51	3.90	0.63
Knowledge	43.75	30.30	77.50	21.76

For design 12, pretest scores from the control group were compared to posttest scores from the treatment group for self-efficacy, interest, and knowledge pertaining to precision measurement. As summarized in Table 3, posttest scores indicated treatment participants had positive perceptions of their self-efficacy and somewhat agreed they were interested in the topic. Mean posttest knowledge scores were 81.25 (SD = 19.96). To test for significance in differences between control pretest and treatment posttest scores, a one-way MANOVA was conducted. The omnibus test indicated a significant difference between groups for one or more dependent variables [Wilkes' $\Lambda = 0.27$, $p < .001$, $n^2 = .733$]. Univariate ANOVAs indicated significantly lower scores for the treatment group on interest [$F(1,30) = 11.31$, $p = .002$, $n^2 = .274$] and significantly higher knowledge scores for the treatment group [$F(1,30) = 17.09$, $p < .001$, $n^2 = .363$]. No significant differences were found for self-efficacy [$F(1,30) = 0.22$, $p = .641$, $n^2 = .007$].

Table 3
Precision Measurement Pretest and Posttest Construct Scores for Design 12

	Pretest (n = 16)		Posttest (n = 16)	
Variable	M	SD	M	SD
Self-Efficacy	5.38	0.96	5.22	0.96
Interest	4.22	0.51	3.41	0.81
Knowledge	43.75	30.30	81.25	19.96

For objective two, pretest measures for design 2 of the carburetor topic indicated participants had positive perceptions of their self-efficacy and agreed they were interested in the topic. Mean knowledge scores were 66.26 (SD = 34.03) (Table 4). Results from paired-sample t-tests indicated no significant differences in perceived self-efficacy [$t(15) = 0.83$, $p = .42$], interest [$t(15) = 2.53$, $p = .02$], or knowledge scores [$t(15) = -1.62$, $p = .13$].

Table 4
Carburetor Pretest and Posttest Construct Scores for Design 2

	Pretest (n = 16)		Posttest (n = 16)	
Variable	M	SD	M	SD
Self-Efficacy	5.44	0.90	5.21	0.97
Interest	4.34	0.51	4.07	0.48
Knowledge	66.25	20.66	80.00	20.66

For design 12, pretest scores from the control group were compared to posttest scores from the treatment group for self-efficacy, interest, and knowledge pertaining to carburetors. Posttest scores indicated participants had positive perceptions of their self-efficacy and somewhat agreed they were interested in the topic. Mean posttest knowledge scores were 80.00 (SD = 20.66) (Table 5). The one-way MANOVA resulted in an omnibus test indicating a significant difference between one or more dependent variables [Wilkes' $\Lambda = 0.689$, $p = .014$, $n^2 = .311$]. Subsequent univariate ANOVAs indicated significantly lower scores for the treatment group on self-efficacy [$F(1,30) = 4.52$, $p = .042$, $n^2 = .131$] and interest [$F(1,30) = 7.27$, $p = .011$, $n^2 = .195$] and significantly higher knowledge scores [$F(1,30) = 1.91$, $p = .177$, $n^2 = .060$].

Table 5
Carburetor Pretest and Posttest Construct Scores for Design 12

	Pretest (n = 16)		Posttest (n = 16)	
Variable	M	SD	M	SD
Self-Efficacy	5.44	0.90	4.69	1.08
Interest	4.34	0.51	3.77	0.17
Knowledge	66.25	20.66	80.00	20.66

Conclusions/Discussion/Implications/Recommendations

Based on the results of this study, we found the precision measurement instructional treatment resulted in a significant increase in knowledge scores for both groups and slight decreases in self-efficacy and interest for both groups. The only significant decrease in interest was observed with Design 12 students. Possible reasons for the increase in knowledge can be the use of a laboratory experience, having high levels of perceived self-efficacy prior to instruction, and incorporation of all three components of the Situated Learning Theory (Bailey et al., 2017; Bell et al., 2013; Green et al., 2018; Pate et al., 2004). While it was beyond the scope of this study to determine why there was a decrease in self-efficacy and interest, a decrease is possible according to the literature and is not always associated with knowledge gain (Guo et al., 2020; Hackett & Campbell, 1987; Nuutila et al., 2021). If the topic of precision measurement was more difficult than students expected or they encountered failure with activities and evaluation, decreases in self-efficacy and interest could result (Niemivirta & Tapola, 2008). Based on pretest scores, students had little knowledge of precision measurement prior to instruction, indicating they may have overestimated their ability in the subject.

Similar results emerged for the carburetor topic. For students in both groups there were increases in knowledge, though not significant, and decreases in measured perceived self-efficacy and interest. The decreases in self-efficacy and interest were significant for students in Design 12. Possible causes for decreased self-efficacy and interest discussed for precision measurement could explain decreases for the carburetor topic as well. In the case of knowledge, pretest knowledge was higher than that of precision measurement and may explain why a significant increase was not found. With only 16 students participating in each design group, this study also may not have had the statistical power to detect a difference. The instructional treatment for carburetors included two one-hour class lectures related to the topic, while precision measurement did not. The extra time spent on the topic may have caused the decrease in self-efficacy and interest, because with more time, students can decide they are not interested in the topic and discover their self-efficacy was not as high as previously thought, although this was not a variable measured in this study.

With the internal replication of Designs 2 and 12, one might expect similar results if the study were valid and reliable. While the direction of changes in self-efficacy, interest, and knowledge were the same across both designs and with both topics, significance was not always the same across both designs. A limitation of this study was the small number of students in each group and could contribute to differences among the groups. The research team also acknowledges the low validity of the knowledge scale; thus, readers should use caution when interpreting results.

Instructors at the post-secondary level and secondary SBAE teachers could use methods described in this study to teach precision measurement and carburetor part identification and function if their goal is to increase knowledge of these topics. We recommend instructional designers keep in mind the three components of Situated Learning Theory when developing lessons. We also recommend the use of self-recorded videos to evaluate student performance as it provided the benefits previously described (Arikan & Bakla, 2011; Borg & Al-Busaidi, 2012). Relatedly, further research should be conducted to measure the impact videos have on perceived self-efficacy, interest, and knowledge gain. Identifying ways to maintain or increase both self-efficacy and interest while gaining knowledge would also be helpful for those wanting to teach topics related to small engines. Additional testing of instructional designs using Situated Learning Theory in agricultural mechanics and other agriculture topics is also encouraged.

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Tasks Associated with Teaching School-Based Agricultural Education: Supervised Agricultural Experiences

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Introduction, Purpose, and Objectives

"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 refine (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 multifaceted system of SBAE which teachers are expected to navigate (Haddad et al., 2022; Traini et al., 2021). One area that 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 & Osbourne, 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 on behalf of 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 within SBAE through the development of foundational and immersive SAEs (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).

Smith (2010) maintained 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 to supervising students' SAEs.

Theoretical/Conceptual Framework

The theoretical framework for this study was human capital (HC) theory. HC 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, HC 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' HC 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 HC, coining the term "task-specific human capital" (p. 203). The authors also posited that acquisition of specialized skills is linked to proficiency in performing tasks. Task-specific HC implies that value is inherent to the skills associated with completing job-specific tasks (Gibbons & Waldman, 2004) such as those related to teaching SBAE in each of the three components of the program model, including SAEs.

Methodology

This study was a part of a larger investigation (Best et al., 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 crucial 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 frame for the 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) 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 (59.09%) 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 to Round 2, and 20 (86.96%) 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), 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 duration of the investigation. Dalkey et al. (1972) indicated 13 responses are needed to establish a reliability coefficient of .90 within Delphi studies. The response rates of this study exceeded 13 participants per round, and each round was comprised of the same participants who responded to the three separate instruments; 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 agreement scale (*1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 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 the study.

Round 3 of the study sought to further refine consensus of agreement among the panelists (Brady, 2015) regarding the number of tasks. An electronic mail 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 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* also was used for Round 3 analysis. Tasks receiving this level of agreement were considered to have reached consensus of agreement among the panelists and were included in the final list of tasks associated with teaching SBAE regarding supervising students' SAEs. Tasks achieving a level of agreement of less than 80.00% failed to reach consensus of agreement and were removed from the study. Items achieving the 80.00% level of agreement in Round 2 and Round 3 were combined to form a final list of tasks.

Findings

Round 1

Panelists identified 168 tasks associated with the roles and responsibilities of a SBAE teacher regarding SAE in a typical year. Once 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 above mentioned themes, the most common tasks for each 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 supervising 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 a level 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 the study.

Round 3

Of the 20 tasks achieving 51.00% to 79.99% agreement in Round 2, panelists reached consensus of agreement (80.00% or more selecting *Yes*) for six tasks, 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 from the study. 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). Tasks achieving at least an 80.00% consensus of agreement in both Round 2 (39 tasks) and Round 3 (6 tasks) were compiled as a final list of tasks associated with teaching SBAE regarding supervising students' SAEs. In total, 45 tasks in 10 themes reached consensus of agreement.

Conclusions, Implications, and Recommendations

Three themes emerged as conclusions related to supervising students' SAEs. First, SBAE teachers are competitive in 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 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 the local community in the SAE component of their programs. SBAE teachers conduct tasks intended to enhance educational experiences by exposing students to community connections, establishing a professional network for students, and engaging them with the local community. Findings of the study supporting this conclusion were the inclusion of task 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 assertation that connections to the local community creates variety in local programming, thus making SBAE programs successful and important actors in local communities (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 include 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 of students' SAE projects. These conclusions support the claim that SAEs are an integral component of the SBAE model and serve as pivotal student learning experiences in agricultural education (Croom, 2008; Lewis et al., 2012).

Because this study was limited to the opinions of the panel of experts, its findings are not generalizable to the greater SBAE population. Instead, the study should be rigorously replicated with a greater sample size and more significant scope. It is recommended that a national study be conducted with regard to career phase (i.e., early, mid, and late career teachers), program size, and community and school expectations regarding SAE involvement. Moreover, it is recommended to evaluate the competence of preservice teachers in job-specific tasks related to SAE both before and after their clinical teaching experience. 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 inservice 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 these job-specific task through professional development opportunities tailored to their needs. Further, it is recommended that state staff in agricultural education use the findings to create curriculum and program management resources to better support teachers in carrying out 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 SAE reporting measures, and the development of a list of community work-based learning engagement best practices.

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 the profession 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 retention rates of those choosing to teach SBAE.

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Climate Variability Education Programs: Targeting Receptive Alabama Agricultural Producers

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Climate Variability Education Programs: Targeting Receptive Alabama Agricultural Producers

Introduction, Purpose, and Objectives

Climate change refers to the current and predicted changes in ecological impacts from the continual increase in greenhouse gas emissions (World Meteorological Organization, 2020). Climate variability refers to the short-term variations in regional climate patterns such as changes in seasonal temperatures or seasonal rainfall quantity and distribution (International Research Institute for Climate and Society, n.d.). Agricultural production is inherently connected to natural resources and will be directly impacted by climate change and variability. Extreme weather events, drought, flooding, and temperature variability will impact agricultural productivity around the globe (International Research Institute for Climate and Society, n.d.; Shaftel, 2020). Impacts of climate change and variability in North America are projected to come from changes to rainfall distribution and quantity, shifts in production areas, and temperature variability (Cohen & Miller, 2001; United States Global Change Research Program, 2018).

Climate-smart agriculture is an integrated approach to ensuring food security through transforming agricultural systems to not only adapt to climate changes, but also contribute to climate change mitigation (Food and Agriculture Organization of the United Nations, 2020; The World Bank, 2020; Consultative Group on International Agricultural Research, 2014). Climate-smart agriculture aims to simultaneously improve productivity, reduce greenhouse gas emissions, and enhance resiliency. Producers with higher resilience are less vulnerable to shocks and stressors caused by climate change and variability. Strengthening producers' adaptive capacity will reduce their vulnerability to the impacts of climate change (Kurukulasuriya & Rosenthal, 2003). This study sought to better understand Alabama agricultural producers' perceptions of climate change and variability threats as well as their level of adaptive capacity. The following research objectives guided this study:

1. Describe producers' attitudes towards specific climate terms.
2. Describe producers' experience with climate variability training.
3. Examine significant differences between adaptive capacity and climate terms.
4. Examine significant differences between adaptive capacity and climate variability training.

Theoretical/Conceptual Framework

Reducing a producer's vulnerability and increasing their resiliency is one of the most effective approaches to combat the uncertainty of climate change and variability (Food and Agriculture Organization of the United Nations, 2013). Resiliency is measured through the ability of individuals to respond to risk through mitigation and adaptation. Improving an individual's resilience involves reducing exposure, reducing sensitivity to shocks, and increasing adaptive capacity (Food and Agriculture Organization of the United Nations, 2013). Resilience Theory seeks to identify the most resilient actors in a system, the opportunities available for innovation and adaptive capacity, and the phases of adoption where resiliency can be improved (Atwell et al., 2008). Adaptive capacity is an essential part of resiliency and covers two dimensions: coping with uncertainty and recovering from shocks (Food and Agriculture Organization of the United

Nations, 2013). The ability of producers to successfully respond to climate variability is measured through adaptive capacity. Risk behavior and decision making are influenced by how a producer gathers information, perceives their self-efficacy, and the effectiveness of adaptation measures (Eakin et al., 2016). An individual's adaptive capacity directly relates to their decision-making. Five cognitive dimensions can be used to measure an individual's adaptive capacity to climate variability: (a) learning and knowledge seeking, (b) experimentation and risk-taking, (c) decision constraints, (d) adaptive management, and (e) perceived efficacy (Eakin et al., 2016; Gardezi, 2017). Measuring place and occupational attachment in addition to adaptive capacity can help predict individual transformation as having strong place and occupational attachment has been shown to increase willingness to adapt (Eakin et al., 2016). Place and occupational attachment is measured using three components: (a) value of agriculture, (b) individual-community interdependence, and (c) community commitment (Eakin et al., 2016).

Methods

This quantitative correlational study utilized descriptive survey research methods using an online questionnaire delivered through Qualtrics. The questionnaire was adapted from Eakin et al. (2016) and Gardezi (2017). Participants were asked to complete the three-part questionnaire on their experiences with and attitudes towards climate variability. The questionnaire collected data on adaptive capacity, place and occupational attachment, and personal demographics, farming operations, and climate variability educational needs. Participants were asked to respond to statements about their past experience with climate variability training, future interest in training, and attitudes towards the terms *climate change* and *climate variability*.

The target population was agricultural producers with Alabama Farmers Federation (ALFA) membership. ALFA works within every county of Alabama and supports its members through 17 commodity groups led by 12-person member committees (Alabama Farmers Federation, 2023). These committee members in addition to the county and state board members were selected through recommendations made by ALFA (C. M. Hornady, personal communication, July 28, 2020). Participants were contacted through the ALFA listserv. The questionnaire took approximately fifteen minutes to complete, and the data collection period lasted one month (July-August, 2020). Recommended web-based survey implementation methods were used such as email communications that were brief and gave clear instructions as well as sending reminders (Dillman et al., 2009). A pilot test was conducted with experienced professionals in our field to test for face and content validity. The nature of this topic along with consciously selecting participants only registered as members of ALFA are noted limitations to response rates and generalizability.

Statistical Package for Social Science (SPSS, 24.0) was used for data analysis and alpha levels were set *a priori* to .05. Participants' attitude towards climate terms and experience/interest in climate variability trainings were calculated using *frequencies, percentages, means,* and *standard deviations*. *T-tests* and *analysis of variance (ANOVA)* were used for examining significant difference. *Cohen's d* was used to determine effect size. *T-test* effect size used the interpretation: small (d = .20), medium (d = .50), and large (d = .80) and *ANOVA* effect size used the interpretation: small ($\eta 2$ = .01), medium ($\eta 2$ = .06), and large ($\eta 2$ = .14) (Cohen, 1988).

Findings

Agricultural producers in Alabama with ALFA membership was the target population for this study. The questionnaire was distributed to 871 ALFA members and a 27.32% ($N = 238$) response rate was achieved. Due to the low response rate caution is warranted against generalizing the findings and recommendations beyond the sample (Lindner, 2002).

Participants were asked about their attitudes towards the terms *climate variability* and *climate change* on a five-point scale ranging from *strongly disagree* to *strongly agree*. The scale was interpreted as *strongly disagree* = 1.00 – 1.50, *somewhat disagree* = 1.51 – 2.50, *neither agree nor disagree* = 2.51 – 3.50, *somewhat agree* = 3.51 – 4.50, and *strongly agree* = 4.51 – 5.00. Overall participants neither agreed nor disagreed ($M = 3.25$, $SD = 1.06$) with the statement *I have negative feelings towards the term "climate variability"* and somewhat disagreed ($M = 3.19$, $SD = 1.15$) with the statement *I have positive feelings towards the term "climate change."*

Significant differences were examined between the five adaptive capacity dimensions and the three place and occupational attachment components and attitudes towards the terms *climate variability* and *climate change. ANOVA* were calculated and significant differences were found. *Pairwise comparison analysis* using the *Tukey HSD post hoc procedure* was conducted for all possible pairs. Participants who did not have negative feelings towards these terms, had higher adaptive management and individual-community interdependence response values.

Participants were asked if they had any previous attendance at any type of climate variability training. More than two-thirds ($n = 172$, 71.1%) of participants indicated they had no previous climate variability training. The 14% ($n = 33$) of participants who did have previous climate variability training reported those trainings to be recent and hosted by various organizations. Participants were also asked about their interest in attending future climate variability training (Table 1). Responses ranged from *definitely not* to *definitely yes* on a five-point scale that was interpreted as *definitely not* = 1.00 – 1.50, *probably not* = 1.51 – 2.50, *might or might not* = 2.51 – 3.50, *probably yes* = 3.51 – 4.50, and *definitely yes* = 4.51 – 5.00. On average participants stated they might or might not ($M = 3.04$, $SD = 1.08$) attend climate variability training.

Table 1

Interest in Climate Variability Training

	Definitely Not		Probably Not		Might or Might Not		Probably Yes		Definitely Yes	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Would you like to attend a training or workshop related to climate variability mitigation strategies?	19	7.9	41	16.9	75	31.0	53	21.9	17	7.0

Note. $N = 205$. $M = 3.04$, $SD = 1.08$.

An independent samples *t-test* was used to determine the existence of a significant difference between previously attending a climate variability training and interest in attending a future climate variability training. A significant difference was found between participants who had previous training and those who did not (Table 2). Participants who had previous climate

variability training (M = 3.39, SD = 0.97) were more likely to be interested in future climate variability training than those participants who had no climate variability training (M = 2.97, SD = 1.09). The difference of 0.42 was significant $t(203) = 2.08$, $p = .04$ and represented a medium effect size ($d = .41$).

Table 2

Independent Samples t-test for Previous Training Attendance and Future Training Interest

Had Previous Training	*n*	*M*	*SD*	*t*	*p*
No	172	2.97	1.09	2.08	.04
Yes	33	3.39	0.97		

An *ANOVA* was calculated to determine the existence of significant difference between the adaptive capacity dimensions and participants' interest in future climate variability training. Table 3 shows a significant difference was found between interest in future climate variability training and each of the five dimensions of adaptive capacity; (a) learning and knowledge seeking $F(4, 200) = 2.53$, $p = .04$ with a medium effect size ($\eta^2 = .05$), (b) risk-taking and experimentation $F(4, 200) = 3.93$, $p < .00$ with a medium effect size ($\eta^2 = .07$), (c) decision constraints $F(4, 200) = 4.19$, $p < .00$ with a medium effect size ($\eta^2 = .08$), (d) adaptive management $F(4, 199) = 15.13$, $p < .00$ with a very large effect size ($\eta^2 = .23$), and (e) perceived efficacy $F(4, 199) = 2.70$, $p = .03$ with a medium effect size ($\eta^2 = .05$).

Pairwise comparison analysis using the *Tukey HSD post hoc procedure* was conducted for all possible pairs. Multiple statistically significant mean differences were found for four of the adaptive capacity dimensions. Overall, participants who responded with interest in attending a future climate variability training had significantly higher learning and knowledge seeking, risk-taking and experimentation, decision constraints, and adaptive management values than participants who responded they were not interested in attend a training.

Table 3
Analysis of Variance for Adaptive Capacity Dimensions and Interest in Future Training

	n	*M*	*SD*	*F*	*p*
Learning and Knowledge Seeking					
Definitely Not	19	3.63	0.58	2.53	0.04
Probably Not	41	3.66	0.55		
Might or Might Not	75	3.83	0.48		
Probably Yes	53	3.81	0.49		
Definitely Yes	17	4.04	0.36		
Risk-taking and Experimentation					
Definitely Not	19	3.73	0.66	3.93	.00
Probably Not	41	3.58	0.73		
Might or Might Not	75	3.87	0.52		
Probably Yes	53	3.97	0.58		
Definitely Yes	17	4.16	0.64		
Decision Constraints					
Definitely Not	19	3.03	0.38	4.19	.00
Probably Not	41	3.01	0.50		
Might or Might Not	75	3.22	0.54		
Probably Yes	53	3.42	0.48		
Definitely Yes	17	3.17	0.71		
Adaptive Management [a]					
Definitely Not	18	3.43	0.57	15.13	.00
Probably Not	41	3.78	0.44		
Might or Might Not	75	4.11	0.57		
Probably Yes	53	4.33	0.51		
Definitely Yes	17	4.52	0.69		
Perceived Efficacy [a]					
Definitely Not	19	3.63	0.93	2.70	.03
Probably Not	41	3.50	0.70		
Might or Might Not	75	3.20	0.70		
Probably Yes	53	3.11	0.81		
Definitely Yes	17	3.46	1.05		

Note. $N = 205$. Learning and Knowledge Seeking: $M = 3.79$, $SD = 0.50$. Risk-taking and Experimentation: $M = 3.85$, $SD = 0.62$. Decision Constraints: $M = 3.21$, $SD = 0.54$. Adaptive Management: $M = 4.08$, $SD = 0.61$. Perceived Efficacy: $M = 3.30$, $SD = 0.80$. Scale: 1 = *strongly disagree*, 2 = *somewhat disagree*, 3 = *neither agree nor disagree*, 4 = *somewhat agree*, and 5 = *strongly agree*.
[a] Total does not equal *N* due to item non-response.

An *ANOVA* was calculated to determine the existence of significant difference between place and occupational attachment components and participants' interest in future climate variability training. Table 4 shows a significant difference was found between interest in future climate variability training and each of the three components of place and occupational attachment: (a) value of agriculture $F(4, 199) = 5.36$, $p < .00$ with a large effect size ($\eta^2 = .10$), (b) individual-

community interdependence $F(4, 200) = 2.76$, $p = .02$ with a medium effect size ($\eta^2 = .05$), and (c) community commitment $F(4, 200) = 6.76$, $p < .00$ with a large effect size ($\eta^2 = .12$).

Table 4
Analysis of Variance for Place and Occupational Attachment Components and Interest in Future Training

	n	*M*	*SD*	*F*	*p*
Value of Agriculture [a]					
Definitely Not	19	4.35	0.68	5.36	.00
Probably Not	40	4.43	0.57		
Might or Might Not	75	4.70	0.45		
Probably Yes	53	4.70	0.42		
Definitely Yes	17	4.90	0.20		
Individual-community Interdependence					
Definitely Not	19	3.61	0.76	2.76	.02
Probably Not	41	3.89	0.83		
Might or Might Not	75	4.13	0.71		
Probably Yes	53	4.08	0.76		
Definitely Yes	17	4.29	0.66		
Community Commitment					
Definitely Not	19	3.86	0.70	6.76	.00
Probably Not	41	4.02	0.59		
Might or Might Not	75	4.30	0.60		
Probably Yes	53	4.36	0.51		
Definitely Yes	17	4.67	0.41		

Note. $N = 205$. Value of Agriculture: $M = 4.63$, $SD = 0.50$. Individual-community Interdependence: $M = 4.03$, $SD = 0.76$. Community Commitment: $M = 4.23$, $SD = 0.60$. Scale: 1 = *strongly disagree*, 2 = *somewhat disagree*, 3 = *neither agree nor disagree*, 4 = *somewhat agree*, and 5 = *strongly agree*.
[a] Total does not equal *N* due to item non-response.

Pairwise comparison analysis using the *Tukey HSD post hoc procedure* was conducted for all possible pairs. Multiple statistically significant mean differences were found for each place and occupational attachment component. Overall participants who responded with interest in attending a future climate variability training had significantly higher value of agriculture, individual-community interdependence, and community commitment values than participants who responded they were not interested in attend a training.

Conclusions and Recommendations

Participants on average felt indifferent towards the term *climate variability* and had moderately negative feelings towards the term *climate change*. Significant differences were found to show that producers with more negative feelings towards these terms had lower adaptive capacity. Further research is warranted to better understand where these feelings stem from and how educational programming can be developed to not only assist educators on best practices, but also how to not exacerbate the existing unease surrounding these terms. Given the indifference

toward the terms, an implication exists that the use of these terms requires specialized disciplinary literacy (Clemons et al., 2018).

Most participants indicated that they had no previous climate variability training and on average participants were indifferent about attending future climate variability training. George et al. (2007) also found producers having little to no formal climate training. Burnett et al. (2014) found extension agents were interested in climate change programming but perceived little to no interest among producers. Significant differences were found between producers who had training and those who did not. Participants who had previous training were statistically more likely to be interested in attending future training. Overall participants who had received any type of climate variability training also had higher adaptive capacity and place and occupational attachment shown by their higher values of learning and knowledge seeking, risk-taking and experimentation, decision constraints, and individual-community interdependence. Marshall et al. (2012) also found that producers interested in learning new skills were also interested in learning more about climate variability impacts.

Participants with previous climate variability training had higher levels of adaptive capacity, higher levels of place and occupational attachment, and were more interested in future climate variability training than participants with no previous training. This research contributes to the literature to better understand producer's receptiveness to climate-smart agriculture and associated training programing. More research is needed to identify effective climate variability training delivery methods. Increasing widespread climate variability training would not only raise awareness among producers but also has the potential to increase the number of producers interested in additional training and improve their adaptive capacity.

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Uncovering the Past: Minority Contribution and Early Start of Black American Students 4-H Program in North Carolina

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Abstract

This historical research focused on the efforts to promote 4-H among African American youth in North Carolina. Through the analysis of historical documents, articles, archives, pictures, speeches, and records, the researcher gained a deeper insight and context into African American 4-H initiatives, key individuals such as G.W. Herring and George Washington Carver and their role in advancing the development of 4-H African American youth, and opportunities available to 4-H African American members. It was found that even though funding was limited, and barriers were in place to limit 4-H among African American youth, tremendous strides by dedicated leaders advanced educational opportunities for African American youth to excel and gain skills that aided them in their future lives and careers. Today, many of the same strategies used to encourage 4-H participation then can assist in providing a foundational context that will benefit 4-H members from underserved populations.

Introduction

"To make the best better." For many individuals, this motto not only signifies 4-H but serves as a foundational component that leads to tremendous impacts throughout one's life. 4-H is a youth development program that aims to equip young people with the knowledge and abilities to lead by offering hands-on learning opportunities in various fields, such as science, health, agriculture, and civic engagement (Smith, 2018). Delivered by Cooperative Extension, a partnership with the U.S. Department of Agriculture and more than 100 public universities nationwide, 4-H engages approximately six million young people annually, with a diverse membership that reflects the population of the United States (Strayer et al., 2020).

According to the National 4-H History Preservation Team (2023) and Clark (2022), 4-H originated from the work of W. H. Smith of Holmes County, Mississippi, who was the first agent employed to focus on 4-H and was paid $1 per year to facilitate his work. Clark (2022) added that Smith also served as the Superintendent of Education in Holmes County and later served as the Superintendent of Education and President of A&M College of Mississippi. In 1909, 4-H club formal operations began when Dr. Seaman A. Knapp brought O. B. Martin, the former Superintendent of Education for South Carolina, and O.H. Benson of Iowa together.

Historical Framework

Even though it is noted that 4-H formal operations began in 1909, 4-H seeds were planted in the late 1890s when several states responded to their charge under the 1862 Morrill Act to expand their extension activities to include youth programs (NC State University Libraries, 2023). Programs such as corn contests were organized for boys to teach farming practices and to demonstrate scientific farming. In North Carolina, 4-H clubs for farm youth began to be established as outreach and development programs sponsored by the county extension services affiliated with land grant colleges nationwide. In 1909, NC State College signed a memorandum of agreement with the United States Department of Agriculture to cooperatively develop Farmers' Boys' Clubs, or Corn Clubs (NC State University Libraries, 2003). It was noted that the

1907 educational revolution emphasized cooperation between agricultural agents and club boys and girls which led to more convenient work than ever before (Clark, 2022). This opportunity was enhanced by the then Superintendent of Public Instruction, J. Y. Joyner, to provide state and federal agricultural club agents access to the state's new schools.

However, besides the benefits brought to its members, 4-H has not always been inclusive and accessible to all youth, especially those from historically marginalized racial and ethnic groups. In the early 20th century, when 4-H was founded, segregation laws and practices prevented African American youth from participating in the same programs and activities as white youth (North Carolina 4-H Honor Club, 2022). Therefore, separate 4-H clubs and extension services were established for African American youth, mainly in the South, where most of them lived. These clubs and services faced many challenges and barriers, such as limited funding, resources, facilities, and recognition. However, several African American leaders and members sought solutions to these challenges and significantly contributed to developing agriculture, education, and community in their regions and beyond.

Purpose and Research Questions

The purpose of this historical research was to understand the minority contributions and early start of Black American students in the 4-H program in North Carolina. Understanding these opportunities is crucial for recognizing the program's transformative role within minority communities. To achieve the purpose of this research, the study was guided by four questions:

1. How was 4-H for African American youth initiated and promoted in North Carolina
2. Who was G.W. Herring, and how did he influence 4-H for African American youth?
3. Who was George W. Carver, and how did he influence 4-H for African American youth?
4. What were the opportunities for the Blacks and rural African American boys in 4-H in North Carolina?

Methodology and Procedures

Historical research allows researchers to improve understanding of the present by analyzing the past. It is important to conduct research studies on current social and cultural issues because every current problem has an inherent connection to the social and historical context of the past (Given, 2008). Aspers and Corte (2019) advised that studying and analyzing historical data is a key component of historical research since it helps us understand the past. Texts, actual relics from historic sites, data that has been recorded, images, maps, and other types of evidence are all examples of evidence that can be used when conducting historical research. However, McCullagh (2000) noted that it is the historian's responsibility to gather information, examine it for biases and substance, support it with further evidence, and utilize that evidence to interpret historical occurrences in a way that has some relevance to the present.

With specific objectives in mind, the methodology combines historical research, biographical analysis, literary research, and empirical investigation to comprehensively address the early days of 4-H for African American youth in North Carolina. To conduct this research, historical records, government documents (USDA), and organizational archives at the NC State

University library to trace the origins of 4-H engagement with African American youth in North Carolin were examined. Biographical sources for the key minority personalities that shaped the 4-H program for African American youth were thoroughly examined, along with books, articles, and archival records to supplement the biographical analysis. Additionally, George Washington Carver's writings and speeches were analyzed for insights into his specific involvement in 4-H initiatives in the state.

Following Lincoln et al. (1985)'s assertion, attention was directed to reliability and validity. According to Morse et al. (2002), credibility, transferability, dependability, and confirmability comprise reliability and validity in historical research. To cater to these, we included certain methodological techniques for proving qualitative rigor, including the audit trail, categorization, negative case analysis, structural corroboration, and sufficiency of referential materials. Dependability was ensured by creating a thorough record of the data collection process. A variety of triangulation strategies (methodological, data source, investigators, and theoretical) for confirmability and measured operational and theoretical data saturation for transferability were used.

Findings

Question One – How was 4-H for African American youth initiated and promoted in North Carolina?

The establishment of 4-H for African Americans in North Carolina began with efforts that analyzed how 4-H Extension personnel perceived the minority youth participation in agricultural-related activities (Alston & Crutchfield, 2009). In the beginning, North Carolina 4-H African American students' clubs and services encountered barriers, including limited funding from the Smith-Lever Act of 1914, which limited funding sources for African-American extension work and restricted the use of private funds, making it difficult to find alternative funding sources (NC State University Libraries, n.d.). However, O.B. Martin of the United States Department of Agriculture and Nathan Carter Newbold, North Carolina's first agent of African American Rural Schools, continued to seek out opportunities to expand work focused on the education of African American youth. Using funds administered by the General Education Board, teachers' wages were for paid for two months during the summer using the Negro Rural Schools fund (Manor & Pronovost, 2007). This system allowed African Americans to establish a small number of clubs and classes similar to the gardening and canning clubs overseen by white agents. Efforts continued and North Carolina became one of the first states to hire an African-American extension agent and start 4-H work for African-American youth. In 1911, Neil Alexander Bailey became the first African American agricultural extension agent in North Carolina and the nation. He was assigned to work with Black farmers in Guilford, Rockingham, and Randolph counties under the supervision of I. O. Schaub, a researcher at NC State College [now NC State University] (Manor & Pronovost, 2007).

Similarly, Bailey organized Corn Clubs for boys following Knapp's model and also taught farmers about soil improvement, crop diversification, animal husbandry, farm management, and home improvement. By 1919, forty-one African American Home Demonstration agents were hired using funds from the federal World War I emergency

appropriation (North Carolina 4-H Honor Club, 2022) and assisted the white county agents during the canning season. Further, Herring emerged as an early promoter of African American youth agriculture in North Carolina by organizing the first 4-H club for African American youth in 1914 (North Carolina 4-H Honor Club, 2022). Herring's background as a teacher and his attendance at a summer training course at Tuskegee Institute under Carver's instruction, allowed him to apply what he learned to his students by forming a club with 15 boys who grew corn on one-acre plots. The club was a success and attracted the attention of other teachers, farmers, and extension agents throughout three counties and the state. Herring also organized Tomato Clubs for girls and taught them canning and gardening skills.

In 1915, John D. Wray was hired as the first African American state club agent to coordinate 4-H work for African-American youth nationwide. He was a graduate of NC Agricultural and Technical State University, North Carolina's 1890 land-grant institution. He worked closely with Schaub and other extension staff to train county agents, teachers, and club leaders on organizing and conducting 4-H activities. He also established county, district, and state events for club members, such as camps, short courses, fairs, contests, and demonstration leaders (Manor & Pronovost, 2007). By 1924, 125 African-American extension agents and 15,000 African-American 4-H club members were in North Carolina and county camps and district short courses provided opportunities for African American members. Clark (2022) noted that Beaufort Club boys and girls participated in a five-day countywide camp, and district short courses were held in Greensboro and Winton. Further, African American youth first participated in a statewide short course in 1926 at North Carolina Agricultural and Technical College (Clark, 2022).

Question Two – Who was G.W. Herring, and how did he influence 4-H for African-American youth?

Born in 1856 in rural North Carolina, Herring developed a connection with the land and witnessed agriculture's challenges and opportunities to his community. His early experiences cultivated an appreciation for farming and a passion for agricultural education. He attended North Carolina Agricultural and Mechanical College, where he studied agricultural science (FamilySearch, 2023). This education exposed him to the transformative power of knowledge and its potential to provide solutions impacting his community. Herring's knowledge and education focused on agriculture strengthened his awareness of the social and economic challenges impacting African Americans and he believed that the sharing of agricultural knowledge could help address some of the issues facing these communities. Herring was inspired by George Washington Carver's work focused on agriculture and education, and used that work to inspire his efforts for youth. Furthermore, his experiences growing up in a farming community made him familiar with the challenges and opportunities in agriculture further fueling his determination to create pathways for others to thrive in agriculture (Berendt, 2022).

Herring played a pivotal role in the early years of the 4-H program in North Carolina (North Carolina 4-H Honor Club, 2022). In 1914, Herring organized the first African American 4-H club in Sampson County which led to agricultural education and leadership development to African-American youth throughout North Carolina (Clements, 2023). As an advocate for

inclusivity and equal opportunities within the 4-H program, he sought to reach underserved communities, and his efforts led to the establishment of the first county camp and district short courses for African American club members in 1924. Herring's initiatives began the efforts that led to greater participation and engagement among African American youth. Herring's leadership ensured effective coordination and expansion of 4-H activities among African American youth as he collaborated with other agents and agricultural leaders (Whisnant, 2006). Herring valued and believed in the power of education that would lead to empowerment of African American club members.

Question Three – Who was George W. Carver, and how did he influence 4-H for African-American youth in North Carolina?

One of the most well-known Black scientists of the early 20th century, George Washington Carver, was an agricultural scientist, inventor, educator, and humanitarian (United States Navy, 2018). Born into slavery in Missouri around 1864 and later moving to Iowa to pursue higher education (The Henry Ford, 2023), Carver became the first Black student and faculty member at Iowa State Agricultural College (now Iowa State University), where he studied agricultural science and received his bachelor's and master's degrees. In 1896, Booker T. Washington invited Carver to join the Tuskegee Institute (now Tuskegee University) in Alabama as the director of agricultural research (West, 2023). Carver's career is highlighted for his teaching and experiments focused on peanuts, sweet potatoes, and soybeans as well as many other crops (United States Department of Agriculture [USDA], n.d.). Through his research, Carver improved the lives and incomes of farmers, especially those in the South by promoting crop options other than cotton and developing products from those crops. In addition, his emphasis on soil conservation, crop rotation, composting, and sustainable farming practices allowed farmers to adopt new practices that would aid in their future (A&E Television Networks, 2023).

While Carver is well known for his teaching and research, he was also a key contributor of 4-H programs for African American youth in the South. A strong proponent of education, he saw education as a potential solution for the poverty and discrimination impacting the African American community. Collaborating with the extension work of Seaman A. Knapp, Carver supported and established Corn Clubs and Tomato Clubs for African American youth. Furthermore, he trained extension agents, teachers, and farmers to conduct demonstrations and taught them how to work with youth in addition to writing bulletins, pamphlets, and articles on various agricultural topics that promoted his and others' research to farmers and agents (USDA, n.d.). Carver also promoted the showcasing of African American's work at fairs, contests, camps, and short courses in an effort to offer additional educational opportunities and strengthen the livelihoods of African American farmers and rural communities. Like his mentor, Booker T. Washington, Carver mentored many club members who later became successful scientists, educators, farmers, and leaders.

Question Four – What were the opportunities for the Blacks and rural African American boys in 4-H in North Carolina?

By 1936, 4-H African American membership reached 10,000 members in the state (Manor & Pronovost, 2007). This remarkable growth demonstrated the program's appeal and impact on African American youth. Building upon the importance of education, 4-H established a loan fund in 1936 specifically for African American club members that offered participants financial aid to pursue higher education, creating new options and professional paths (NC State University Libraries, n.d.-a). The program hired its first full-time African American 4-H leader, R. E. Jones, in the same year, further demonstrating its commitment to fostering leadership and educational opportunities among African American youth. In 1939, *The Negro 4-H Mirror*, the first statewide African American club newspaper was published and served as a main source of communication to increase the awareness 4-H activities and achievements among African-American members. In an edition of *The Negro 4-H Mirror* (1939), Alvin Morrison of Statesville, North Carolina, is highlighted for his farming practices and is quoted stating that "Agriculture is a quite good occupation provided they do not mind the work" when asked if a youth should participate in agriculture and 4-H (NC State Libraries, n.d.-a). In 1965, 4-H officially integrated. During this period, the State Council of Negro Home Demonstration Clubs merged with the North Carolina Organization of Home Demonstration Clubs to create the integrated North Carolina Extension Homemakers Association (Manor & Pronovost, 2007).

4-H played an important role for rural African-American boys in North Carolina by providing them with educational and economic opportunities that allowed them to apply what they learned to their farms or gardens and earn money from selling their produce (Manor & Pronovost, 2007). Through competitions at local, district, and state levels, members won prizes such as cash, medals, ribbons, scholarships, and trips. Many rural African American boys faced challenges such as poor schools, limited resources, low expectations, racial discrimination, and lack of role models, but 4-H allowed them to learn new skills, gain knowledge, develop confidence, earn income, and explore careers in agriculture and related fields (Alston & Crutchfield, 2009). Also, through 4-H activities, rural African American boys gained exposure to different people, places, and perspectives that broadened their horizons. They interacted with extension agents, teachers, farmers, scientists, and other professionals who served as mentors and role models. In addition, African American 4-H members visited colleges, experiment stations, factories, businesses, and government offices, where they learned about various careers and educational opportunities. They also traveled to other counties and states, where they met other club members from different backgrounds and cultures. Through 4-H, African American boys developed positive attitudes, values, and behaviors that prepared them for life (Manor & Pronovost, 2007).

Conclusions and Implications

The analysis of minority youth participation in agricultural-related activities during the early start of 4-H revealed that 4-H for Black American youth was founded in the early 20th century, following segregation laws and practices that prevented African-American youth from participating in the same programs and activities as white youth (Smith, 2018). These African American youth clubs and services faced many challenges and barriers, such as limited funding, resources, facilities, and recognition, and the pioneering efforts of many individuals led to

significant contributions to develop agriculture, education, and community that would impact the lives of African American youth. This historical perspective emphasizes the dedication to inclusivity and diversity in 4-H programs and illustrates how G.W. Herring greatly impacted how 4-H for African American youth was developed.

Knowing the historical contributions made by minority communities to initiatives like 4-H serve as motivation to continue the work to promote inclusivity. Learning from the work of individuals such as Carver, Washington, Herring, and Bailey provide key context for strategies that can be implemented even today as we strive to promote opportunities for all individuals in agriculture. George W. Carver and G.W. Herring emphasized the importance of mentors and role models in encouraging minority students to pursue agricultural education and mentorship is a key component of leadership development. Mentoring programs can motivate and direct the subsequent generation of African American students studying agriculture. Furthermore, this study shows that 4-H programs have served as a link between agricultural education and underserved populations. As a result, it suggests that greater community engagement initiatives in agricultural extension that focus on marginalized groups are necessary. The findings of this study highlight the significance of preserving the historical accounts of minority contributions to agricultural education. Acknowledging and celebrating these contributions can inspire future generations to actively participate in initiatives like 4-H and advance the agricultural industry.

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Evaluating Elementary Agriculture Teacher Workshops on Pedagogical Content Knowledge

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Evaluating Elementary Agriculture Teacher Workshops on Pedagogical Content Knowledge

Introduction & Background

Historically Agricultural Education has been exclusively a part of high schools through state Career, Technical, and Agricultural Education (CTAE) programs. In the 1990's many states began to experiment with middle school programs and the number of middle school agricultural education programs has increased steadily since that time. In the state of Georgia and in surrounding states there has been an awakening of Agriculture Education in elementary schools. In 2018, Governor Nathan Deal signed into law Georgia Senate Bill 330, referred to as the Georgia Agricultural Education Act (Senate Bill 330, 2018). Senate Bill 330 (2018) amended the "Quality Basic Education Act" to establish new educational program codes. The amendment included the establishment of Elementary Agriculture Education (EAE) pilot programs in Georgia (Senate Bill 330, 2018). The implementation of Georgia's Elementary Agriculture Education Pilot program began with 25 participating schools (Georgia Agriculture Education).

In 2022, the three-year pilot programs transitioned to the status of ongoing programs (House Bill 1303, 2022). During this time, the prevalence of EAE programs in Georgia's elementary schools steadily increased (Georgia Agriculture Education, 2023). The creation of Elementary Agriculture Education in Georgia schools resulted in the development of state standards through a Delphi research study (Peake et al., 2020). Approval and adoption of standards presented new obstacles.

Research has been conducted on the Pedagogical Content Knowledge (PCK) development in agriculture education teachers focusing on teachers' beliefs of the purpose of agriculture education through experiences and influences (Rice & Kitchel, 2018, 2017, 2015). Rice & Kitchel's (2015) findings highlighted the need for preservice application opportunities for content implementation to support the growth of agricultural literacy. Preservice Agriculture Education educators receive training through four-year colleges and universities in traditional educator programs focusing on teaching methods, curriculum development and planning, and infield experience with certified agriculture educators which results in traditional certification through the Georgia Professional Standards Commission (2023).

EAE teacher endorsement programs currently exist with a focus on training preservice teachers with a degree program. While EAE endorsements through universities for practicing teachers are available, they are costly and are not accessible to practicing EAE Teachers. With the establishment of EAE programs in Georgia, teachers require training on agriculture content knowledge and pedagogical approaches to support the implementation of the new standards. This benefits teachers in building individual agricultural literacy to educate students utilizing PCK. Through United States Department of Agriculture (USDA) grants, Professional Development for Agricultural Literacy in Elementary Agriculture Teachers (PDAL EAT) workshops were developed in partnership with Georgia Farm Bureau to support the growth of agricultural literacy among teachers and provide a source of pedagogical content knowledge.

To determine the needs and support in-service EAE teachers in Georgia a needs assessment was conducted (Bailey, 2021). An analysis of the results provided topics and focus areas for PDAL EAT Workshops. First, the creation of an online "EAE Ag Ed 101" to meet foundational training needs of new EAE Teachers (online due to Covid 19); then a series of in

person workshops: (1) Farm Tours and Hydroponics, (2) Experiential Learning, (3) Teaching with Animals, and (4) School Gardens. Through the development and implementation of PDAL EAT workshops and serving as the leading source of EAE teacher training in PCK, feedback was necessary for the continued development of workshops. The purpose of this study is to determine the effectiveness of the PDAL EAT Workshops in developing agriculture literacy and PCK in teachers.

Theoretical Framework

The PDAL EAT workshops were developed to address content and pedagogy training needs of EAE teachers in Georgia. This is also referred to as Pedological Content Knowledge (PCK). Shulman (1987) defines PCK as "the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction" (p. 8). The blend of what teachers know about a content area, such as agriculture education, and what they know about teaching practices leads to successful teaching.

The theory that teachers can learn new knowledge from experiences is the core of the PDAL EAT workshops. The PDAL EAT workshops were designed and structured according to Kolb's (1984) Experiential Learning Theory. Kolb (1984) insists that, "Learning is the process whereby knowledge is created through the transformation of experience." (p.38). Knowledge along with pedagogical practices were put into practice through experiential learning practices at PDAL EAT workshops across the state of Georgia.

Methodology

Population and Sample

The population targeted for this study are the participants from PDAL EAT workshops (2) Experiential Learning and (3) Teaching with Animals. Workshop data from (1) Farm Tours & Hydroponics is omitted due to low response rate. Survey data from workshop (4) School Gardens is not included as it is not available at the time of this writing. All participants were asked to complete the workshop evaluation survey at the conclusion of the workshop. Participants were chosen due to their attendance of the PDAL EAT workshops to determine the teacher perceived effectiveness of professional development. Of the 54 attendees from the (2) Experiential Learning and (3) Teaching with Animals workshops, 100% of participants responded to the survey. Survey respondents included 51 females (96.2%), 2 males (3.7%) and with one not disclosing gender. Most respondents identified as white or Caucasian (96.2%; n=51), with two identifying as Black or African American (3.8%), and one omitting the question. With the exclusion of information from two participants (n=54), 16 (29.6%) participants have a bachelor's level of education and 36 (66.7%) have graduate level education with 18 of those with a masters (33.3%), 17 with a specialist (31.5%) and one having a doctorate (1.9%).

Prior knowledge of agriculture experience among participants varied (n=54) 6.2% majored in agriculture in college, 6.2% completed some agriculture courses in college, 8.3% participated in production agriculture, 9.3% participated in paid work experience in agriculture,

24.7% participated in youth agricultural experiences such as FFA or 4H, 30.9% of participants were raised in an agricultural family, and 14.4% reported "none" to agricultural experiences.

Instruments and Data Collection

The survey was designed to measure opinions, attitudes, and behaviors. Most of the questions were written as Likert scales. Likert scales provided degrees of opinions to support clarity in understanding of the feedback received. Dillman's Tailored Design method was utilized to effectively design surveys (Dillman et al., 2014). Dillman's (2014) procedures were used to validate results obtained from the workshop surveys. A panel of experts reviewed the validity of questions presented.

Following each workshop, participants were emailed a survey through Qualtrics to determine how helpful they found the workshop to be. A follow-up email was sent out as well for a total of two attempts for response.

Data Analysis

Data collected was analyzed on Qualtrics to calculate descriptive statistics; frequency, percentage, mean, and standard deviation were included in the data analysis.

Results

Reaction and Learning from Workshops

Participants in the PDAL EAT workshops indicated a high level of satisfaction with the training provided. When asked about the level of increase in knowledge to be able to teach agriculture in an elementary classroom, participants from both the Experiential Learning workshop (M =1.24, SD =0.81) and Teaching with Animals workshop (M =1.11, SD =0.31) overall felt the workshop was extremely helpful as shown in Table 1 and Table 2. Table 3 and Table 4 present the participants viewed the training as extremely helpful in increasing pedagogical content knowledge for the Experiential Learning workshop (M =1.12, SD = 0.32) and the Teaching with Animals workshop (M =1.26, SD =0.40). The third question presented measured the participants' belief that the workshop increased their ability to teach agriculture to elementary students (Table 5 and Table 6). Both the Experiential Learning workshop (M =1.12, SD =0.32) and the Teaching with Animals workshop (M =1.19, SD =0.47) believed that the workshops increased their ability to teach agriculture. When participants were asked about the transferability of the (experiential learning) activities from the workshop to classroom instruction, the Experiential Learning workshop participants (M =1.12, SD =0.32) and the Teaching with Animals workshop participants (M =1.22, SD =0.50) both indicated extremely transferrable with a few outliers of slightly transferrable as presented in Table 7 and Table 8.

Teacher Preferences for Workshop Delivery

In terms of formatting of professional development, teachers ranked their preferences from a set of choices. Of the participants 31 provided feedback on this topic and 2 did not. 31.37% of participants selected 2–3-hour seminar/workshop, 23.53% selected a mentoring program with an experienced agriculture educator, and 17.65% selected a one-week short course (during the summer) as their first choice. The least favorable delivery methods were asynchronous online workshops (n =15, 29.41%), courses for credit at a university (n =12,

23.53%), and district in-service courses in the form of four meetings/four hours each (*n* =8, 15.69%). The workshops provided were (1) Farm Tours and Hydroponics, (2) Experiential Learning, (3) Teaching with Animals, and (4) School Gardens.

Table 1

(2) Experiential Learning workshop - How helpful was this training in increasing your ability to teach agriculture in an elementary setting utilizing experiential learning in the classroom?

#	Answer	%	Count
1	Extremely helpful	88.00%	22
2	Slightly helpful	8.00%	2
3	Neither helpful nor unhelpful	0.00%	0
4	Slightly unhelpful	0.00%	0
5	Extremely unhelpful	4.00%	1

Table 2

(3) Teaching with Animals workshop - How helpful was this training in increasing your ability to teach agriculture in an elementary setting utilizing animals in the classroom?

#	Answer	%	Count
1	Extremely helpful	88.89%	24
2	Slightly helpful	11.11%	3
3	Neither helpful nor unhelpful	0.00%	0
4	Slightly unhelpful	0.00%	0
5	Extremely unhelpful	0.00%	0

Table 3

(2) Experiential Learning workshop - How helpful was this training in increasing your pedagogical content knowledge (increase your ability to teach Elementary Agricultural Education by increasing what you know about teaching as it relates to what you know about agriculture)?

#	Answer	%	Count
1	Extremely helpful	88.00%	22
2	Slightly helpful	12.00%	3
3	Neither helpful nor unhelpful	0.00%	0
4	Slightly unhelpful	0.00%	0
5	Extremely unhelpful	0.00%	0

Table 4

(3) Teaching with Animals workshop - How helpful was this training in increasing your pedagogical content knowledge (increase your ability to teach Elementary Agricultural Education by increasing what you know about teaching as it relates to what you know about agriculture)?

#	Answer	%	Count
1	Extremely helpful	85.19%	23
2	Slightly helpful	7.41%	2
3	Neither helpful nor unhelpful	3.70%	1
4	Slightly unhelpful	3.70%	1
5	Extremely unhelpful	0.00%	0

Table 5

(2) Experiential Learning workshop - Do you believe this workshop increased your ability to teach agriculture to elementary students?

#	Answer	%	Count
1	Yes, a lot	88.00%	22
2	Yes, slightly	12.00%	3
3	Neutral	0.00%	0
4	Not really	0.00%	0
5	Not at all	0.00%	0

Table 6

(3) Teaching with Animals workshop - Do you believe this workshop increased your ability to teach agriculture to elementary students?

#	Answer	%	Count
1	Yes, a lot	85.19%	23
2	Yes, slightly	11.11%	3
3	Neutral	3.70%	1
4	Not really	0.00%	0
5	Not at all	0.00%	0

Table 7

(2) Experiential Learning workshop - How transferable are the activities you participated in today to your classroom?

#	Answer	%	Count
1	Extremely transferable	88.00%	22
2	Slightly transferable	12.00%	3
3	Neither transferable nor nontransferable	0.00%	0
4	Slightly nontransferable	0.00%	0
5	Extremely nontransferable	0.00%	0

Table 8

(2) Teaching with Animals workshop - How transferable are the activities you participated in today to your classroom?

#	Answer	%	Count
1	Extremely transferable	81.48%	22
2	Slightly transferable	14.81%	4
3	Neither transferable nor nontransferable	3.70%	1
4	Slightly nontransferable	0.00%	0
5	Extremely nontransferable	0.00%	0

Conclusions & Recommendations

In the state of Georgia, Elementary Agriculture Education has grown since its development in 2018. There is a statewide need for accessible, in-service training on PCK for new agriculture teachers. With the addition of new teaching positions and EAE standards, content knowledge and appropriate teaching practices are essential for the creation of quality EAE programs. Due to lack of existence of EAE agriculture literature and research on the formation of PCK in EAE teachers, this knowledge is provided to guide further research on EAE and the development of PCK through workshops.

The surveys provided insight into the effectiveness of PDAL workshop in terms of teacher's ability to teach agriculture, helpfulness of training on improving PCK, increasing the ability to teach agriculture in an elementary setting, and the transferability of workshop activities to the classroom. Designing PDAL EAT workshops around Kolb's (1984) Experiential Learning Theory yielded positive feedback from participants in the development of PCK for elementary agriculture educators. The findings from this study relates to Rice & Kitchel's (2015) findings that agriculture (pre-service and in-service) teachers desire quality professional development in content with context in addition to learning opportunities with transferable activities.

Furthermore, this study collected information on the preferences of EAE teachers for in-service delivery of PCK. The majority of teachers prefer professional development through the medium of a workshop, mentoring program, or weeklong course provided in the summer. EAE teachers did not favor asynchronous online workshops, university courses, or district in-service courses. This study displayed EAE teachers' beliefs of increased teaching abilities due to the selected experiential learning-based activities presented at the PDAL EAT workshops. The delivery method of information through a seminar/workshop aligned with teachers' preferences of professional learning.

Through the analysis of participants' responses several recommendations can be made. EAE teachers prefer professional development in the form of a workshop, mentoring program, or a weeklong course provided in the summer. For the creation of teacher professional development, incorporate experiential learning activities into professional development to connect content, pedagogy, and context to provide meaningful growth opportunities for teachers.

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Exploring the Influence of Cooperative Based Learning in an Undergraduate Agricultural Leadership Course

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Introduction

Colleges of agriculture have the unique responsibility to equip students with effective leadership competencies to foster innovation and advancement in the agricultural and natural resources industry (Bush et al., 2023). It is projected that 59,400 annual job openings will be available to college graduates with an expertise in agriculture, food, renewable natural resources (AFNR), and the environment through 2025 (Fernandez et al., n.d.). Therefore, as the global agricultural system faces increasingly complex challenges, it is imperative for post-secondary agricultural leadership courses to prepare students with the essential employability skills workforce leaders are demanding (Crawford & Fink, 2020; Easterly et al., 2017; Kaufman, 2010; Morgan et al., 2013; National Academies of Sciences, Engineering, and Medicine [NASEM] 2021; Robinson & Garton, 2008).

Crawford and Fink (2020) identified 11 critical growth areas for students in AFNR, such as: (a) conflict management, (b) accepting and applying feedback, (c) listening skills, (d) communicating accurately and concisely, (e) building professional relationships, and (f) identifying and analyzing problems, among others. Employers stated the most important skills college graduates of AFNR should obtain are foundational skills (Crawford & Fink, 2020). Crawford and Fink (2020) defined foundational skills as the ability to listen effectively, communicate accurately and precisely, and identify and analyze problems. Based on industry expectations and standards, college graduates must have these skills to lead effectively (Crawford & Fink, 2020). However, numerous studies have noted there continues to be a skill preparedness gap (Crawford et al., 2011; Crawford & Fink, 2020; Easterly et al., 2017; Franzan, 2020; Robinson & Garton, 2008).

Colleges and universities have invested into the development of leadership education programs for decades (Martinez et al., 2020; Owen, 2012). Despite the numerous delivery approaches used among agricultural leadership educators (Jenkins, 2011), it has been found that cooperative, project-based learning environments enable students to explore their leadership abilities (Chung & Personette, 2019). Even still, due to the continually developing demands of the AFNR industry and the evolving paradigm of leadership, academic program curriculum should be frequently evaluated to ensure it consistently aligns with workforce needs (Finch & Crunkilton, 1999). Numerous studies have suggested that post-secondary agricultural instructors implement team-building activities and create applied learning environments to develop students' problem-solving skills (Marchant, 2014; Morgan et al., 2013; Rateau et al., 2011). Easterly (2017) recommended programs be designed to incorporate technical agricultural content with writing, public-speaking, and problem-solving skills using real-world application in an integrative setting. Similarly, workforce leaders suggested "implementing curricula based on competencies defined by industry to ensure that students gain the skills that employers seek" (NASEM, 2021, p. 8).

Agricultural leadership programs aim to address industry needs by preparing skilled and knowledgeable graduates who also display essential soft skills (Alexander et al., 2017). Students enrolled in agricultural leadership programs have many opportunities to engage in activities of high impact learning such as experiential learning, peer-to-peer interactions, team-based experiences, and undergraduate research projects (Velez et al., 2014). However, limited literature exists exploring the perceived effects cooperative learning has on developing desired employability skills and key competencies through an agricultural leadership course. Therefore, this study's purpose was to explore the influence of cooperative-based learning in an agricultural leadership course.

Theoretical Framework

The theoretical foundation for this study is the theory of constructivism (Piaget, 1970). Piaget (1970) defined constructivism as the construction of one's own perspectives and understandings through active learning experiences while building on prior knowledge. Active learning, in contrast to passive learning, provides the basis for common teaching strategies adopted by educators to challenge learners to construct new knowledge through critical thinking and problem-solving (Nilson, 2016; Schunk, 2012). However, it is important to note that learning is contextual, differing from person to person and constantly evolving (Bredo, 2006). Both the individual and environment are instrumental in the acquisition of knowledge and should be considered in the learning process (Ertmer & Newby, 1993). Ertmer and Newby (1993) suggested that it is the engagement between these two variables that produces knowledge through activity.

"In a learning community grounded in constructivism, learners mediate knowledge within a social context. The role of language in a constructivist environment is that of mediator between the learner and the world, shaping and extending thought" (Hirtle, 1996, p. 91). Furthermore, social constructivism refers to the belief that shared experiences and human interaction leads to increased knowledge among individuals (Doolittle & Camp, 1999). Knowledge construction takes place between two or more people using social interaction (Schunk, 2012). Vygotsky (1962) emphasized that social interaction and peer to peer collaboration is critical to learning, deeming social exchanges essential for human development.

Implementing instructional techniques that support constructivism theory such as discovery learning, peer-assisted learning, cooperative learning, discussions and debates, among others, have shown to be effective in learners becoming actively involved (Schunk, 2012). Wentzel (1998) purported that peer-assisted learning fosters success and increases academic and social motivation. Cooperative learning, a form of peer-assisted learning, has shown to enhance social motivation for learning, problem solving skills, and increase cognitive development due to students being tasked with projects in which they are dependent on one another (Nilson, 2016; Rohrbeck et al., 2003). Therefore, the constructivism theory, specifically social constructivism, provided the framework for which this study was performed to determine if students experienced the same effects of a cooperative learning environment in an agricultural leadership course at the post-secondary level.

Purpose and Questions

The purpose of this study was to determine students' perceptions of a cooperative based learning environment in an agricultural leadership course at Oklahoma State University. The overarching research questions guiding this study were:

1) What employability skills do students believed they obtained?
2) What are their perceived abilities to apply leadership theory to real-world situations?

Methods

This qualitative research was guided with a case study methodological approach (Creswell, 2013; Stake, 1995; Yin, 2018). The purpose of a case study is to investigate a contemporary phenomenon that is bound by its unique context (Yin, 2018). The context of this case was an undergraduate, upper-division-level, agricultural leadership course at Oklahoma State University in the fall semester of 2022. The purpose of the course was to examine leadership theory and its applications for understanding contemporary agricultural issues. Similar "agricultural issues" courses are taught within colleges of agriculture across the academy; however, instructional approaches often vary. This course was taught using a cooperative, project-based approach, also known as collaborative or group learning (Nilson, 2016). Within this approach, students were broken into collaborative groups for the semester, and were challenged to investigate a selected agricultural issue and frame it with leadership theory. Students were then given an entire class period in which they were responsible for facilitating the class in unpacking their selected issue. Structures for successful cooperative learning, such as group and individual grading, self- and peer-assessment, and prompted reflection, were established by the instructor. Such structures can build positive interdependence and individual accountability (Nilson, 2016). There were 14 students enrolled in the course, who were juniors or seniors. Most of the students (n = 11) were agricultural leadership majors and a majority were female (n = 8).

Case study research "relies on multiple sources of evidence, with data needing to converge in a triangulating fashion" (Yin, 2018, p. 15). As such, sources of data for this study included (a) instructor-scored project rubrics, (b) instructor observations, (c) student presentations, (d) self- and peer-evaluations, (e) post-experience reflective statements, (f) end-of-course, university-collected evaluations, and (g) end-of-course focus groups. A primary source of data was the focus groups, facilitated by individuals external to the course, which debriefed students' perspectives of the course, the instructional approach, and their learning outcomes. Another primary data source was the post-experience reflections, in which students journaled about their experience and group project performance. Other sources of data were analyzed for data triangulation.

Data were analyzed inductively through multiple rounds of coding, which included initial (focused) coding, axial coding, and selective (theoretical) coding (Strauss & Corbin, 1998; Saldaña, 2021). Pseudonyms were used to protect participants' identities. The initial round of coding resulted in 17 open codes, which were then reduced to four overarching categories through axial and selective coding (Saldaña, 2021). Data were coded by hand initially and then organized into a code matrix using Microsoft Excel©. Rigor and trustworthiness of the data were built using the four criteria recommended by Lincoln and Guba (1985): (a) credibility, (b) transferability, (c) dependability, and (d) confirmability. This included practices such as

prolonged engagement with the case, data and investigator triangulation, analytic memoing, peer debriefing, and researcher reflexivity (Creswell, 2013; Lincoln & Guba, 1985; Saldaña, 2021; Tracy, 2010). The research team included a graduate assistant studying agricultural education and leadership whose undergraduate background is in horticulture. This researcher was not involved in the delivery of the course and led the initial rounds of data analysis. This was done intentionally, as to offer a less-biased interpretation of the data. The second researcher is a faculty member of agricultural education and leadership, who also served as the course instructor. Even with reflexive practices and peer debriefing, this poses a potential bias and study limitation. However, we maintain this also strengthens the research through the level of prolonged case engagement that was achieved as a result.

Findings

The findings from this study revealed four central themes: (a) *educator as facilitator, (b) cooperative learning approach, (c) foundational employability skills,* and *(d) application of theory.* The first two themes, *educator as facilitator* and *group project structure,* focus on students' perceptions of the process while engaging in course projects and instructor lead lectures. The themes of *foundational employee skills* and *application of theory* support participants' perceived ability to apply leadership theories in numerous settings.

The first theme, *educator as facilitator,* emphasizes the positive impact of the facilitator strategy used by the course instructor. Participants expressed the significant influence of a learning environment fostered by open dialogue. Students demonstrated the value of a discussion-based course by stating, "I think it was really good class. We get more out of a discussion-based class than we do out of lecture-based classes," and "The discussion and actually going through [the project] really helped me remember and understand the topic, rather than just learn it and put it on a paper, and then forget about it." Participants feel the instructor encouraged them to approach complex issues with an unbiased mindset and respectful manner while different opinions are present. One representative, Jacob, said:

> I learned so much about a topic that I kind of had my own personal bias about. What I thought about my topic completely changed, and I know that a lot of my classmates had the same experience when it came to their topic. It really showed us how to be flexible in our beliefs. And like I mentioned earlier, kind of like take other people's opinions into account and to just see all sides of things and be more fair instead of just sticking to what we've always thought.

Ruth echoed this by stating, "I like that we get to look from multiple viewpoints that we might usually not." Another student elaborated, "[Open dialogue] has become a valuable asset to have at our disposal as people going into the agricultural industry." A high emphasis on open dialogue fostered by the instructor enabled the students to approach discussion on complex agricultural issues with an open mind while identifying problems and communicating effectively.

By participating in a *cooperative learning environment,* students were paired together and required to develop an engaging learning activity to facilitate to class members (i.e., discussion, small group activities, a demonstration, a simulation, critical thinking strategies, systems

thinking strategies, etc.). The collaboration and peer assisted learning strategy was seen as an advantageous experience for participants. John communicated this disposition by commenting, "I think it is beneficial to have partners," and "Learning how to work with another person is [an employability skill] I will take with me to the workplace." Many others expressed their enjoyment for working in collaborative groups. One student conveyed that they valued "…work[ing] together despite our different styles and…different ideas, so being able to collaborate was [beneficial]." James supported that statement by saying "We learned a lot better from each other with discussions rather than sitting and taking notes from a lecture." The ability to facilitate discussion comfortably and collaborate with others effectively emerged as important takeaways from participating in a cooperative project-based learning environment. One participant explained the benefit of the group project in this way: "I think when you have to teach something, you learn it better. The best way to learn something is to teach [the material]."

Participants found the development of *foundational employability skills* to be an important outcome of the course. Students felt their willingness to listen increased as demonstrated by responses: "I can listen to somebody now for a little bit longer" and "[This course] made everybody listen more." Students expressed that facilitating a learning activity centered around a complex topic was no easy task; however, many expressed the project forced them to "…think deeper into a subject or issue," and "…actually trying to learn my topic." Sarah supported that statement by sharing: "…the ability to get up and lead a meeting or facilitate is a really useful tool that a lot of people don't gain." Several participants believed their ability to identify and solve problems increased after taking this course. One participant stated, "I am much more confident in problem solving when I can relate [leadership] theory to the task at hand." Another participant echoed that sentiment by stating "[This course] has taught me how to critically analyze situations that I may or may not have knowledge of, or potentially a bias, and objectively present all sides to the issues and lead a group to a consensus." For many others, it was an eye-opening experience gaining exposure to different perspectives about complex topics. Representatives' perceptions of their newfound ability to listen effectively, communicate accurately, and solve problems was reflected strongly in their comments.

The main objective of the agricultural leadership course was for participants to synthesize knowledge of leadership theories with contemporary agricultural issues. Although students expressed the challenge of *applying leadership theory* while facilitating discussion on agricultural issues, they are now confident in their ability. Participants reflected this confidence when commenting, "I definitely feel like I gained a new sense of awareness by having to learn and research the entire issue, not just the part I agree with. I feel more aware and knowledgeable about how to have a conversation with a very complex issue," and "Applying leadership theory to a controversial topic gives me a plan of action and directs my steps as a leader." Many representatives voiced they gained a firm understanding of leadership theories while enrolled in previous courses; however, they were never granted the opportunity to apply them in class. As Abigail said, "The theory class taught us all these [leadership] theories. Having to teach [leadership theories] in this class actually made us apply them. And we haven't gotten to do that before." When asked to discuss how this experience influenced their ability to apply leadership theory to real world issues, Paul shared, "This project has influenced my ability to apply leadership theory greatly." Hannah shared similar thoughts saying, "This project helped me dig deeper into several theories and made me think critically about how to apply them to real life."

Many participants shared it was no easy task exercising critical thinking skills while applying theory, but they are appreciative of the experience. They viewed the opportunity to practice application as valuable while they believe it will benefit them as a leader in the workplace someday. Matthew shared their appreciation this way: "Whenever we enter the workforce, we can use different theories and integrate them into all different types of situations…and I think that's the greatest [takeaway]." Another participant expressed they "…[enjoyed] how we were able to expand on the theories and relate them to [agricultural issues]…". Participants explained this experience was instrumental in developing essential critical thinking skills while approaching contemporary agricultural issues in society by sharing, "[This course] has allowed me to view leadership in a deeper way…there's more to leadership than standing up and leading a group of people."

Conclusions, Discussion, and Recommendations

The researchers sought to determine the perceived influence of a cooperative based learning environment in an undergraduate agricultural leadership course. Students demonstrated the effectiveness of said teaching approach through the four emerging themes identified in their comments while participating in focus groups and written responses through a post-experience reflection. Participants found the cooperative based approach to have a positive influence on their learning experience which aligns with previous research (Piaget, 1970; Davis & Arend, 2013; Nilson, 2016). Students perceived this teaching method to be beneficial in developing essential employability skills requested by employers, as outlined by Crawford and Fink (2020). Students acknowledged that the positive impact they experienced could be attributed to the instructor taking on a facilitator role. Using the facilitator technique, the instructor fostered an environment of open dialogue and social interaction (Vygotsky, 1962), which encouraged students to exercise critical thinking skills. Participants were empowered to exercise critical thinking when they were prompted to apply previously learned leadership theories to real life situations, as suggested by Jenkins (2011). The practice of challenging students to apply theories previously learned is often overlooked in Agricultural Leadership programs. However, it is essential to provide students the opportunity for practical application, which is the best way to learn leadership (Jenkins, 2011).

This study provides an example to others seeking to foster a cooperative learning environment in an agricultural leadership course. Instructors should encourage student collaboration and participation by implementing teaching methods such as group projects. Through cooperative project groups, students learn to communicate effectively, develop innovative ideas, gain new perspectives, and improve critical thinking skills by analyzing and applying concepts effectively. We recommend that educators teaching similar courses shift from the traditional, lecture-based instruction to more of a facilitated approach. Like many other teaching methods, students must have guidance and clear direction on assignments to reach maximum effectiveness (Nilson, 2016). Therefore, we recommend that the instructor model complex tasks such as applying leadership theory to relevant situations. Students should be provided with the opportunity to ask questions, seek clarification, and develop a firm understanding of what is being requested of them. Instructors could provide students with both a self- and peer-evaluation feedback survey upon completion of the course to reflect the importance of being a team member.

The researchers recommend future research to strengthen the literature base on the effects of cooperative-based learning across agricultural leadership programs. This study included only 14 participants. Therefore, future studies should be replicated in different contexts, including a larger sample of participants, or multiple class sections. Despite gathering qualitative data on students' perceptions of the course, there was no quantitative data collected to measure participants' developed competencies and skills. This could be done in future studies. An interesting extension to comparable studies would be to follow up with participants after several years of experience in the workforce to evaluate the course's effectiveness from a professional's perspective and measure employee achievement levels. This strategy would aim to minimize the career preparedness gap.

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Living in the Borderland: An Examination of the Work-Family Borderland of Dual Agriculture Teacher Couples in North Carolina

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Introduction

Faculty in North Carolina State University's Department of Agricultural and Human Sciences identified that 20% of agriculture teachers in North Carolina (NC) are work-linked with their families. Little research documents work-linked families teaching agriculture in NC or explores their lived experiences (Spence & Park, 2022). NC reported that 80 agriculture teachers left the classroom, the highest number reported nationwide (Foster et al., 2023). This fact, combined with the significant number of teachers who identify as work-linked families, creates an urgent need to understand how working with family impacts agriculture teachers' experiences. This research aims to explore dual-agriculture-teacher-couples' experiences with the work-family interface to describe how blended work-family relationships may impact the recruitment and retention of agriculture teachers with work-linked family members. The study aimed to (1) minimize the gap in our understanding of the work-family interface as it relates to the work-family integration/segmentation continuum, (2) provide a voice to a previously unheard subpopulation of agriculture teachers, and (3) identify or develop workplace and organizational strategies that support agriculture teachers' work and family roles. The dissemination of this research promotes the national research values of 'examining social dynamics in human and life science' and 'fostering healthy living' (AAAE, 2023) by examining agriculture teachers' work and family dynamics to benefit their social and emotional well-being.

Theoretical Framework

The interactions between life spaces (e.g., work and family) are described using the concepts of domains, domain participants, borders, border strength, permeability, flexibility, blending, and borderlands (Clark, 2000). Areas where domains are highly blended are referred to as 'borderlands' or areas that cannot be exclusively called either domain. Within borderlands, domain-related identities and behaviors overlap or merge. Work-linked couples, or couples that experience occupational similarity between spouses (i.e., spouses who share their occupation, workplace, or organization), spend significant time in the borderland that encompasses their work and family domains. Within the borderland, work and family domains overlap temporally, physically, and psychologically. In this study, we highlight the differences between the dual-agriculture-teacher couple work/family borders and those outlined in Work/Family Border Theory, including (1) the work-linked spouse as central participants in both domains, rather than the family domain only; (2) the subdomains that exist within the work and family domains, (3) the dual-agriculture-teacher couple children as frequent border-crossers.

Methods

As part of a larger mixed-methods study utilizing an explanatory-sequential design (Creswell & Clark, 2017), the qualitative phase answered the research question: "How do dual-agriculture-teacher couples in NC experience the work-family interface?" The qualitative phase used semi-structured interviews and personal photos to answer this question. Purposive sampling was used to select study participants who are work-linked spouses in a dual-agriculture-teacher couple (Merriam & Tisdell, 2015). Participants for the qualitative phase were prioritized based

on years of teaching experience, geographic location, and presence of children in their homes. Only couples in which both spouses could fully participate in the interview process were included.

Interviews were conducted via Zoom. Two separate, one-on-one interviews take place over six months, considering the work and family role changes that may occur throughout the school year and the calendar year (e.g., state FFA calendar, school calendar, family calendar including vacations, holidays, school breaks, other times when children are not in school or daycare). The interviews followed the survey administered in the fall semester in the two weeks leading up to Thanksgiving and the week of the break. The interview protocol was developed using the study's quantitative phase results. The protocol aimed to describe the dual-agriculture-teacher-couple borderland and explore borderland experiences with work-family conflict and enrichment. Participants were interviewed once in the spring semester and again during the summer. Participants submitted their photos between the first and second interviews. Photos were collected via Qualtrics.

Dedoose software was used to analyze the interview data. During each round of data analysis, the first steps were designed to avoid cognitive overload and focus on the data directly related to the research questions. Data were reduced and coded. A code frame was generated *a priori* from field notes. Open coding was used to modify the code frame to reflect the data more accurately. Codes were checked for mutual exclusiveness and organized by themes. After analyzing the transcripts, photos were reviewed using qualitative content analysis (Schreier, 2015). To supplement the transcript findings, content analysis was used to explore the experiences represented in the photos. Photos were de-identified using the 'BeFunky' photo editor. Photo and interview data were integrated to refine results. A reflexivity journal, member checks, and triangulation were used to promote trustworthiness and rigor.

Results/Findings

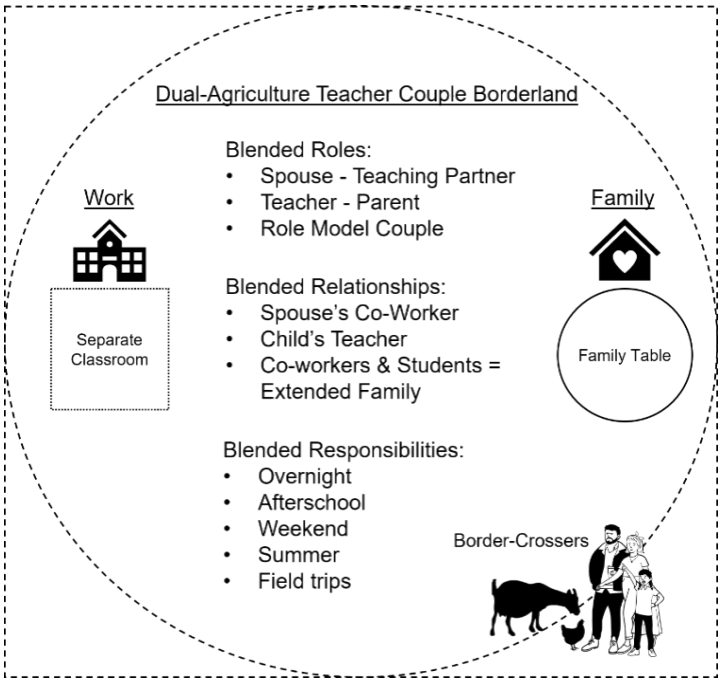
The study included nine couples (Anthony-Kate; Benedict-Sophie; Collin-Penelope; Daphne-Simon; Elouise-Phillip; Francesca-Michael; Gregory-Lucy; Hyacinth-Gareth; Violet-Edmund). A total of 36 one-on-one interviews were conducted. The interviews totaled 2033 minutes of data that were transcribed into 359,423 total words. In addition to interview participation, six couples were represented in the 44 collected photos. Some results describe the general structure and navigation of dual-agriculture-teacher couples' borderland.

Borderland Structure

Work-linked spouses emerged as central participants in both the work and family domains. This is a major difference from Clark's theory (2000) and makes a significant impact on the size and structure of the work-family borderland of dual-agriculture-teacher couples. The work and family roles, responsibilities, and relationships of dual agriculture teacher couples are highly blended (see Figure 1) to the point it is difficult to separate them. Many participants shared how their work and family are experienced as a merged life space. "*Everything* we did was so intertwined" (Hyacinth). Luch stated, "When we look back at all these different goals that we met or helped students meet, we did it *together*. [We] cannot identify. 'Oh, that was that was his thing. That was my thing.' It was our thing." Gregory added, "We are *always together. Everything* is shared." This significant borderland develops through borders that are weakened

Figure 1

The Work-Family Borderland of Dual-Agriculture-Teacher Couples



by occupational similarity. As occupational similarity increases between spouses, borders are weakened, and blending increases. The study found that couples who teach together at the same school where their children attended and are students and FFA members have the most significant borderland. The significance of work-family borderland impacts how dual-agriculture-teacher couples navigate their work-family interface through border-crossing and border-keeping work and family domains and subdomains.

Border-Keepers. Administration and extended family were border-keepers. Administration influenced work culture by establishing which family permeations are allowable and which are not (e.g., allowing teachers' non-school-aged children on campus). Extended family members served as border-keepers because the work-linked spouse's parents, grandparents, siblings, and other family members influenced and shaped their family culture and engage the dual-agriculture-teacher couple in non-work-related activities (e.g., holidays and family gatherings).

Border-Crossers. The most frequent border-crossers were the dual-agriculture-teacher couple's children and their students. The dual-agriculture-teacher couple's children often border-crossed into the work domain when they helped care for animals and plants, attended FFA events, and spent time after school in their parents' classrooms. The close relationship dual-agriculture-teacher couples built with students or FFA members also allowed them to cross over into the family domain. "We spend so much time with students that they often become our extended family (Benedict)." Daily interaction with dual-agriculture-teacher couple children and students made them the most frequent border-crossers, but not the only border-crossers. While less frequent, other domain members such as other teachers and extended family, may also border-cross. Other teachers, especially other agriculture teachers, may cross the family domain border as they form close friendships with the dual-agriculture-teacher couple. However, these interactions occurred less often than daily for most participants. Hyacinth shared that she and her

spouse developed close personal relationships with other agriculture teachers over time. Hyacinth stated:

> Gareth and I, having come through together, we built a family with [other agriculture teachers]. Those are the people that we still go hang out with when we have time to hang out. We still talk to them and see them and, you know, conventions and conferences and camps and stuff like that are like a big family reunion for us.

Gregory supported this notion by adding, "It is like a big family get-together, like a family reunion, because you get to know so many teachers from all over that you still stay in contact with (Gregory)." Less frequently, extended family will cross the work border by attending banquets (Francesca), traveling overnight as a chaperone, helping with childcare (Lucy, Hyacinth), or helping care for plants/animals on weekends (Gareth). The size of the borderland makes true border-crossing less frequent for the dual-agriculture-teacher couple because of the high level of family integration into the work domain.

Dual Central Participants. The work-linked spouses were both border-crossers and border-keepers. Clark (2000) identifies the border-crosser's spouse as a family domain border-keeper. While this remained true for the dual-agriculture-teacher couples, the process was slightly different for work-linked spouses because they navigated the "yours, mine, and ours" qualities of the work-family borderland and sub-domains. The "yours" and "mine" were the individual, unblended responsibilities occurring in each work-linked spouse's classroom. The "ours" was the remainder of the work-family borderland and the highly protected family subdomain.

Dual-Agriculture-Teacher Couple Border-Crossing: The Commute

Border-crossing is the process by which the dual agriculture teacher couples navigated the borderland and subdomains. If spouses work at the same school as their spouse, they may not ever completely border-cross from family to work. However, dual-agriculture-teacher couples physically transitioned between home and work. The commutes to and from school differed in transitional processes. Commuting to school was an opportunity for daily planning and preparation for work activities, while the commute home was time for reflection. Gregory said, "The biggest thing that we benefited from our drive was just figuring out what we were doing that day. It [the commute] was a briefing and debriefing of what was happening." Gregory continued, "It was time we could be preparing the way to school, get our heads together. In the evenings, it would be a little de-stress." Gareth supported this notion by saying, "We had time there in the afternoons, times to decompress." This decompression phase helped the dual agriculture teacher couples prepare for family roles and responsibilities.

Weak work-family borders presented challenges to border-crossing. Without purposefully self-created borders, border-crossing was more difficult to navigate. Lucy outlined the challenge of weak borders. Lucy said:

> We had to have a lot of conversations about 'let's leave work at work.' And once we get in the car or once we get home, we have to leave school at school. And let's not spend our time around the kitchen table talking about stuff that's going on at school, which was still a challenge because, you know, you never leave one or the other.

Lucy's statement describes how the border-crossing family attempted to border-keep subdomains within the work-family borderland.

Dual-Agriculture-Teacher Couple Border-Keeping Subdomains

Borders between work and family were weak, but subdomains with stronger borders existed within the borderland. "It was definitely a 'yours, mine, and ours' kind of situation"

(Francesca). Another stronger border was kept around the spouse's classroom within the work domain. Similarly, a strong border was kept around the "family table" in the family domain. These strong subdomain borders were key to the dual-agriculture-teacher couple's ability as border-keepers.

Border-Keeping: The Classroom. While spouses shared many similarities, teaching styles were not among them. Gareth's comments reinforced this notion, "We each came at teaching a little differently, and that was good." Daphne experienced something similar and stated, "I had my way of doing things, and he had his." "We are very different people, very different teachers, very different FFA advisors" (Violet). These differences strengthened the border separating the spouse's classroom from the rest of the work domain. This border also created an element of autonomy within the subdomain. "I did not go in his classroom and tell him how to teach. And he (Gregory) did not come into my classroom and tell me how to teach," said Lucy. The rigid structure of many school settings and bell schedules reinforced the border around the classroom subdomain.

Even the participants who worked at the same school as their spouse were not often together with their spouse during the school day. Participants described parting ways once arriving at school, then only seeing each other briefly, if at all, during the school day between the first and last bell. "We really did not see each other that much at school once the school day started" (Anthony). Lucy concurred, "Once you get on campus, I am running my classroom, and he (Gregory) is running his [classroom], and we are doing all our duties." As the classroom subdomain existed within the work-family borderland, another subdomain seemed to exist in relation to family.

Border-keeping: The Family Table. The couples allowed work to permeate the family domain by grading student work at home or preparing for the next school. Dual-agriculture-teacher couples found a strong border necessary to protect strictly family time and activities. A common physical symbol of the work-family border was represented by the dual-agriculture-teacher-couple's front door of the family's home or the family dinner table. I concisely described this subdomain with the in vivo code 'the family table.' The family table subdomain encompassed the family-only activities safeguarded by the couple. Generally, the only participants in this subdomain were the couple and their children.

Following her years as a classroom teacher, Kate created strong borders to protect family time in the interest of her child. She stated, "[At home] I do not touch work stuff–that consumed my life a couple of years ago, and I learned quickly when [child] was born that (working after hours at home) is not the best thing for my family." Hyacinth echoed Kate's desire to protect family time as a best practice for family well-being. "I have always been more protective of that family time and that family aspect" (Hyacinth). These comments and others shared by the participants suggested that the strength of this border seems to increase over time and after children enter the family domain.

Michael identified the difference in having a child placed on his work-family border-keeping. Michael said, "As a single-teacher program without a kid at home, I would say I will shotgun blast. We are going to do every single competition." Michael juxtaposed after-school preparation after having a child. Michael said, "We definitely do not stay as late as we used to." Gareth supported Michael's notion that children impact border-keeping by creating a new need for parents to care for children in the family domain. "Children were a reality check. [With a child to care for] you have got to leave school at a certain time" (Gareth). Gareth's children attended a commercial daycare facility, so Gareth or Hyacinth were timebound to pick them up

by a certain time each day. Border-keeping is necessary to provide for children's needs outside of daycare hours.

The commute was an essential component of the border-crossing process. For many participants, the border-keeping process is related to a physical marker between work and their family. This physical marker was a specific location along their commute, ranging in landmarks (e.g., the door of their school, their driveway, or a seat at their family's table). For Daphne, border-keeping began at the front door of their shared home. Daphne said, "When we come in the door, we kind of left it at that point." Sophie, Daphne's daughter-in-law, discussed how border-keeping is an ongoing process rather than the flipping of a switch. Sophie explained that we couple's "outside time" is often interrupted by work-related stressors. Recently, the couple has been purposeful about not discussing stressful work-related topics outside work hours. Sophie said:

> We (Sophie and Benedict) will be sitting there (at the table) or cooking dinner, and I will be like, 'We did not think about it (the work issues) this way.' And he (Benedict) will say, 'We agreed, we are not talking about it anymore. We are leaving it (school) at school.

Border-keeping was not as simple as flipping an off switch. The couples must consistently reinforce the subdomain border from moment to moment to avoid work interruptions during family-only time and activities.

The processes of border-keeping and border-crossing are ongoing. The result was the construction of dynamic borders that ultimately shaped the borderland and allowed the dual-agriculture-teacher-couple to navigate the blended space using blended work-family resources and flexible work-family arrangements.

Conclusions

Spence (2022) found that 'balance' is not a realistic term for describing some work-linked couples' work-family interface. This study also found that balance does not accurately describe the work-family interface of dual-agriculture-teacher couples. Work-family balance implies separate domains, whereas dual-agriculture-teacher couple borderlands blend work and family roles, responsibilities, and relationships. The dual-agriculture-teacher couples' work-family interface functions more accurately as a cell: the dual-agriculture-teacher couple is the nucleus, the borderland is the cytoplasm, and the borders are cellular membranes (e.g., nuclear and cell membranes). The dual-agriculture-teacher couple influences borderland participants and activities as the nucleus directs cellular function. The borderland allows movement within the blended domains as the cytoplasm allows intracellular movement. The domain borders (e.g., cell membrane) control border-crossing, and the subdomain border (e.g., nuclear membrane) controls border-keeping as the cellular membranes control cell structure and permeations. The goal of the dual-agriculture-teacher couple work-family interface is equilibrium in which permeations reach an optimal concentration across work and family domains.

Recommendations

As a profession, educators should stop encouraging work-linked couples and other teachers with significantly merged work and family domains to 'balance' those domains. Instead, we should encourage and support teachers who blend their roles to reach work-family equilibrium. Resources and support should enable borderlands through flexible work

arrangements and family-friendly attitudes, spaces, and policies. The study also recommends future research to explore further work-linked families teaching agriculture and other disciplines by considering other forms of work-linked families, such as parents and their children, siblings, and other variations of work-linked spouses (e.g., spouses who teach different subjects at the same school).

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A Co-Curricular Undergraduate Research Program Evaluation

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Introduction/need for research

Undergraduate research is an increasing focus of higher education across all institutions, particularly colleges of agriculture. Notably, undergraduate research is viewed as a high-impact experience that allows students to develop critical thinking skills (Thiry et al., 2012), engage in collaborative research with faculty mentors and potentially other students, and improve student learning (Dvorak et al., 2019). Being part of undergraduate research allows students to develop advanced writing skills needed for publishing research (Shivni et al., 2021). Students engaged in undergraduate research experience (UREs) are more likely to attain science-driven bachelor's degrees and acceptance in graduate school (Hernandez et al., 2018). Additionally, experience conducting research increases students' capacity to adjust to new situations and solve challenging problems, which are critical skills given the rate of global change (Ahmed & Al-Thani, 2022).

While there are clear advantages among students who can participate in extracurricular research, there has become an interest in developing students' research skills through embedding concepts into coursework for all students to gain benefits (Auchincloss et al., 2014). Since non-credit earning opportunities for research are unpopular among undergraduate students, a consideration is to provide students exposure to research concepts as part of their coursework (Faulconer et al., 2020). When embedding research throughout a course, it is vital that students have an active role in the research by allowing hands-on aspects like data collection and analysis (Olivares-Donoso & González, 2019). Students have been known to engage in course-based undergraduate research experiences (CUREs), where they receive instruction targeted to develop research skills while providing course credit (Corwin et al., 2014). Compared to traditional (UREs), studies have shown similar benefits from students engaging in CUREs (Linn et al., 2015). Having instructors facilitate research in a more manageable setting, like a consistent course schedule, can expose more students to research concepts (Brownell et al., 2015).

Faculty members dedicated to mentoring undergraduate students play a crucial role in guiding students to shape their future career aspirations and fostering a sense of belonging within their academic community (Eagen et al., 2013). Faulconer et al. (2020) observed that dedicating time to adequately assessing students as an additional challenge for new and experienced faculty members engaging in undergraduate research and inquiry. Therefore, it is essential to provide faculty with the necessary support and training to help them guide and mentor student researchers.

Background of the Study

Within the humanities and social sciences, an underwhelming body of literature refers to undergraduate students' research experiences (Rand, 2016; Cuthbert et al., 2012). Therefore, the Department of Agricultural, Leadership, and Community Education at Virginia Tech sought to increase access to undergraduate student research. Support from the Undergraduate Research Faculty Grant allows us to develop, implement, assess, and disseminate curriculum and materials related to undergraduate research in colleges of agriculture, specifically departments related to agricultural leadership education and communication.

The undergraduate research program has two main components: (a) incorporating an undergraduate research experience into an existing introductory course for all students majoring in Agricultural Sciences and (b) working with committed faculty members within a community of practice (CoP) to provide professional development and accountability for mentoring undergraduate students.

First, the students enrolled in a required course are exposed to a two-module curriculum that gives a high-level overview of general research and features recent scholarship conducted by faculty members in the department. The students engage directly in data analysis by analyzing a short scene from an open-access interview to develop themes. Students consider a career-related question they are curious about and what data would be needed to address it. Students enrolled in this course must do 16 hours of undergraduate service related to their major at a service site of their choice. As part of their 16 hours of service, students interview 2-3 individuals seeking to answer their research questions.

Building on the two modules further into the semester, students implemented basic data analysis strategies in their research projects for the course. Students then coded the interviews for overarching themes and disseminated the results to the class. These activities aim to scaffold students' experience and help them create an interest in participating in undergraduate research.

For our second component, the project team developed a CoP to provide faculty professional development (e.g., structuring an undergraduate research experience to benefit faculty and students) and accountability for mentoring undergraduate students. The CoP will be purposeful in discussing methodologies and research topics/questions that are well-suited to undergraduate exploration and align with students' current research interests. Both streams of activity were implemented throughout the 2023 Spring semester. This evaluation is specifically designed to focus on aspects of URE implemented into ALCE 3004.

Evaluation Framework

This evaluation utilizes Kirkpatrick and Kirkpatrick's (2006) framework to identify the outcomes of an undergraduate research grant to increase student access. Kirkpatrick's model has four levels of program outcomes that will be evaluated: (1) levels of satisfaction among undergraduate students with the implemented program pieces in class, (2) changes in participants' skills and knowledge, (3) behavior changes among participants because of the program, (4) evaluate the overall impact of the program to include broader outcomes associated with organizational goals. This project focused on the first two framework levels as the program will be implemented again in Spring 2024.

Methodology

The study utilized qualitative methodology a to explore students' experiences engaged in a curriculum designed to develop and encourage undergraduate students' participation in research (Patton, 2015). After IRB approval, the students enrolled in ALCE 3004 in Spring 2023 were asked to participate in semi-structured interviews after grades were submitted. A total of six

students participated in an interview, out of the seventeen students enrolled in the class. Each interview lasted approximately thirty minutes.

The research team utilized Glaser's (1965) constant comparative method of analysis to identify emerging themes. Initially, the data was reviewed and categorized for analysis. Glaser (1965) described that the researchers must examine codes previously categorized within the same group to identify overarching themes.

Results/Findings to Date

The results of this evaluation focused on the first two levels of Kirkpatrick and Kirkpatrick's (2006) model. Focusing on these two levels will allow for programmatic changes for Spring 2024. Seventeen students were in ALCE 3004 in the Spring of 2023. Six students consented to participate in the program evaluation interviews. Pseudonyms were used to protect the participant's identity. The purpose of this program was to develop materials to increase student engagement in undergraduate research. As a result of participating in the current proposal, students will be able to:

1. Explain research projects conducted by ALCE faculty.
2. Engage in introductory data analysis and theme construction.
3. Describe how research may contribute to their career plans.
4. Conduct interviews with people at their service site
5. Analyze interviews for key themes.
6. Communicate the key themes to their classmates and the service site.
7. Participate in longer, more comprehensive research projects through enrolling in ALCE 4994.

Applying these questions to Kirkpatrick & Kirkpatrick allows us to align our current findings with the anticipated levels (2006). These levels included (1) satisfaction with the implemented program pieces in class and (2) changes in participants' skills and knowledge.

Level 1: Satisfaction with implemented program pieces

Students experienced aspects of research throughout the course by conducting small, individual studies based on questions related to their future careers by conducting interviews and analyzing transcripts. Having the students practice coding interview transcripts guided how to analyze data. While many students expressed satisfaction with this aspect, other students would have liked the opportunity to read and code the interview transcript independently and then return to compare notes with classmates: "To me, the best way to do it is to do it alone, but then come together and compare our notes…I feel like your perspective of both of those change during conversations with others".

The students also noted how the introduction to the faculty coming and teaching the modules in the course was helpful and made it feel as though they were more approachable. Demi, who did not have prior research experience, appreciated being introduced to the different faculty research areas within the department.

> I think the connection with different people coming in during class, like when they discussed their research and taught aspects of coding. It made the gap between students and faculty a little bit smaller. Yeah, so it didn't feel so intimidating.

Level 2: Changes in participants' skills and knowledge.

Three of the students interviewed (n=6) had prior experience conducting undergraduate research or are currently involved in a URE. The students who had experience with research described how taking time during class to develop their coding skills was helpful as they noticed that it is a skill you do less often than reading or writing. Students having to conduct in-person or Zoom interviews allowed them to gain a new level of comfort with those skills they may have already developed.

The results from this study provide several insights into aspects of the UG Research Faculty Grant that will be used and implemented in the Spring 2024 section of this class. Current changes suggested including adding a section explicitly informing students on action research, allowing students to code their data after going through an example as a class, and additional interview etiquette before data collection. More modules will need to be added to address the suggestions provided by the students.

Requests for Input/Guidance/Mentorship/Questions

No conclusions have been made because the program is being revamped to include current results for CLASS in Spring 2024. For now, the following questions are being asked from the individuals developing and evaluating the program.

1. What research skills (i.e., coding and annotating) should be included in learning modules?
2. What methods should be adopted to best evaluation the second round of this program?

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Emerging Results of a Systematic Review: The Impacts of School-Based Agricultural Education in Low and Lower-Middle Income Countries

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Emerging Results of a Systematic Review: The Impacts of School-Based Agricultural Education in Low and Lower-Middle Income Countries

Introduction, Purpose, and Objectives

Grounded in the theories of experiential learning and positive youth development, school-based agricultural education (SBAE) programs, implemented through classroom education, experiential learning activities, and leadership development can empower youth and encourage the adoption of best practices and innovation in agriculture (Haruna et al., 2019; Spielman et al., 2008). Beyond individual and family outcomes, SBAE programs have the potential to contribute to broader community impacts to increase agricultural productivity, reduce food insecurity, and improve income generation (Lamiño Jaramillo et al., 2023; McKnight, 2021; Strong et al., 2023). Though SBAE evolved from various grassroots efforts to reach rural youth in the United States, the model has expanded in the past 100 years to include similar programming on almost every continent (Connors, 2013; Wright et al., 2019).

Given the grand challenges facing agricultural systems globally and the limited resources available to invest in the necessary agri-food systems transformation, the need for evidence-informed programs and policies has never been more important than it is today (Mallett et al., 2012; Newman & Gough, 2020). With SBAE programming proliferating around the world, and given the sporadic and often anecdotal nature of the evidence related to the impacts of SBAE programming, this study seeks to map the full body of evidence on the impacts of school-based agricultural education programming in low and lower-middle income countries.

As a component of a larger study, which is the most comprehensive review of the state of evidence of the impacts of youth agricultural education and training programs, this study reports a subset of the broader results. These results focus on evidence and gaps in the literature among studies and evaluations assessing the impacts of SBAE interventions which target adolescent youth 15 to 19 years of age. The study specifically examines the impacts related to resilience, food security, climate change adaptation and mitigation, and economic growth. This ongoing study also assesses the evidence related to SBAE interventions' impacts on social inequalities, particularly as it relates to the diffusion of innovations among women, ethnic minorities, and youth in smallholder farm families. Aligned with these purposes, the study aims to answer three research questions:

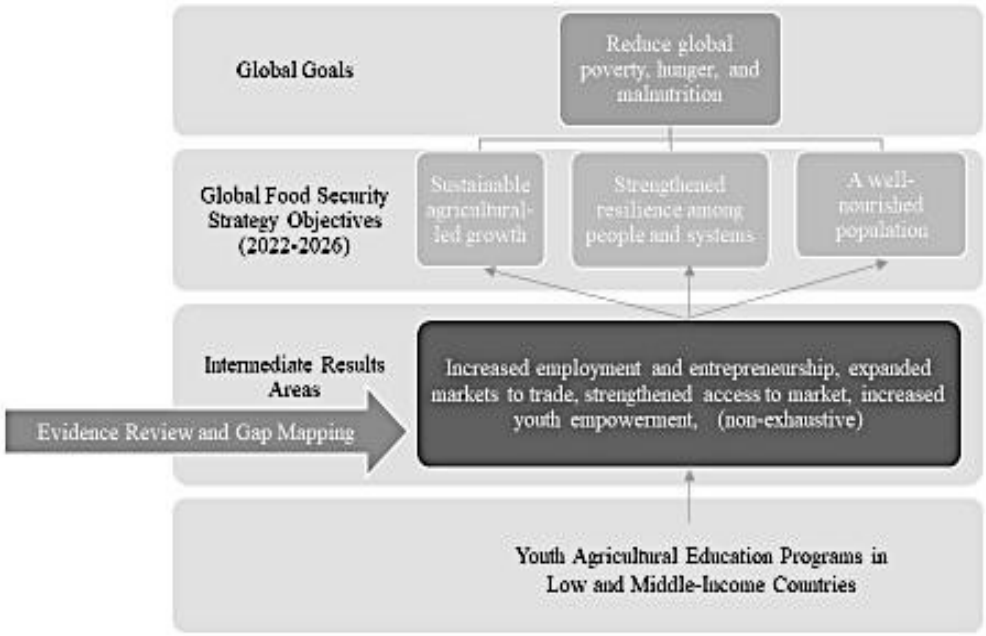
1. What evidence currently exists of the impacts of SBAE programs in low and lower-middle income countries on indicators of economic growth, resilience, and nutrition?
2. Under what circumstances and conditions do SBAE programs result in impacts aligned to the economic growth, resilience, and nutrition priorities of the U.S. Global Food Security Strategy; and
3. To what extent does existing evidence related to the impacts of SBAE programs in low and lower-middle income countries assess outcomes through a lens of gender and social inclusion?

Ultimately, this research is intended to target international investments and policies while informing the design and implementation of agricultural education programs to maximize individual and community impact.

Conceptual Framework

This study is informed by a conceptual framework that is essentially an emerging research agenda. Structuring a research agenda into research problem areas helps to align study objectives with sector priorities, thus informing allocation of research resources and the communication of priorities for the research community (Buriak & Shinn, 1989). This study and the conceptual framework on which it is based seeks to identify evidence of the impacts of agricultural education beyond the program output level. Priority impact areas in the conceptual framework aligns with the recently updated U.S. Government Global Food Security Research Strategy, focusing on the link between participant-level outcomes and community-level impacts on food security, nutrition, and resilience.

Figure 1.
Study conceptual framework, aligned to the U.S. Global Food Security Strategy



Methods

The research is being implemented in three phases. First, we are employing systematic review methodology as a means for "finding a robust and sensible answer to a focused research question" (Mallett et al., 2012, p. 445). In this first stage, we are using rigorous systematic review protocols, published a priori, to identify, critically appraise, and qualitatively analyze evidence of the impacts of SBAE programs (Mallett et al., 2012). Arguably the most important stage, and the stage at which weaknesses are most often introduced in a systematic review, is developing transparent and replicable search protocols (Cooper et al., 2018). For this purpose, we are using the Population, Intervention, Control, and Outcome (PICO) search strategy to frame our database searches around the study population, intervention, outcomes, and study designs (Methley et al., 2014; Waddington et al., 2012).

Table 1.

The PICO search strategy components for this study (Cooke et al., 2012)

Population	Youth (ages 14-29) in communities in low and lower-middle income countries.
Intervention	Participation in formal or informal agricultural education programming between 2003 and 2023; Disaggregated by intervention type.
Control	Not applicable.
Outcome	Outcomes or impacts attributable to these programs, ranging from individual-level outcomes, family outcomes, and broader community and global outcomes.
Study Design(s)	Quantitative, qualitative, and mixed-methods; including evaluation reports; Disaggregated by study type and source (peer-review or grey literature sources).

Because each of the databases to be searched has different search capabilities, we developed unique search and screening protocols for each database, with screening for inclusion or exclusion decisions detailed in the researcher team's online audit trail including journaling-type recordkeeping (White et al., 2020). Included studies are then screened for duplication using a reference management software, followed by a content review, critical appraisal, and a qualitative content synthesis to draw out findings related to outcome areas in the conceptual framework and other emerging themes. This process for deductive screening and analysis in the systematic review is demonstrated in Figure 2.

Figure 2 .

The Systematic Review Process for Deductive Review of Evidence

In the second phase, we are synthesizing the evidence based on intervention type, looking closer at four primary intervention types: SBAE programs (to inform this presentation), non-formal agricultural education for youth, post-secondary education, and job skills training. In the third and final phase, we plan to use evidence gap mapping (EGM) which is "a systematic evidence synthesis product which display the available evidence relevant to a specific research question" (White et al., 2020, p.2), to assess the strength of evidence as aligned to the theory of change connecting youth agricultural education programs to potential impacts on resilience, food security, and nutrition. The visual presentation of evidence gap maps are effective in communicating the state of the evidence to the scholarly and practitioner communities.

Results/Findings to Date

To date, we have recovered 4,215 artifacts from nine database searches. Though screening for inclusion and inclusion, qualitative analysis, and critical appraisal are all still ongoing at the time of this abstract submission, we offer the following emerging findings as initial observations. First, the volume of artifacts meeting the inclusion criteria related to school-based agricultural education programming is sparse, with the majority of artifacts excluded for the following reasons: intervention or programs based in countries outside of low and lower-middle income countries, publication methodologies not following an evaluation protocol (examples include editorial publications, promotional materials, and descriptive publications), and publications describing programs other than school-based agricultural education programs.

Of those articles preliminarily included for further analysis and critical appraisal, we are finding that very few articles measure impacts beyond the individual level, pointing to a likely gap in evidence from longitudinal studies that measure the medium to long-term outcomes of SBAE programs on community or regional food security, nutrition, and/or resilience outcomes. To date, no examples of completed true experimental studies specific to SBAE programming have been discovered, with most studies or evaluation reports presenting case studies, post-program reaction-level training evaluations, and/or output-level project evaluations. When assessing the preliminarily included studies, we are finding that while most quantitative studies or evaluations do at a minimum, disaggregate data by gender, very few present an analysis of data comparing results between participants of different genders, socio-economic statuses, ethnic groups, farm size, or other factors that would allow for a more nuanced understanding of results or for a deeper analysis of the underlying power, access, and control that impact technology adoption and long-term outcomes.

Requests for Input

At the time of the Southern Region American Association for Agricultural Education (AAAE) 2024 conference, the final results of the systematic review and evidence gap mapping will be available to share with membership. The conference will be an opportune time for the lead researcher to engage the AAAE membership to inform the study conclusions, implications, and recommendations, grounding our understanding with feedback from the broader agricultural education community. Specific questions for discussion and member feedback include:

1. What are other sources of evidence that the research team has not yet considered?
2. What do the results of the systematic review and evidence gap mapping mean for what we, as a community, understand about the circumstances and conditions of SBAE programs that lead to the greatest positive impacts aligned to the economic growth, resilience, and nutrition priorities of the U.S. Global Food Security Strategy?
3. What are the implications for priority agricultural education research?

Following the conference, the research will be completed in March 2024, with evidence presented in future academic convenings, published in high-impact journals, and brief synopsis presented in user-friendly formats for educators and policy makers, thus informing the work of practitioners, guiding the prioritization of research, and contributing to the overall body of knowledge (Lindner et al., 2020).

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An Assessment of the Inner Working Relationships of School Based Agriculture Educators in Multi-Teacher Departments

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An Assessment of the Inner Working Relationships of School Based Agriculture Educators in Multi-Teacher Departments

Introduction

Teacher relationships in multi-teacher departments have many dynamics that can create high levels of efficacy and measurable levels of ineffectiveness (Vallone et al., 2022). The synergistic effect of accomplishing an FFA advisor's goal, such as the advancement of a leadership development event (LDE) team, can feel utopic and give feelings of task elevation; in contrast, when there is conflict in a school based, multi-teacher department, training an LDE team can create issues of competing and division between advisors (Solomonson et al., 2019). Numerous school-based agriculture educator (SBAE) programs have one teacher who balances the duties of the agriculture education model, but in larger school systems there are higher occurrences of multi-teacher departments and work groups. The scope and size of the program dictates how many teachers facilitate learning in various courses that range from animal science to turf management. The SBAE course descriptions are diverse and can create variations in teaching styles, classroom management practices and student outcomes. In multi-teacher departments, teachers can view the outcomes and work ethic of their partners; those observations can create feelings of admiration for their colleagues or sense of envy in the other person's abilities (Chernyak & Rabenu, 2018). This research explores what can give rise to conflict in multi-teacher departments. This research also explores the ideals of conflict management and conflict resolution skills and if those concepts are taught in educator preparer programs.

Conflict is an amorphous or nebulous term whose definition has as much to do with the culture of the person defining it as it does with the term itself (Himes, 2008). At its core, conflict can arise whenever values, purposes, missions, passions and beliefs are different between two individuals and can lead to conflict or strife (Himes, 2008). Conflict consistently arises in the workplace due to goal incompatibility or in the absence of unification in the process to plan and implement goals (Cornille,1999). Conflict can be seen as dysfunctional, but in many cases, if it is properly managed, it can be practical and help peers create a better outcome (Wienclaw, 2021). Conflict between groups may also improve team dynamics, cohesiveness, and task orientation but if the conflict becomes too emotionally charged, a win-lose mentality can arise, with negative results such as groupthink, frustration, job dissatisfaction, and stress (Wienclaw, 2021).

Purpose and Objectives

The purpose of this qualitative study is to investigate and assess the interworking relationships within SBAP with multi-teacher departments and if conflict resolution affects SBAE retention. The following objectives guide this study:

- Describe the personal demographics of SBAE educators that have worked in a multi-teacher department;
- Assess if SBAE instructors are being taught to participate in a culture of openness, problem solving and conflict management during pre-service training;
- Assess if SBAE instructors are being taught to participate in a culture of openness, problem solving and conflict management at their in-service conferences;
- Determine if school districts play a role in training SBAE educators a multi-teacher department on how to problem solve, resolve conflict and effectively communicate;

- Identify current and past SBAE experiences that help teacher educators prepare instructional materials related to the interworking of SBAE relationships.

Conceptual Framework

There is a lack of research in regard to the relationship between conflict management resolution, output and outcomes in multi-teacher SBAE programs (Solomonson et al., 2019). There is no conclusive research that establishes if the inner workings of two or more SBAE educators will affect the level of output between the teachers in a multi-teacher department. There is a further gap in research relating to how the conflict between educators affects attrition, job placement and work output intensity.

The course of action in developing an individual into an SBAE educator is a purposive process that requires training, certifications and enrichment. The traditional SBAE training process entails enrolling into and completing a teacher preparation program and earning a passing score on a state or national based pedagogy exam and agriculture knowledge content exam (Swortzel, 1999). The teacher preparation programs are broad and cover a myriad of topics to prepare the future educator for lesson planning, student leadership development, community outreach and the management of supervised agricultural experiences. In educator preparation programs, students are entrenched in a block of courses that pre-service teachers experience just before heading out to their student teaching location (Swortzel, 1999). Although the block can be an exhilarating experience, it does lack some domains that are assumed will come naturally for future educators, one of them being conflict management (Boone & Boone, 2009). Wienclaw (2021), states that conflict frequently arises in the workplace and that goal incompatibility between groups or individuals, differentiation, task interdependence, scarce resources, ambiguity, and communication problems can all lead to a situation that promotes conflict. The lack of effort to identify which issues affect SBAE instructors in multi-teacher departments could be one of the reasons there is high turnover in the profession, recruitment and retention concerns and a decrease in career visibility.

The role of the school-based agriculture educator is varied and multi-dimensional. The most overlooked dimension and dynamic is the impact of conflict in a multi- teacher department (Boone & Boone, 2009). Boone and Boone (2009) indicated a difference in the nature and degree of problems faced by teachers in West Virginia when comparing the size of the department, single teacher versus multi-teacher departments. They further report that there may be a correlation between multi-teacher department teachers' and their relationships with faculty and peers.

Methods

This mixed methods study aims to determine the nature and degree of interworking relationships of SBAE instructors with their peers in a multi-teacher department. The mixed method design (Creswell & Plano, 2017) was chosen to gather primary data from SBAE instructors on their experiences with their peers and faculty that include, but are not limited to, their own personal reflections, experiences with their teaching partners in multi-teacher departments, principals, career and technical education administrators, teacher educators and colleagues in agriculture teacher associations. Those data will then be used to explore a quantitative instrument that can be used to assess needs of SBAE teachers when conflict is concerned and determine what role professional development can play in creating holistic relationships.

The origins of this study were piloted informally to ascertain if conflict management resolution is taught in some capacity in a course during teacher preparation at universities. This was done in an attempt to inform the planning of the pre-service experience at Auburn University. An email was sent to several SBAE pre-service teacher faculty. They were asked whether or not the topic of conflict management, conflict resolution, or group thinking was covered in their pre-service teacher training courses. Their responses were collected and reviewed to help determine the use of conflict management topics in the pre-service SBAE preparation process. Eleven individual pre-service educators provided usable responses.

In addition to the faculty, SBAE teachers were sought out and asked about conflict management issues in multi-teacher departments in an attempt to provide examples to students in a pre-service teacher course. Teachers in a national SBAE social media group were asked “What are some conflict management issues you’ve had with a teaching partner?” Responses and direct messages originating from the original post were collected and thematically coded. Forty-one SBAE instructors provided responses.

Having completed the exploration portions, a formal study needs to be conducted to identify the proper strategies SBAE teachers should be using specifically in multi-teacher departments. an instrument will be sent to SBAE teachers identified as having strong workplace cohesion.

The instrument will consist of scale questions that will focus on gathering information that assess the participants personal and professional experiences in a multi-teacher department. The instrument will likely be broken down into several categories to assess the experiences of working in a multi-teacher department and address the interactions and experiences the participant has with faculty and peers. Question sections will include question categories pertaining to conflict styles, personality, and behavioral dimensions, as recommended by Moberg (2001). Formal interviews will also be conducted to assess the strategies used by successful and unsuccessful teacher teams. Results from this study are intended to develop a case study or a series of cases that can be used to assist in the development of SBAE teachers.

Findings to Date

In the responses from SBAE faculty, only one post-secondary instructor confirmed their program directly instructs on conflict management, group conflict, and leadership. They further clarified that the conflict related topics are only touched on during a few days of instruction with leadership being the main focus of the course. The other 10 responses confirmed that their agricultural education programs do not cover any conflict related topics. These results point to a concerning lack of training on these conflict topics. While there are possibly other means SBAE instructors are receiving instruction on these topics, the lack of direct course work during the pre-service degree plan is an area that needs to be further explored.

Looking at the informal responses gathered during Part 2 of the study, several themes emerged from the responses shared about SBAE instructors working within a multi-teacher department (Table 1).

Table 1
Emerging Themes of SBAE Conflict Experiences

Theme	*f*	%
Administration	4	1.64
Accountability	1	0.41
Character Assassination	2	0.82
Character Flaws	2	0.82
Communication	7	2.87
Generation / Age Differences	7	2.87
Knowledge Gap	1	0.41
Lack of Cooperation	1	0.41
Program Power Dynamics	3	1.23
Racism	1	0.41
Sexism	1	0.41
Split Campuses	1	0.41
Teacher Certification Programs (Alma maters)	2	0.82
Teacher Certification Types	1	0.41
Teaching Styles	1	0.41
Work Ethic Differences	7	2.87
Work Life Balance	3	1.23

Of these themes conflict based on communication, work ethic and age gap differences were the most apparent from the respondent group. While this is not an exhaustive list of the conflicts shared among SBAE instructors in a multi-teacher program, it is apparent that conflict exists and needs to be addressed.

Request for Input

The research team is requesting feedback in regard to which leadership theory would best fit this study. The researchers have investigated the leader-member exchange theory, situational leadership theory, social exchange theory, and various other behavioral theories and have explored different models such as the Thomas-Kilmann Conflict Mode Instrument, the Five Factor Model Personality measures and the Teacher Retention Model. Feedback in regard to the most feasible research theories and thoughts on the methodology process would be greatly appreciated. Feedback is also being sought as to the identification of teachers and teacher teams that can be used as the basis for the development of the cases. It is believed that each state or area that is served by SBAE pre-service institutions would likely have best and worst-case examples that can be used for the development of these cases. It is also believed that the identity of those examples would likely be known by members of AAAE.

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Effects of Educational Technology on Students' Academic Achievement in Agricultural Education: A Meta-analysis

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Effects of Educational Technology on Students' Academic Achievement in Agricultural Education: A Meta-analysis

Abstract*: The use of educational technology is essential in education, and numerous studies have demonstrated the benefits and effects of implementing educational technology in general education settings. However, there is a research gap concerning the investigation of its impact in the field of agriculture using the meta-analysis method. To address this research gap, we conducted a comprehensive meta-analysis investigating the effect of educational technology on students' academic performance in agricultural education from 2000 to 2022. The study included 14 research works, and the average mean effect size was found to be 0.23 for the fixed-effect model and 0.21 for the random-effect model. Variables such as subjects, educational level, types of educational technology, and sample size were used for moderator analysis. The findings revealed that all four variables significantly moderate the effect size. This suggests that the use of educational technology has a positive impact on students' academic performance in agricultural education. Considering these results, implications for further research and classroom practice are provided.*

Keywords: educational technology; agricultural education; meta-analysis; learning outcome

Introduction

The importance of educational technology (ET) in today's classrooms cannot be denied, and numerous studies have highlighted this. These studies have explored different aspects of ET, including laptop initiatives (Keengwe et al., 2012), the utilization of mobile apps (Domingo & Garganté, 2016), and the implementation of multimedia (Malik & Agarwal, 2012). The focus has been on how these technologies work together to enhance the teaching and learning experience to ultimately improve students' academic achievements.

Agricultural education, which has as its core focus the equipping of students at various levels with the latest skills for careers in agriculture, food, and natural resources (AFNR) has also not been left out of this quest. To achieve this goal through the teaching and learning process, ET has been extensively incorporated into this field. Studies such as those of Alston et al. (2003), Birkenholz & Stewart (1991), and Wells & Miller (2020) are just a few of the numerous studies that have sought to establish the significance of ET in the field of agricultural education.

Although the use of ET in agricultural education has been shown to have many positive effects, some authors question its necessity and impact on students' academic achievement. Shatri (2020) for instance found that ET use can reduce concentration and take up a lot of time. Jin and Bridges (2014) also noted that while ET can have advantages for problem-based learning, there are also challenges such as complex scenarios, infrastructure requirements, and the need for staff and student support.

The lack of clarity about the impact of ET on academic achievement in agricultural education highlights the need for further research. This meta-analysis aims to fill this gap by systematically examining the moderating variables that determine the most significant effects of ET usage on students' academic achievements in agricultural education.

Literature review

Educational technology in agricultural education

Key stakeholders in the agricultural industry are at the forefront of ensuring a revolution in the ways agricultural graduates are being prepared to meet future industry demands. Alston et al. (2003) noted that the National FFA organization and the National Research Council- two notable bodies in the field have attributed the global impact of the United States agricultural sector partly to the "infrastructure for developing and delivering technology, including agricultural education programs" in the public schools and therefore emphasized the need to constantly reinvent the methods of instruction for the very crucial sector.

Since the time Birkenholz & Stewart (1991) conducted a thorough review of the instructional technology used in agricultural departments in schools, which included microcomputers, modems, printers, overhead computer projection units, VCR players, cameras, amplified telephones, and more, there have been significant advancements in the range of educational technology utilized in classrooms. ET such as multimedia presentations (Marrison & Frick, 1993; Patel & Patel, 2006; Shanthy & Thiagarajan, 2011), virtual tours (Nguyen et al., 2023; Schütz et al., 2022), virtual reality (VR) (Stone et al., 2022; Strong et al., 2022; Wells & Miller, 2020), simulations and digital game-based learning (Bunch et al., 2014, 2016; Klerkx, 2021; Klit et al., 2018) enable interactive and immersive learning. These technologies also offer personalized learning, allowing students to explore agricultural concepts at their own pace, while educators can track progress effectively.

Previous literature review

According to Cheung and Slavin (2012), there has been extensive research on the effectiveness of ET applications, including computer-assisted instruction (CAI), for improving learning outcomes since the 1980s. Among these are previous meta-analyses that have reported the impact of ET on students' academic achievements measured across different topics. These studies, which have mostly been conducted in the general field of education, as shown in Table 1, indicate positive impacts (except Tamim et al. (2021)) of ET on students' academic achievement, with effect sizes ranging from -0.41 to +0.93. Tanim et al. (2021), however, stands as an outlier; they found an overall negative effect size (-0.41) from the 52 meta-analyses that were included. This finding was however predictable as their study was a meta-analysis of meta-analyses (second-order meta-analysis), and the authors rightly acknowledged the potential for inherent limitations in their methodology. Lakens (2013) noted that effect sizes are an important outcome of empirical studies over mere statistical significance because researchers use standardized effect sizes to communicate the practical implications of their findings on daily life. Additionally, these effect sizes enable meta-analysis and inform the design of new studies.

Unfortunately, there has not been any meta-analysis conducted on the subject of ET in the field of agricultural education, unlike other fields of pure and applied education. This has resulted in a lack of knowledge on the subject. This current meta-analysis is therefore very timely as it significantly contributes to the body of knowledge. It systematically examines overall and moderator effect sizes to determine the impact of ET on students' academic achievement in agricultural education.

Theoretical framework

The Technology Acceptance Model (TAM) first created by Davis (1989) provides a useful framework for examining the use of ET in agricultural education. TAM identifies two key factors that influence the acceptance and integration of technology in educational settings: perceived usefulness and perceived ease of use. Perceived usefulness means that ET can enhance learning outcomes, support agricultural practices, and improve educational experiences. Perceived ease of use means that the technology is user-friendly, efficient, and easy to incorporate into teaching and learning processes. This meta-analysis aims to identify patterns and trends in the impact of these factors on the adoption and implementation of educational technology in agricultural education. Four moderators: domain subjects; educational levels; types of ET used, and the sample size were considered. The findings of this research will contribute to evidence-based strategies for successful adoption and use of educational technology in agricultural education.

Research questions

1. Do educational technology applications improve academic achievement in agricultural education?
2. How do substantive and methodological characteristics of the studies, such as subjects, educational level, types of ed tech, and sample size, affect the estimate effect?

Methods

Literature search

To evaluate how ET impacts the academic achievements of students studying agricultural education, we conducted a thorough literature review from 2000 to 2022. We chose this time frame to include only the most recent studies and capture the latest development that has taken place in ET since 2000 (Alston & English, 2007; Wingard, 2004). We searched the five databases covering the disciplines of agriculture and education: CAB Abstracts (Ovid), AGRICOLA (EBSCO), ERIC (EBSCO), Education Source (EBSCO), and Web of Science Core Collection (Web of Science).

In this meta-analysis, educational technology (ET) is defined as the practice of using technological processes and resources like computers, video projectors, and the internet to facilitate learning and improve performance (Januszewski & Molenda, 2008). These technologies are placed in the classroom with the purpose of enhancing teaching and learning. This study posits that educational technology includes both a process, such as e-learning and virtual simulations, as well as instructional technology/devices like projectors, iPads, smartphones, computers, mobile devices, and videos.

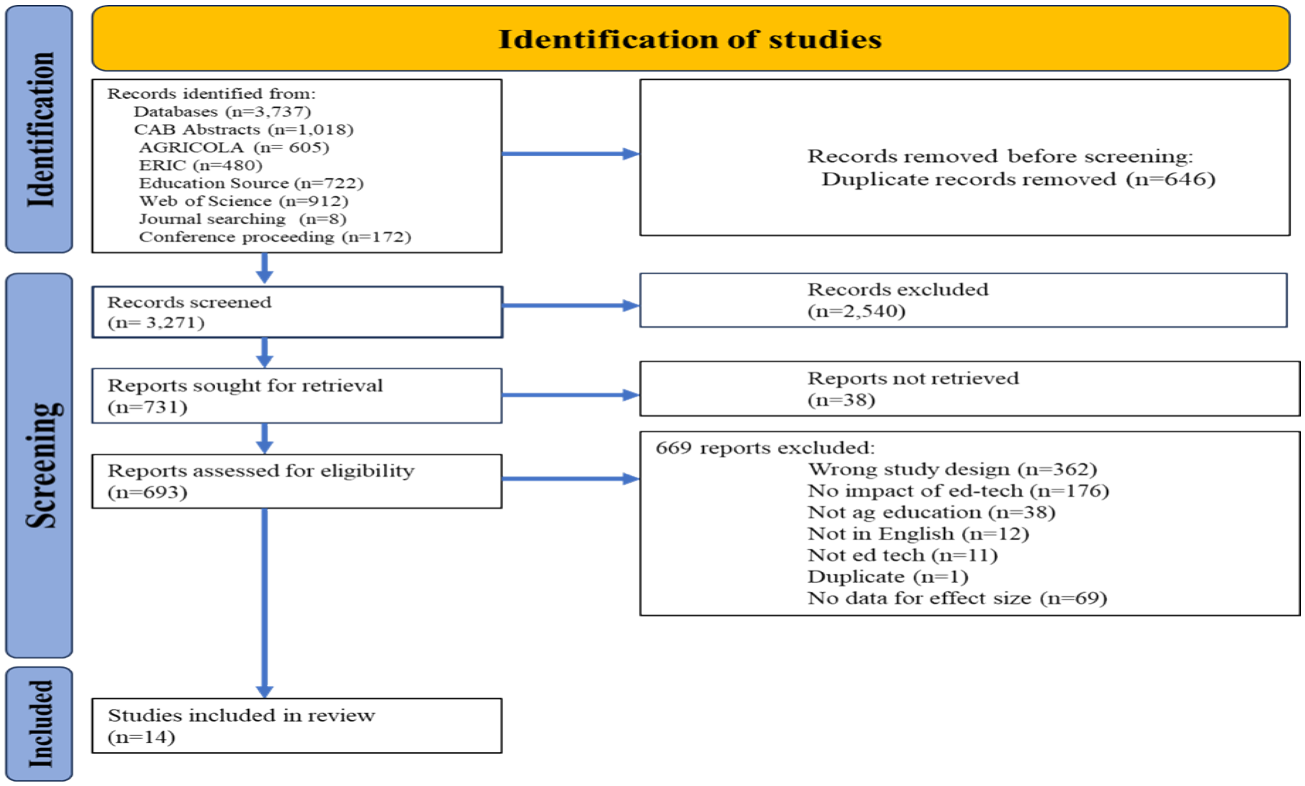
Inclusion & exclusion criteria

Studies selected for this meta-analysis satisfied the following criteria:

- The selected studies must have examined the effect of ET on agricultural education.
- The included studies must have been published in a journal, as a conference proceeding, or as a thesis between 2000 and 2022.
- The included studies must report a method of assessment of educational technology's impact/effect on agricultural education.
- Included studies needed to report detailed information on the effect of educational technology on academic achievements in agricultural education, which include the sample size, experimental design, and detailed results.
- The included articles without a control group were excluded from the study.
- Articles with academic performance results such as final score, knowledge test score were included.
- Studies with self-reported achievement scores were excluded.
- Articles without enough information to calculate the effect size were also excluded.

Figure 1

PRISMA flow diagram



Coding of studies

Subjects. We categorized the subjects within the agricultural field into distinct areas, namely agricultural science, agricultural engineering, agricultural leadership, education and communication (ALEC), and agricultural economics and finance.

Educational level. We coded educational level as secondary, undergraduate, graduate, and mixed. These categories allow us to examine the impact of educational technology across different levels of education.

Types of educational technology. The primary objective of our article is to investigate the role of educational technology and identify the types of educational technology that demonstrate the highest effectiveness. Educational technologies were grouped into online/distance education, simulation/digital games, multimedia & traditional technology, mobile technology, and the flipped classroom.

Sample size. We adhered to widely recognized guidelines in the educational field for categorizing the sample sizes of the included studies. Studies with fewer than 100 participants were grouped into the small sample group, studies with 100-250 participants were classified as the medium sample group, and studies with over 250 participants were designated as the large sample group (Cheung & Slavin, 2012; Xu et al., 2020).

Calculation of Effect sizes and statistical analysis

Using the means and standard deviations reported, we employed the methods outlined by Lipsey and Wilson (2001) to compute an unbiased effect size (Cohen's d). Out of 14 studies, eight used pre-test and post-test designs, whereas six studies only had post-test measures. Two studies did not report the pre-test scores. To ensure consistency, we employed the post-test scores of the treatment and control groups to calculate effect size.

The effect sizes included in our analysis were mostly independent, except for one article that contributed two effect sizes in different measure domains (science and math). Due to the small number of dependent effect sizes, we employed single-level meta-analysis instead of multivariate meta-analysis. In total, we included 14 effect sizes for analysis. The software R version 4.3.0 (R Core Team, 2022) was used for data analysis.

In our analysis, we reported both fixed effect model and random effect model results to assess the overall effectiveness of the educational technology interventions. Fixed effect model assumes that each study has the same underlying effect, the variability comes from sampling error, random effect model allows a variance in both the estimated and the true effect between the individual studies (Brockwell & Gordon, 2001; Dignath & Buttner, 2008). Fixed effect models risk producing type I error rates if effect sizes are heterogeneous (Cohn & Becker, 2003; Higgins & Thompson, 2004). If assumption for random-effect model is violated, error variance may be overestimated, and confidence intervals may be too conservative (Overton, 1998). Thus, we used both models considering those concerns. The fixed effect model was used for moderation analysis for moderators. Homogeneity tests were conducted to determine if the effect sizes obtained from different studies provided consistent estimations of the same population effect size, with a statistically significant Q suggesting the heterogeneity. We employed several methods to check for publication bias. First, we examined a funnel plot to evaluate the expected relationship between effect-size magnitude and their corresponding standard errors. Second, we conducted a quantitative assessment method using Egger's regression test (Egger et al., 1997) to estimate the likelihood of publication bias. Both approaches consistently indicated a low probability of publication bias.

Results and discussion

Overall results

Thirteen articles were included in the meta-analysis, contributing a total of 14 effect sizes. The studies were published between 2000-2020 and all included both a control group and an experimental group. Eight studies used pre-test and post-test designs, while six studies only had post-test measures. The post-test exams were achievement tests that assess students' knowledge. The total number of participants included in the analysis was 1808, with sample sizes ranging from 8 to 317.

For the overall meta-analysis, both the fixed and random effect models were used. As is demonstrated in Table 1, the fixed effects weighted effect size was d=0.23 (p <.001, SE=0.05), with a 95% confidence interval of [0.13, 0.33]. This indicated that educational technology-based interventions have a small positive effect on participants' learning outcomes (Hattie, 2009), improving learning compared to traditional teaching methods. Heterogeneity tests revealed significant heterogeneity among the 14 included studies (Q(df=13) =376.62, p<.001). The overall random effects weighted effect size was d=0.21(p=.57, SE=0.37), with a 95% confidence interval of [-0.51, 0.93]. These results indicated the suitability of conducting moderation analysis for moderators.

Our study aligns with previous reviews in the general education field, which have shown consistent findings regarding the effectiveness of educational technology. These reviews have reported small, positive effect size: ES=0.16 (Cheung & Slavin, 2012), ES=0.25 (Kulik& Kulik, 1991), ES=0.18 (Becker, 1992), ES=0.16 (Ouyang, 1993), ES=0.12 (Fletcher-Finn & Gravatt, 1995), ES=0.13 (Soe et al., 2000), ES=0.19 (Blok et al.,2002), ES=0.27 (Schmid et al., 2014). For instance, Cheung and Slavin (2012) found a positive, small effect of educational applications on reading outcomes for K-12 learners compared to the traditional method (ES=0.16). Major et al. (2020) found that technology-supported personalized learning intervention has a significant positive effect (ES=0.18) on students' learning. Schmid et al. (2014) found a small positive effect (ES=0.27) in higher education for classroom applications. Kim et al. (2021) reported an effect size of 0.31 for educational apps on elementary school learners in literacy and math. However, there are also studies that reported medium to large effect sizes. Chauhan (2017) reported a medium effect on learning effectiveness for elementary students. Liao et al. (2007) synthesized computer applications and reported a medium effect size (ES=0.449) in elementary school in Taiwan. Lee et al. (2022) investigated technology-integrated instruction on literacy development for K-12 English language learners and found a positive effect size of 0.47. Zheng et al. (2022) reported that technology-facilitated personalized learning had an effect size of 0.673. Xu et al. (2019) suggested that technology applications produced a large effect size (ES=1.28) on adult English language learners' writing quality.

Table 1. Average Effect Sizes and Heterogeneity Statistics.

Model	Average Effect Size (ES)	Standard Error (SE)	95%CI	*p*	Test of heterogeneity		
					Q	*df*	*p*
Fixed	.23	.05	[0.13, 0.33]	< .001	376.62	13	< .001
Random	.21	.37	[-0.51, 0.93]	0.57	376.62	13	< .001

Figure 2. Effect Size Result for Fixed Effect Model.

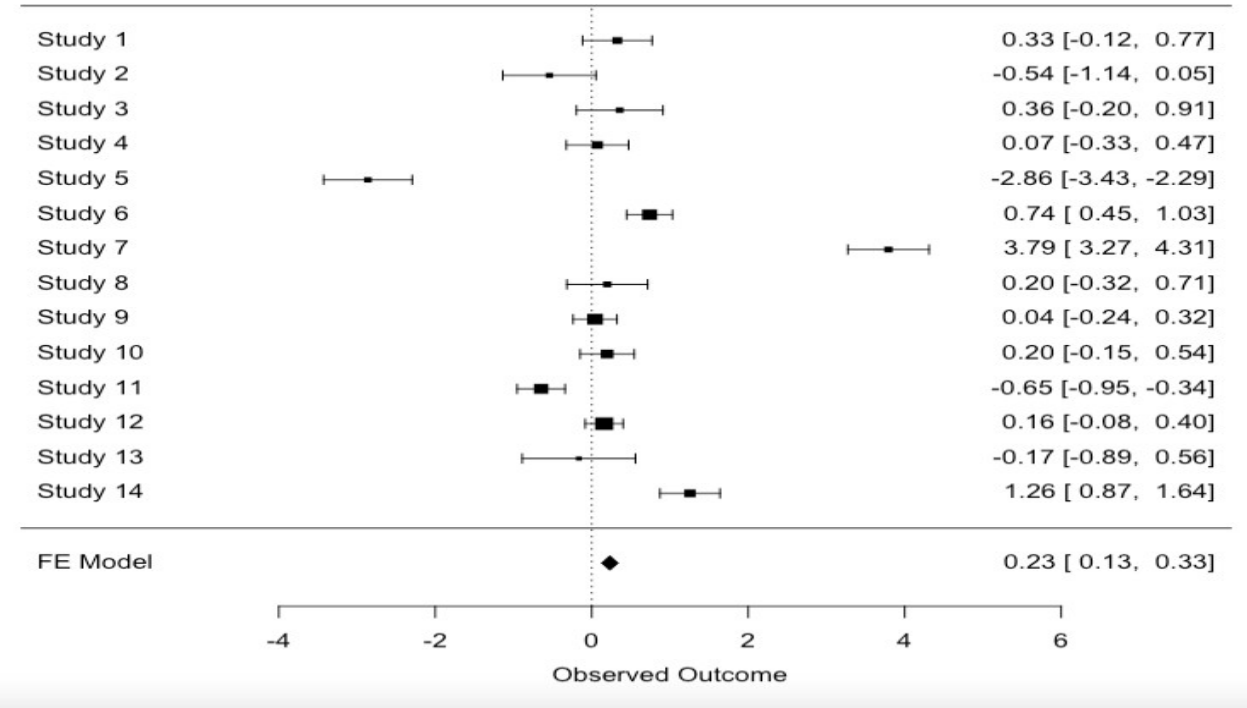
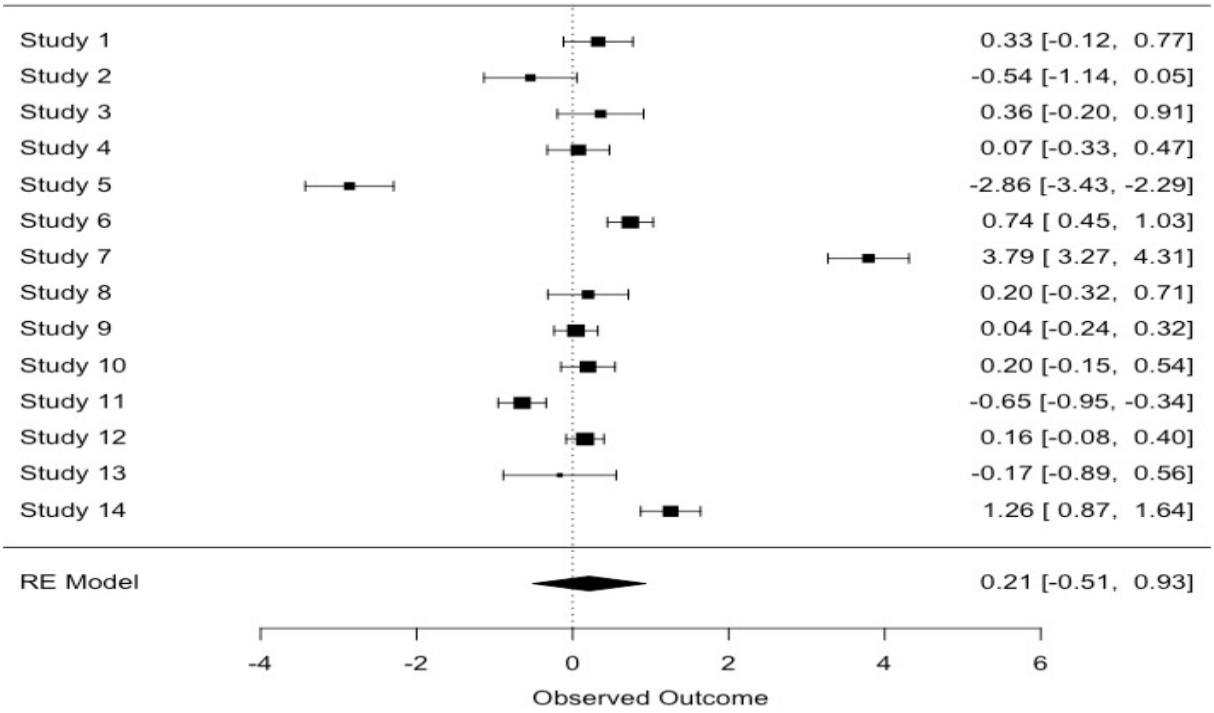


Figure 3. Effect Size Result for Random Effect Model.



The magnitude of effect sizes reported in previous studies can be influenced by various factors, leading to a complicated and varied outcome. Several factors that can affect the intervention's effectiveness include grade levels (e.g., K-12 or higher education setting)(Cheung & Slavin, 2012; Sahin & Coban, 2020)), subject domains (such as math or language, science or general)(Xu et al.,2022), types of educational technology (such as mobile learning, simulation, or online education), the educational setting (formal or informal) (Chauhan, 2017) of the intervention implementation. For instance, subject domains may have varying levels of compatibility with different types of educational technology, impacting the outcomes (Chauhan, 2017). Furthermore, the specific type of educational technology used, whether it's mobile learning, simulation-based learning, or online education, can influence the effectiveness of the intervention (Ni et al., 2022). Several factors can play a role in shaping the impact of educational technology on learning outcomes.

Given the complexity and variability of these factors, conducting a moderator analysis becomes essential to explore which specific factors contribute to the variability of the effect sizes observed in included studies. By analyzing these moderators, we can gain a deeper understanding of how different factors influence the effectiveness of educational technology interventions and make more informed decisions regarding their implementation.

Moderator analysis

We examined four study characteristics (subjects, educational level, sample size, and types of educational technology) as moderators of effect sizes. All the variables were categorical. Table 2 demonstrated the characteristics of included studies. A fixed effect model and a random effect model were used.

As shown in Table 3, the subject moderator analysis revealed a significant amount of effect-size heterogeneity in effect sizes ($Qb(3)=22.64$, $p< .001$), indicating variations among different subject groups, namely agricultural science, agricultural engineering, agricultural leadership, education and communications, and agricultural economics and finance. The educational level moderator analysis revealed a significant amount of heterogeneity in effect sizes ($Qb(3)=38.48$, $p< .001$), indicating that the educational level of participants impacted the effectiveness of educational technology in agriculture education. The type of technology used had a significant impact on the effectiveness of interventions in agricultural education through educational technology, as indicated by the moderator analysis ($Qb(4)=104.73$, $p< .001$). The moderator analysis demonstrated that the sample size significantly influenced the effectiveness of educational technology interventions in agricultural education ($Qb=8.88$, $df=2$, $p=0.0118$).

Table 2. Summary of included studies.

Study ID	Publication	Subjects	Educational level	Types of ed tech	Sample size	ES
1	Armah (2001)	agricultural economics and finance	undergraduate	multimedia & traditional technology	large	0.33
2	Wingenbach (2000)	ALEC	undergraduate	multimedia & traditional technology	small	-0.54
3	Wells & Miller (2020)	agricultural engineering	mixed	simulation/digital games	medium	0.36
4	Bunch et al. (2014) I	agricultural science	mixed	simulation/digital games	medium	0.07
5	Bunch et al. (2014) II	agricultural science	mixed	simulation/digital games	medium	-2.86
6	Boyd & Murphrey (2002)	ALEC	secondary	multimedia & traditional technology	medium	0.74
7	Wickenhauser et al. (2020)	agricultural science	undergraduate	online/distance education	medium	3.79
8	Namuth-Covert et al. (2019)	agricultural science	undergraduate	flipped classroom	medium	0.20
9	Mueller et al. (2015)	agricultural engineering	secondary	online/distance education	small	0.04
10	Klit et al. (2018)	agricultural science	undergraduate	simulation/digital games	medium	0.20
11	Davis et al. (2012)	agricultural science	undergraduate	simulation/digital games	medium	-0.65
12	Smith et al. (2018)	agricultural science	undergraduate	mobile technology	large	0.16
13	Witt et al. (2011)	ALEC	graduate	simulation/digital games	small	-0.17
14	Harder & Bruening (2011)	ALEC	undergraduate	online/distance education	medium	1.26

Note: when ES=0.2, it is small; when ES=0.4, it is medium; when ES =0.6, it is large (Haiti, 2009).
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Table 3. Results of moderation analyses.

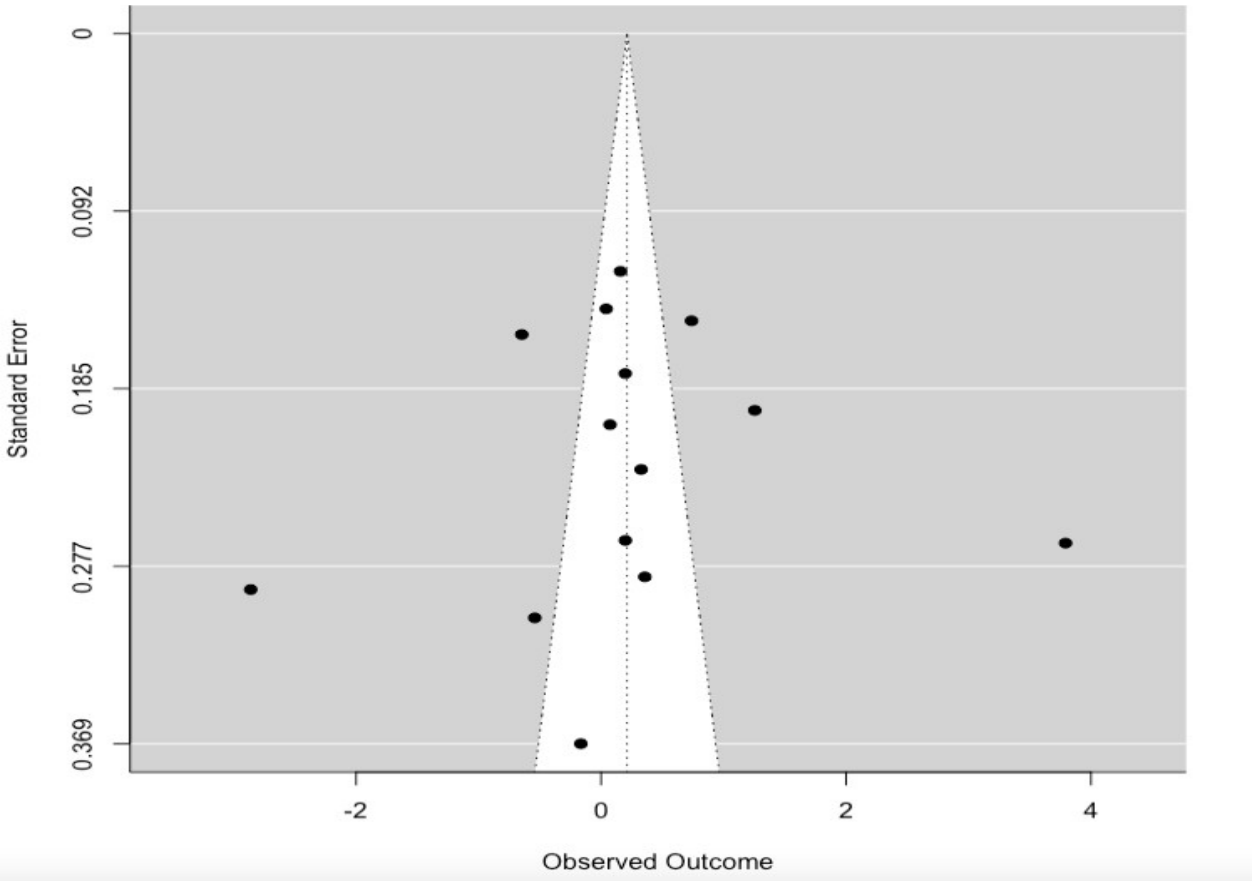
Moderator	k	d	se	95%CI	I^2	$p_{subgroup}$
Subjects					97.17%	< .001
Agriculture Science	7	.07	.07	[-0.07, 0.21]		
Agricultural engineering	2	.11	.13	[-0.14, 0.36]		
Agricultural leadership, educated and communication	4	.66***	.11	[0.45, 0.87]		
Agricultural economics and finance	1	.33	.23	[-0.12, 0.77]		
Educational level					97.04%	< .001
Secondary	2	.38***	.10	[0.17, 0.58]		
Undergraduate	8	.36***	.07	[0.23, 0.49]		
Graduate	1	-0.17	.37	[-0.89, 0.56]		
Mixed	3	-0.58***	.14	[-0.86, -0.29]		
Types of ed tech					96.69%	< .001
Online/distance education	3	1.00***	.11	[0.79, 1.20]		
Simulation/digital games	6	-0.38***	.08	[-0.56, -0.21]		
Multimedia & traditional technology	3	.45***	.12	[0.22, 0.67]		
Mobile technology	1	.16	.12	[-0.08, 0.40]		
Flipped classroom	1	.20	.26	[-0.32, 0.71]		
Sample size					97.01%	< .001
Small	3	-0.08	.12	[-0.31, 0.16]		
Medium	9	.34***	.07	[0.21, 0.47]		
Large	2	.20	.11	[-0.02, 0.41]		

*Notes: k - number of studies; * p<0.05; *** p<0*

Publication bias

Publication bias was investigated through funnel plot and Egger's regression test. The funnel plot exhibited effect-size symmetry, and the results of Egger's regression test suggested a lack of statistical significance (-0.002, p=0.99). These findings provide no evidence of plot asymmetry and suggest a minimal likelihood of publication bias.

Figure 4. Funnel Plot.



Conclusion, limitation, and implication

Our study aimed to examine the effectiveness of educational technology in agricultural education. The findings indicated a small yet positive effect of educational technology. Aspiring educators should consider integrating educational technology into their classrooms. Additionally, our research revealed that various factors, such as subjects, educational level, types of technology, and sample size, significantly moderate the effectiveness of educational technology interventions. Teachers should be mindful of these factors when implementing educational technology. Specifically, in disciplines such as agricultural leadership, education, and communication, it is recommended to select educational technology for enhanced efficacy.

Secondary-level education is particularly encouraged in this regard. Different types of educational technology also yield varying effects. Online or distance education, for instance, can be particularly advantageous for policymakers, educators, and relevant stakeholders. Classroom teachers should select the type of educational technology based on the learning objectives, curriculum, and learners' characteristics. Furthermore, we suggest that future researchers in similar fields opt for a medium sample size for optimal results.

Our study makes significant contributions to the existing literature in several ways. Firstly, it employs a comprehensive meta-analysis approach, providing a thorough investigation into the effectiveness of educational technology in the agricultural domain. Secondly, we successfully identified several important moderators that elucidate the effectiveness of educational technology, thus offering valuable suggestions and clear directions for both classroom practice and future research. However, it is important to acknowledge certain limitations in our study.

First, inconsistent study design in included studies might be the limitation. Some studies used pretest and posttest while some studies only have posttest. Two studies used a pretest-posttest design, but pretest scores information was not reported. Thus, the initial equivalence between experimental and control groups cannot be assessed for those without a pretest assessment. We included all the studies in the same meta-analysis for those with pretest, posttest design, and only posttest design due to lacking enough of our included studies. Future studies should separate different study designs or preferably include only those with initial equivalence established with the evidence that pretests for the control and experimental group are not significantly different. Second, a small number of included studies for analysis. Our studies only included 13 articles with 14 effect sizes due to the limited research in this field. With time passing and more flourished research in the field, future studies should employ larger sample sizes for included articles to validate the findings. Third, not all studies reported a comparable reliability indicator or fidelity of the intervention. The quality of the intervention from the studies can be questioned. Future studies investigating the effectiveness of educational technology can improve by reporting the indicators of the quality of the intervention so the conclusion of non-effectiveness can be generalized towards the educational technology itself instead of due to other factors like lacking quality of the intervention. Fourth, our included studies measured learning outcomes through achievement scores like knowledge tests. Other outcome measures like strategy use, motivation, attitude, and engagement can be explored as learning outcomes in the future.

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Adoption of a Cooperating Teacher Support Program in University Teacher Preparation Programs: A Diffusions of Innovations and Concerns-Based Adoption Model Exploration

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Introduction and Literature Review

Mentorship is an essential component of teacher effectiveness, profoundly influencing the motivation, engagement, satisfaction, and persistence of novice educators (Blackburn & Robinson, 2008; Tschannen-Moran et al., 1998). The utilization of mentoring programs is widespread to strengthen teacher retention and guide new educators through their transition into the classroom (Greiman et al., 2005; Ingersoll & Strong, 2011; Nasser-Abu Alhija & Fresko, 2010). Mentors play a dual role by providing both instructional and personal support, ultimately enhancing self-efficacy and assisting new teachers in navigating their diverse roles and responsibilities (Blackburn & Robinson, 2008; Hasselquist et al., 2017; Tschannen-Moran et al., 1998). Within the context of student teaching internships, cooperating teachers (CTs) occupy a key position in guiding and mentoring student teachers (STs) (Roberts, 2006). CTs not only exemplify effective teaching strategies but also offer constructive feedback, nurturing STs' pedagogical skills and confidence (Clarke et al., 2014; Roberts, 2006). Moreover, CTs bridge the theoretical-practical divide, translating educational theory into classroom practice (Grossman et al., 2009). Ultimately, their mentorship significantly contributes to the growth, self-efficacy, and professional development of STs (Curtner-Smith, 2001; McKim & Valez, 2017).

To be effective mentors, CTs must possess qualities of professionalism, effective teaching, nurturing personal characteristics, and a genuine commitment to building strong relationships with their STs (Roberts, 2006). They are perceived as industrious, open communicators, and exemplary educators (Stewart et al., 2017). However, there exists a notable gap in addressing the professional development and support necessary for CTs to fulfill their mentoring role effectively. To address this, universities should implement formalized preparation and continuous support for CTs, aligning their mentoring capabilities with the evolving needs of STs (Barry, 2019; Barry et al., 2021). This comprehensive approach encompasses active engagement from the university, training in mentoring techniques, and the provision of clear guidelines for transitioning STs into full teaching responsibilities (Hamilton, 2010). Incorporating best practices in mentoring, such as offering social and professional support and setting role modeling as a standard, is imperative (Alemdag & Simsek, 2017; Barry, 2019; Nesbitt et al., 2022; Russell & Russel, 2011). A mutual understanding of the mentor and mentee roles is also fundamental in this context. By diligently implementing these practices and providing necessary support, we can establish successful mentorship programs that benefit both CTs and STs (Barry, 2019; Nesbitt et al., 2022). This approach is vital for the continued enhancement of teacher mentorship and the ultimate success of novice educators in the classroom.

Theoretical and Conceptual Framework

This study employs a conceptual framework rooted in the Diffusion of Innovations (DOI) theory and the Concerns-Based Adoption Model (CBAM) to analyze program adoption in the educational and university system. DOI, as described by Rogers (2003), explores how individuals or groups embrace innovations, hinging on five perceived characteristics: relative advantage, compatibility, complexity, observability, and trialability. These attributes influence the likelihood of adoption across various fields, though only 8% of DOI research focuses on education, creating a gap in understanding the application of DOI to professional development (PD) adoption. External factors, such as program leadership, planning, and participant experiences, play pivotal roles in the success of professional development (PD) innovation implementation. Additionally, Kaminsky (2011) highlights the importance of considering adopter perceptions to tailor the adoption process effectively. CBAM provides a framework to comprehend the stages of concern during the adoption of new practices or programs in education. It identifies seven stages commonly experienced by teachers: informational, personal, management, consequence, collaboration, refocusing, and consolidation (Haines, 2018; Hall & Hord, 2006; Hollingshead, 2009, Ogegbo & Ramnarain, 2022; Trapani & Annunziato, 2018). Addressing these concerns is vital for the successful integration of new PD, instructional practices, or programs.

The study merges DOI and CBAM theories to form a conceptual model for program adoption. In this model, the perceived characteristics of the innovation, represented by the preparation and support program for cooperating teachers, are leveraged to encourage university teacher preparation programs to participate in the pilot program. Subsequently, university program coordinators' stages of concern, as per the CBAM framework, are assessed to determine their potential adoption of the program. By integrating these theories, the study seeks to enhance the mentorship and professional development experiences of student teachers, ultimately improving their internship experience (see Figure 1).

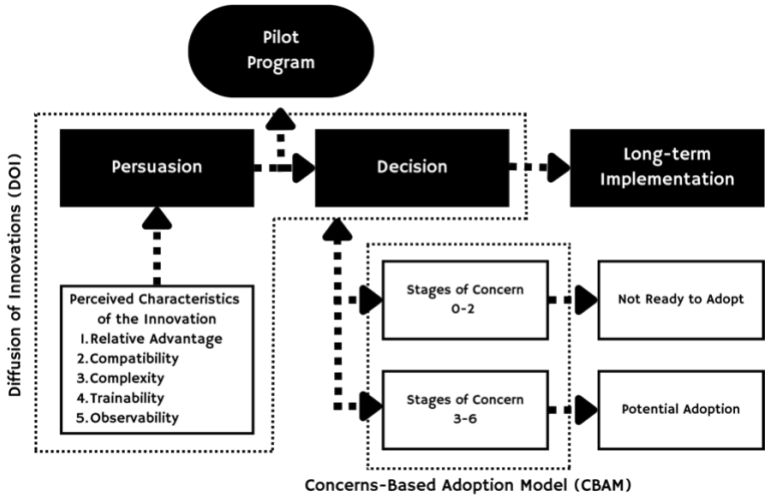

Figure 1. Conceptual model of the combination of diffusion of innovations (DOI) and concerns-based adoption models (CBAM) to influence a decision to adopt.

Purpose and Objectives

This study was part of a larger study that examined the adoption of best practices support from teacher preparation programs. The following research questions guided this portion of the study:

1. What components of the cooperating teacher support program were deemed most effective by the student teaching internship program coordinators?
2. What are the perceived barriers of student teaching internship program coordinators in adopting a cooperating teacher support program?

Methods

Our study was grounded in a pragmatic epistemological framework, seeking practical insights into the Cooperating Teacher Preparation and Support Program's implementation (Creswell & Poth, 2018, p. 35). Additionally, we integrated elements of a constructivist approach by drawing upon the program coordinator's lived experiences to enhance our understanding of the adoption process (Vijaya Kumari, 2014; Vygotsky, 1978). A case study is a research method that involves a thorough examination of a specific individual, group, event, or phenomenon in its natural context (Yin, 2018). Its primary objective is to gain a deep understanding of the subject within its real-world setting, considering various influencing factors (Stake, 2006; Yin, 2018). In this research, the focal phenomenon of the case is the adoption behavior of agricultural education teacher preparation universities regarding the Cooperating Teacher Preparation and Support Program. Four programs were chosen to participate in this case study, but only two fully completed the program and are the main focus of this case study (Casey & Houghton, 2010; Stake, 2006). The selection process considered geographical locations, certification procedures, and willingness to implement the program. Both universities in this study are land-grant universities with agricultural education teacher certification programs in different regions, and neither had previously conducted their own cooperating teacher preparation and support program before participating in this research.

In the fall of 2018, the University of Florida Department of Agricultural Education and Communication launched a mentorship program tailored for cooperating teachers. The program's primary goal is to equip and support these teachers in their mentoring roles during student teaching internships. It places a strong emphasis on best practices, focusing on social support, professional support, and role modeling. Key program components include a pre-internship workshop, regular email updates, informative infographics, and monthly collaborative Zoom meetings, fostering a supportive community among cooperating teachers. An online support website further enhances accessibility to valuable resources. In 2020, the program expanded to include student teachers, providing training on leveraging feedback and collaborating in lesson planning. In 2022, adjustments were made to initiate onboarding meetings via Zoom before the workshop to encourage early mentorship relationships (Barry, 2019; Barry et al., 2021; Nesbitt et al., 2022).

Adhering to Creswell and Poth's (2018) interview guidelines, an interview protocol was created to explore the phenomenon from the unique perspectives of our study's case participants. These protocols probed the program coordinators' perceptions of the effective program components and the barriers (Hall & Hord, 2006; Rodgers, 2003). To ensure the interview protocol's credibility, three university faculty members, known for their expertise in qualitative research, change-based theories, and agricultural education, reviewed the protocol. Interviews with each program coordinator occurred in July 2023, following the program's full implementation from fall 2022 to

spring 2023. These semi-structured Zoom interviews, lasting approximately 45 to 60 minutes, were subsequently transcribed using Otter AI. Throughout the interviews, probing questions were strategically employed to delve deeper into program coordinators' experiences within the case, aiming for a more comprehensive understanding of the phenomenon (Stake, 2006). Ensuring confidentiality, we assigned pseudonyms to the participants, and the transcript was checked for accuracy. A three-phase reading process was employed, with the third phase involving the creation of structural codes guided by predefined constructs. This facilitated the identification of adaptable program characteristics and the coordinators' stages of concern within the adoption process. Additionally, we employed in vivo coding to unearth any emerging themes within the structural codes (Saldana, 2013).

Emphasizing the significance of research subjectivity and reflexivity, we acknowledge the researcher's background and inherent biases as integral research components (Creswell & Poth, 2018). Reflexivity requires critical self-reflection on one's positionality, assumptions, and personal perspectives, which can impact the research process and outcomes. Recognizing and addressing these potential biases enhances research credibility and rigor (Creswell & Poth, 2018). Importantly, as the researcher, I acknowledge my biases stemming from my role in facilitating the CT support program and my prior experiences as both an SBAE teacher and a student teacher. These experiences have influenced my perceptions and viewpoints regarding the necessity of support programs. This awareness of my subjectivity and potential biases is vital for maintaining research integrity and validity. To ensure the reliability of our study, we utilized member checking to confirm the accuracy of our findings, as well as analyzed the case in-depth, allowing the program coordinator's own words and experiences to reveal emerging themes and patterns (Yin, 2018) This approach helped capture the core aspects of the phenomenon at two universities. However, it's important to note that the findings may not be widely applicable due to their limited generalizability. Nonetheless, our study provides valuable insights into the university program's implementation experiences, supports program development efforts, and identifies potential areas for further research in this field.

Findings to Date

Preliminary findings have shown that the program coordinators in this study have identified several positive aspects of the cooperating teacher support program after implementation. The support program fit well into their existing program and was easy to implement. This program pushed the coordinators to implement components that they were already interested in, such as hosting a cooperating teacher workshop and more regular email communication. The program coordinators commented on the barrier of time to create materials being removed due to the materials being created for them. They were surprised by the appreciation and willingness of most cooperating teachers to participate in this program.

Amongst the positive feedback, there were still barriers that the program coordinators identified. These included some lack of participation from the cooperating teachers with reading emails, attending monthly zoom sessions, and having buy-in from experienced mentors. Timing was the most discussed barrier as it related to the coordinators' time to plan and implement support components such as the workshop and zoom sessions, as well as the cooperating teachers’ time to attend these functions. Concern was shared from program coordinators related to learning new technology, such as Canva to edit infographics and the ability to manage a website if they had to do that on their own. The tenure process was also shared as a time concern for the investment of a program like this and its potential weight in the tenure packet.

Requests for Guidance

I am a doctoral candidate in agricultural education, and this research is based on the preliminary findings for a portion of my dissertation. My committee has provided excellent guidance for this study, however, guidance across the profession is always welcomed. We would love input on the potential next steps for this line of research regarding program implementation in university teacher preparation programs. Here are a few questions we would like to be considered: How can we gain more buy-in from other university programs to want to implement a cooperating teacher support program like this? How can we work together to bring more focus to our profession on cooperating teacher support and preparation program implementation? What are your thoughts on the overall approach of this study?

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Empowering Tomorrow's Science Communicators: A Case Study in Integrating Cooperative Extension into Science Communication Education

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Empowering Tomorrow's Science Communicators: A Case Study in Integrating Cooperative Extension into Science Communication Education

Introduction

Science communication is a critical component of the modern world, bridging the gap between scientific knowledge and the public. It encompasses various forms of dissemination and interaction to convey scientific information, making it understandable, engaging, and relevant to diverse audiences. Effective science communication is vital to enhance public understanding of science and increase scientific literacy (Nisbet & Scheufele, 2009). Moreover, it can influence public attitudes, support for scientific research, and policy decisions (Brossard et al., 2013). Science communication is fundamental in addressing complex societal issues, such as climate change and public health (Maibach et al., 2008).

Similarly, Cooperative Extension was founded on the idea of communicating science with a primary focus on knowledge transfer (Warner & Christenson, 2019). Extension serves as a vital bridge between the resources and expertise of land-grant universities and the needs of communities, ultimately contributing to the betterment of society (Franz & Townson, 2008). While Extension has the ability to address complex societal issues, such as climate change and public health, it has struggled to communicate its public value beyond its core clientele. While previous work has used a public relations framework to market Extension to college students (McLeod-Morin et al., 2023), the current study is novel in that it paired learning about science communication through the lens of Extension as an application tool for science communication efforts.

Purpose & Objectives

The purpose of this study was to determine if a lesson on science communication could effectively teach science communication concepts while simultaneously marketing Extension to undergraduate students. The following research objectives guided the study:
RO1: Determine students' perceptions about a science communication learning experience.
RO2: Understand the relationship between the science communication learning experience perceptions of students and their knowledge and intentions toward Extension.

Theoretical/conceptual framework/perspective

The conceptual framework that guided this study included 1) the process of science communication, 2) the Extension mission, and 3) the marketing of the Extension brand. Science communication and the mission of Extension are one in the same, in that they ultimately both aim to bring scientific knowledge to the public in a comprehensible and relatable manner (Nisbet & Scheufele, 2009; Warne & Christenson, 2019). Science communication was founded on the idea of increasing public understanding of science (Franz & Townson, 2008), which ultimately could lead to social support and policy decisions (McLeod-Morin et al., 2023). The Cooperative Extension system has been serving as the link between university-led research and the

communities it serves for over a century (Franz & Townson, 2008). Although both processes aim to relay scientific information to its audiences, literature has identified marketing as a pain point of Extension systems (Abrams et al., 2010; Baker et al., 2011; Settle et al., 2016; Zagonel et al., 2019).

Research has demonstrated the importance of marketing Extension to help in creating and maintaining a strong brand identity (Ray et al., 2015; Settle et al., 2016) and ensuring the organization's mission aligns with the perceptions of its various stakeholders, including employees (Settle et al., 2016; Zagonel et al., 2019), agricultural leaders (Abrams et al., 2010), the media (Baker et al., 2011), and undergraduate students (McLeod-Morin et al., 2023). Marketing Extension is instrumental in building and sustaining the reputation of Extension, fostering engagement, and ultimately achieving the Extension mission of communicating science to the people.

Methods

Data were collected September 19-26, 2023, in an undergraduate course on effective oral communication at the University of Florida. The course focused on science-related communication regarding food and agricultural and natural resources. A faculty member, who has a research and Extension appointment focused on science communication, developed and delivered a guest lecture in the course. The presentation combined knowledge about science communication principles, using Extension as an application/example, which also fit the learning objectives of the course. Specifically, the course objectives related to understanding strategies and techniques to present science-based information effectively to varying audiences, using oral and visual methods for formal and informal situations, improving teamwork and leadership abilities, learning processes related to speaker credibility and responsibility, articulation, science communication, critical thinking and listening, cultural awareness, audience analysis, and civic discourse.

The guest lecture developed for the learning experience included an emphasis on knowing the audience for the material/information and using an understandable format (audience analysis) to ensure that the information is received accurately and as intended (cultural awareness, civic discourse, speaker credibility and responsibility, articulation). Information was shared about how Extension disseminates the research being conducted at land-grant universities, highlighting the land-grant mission and how Extension fits. Additionally, information about a specific Extension program was shared, how and where to find Extension resources, and opportunities for a career in Extension.

After the guest lecture, students were asked to answer a reflective pre/post questionnaire about the learning experience. Items were measured on a five-point Likert-type scale where 1 = strongly disagree to 5 = strongly agree. Each question in the questionnaire was answered with a single-choice scale. In addition, students' educational classification, residency, and other demographics were collected. In analysis for RO2 demographics other than educational classification and residency were controlled for in analyses. Descriptive statistics, paired t-tests, and linear regression were used to analyze the data in SPSS. For the linear regression, five items to understand students' perceptions of the effectiveness of the learning experience were included in the scale: quality, useful, communicate, successful, recommend ($\alpha = 0.89$, $M = 4.45$, $SD =$

0.60). The knowledge and intention change (post-test – pre-test) scale included eight items: I was knowledgeable about science communication, I was aware of Extension, I was aware of the services and programs Extension offers, I would have considered a career in Extension, I thought, Extension was relevant to me, I thought Extension was familiar to me, I thought Extension was useful to me, I thought Extension was valuable to me. (α = 0.92, M = 1.84, SD = 95).

Results

The final sample included 90 undergraduate students. Most of them were sophomores (f = 30, 33.0%) and juniors (f = 28, 30.8%); most grew up in subdivisions in a town or city, urban (f = 44; 48.4%), or suburban area outside of the city limits (f = 35; 38.5%). For their perceptions of the effectiveness of the learning experience, the mean score of individual items ranged from 4.38 to 4.63, with a standard deviation from 0.59 to 0.79 (Table 1).

Table 1.

Students' Perceptions about The Science Communication Learning Experience (n = 91)

Statement	*Mean*	SD
The presenters were able to communicate content in the training effectively.	4.63	.59
I would recommend this training to others.	4.42	.76
The quality of this training met my expectations.	4.41	.75
As a result of this training, my communication efforts are likely to be more successful.	4.40	.79
The information presented in this training was useful.	4.38	.73

Note. Scale: 1 = strongly disagree to 5 = strongly agree

Based on the paired t-test analysis performed on the pre-test and post-test results (Table 2), all eight aspects of students' knowledge and intentions about Extension were significantly improved (p < .001). This implies the learning experience was effective initially in marketing Extension while providing application and context for the science communication learning experience.

Additionally, students' perceptions of the effectiveness of the learning experience explained 14% of the variance in higher knowledge and intention by controlling the demographic variables, other than residency and classification. Multivariate linear regression revealed a significant positive relationship between the two factors, β = .37, $t(90)$ = 3.81, p < .001. This indicates that if students indicated the learning experience was more effective, it positively impacted their knowledge and intentions related to Extension. While 14% is a low-level of explanation for the variance

Table 2.

Paired Samples T-test of Students' Pre and Post Knowledge and Intentions about Extension (n = 91)

	Before		After		*t*	*p-value*	Cohen's *d*
	M	*SD*	*M*	*SD*			

I was knowledgeable about science communication.	3.31	.93	4.41	.65	-11.55	<.001**	.91
I was aware of Extension.	2.26	1.27	4.53	.58	-14.95	<.001**	1.44
I was aware of the services and programs Extension offers.	1.98	1.06	4.49	.58	-18.80	<.001**	1.28
I would have considered a career in Extension.	1.90	.96	3.44	1.00	-13.36	<.001**	1.10
I thought Extension was relevant to me.	2.33	1.17	4.02	.77	-13.26	<.001**	1.22
I thought Extension was familiar to me.	2.04	1.13	4.15	.68	-16.95	<.001**	1.19
I thought Extension was useful to me.	2.35	1.16	4.15	.80	-13.96	<.001**	1.23
I thought Extension was valuable to me.	2.43	1.11	4.16	.70	-14.87	<.001**	1.11

Note. $p < .05$*, $p < .001$**

Requests for Input

The results of this emerging and continuing project indicate initial proof of concept that a learning experience on science communication can effectively teach science communication concepts while simultaneously marketing Extension to undergraduate students. However, the results are still being analyzed and questions remain around what the specific impact of the learning experience is and if the experience will result in long-term awareness and use of Extension. The authors would appreciate input on the concept of this study and recommendations for future analysis.

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Developing Evidence-Based Messages to Encourage Sustainable Cattle Production: A Sequential Exploratory Approach to Message Design Using Q Sorts and Interviews

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Developing Evidence-Based Messages to Encourage Sustainable Cattle Production: A Sequential Exploratory Approach to Message Design Using Q Sorts and Interviews

Introduction & Purpose

The cattle production process has experienced increasing pressure to adopt, measure, and market sustainable production practices from a public interested in promoting a sustainable society (Cusworth et al., 2022). In order for the cattle industry to meet public expectations, industry and federal benchmarks, and maintain the viability of the beef market, there has been a noticeable call for the widespread adoption and promotion of sustainable beef production practices. Stakeholders such as commodity groups (NCBA, 2023; American Society of Animal Science, 2015; U.S. Roundtable for Sustainable Beef, 2023) and government agencies (e.g., U.S. plan for Net-Zero Greenhouse Gas Emissions by 2050; The White House, 2021) have prioritized encouraging the adoption of these practices through messaging, incentive programs, and interorganizational benchmarks.

In areas where there is a goal for communication to change an attitude or behavior, such as the many groups working to increase adoption of sustainable cattle production practices, persuasive communication scholarship can lend understanding and guidance (O'Keefe, 2016). Many persuasive communication scholars have warned against the idea of intuitive thinking guiding communication best practices (Cho, 2012; Nisbet and Scheufele, 2009; Shen & Bigsby, 2013; O'Keefe, 2016). Instead, the gold standard for messages are those that have been empirically evaluated and proven to have a higher chance of intended effects. Scholarship has also established it is not knowledge alone that motivates individuals to change their behavior, but other intrinsic factors such as values, motivations, and ability to enact the desired change (Lee & Kotler, 2020). Messages which target these influential cognitive characteristics and consider the audiences' characteristics (e.g., information needs, preferred communication sources, demographics, etc.), also known as tailored messages, have proven to have higher desired effects.

The need for this study is driven by multiple sources. Fundamentally, meeting industry and federal expectations hinges upon widespread adoption of more sustainable production practices, emphasizing the importance of producer buy-in. Just as each practice must be suitable for the operations' characteristics, so should messages be tailored to the producer's characteristics. Campbell and King (2022) stated "[beef] producers need to be provided with the information that they want and need to make an informed choice, not just what we as researchers think that they need to know to implement them." In order to design these tailored messages, rich audience insight is needed. Therefore, the study at hand is an ongoing attempt to provide an in-depth audience analysis of American cattle producers. The results will provide formative insight for a message-testing experiment to be conducted to provide evidence-based messaging recommendations for communicating to cattle producers about sustainability pursuits.

This abstract presents phase one of a larger two-phase study employing an adaptation of a sequential, exploratory, mixed methods research design determined to investigate the message development process from audience analysis to experimental message testing. We are first using interviews and Q Sorts to describe the audience and then using the results to inform the development of tailored messages to be experimented between at [industry commodity convention] 2024.

This abstract presents emerging results of phase one (audience analysis), which is still underway. The purpose of this phase is to describe cattle producers' perceptions of sustainability and related messaging by answering the following questions:

RQ1: What are cattle producers' attitudes towards sustainable production practices?
RQ2: What are cattle producers' subjective norms towards sustainable beef production practices?
RQ3: What are cattle producers perceived behavioral control towards sustainable beef production practices?
RQ4: How do cattle producers intend to incorporate sustainability in the next 5 years?
RQ5: What are cattle producers' qualitative perceptions of message attributes regarding sustainable beef production practices?
RQ6: What are cattle producers' perceived levels of importance of message attributes regarding sustainable cattle production practices?

Theoretical & Conceptual Frameworks

In order to provide the desired evidence-based messaging recommendations, producer-facing communications can benefit from the guidance of persuasion, social marketing, and behavior change scholarship. The overarching conceptual framework used for the study is social marketing, which provides a process for planning marketing campaigns designed to promote behavior for the common good (Lee and Kotler, 2020). The social marketing process emphasizes tailoring communication to the audience's characteristics to enable long-lasting behavior change. Within this framework, we apply the Theory of Planned Behavior (TPB) (Ajzen, 1991) to inform the interview guide development and coding process. The TPB has been used to describe the behavior-change constructs of attitudes, subjective norms, perceived behavioral control, and intention to perform a behavior, which are posited to influence likelihood to adopt a behavior.

Additionally, we used an adaptation of Shen & Bigsby's (2013) concepts of message features to operationalize the variations within and design of messages, or the design decisions practitioners must make when approaching message development. The study at hand taxonomizes the components that compose the message as message attributes of content, format, and style. Message content refers to the information included in the message. Shen and Bigsby (2013) described content as the type of evidence and information presented. In the case of communication about sustainable beef production, we define content as the topics surrounding sustainable production. Message style captures *how* the message content will be portrayed (i.e., that grazing management plans can improve soil health and long-term profit). The style construct represents the framing, tone, and overall nature of the message (e.g., narrative/persuasive, gain/loss, positive/negative). Finally, we operationalize message format as the medium or channel on which the message is delivered (e.g. print news article, online video). Producers' preferences of these message attributes will inform message development for subsequent communication efforts to this group.

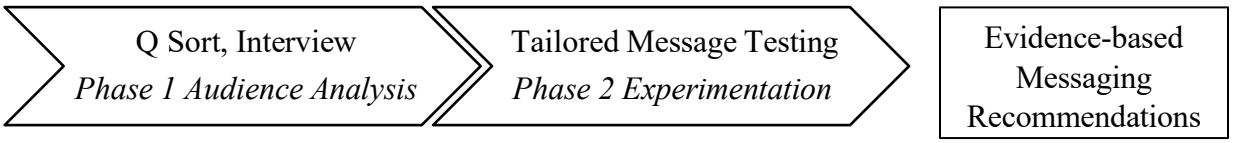
Methods

Research Design

A sequential, exploratory strategy is a mixed methods approach in which a qualitative phase of data collection and analysis informs a phase of quantitative data collection and analysis (Terrell, 2012). We employ an adaptation of this approach by using Q Sorts (a mixed method) and in-depth interviews (a qualitative method) to inform a quantitative message testing experiment (see Figure 1).

Figure 1

Proposed Sequential Exploratory Approach for Evidence-based Messaging Recommendations



Note. This abstract presents solely the ongoing q sorts and interviews.

Q Sort

Q methodology is a systematic approach to studying subjective perceptions or "points of view" toward a topic (Coogan & Herrington, 2011; Watts & Stenner, 2005). A Q Sort is the card sorting activity that requires participants to rank statements according to a given situation or instruction in a preset pattern called a concourse. In this case, participants are asked to consider their information needs regarding sustainable cattle production. Then, we ask them to rank the importance of cards with statements related to sustainability in the cattle industry, considering their importance not generally but for the participants own information needs. They place the cards in order of importance across a quantified spectrum, shaped like a bell curve, with polarized ends (e.g., -5 not important to +5 very important). We utilized Shen and Bigsby's message features of content and style to develop the statements. There were 39 statements total, with examples of message content being information about "invasive species management" and "conserving water" and message style being information about "how cattle production can be 'part of the solution' to a sustainable society" and information about "sustainable practices other producers have found successful." Each participant's completed concourse is compared with all the others, providing the opportunity for factors to emerge, which represent a shared viewpoint. In the case of this study, these emergent shared viewpoints will represent the information cattle producers desire and therefore what message content to include in the message and in what style.

Interview & Survey

Following the Q Sort, participants engage in an in-depth interview with open-ended questions related to each construct of the TPB (i.e., attitudes, subjective norms, perceived behavioral control, intention to perform behavior) (Ajzen, 1991). In order to adequately describe the needed producer characteristics, participants were also given a brief online survey via Qualtrics containing both personal and operation-related demographic questions. Survey questions reported on likelihood to utilize sources for sustainability information as well as preference for information format and delivery (e.g., message format). We combine the Q Sort with the use of the interview and survey to provide comprehensive descriptions of the key components of message development: content, style, and format (Shen and Bigsby, 2013).

Population & Participation

Attendees of the [industry organization] convention in February of 2023 were provided the opportunity to participate in an intercept survey regarding cattle producer's perspectives of sustainability practices. The last question of the survey provided participants the option to be contacted for an interview going into more depth about the survey topic. From this initial sample (n = 15), we are using a combination of snowball and purposive sampling to achieve our final sampling goal of 21-35 members, based on 3-5 participants from the seven [industry organization] membership districts.

Participants were contacted via email and offered the opportunity to participate in a one hour long Zoom study consisting of a card sorting activity followed by an interview, both about cattle producers' perspectives of sustainable production practices. To conduct the Q Sort, we use an online tool called Q Method Software (Q Method Software, 2023) and share a link via Zoom to the activity. We also use the software for data analysis. All interviews are conducted directly after completion of the Q Sort on Zoom, recorded, transcribed, deidentified. We will code using an inductive approach guided by the constructs of the TPB. Through a partnership with [industry organization,] participants are paid $25. Data collection was approved by [University] IRB Institutional Review Board (IRB2023-529).

Results to Date & Requests for Input

We report only on big-picture themes from the first 12 interviews and Q Sorts. We desire more participants and a more nationally representative sample before beginning final data analysis to inform message design for phase 2 (experimental message testing at the next convention). Participants so far are diverse in age and gender, from Florida, Mississippi, California, Georgia, Idaho, Kansas, Louisiana, Oklahoma, and Ohio, and are mostly decision makers on cow/calf operations. They tend to prefer information about sustainability from "producers with operations like mine" or from scientists. Their preferred formats are workshops/field days, in-person meetings, and on-farm visits. When looking at the importance of message features from the Q Sort, producers ranked information about "practices other producers have found successful", "quantifying/measuring the impact of sustainable practices", and "mental health efforts" as the most important to them at the moment of participation. Interview themes have lingered on the importance of promoting ongoing sustainability efforts to the public (i.e., "tell our story"). Participants have also acknowledged generational differences in attitudes towards sustainability pursuits. Notably, most of our participants have been from the southeastern United States and would be considered early-adopters with positive attitudes toward sustainability. However, they acknowledge many other producers are less favorable. So far, we have had no participants of neutral or negative attitudes, despite their presence in the industry being highly mentioned when discussing subjective norms. We are seeking input on strategies to foster more participation from uninvolved or skeptical producers. As far as we can tell, no other research has employed a Q Method to inform message development. We are therefore seeking expertise in data analysis of Q Method to maximize the data's potential. Finally, because producers are tending to favor in-person events, we are seeking input on ways to empirically examine the impact of events such as these (e.g., workshops, field days) that are less compatible with empirical analysis than virtual messages which can be tested via online survey.

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STEM Teaching for All Online Certificate Program

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STEM Teaching for All Online Certificate Program

Introduction, Purpose and Objectives

U.S. students are underprepared for tomorrow's workplace (Carnevale et al., 2011; Holdren, 2013; National Academies of Sciences, Engineering, and Medicine, 2018), and great opportunity and need in the agriscience workforce exists (Goecker et al., 2015). The most recent USDA report highlights an increased number of job openings requiring scientific and engineering expertise by nearly 30% from the previous five-year report (Goecker et al., 2015; Fernandez et al., 2020). Many secondary schools emphasize career exploration and preparation (Brand, 2013) such as through STEM or Career and Technical Education, including agricultural education (DeLuca et al., 2006). While researchers have not yet established a direct link between coursework in high school and attainment of STEM careers, K-12 teachers meaningfully shape students' success in school as well as postsecondary college attendance and earnings (National oemies of Science, Engineering, and Medicine, 2020).

Education reforms and standards documents (NGSS Lead States, 2013; Spielmaker & Leissing, 2013) continue to emphasize the need for both content and relevance of that content to students' lives and the broader scientific enterprise. National challenges in agriscience education are acutely recognized in Florida, with disproportionately large populations of minority and financially disadvantaged students in rural schools in particular. Such students are especially at risk for missing incentives and opportunities for agriscience knowledge and careers. Teachers have few opportunities to learn authentic agriscience research practices (Banilower et al., 2018; Tolbert et al., 2019; Wang & Knobloch, 2018) and therefore struggle to implement these practices with their students. Complicating such reform are persistent gaps among traditionally underserved students and their more privileged peers (Lee & Buxton, 2010). Disparities among privileged and historically marginalized students in science worsen the outcomes of those whose voices are most needed (Bancroft & Nyirenda, 2020).

Recent scholarship reveals nuances within teacher professional development. Content focus is still at the forefront (Lynch et al., 2019; Smith, et al., 2015), but content must be grounded in helping teachers to change their practice in relation to their context to yield positive student learning outcomes (Kennedy, 2016). Additionally, there is not a clear relationship between program duration and student outcomes: teachers' motivation to attend the PD program may be more important (Kennedy, 2016). To support teacher professional development in agriscience practices for all students, we are co-designing an online, asynchronous introduction to issues and solutions to support equitable teaching for all Florida learners. The course will be part of a larger professional development workshop for secondary school teachers, where teachers collaboratively co-design lessons with STEM and education faculty from a state university, as well as a stand-alone offering. This work directly addresses AAAE Research Values (AAAE, 2023) Advancing Public Knowledge of AFNR Systems; and Ensuring Equity, Inclusion, and Belonging.

Theoretical/Conceptual Framework/Perspective

The combination of Community of Practice (CoP) (Wenger, 1998; Wenger & Snyder, 2000) and social constructivism (Vygotsky, 1978) provide our theoretical framework, with an emphasis on education facilitators grounding their work in equity-based learning practices such as those from the STEM Teaching Tools Initiative (Bell & Bang, 2015). These perspectives embrace the importance of social, temporal, and environmental contexts on learning, acknowledging that learning occurs through our interactions with others. The role of a CoP in particular describes the interactions in and among the project team and educators comprising three components: domain [equity], community [classroom educators, education researchers, and agriscientists], and practice [improvements to education] (Wenger et al., 2002). The conceptual framework additionally falls within a larger idea of teachers as designers and literature describing teaching as a design science (Laurillard, 2013). Researchers have shown that teachers seldom engage in all stages of the design process (Huizinga et al., 2014), suggesting teachers need design support. Activity structures and design supports are components of the PD program that provide scaffolding to help develop teacher professional content design knowledge (Huizinga et al., 2014, 2015). Researchers have demonstrated professional learning through university-based PD can effectively foster teacher design development by supporting their content design knowledge (Brown et al., 2014; Dresner & Worley, 2006).

Methods

Using tools from the STEM Teaching Tools Initiative, the National Academies, and other sources, we designed an initial pilot self-guided asynchronous course offered through the university's online course management system, Canvas. We invite all self-identified educators from both formal and informal settings, all ages or grade levels to participate in the pilot version of the course. As of 2023, we have advertised the course availability via social media and in connection with the larger professional development workshops via email to Florida's education-focused (both formal setting and informal setting educators) professional groups. The course is free and available online at any time.

In particular, we are designing the in-person workshops to prioritize teachers in a distinct region of the state with high need due to its persistent poverty and rurality, and therefore, we are marketing the online course most heavily to them. The region of need is home to some of the most rural counties in the state. Two of the state's educational consortia in this region represent nearly one-third of the state's districts, and within these districts, all but three are considered rural. With small numbers of students, only one or two high schools in many districts, and shortages of qualified teachers, the science and research-based courses offered are limited. Additionally, the racial divide within the state is quite evident, particularly in the priority region where some schools are almost 100% racialized minority while others are less than 20%. These communities are often quite underserved: 22 of the 66 schools serve 100% economically disadvantaged students while another 14 serve populations more than 70% economically disadvantaged. Often students who do attend college from these communities are first in family.

Course Design

The equity course has the following goal: introduce a shared framework of Equity for secondary school agriculture, science, technology, engineering, and math educators and

preparing educators to implement strategies for equitable AgSTEM learning. Course objectives include, by the end of the course, educators should be able to: describe equity issues that relate to students' educational experiences and outcomes in agricultural science, technology, math, and engineering (AgSTEM); identify opportunities to adapt curriculum to promote inclusive science instruction, make diversity visible, and value multiple modes of expression; and identify at least three new strategies for a more equitable AgSTEM learning environment.

The first few modules of the course, designed to comprise an estimated 3.5-4 hours of content, cover topics that all participants read and discuss. Educators can choose to discuss particular aspects in the forums that they find compelling related to their own students. For the final modules of the course, educators choose from a menu related to different learner populations such as English-language learners and learners from indigenous populations. Teachers then have a final reflection discussion forum before completing the evaluation.

Research questions

First, we ask evaluation questions related to course satisfaction and setup. Next, we ask: is an online, asynchronous course effective at increasing teacher self-efficacy with teaching techniques that address marginalized learners in STEM? As part of our larger professional development, we hope to examine the role of this course in alleviating barriers to curriculum implementation, especially around equity-based frameworks.

Data Collection

After completing the course, educators complete an online survey through Qualtrics. For research question 1, we ask about course satisfaction, time required, intention to implement, open-ended what they will incorporate, time needed to implement, background with these issues using Likert scale questions, multiple choice, and open-ended responses as appropriate. We will also collect Canvas metrics such as time in each module and overall, as well as access to materials provided such as videos and readings. For research question 2, we ask about teacher self-efficacy at equity-focused lesson design, self-reported learning in the course, desire for future content, and also assess teacher understanding of basic equity principles. Further assessment of the (probable) in-person workshops where teachers actually co-design lessons with an equity and contemporary AgSTEM focus will allow us further assessment of teacher self-efficacy and assessment of equity-based practices in their lesson plans via content analysis of their lesson materials. Finally, we will collect demographics of educators and their typical learners.

We are also convening a series of local teacher leader and administrator focus groups to further understand teacher professional development needs in this area, both through the asynchronous certificate and through supporting contemporary AgSTEM content and practices in-person and online, and synchronously vs asynchronously. The goals of the overall professional development will be to prepare a set of teachers in the state who can guide other teachers to course re-design for all learners in AgSTEM secondary courses. Following the eventual follow-up workshops, we will interview teachers after implementation of their co-

designed lessons and re-assess their self-efficacy and implementation of equity-based authentic STEM practices.

Data Analysis

We will use a combination of statistical analysis, both descriptive and inferential comparing teachers with different experience levels, baseline self-efficacy in equity-based practices, and school settings to determine effectiveness of the online and eventual followup professional development. For open-ended responses, lesson plan review, and interview analysis, we will use thematic analysis based on expected and emergent codes regarding barriers to implementation such as time, lack of access to resources, and lack of knowledge (Stofer et al., 2023).

Results/Findings to Date

Not Applicable, see Requests for Input

Requests for Input

Due to ongoing disruptions to formal education after the COVID emergency, teachers continue to be challenged to find time and energy for outside professional development. Ongoing legislative changes without clear implementation guidelines may also play a role in preventing teachers from signing up for the course. Therefore, we propose this session to seek feedback for the course structure and any necessary incentives for piloting, ideas for marketing and communicating with educators in agriculture and STEM, as well as evaluation methods and questions to improve the course and spur its adoption among a variety of educators.

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Identifying Relationships and Differences Related to Arkansas FFA Chapter Success in Career Development Events

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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 American in 1928 (National FFA Organization, 2023). Almost a century later, livestock evaluation, now one of many Career Development Events (CDEs), is still a popular competition within the National FFA Organization and 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). CDEs have a direct tie to career success and thus may advance that 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. Factors contributing to equitable opportunities for all students 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 such as Agricultural Technology and Mechanical Systems, Horse Evaluation, Floriculture, Forestry, Livestock Evaluation, and Veterinary Science (National FFA Organization, 2023). In Arkansas teams must qualify at the district level for participation at state and, then they must win first place team at the state level to advance to the national competition (Arkansas Agricultural Education and FFA, 2023). Previous research related to CDEs indicated participation in these competitions was lower than desired with two-fifths of FFA members surveyed never participating in a CDE (Talbert & Balschweid, 2004). In another study, Kansas schools had high participation in Livestock, Dairy Cattle, and Horse Evaluation with more than 75% of chapters having a team but lower participation levels were found in other CDEs (Harris, 2008). In addition to participation, success has also been studied within CDE competitions. Herren (1984) found winning was the main goal of many advisors who coached a livestock evaluation team, as opposed to learning. He also found teams from small schools competed successfully with teams from large schools and the number of students in the local program did not affect success at the national contest. However, in the Agricultural Mechanics CDE, regional advantages have been found for chapters competing at the national level (Franklin & Armbruster, 2012).

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 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 student achievement at 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.

Purpose and Objectives

The purpose of this study was to identify relationships and examine differences related to FFA chapter CDE success in Arkansas. We used the following objectives to guide this study:

1. Describe Arkansas CDE participation by contest, location, and FFA chapter characteristics.
2. Determine differences in Arkansas state level CDE scores among three FFA districts in Arkansas.
3. Describe relationships among chapter membership size, number of chapter FFA advisors, number of teams competing from each chapter, school size, and team score.

Methods

This study was associational research with correlational and causal-comparative components (Fraenkel et al., 2023). Arkansas is divided into three different 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. 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. Refer to Table 1 for a more detailed description of FFA districts in the state.

Table 1
FFA Chapters, Advisors, Members, and School Enrollment within Arkansas FFA Districts

	Eastern	Northwest	Southern	Total
FFA Chapters	71	83	57	211
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 number students in grades 9-12 of all schools with an FFA chapter.

To accomplish the objectives of this study, we collected data from district and state CDE competition results posted to judgingcard.com for spring 2023 competitions. We purposively sampled from the five most popular CDEs: Agricultural Technology and Mechanical Systems, Horse Evaluation, Livestock Evaluation, Veterinary Science, and Wildlife Management. We entered data into a spreadsheet where team name, team score, and FFA district were recorded. The state agriculture teacher directory was used to determine the number of FFA advisors for each chapter; FFA chapter size was determined by a report supplied by the state FFA advisor listing chapters and membership numbers. We matched the data with results from judgingcard.com. To determine school size for each school with an FFA chapter, we manually searched and recorded enrollment numbers for grades 9-12 from the online Arkansas Department of Education (2023) Data Center.

To analyze collected data, we used frequencies to describe participation by FFA 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. We used ANOVA to determine if differences existed between team scores based on FFA district. *Post hoc t*-tests were then used to specify where differences occurred. Significance was established *a priori* at $p \leq 0.05$.

Results

Results showed Livestock Evaluation had the great portion of FFA chapters participating, followed closely by Wildlife, Vet Science, and Horse Evaluation. Ag Mechanics had the lowest percentage of chapters participating across all districts. Table 2 provides a complete breakdown of participation by CDE contest and location/level of contest.

Table 2

Number 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
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
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 one or 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 each contest 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
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
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
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
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
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
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
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
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' Wildlife scores ($F(2, 21) = 3.93$, $p = .035$). P*ost hoc* analyses failed to detect if Eastern District scores were significantly different from Northwest [$t(14) = -2.05$, $p = .059$, $d = -1.03$] or Southern District scores [$t(14) = 0.42$, $p = .680$, $d = 0.21$]. However, Northwest District scores were significantly higher than Southern District scores [$t(14) = 3.20$, $p = .006$, $d = 1.60$] in the Wildlife CDE.

Table 4

ANOVA Results Comparing Team Scores by District at the State Level Competition

	Eastern	Northwest	Southern

CDE	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
Ag Mechanics[a]	757.25	145.07	712.75	270.28	615.57	115.04	1.05	.369	.10
Horse[b]	1420.57	50.64	1491.63	31.93	1276.50	349.08	2.19	.138	.18
Livestock[c]	1683.29	89.33	1733.63	73.66	1709.71	41.08	0.94	.409	.09
Vet Science[d]	1598.50	175.41	1719.71	156.80	1534.38	173.26	2.28	.128	.19
Wildlife[e]	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]$df = 2, 19$, [d]$df = 2, 20$, [e]$df = 2, 21$.

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. Moderate, positive associations (Davis, 1971) were found in the Eastern District with Ag Mechanics, Vet Science, and Wildlife. The Northwest District had significant, moderate, positive associations in Ag Mechanics, Livestock, and Vet Science. The Southern District only had one moderate, positive association in Horse Evaluation. Positive relationships between chapter size and team scores were moderate at the state competition in Ag Mechanics, Livestock, and Vet Science.

Table 5

Pearson Correlation Coefficients Between FFA Chapter Size and CDE Team Scores

CDE	Eastern	Northwest	Southern	State
Ag Mechanics	.44	.45*	.28	.31
Horse	.09	.28	.36	.18
Livestock	.27	.36*	.17	.33
Vet Science	.43*	.36*	.03	.39
Wildlife	.34	.31	.22	.11

*$p \leq .05$. **$p \leq .01$.

As seen in Table 6, correlations between number of FFA advisors in a chapter and team scores revealed several moderate and strong correlations of significance. Moderate, positive associations were found among all teams at the Eastern District contest except for Horse Evaluation. At the Northwest District competition, the association between number of FFA advisors and team scores were positive and moderate in Ag Mechanics, Livestock, and Vet Science, of which two were significant. The Southern District competition had one substantial, statistically significant relationship in Livestock Evaluation. At the state competition, associations were substantial and significant for Vet Science, moderate for Ag Mechanics and Livestock, low and negatively associated in Horse Evaluation.

Table 6

Pearson Correlation Coefficients Between Number of Chapter Advisors and CDE Team Scores

CDE	Eastern	Northwest	Southern	State
Ag Mechanics	.44	.38	.09	.34
Horse	.15	.28	.01	-.20
Livestock	.34	.48**	.51*	.39
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 6) were mostly low to moderate for the Eastern District, with only 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 all negligible to low with Ag Mechanics and Livestock having negative associations. Relationships at the state level were mixed with three contests having negative associations and Vet Science having a moderate, positive association.

Table 6

Pearson Correlation Coefficients Between School Size and CDE Team Scores

CDE	Eastern	Northwest	Southern	State
Ag Mechanics	.44	.46*	-.01	.23
Horse	.10	.13	.14	-.27
Livestock	.32	.05	-.03	-.05
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. $^{*}p \leq .05$. $^{**}p \leq .01$.

Conclusions/Discussion/Implications/Recommendations

We found that fewer than half of FFA chapters in the state participated in each of the competitions; the level of participation was lower than those reported 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. Mixed results were found with chapter size, number of advisors, and school size for teams competing at the district level. Teams qualifying for participation at the state level generally came from larger chapters with more FFA advisors and larger schools. At the state level, the only difference in scores by district was in the Wildlife CDE. Based on results, it is plausible students from the Southern District are disadvantaged compared to the other districts, consistent with findings by Franklin and Armbruster (2012).

Correlations revealed several moderate associations between chapter size and success at both the district and state levels; however, this was not consistent across districts or CDE competitions. Nonetheless, descriptively, there were positive correlations between chapter size and CDE team scores for all CDEs, all three districts, and at the state level. Similar results were found relating to school size. Interestingly at the state level, three of the five 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 on 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.

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. Future studies on this topic should include a larger number of CDEs, other levels, and locations. Additional work identifying variables that 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.

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

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Introduction

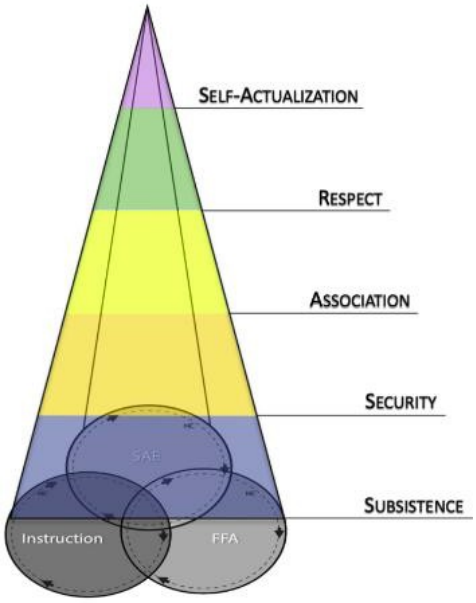
Research on school-based agricultural education (SBAE) teacher needs has been conducted since 1983, driven by historic attrition within the profession (DiBenedetto et al., 2018; Eck & Edwards, 2019). Work-life balance and job satisfaction are two needs with major focuses in agricultural education research (Marsh et al., 2023$_b$; Phipps et al., 2008; Shoulders et al., 2021). While work-life balance and teacher stress have been heavily researched, the depth of understanding necessary to provide actionable change for SBAE teachers to empower and support them in their practice is lacking (Marsh et al., 2023$_a$; Marsh et al., 2023$_b$; Klassen & Chiu, 2010). The development of a new method to evaluate SBAE teachers' needs is paramount so we can identify resources needed and provide support to mitigate overwhelming stress and improve retention of SBAE teachers through improved work-life balance.

Theoretical/Conceptual Framework

The Conceptual Model of Support for SBAE Teachers (See Figure 1) has been proposed as a new way to evaluate the needs of SBAE teachers (Marsh et al., 2023$_a$). This model utilizes the Three-Component Model for Agricultural Education (FFA, 2022) as the base due to the interdependency of the components and the number of overlapping roles of SBAE teachers. Human capital development takes place in each of the three components based on the needs of the individual 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 three components, 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 (Marsh et al., 2023$_a$; Marsh et al., 2023$_b$; Eck et al., 2019).

Figure 1

Conceptual Model of Support for School-Based Agricultural Education Teachers



While the model is focused on individual SBAE teacher needs (see Figure 1), Maslow's base does not describe or account for how school-site, community, and external factors, such as school district policy, community resources, school culture, and professional support networks, can influence a teacher's effectiveness and practice, which are all essential as individuals work to ascend the hierarchy (Fisher & Royster, 2016) and become more effective SBAE teachers (Eck et al., 2019). These components are further impacted by self-determination theory (SDT), which describes three basic needs for autonomy, competence, and relatedness of individuals (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 factors directly impact the situations SBAE teachers have to navigate daily in the implementation of their professional practice. To establish a more human lens, two research objectives guided the study: 1) Validate the SBAE Model of Support instrument, and 2) Determine the internal consistency reliability of the instrument.

Methods

To address the study's research objectives, a non-experimental descriptive survey research design was implemented (Privitera, 2017). A census was attempted with NAAE Region Two in-service SBAE teachers from the states of Arkansas, Louisiana, Kansas, Colorado, New Mexico, Oklahoma, and Texas ($N = 3729$). An email contact list was developed using existing listservs and directories from each of the seven states. Emails were personalized by state, including an initial email invitation with a link to the questionnaire, followed by three reminders requesting participation in the study (Dillman et al., 2014). An electronic Qualtrics instrument was developed using the findings of (Doss et al., 2023) and (Marsh et al., 2023_a), resulting in a 153-item questionnaire focused on evaluating the job satisfaction, human capital, and individual human needs of SBAE teachers. Participants rated how often they were able to manage the 153 items on a scale of 1 = *Never* to 5 = *Always*. The total number of items were separated and presented by the following components: Relationships, Classroom/Instruction, Program factors, Miscellaneous factors, Professional factors, Personal factors, and Maslow's Hierarchy – Individual needs.

To address the first research objective, data from responses of SBAE teachers (n = 303) was used to conduct a Principal Component Analysis (PCA) to reduce the number of items into a smaller set of related items (Costello & Osborne, 2005). The initial analysis of all 153 items used PCA with a Varimax rotation (Kaiser, 1958) This method was chosen with the assumption that the seven components are correlated due to their close association with SBAE teacher needs [Doss et al., 2023]. The Kaiser-Meyer-Olkin (KMO) was used to measure sampling adequacy, with a minimum accepted value of 0.6 and an ideal value of 1.0, to evaluate the beginning output (Beavers et al., 2013). Eigenvalues greater than 1.0 represented components to be retained and then evaluated through parallel analysis. Any eigenvalues greater than the parallel analysis were to be retained within the reduced data set (O'Connor, 2000). "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). A Cronbach's alpha was used to establish the internal consistency measure for reliability of the instrument assessing teachers through the SBAE Model of Support, per the second the research objective.

Findings

The 153-item instrument was analyzed to determine the primary components using a PCA. The KMO measure of sampling adequacy equaled 0.77 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, with resulting parallel analysis finding eight components loading above the output accounting for 51.84 percent of the variance. Data were re-analyzed (PCA with Varimax rotation) fitting the 153 items to the eight components loading above parallel. The component loadings and communalities of the rotated matrix were analyzed to determine that 54-items were to be retained, which were re-analyzed using an additional PCA to verify the number of components using the reduced dataset. The analysis resulted in a KMO of 0.912, with six components representing eigenvalues above parallel analysis, demonstrating the need to re-analyze the PCA with a Varimax rotation while limiting items to six components. The component loadings and communalities of the rotated matrix were analyzed to develop the final component structure of items resulting from the six components (see Table 1).

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 loadings below .300 are not displayed; Item numbers correspond to complete 153-item list; 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 (see Table 1), explaining 58.7% of the variance. The five components are outlined in Table 2 with the corresponding and updated item numbers to represent the SBAE model of support instrument and the Cronbach's alpha level for each of the five components.

Table 2

Emerging Components and Retained Items (46 items)

Component Title	Item	Corresponding Item Description	α
Personal Needs (Safety and Security)	P_1	Ability to take care of yourself	.958
	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	
Intracurricular Program Needs	I_1	Role as the FFA advisor	.945
	I_2	Managing the FFA chapter	
	I_3	Managing the total Agricultural Education program	
	I_4	Attending fairs/showing/exhibitions	
	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	
Relationship Needs within School and Community	R_1	Relationship with principal	.903
	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	
Classroom/Instructional Needs	C_1	Teach effectively	.827
	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	
School-Based Support Needs	S_1	Relationship with assistant principals	.510
	S_2	Competence of assistant principals	

The 46-item instrument was deemed valid through a PCA loading across five components, with an overall Cronbach's alpha of .951, reliability estimations were analyzed for the corresponding items within each of the five components (see Table 2). The deletion of any item would result in a reduction of Cronbach's alpha, so all items were retained. 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) suggested that coefficient alpha for a two-item scale is not a meaningful measure; additionally, the deletion of the two items would reduce the overall instrument reliability, leading researchers to retain two items even though two-item scales are problematic (Yan & Green, 2011).

Conclusions and Recommendations

The SBAE model of support instrument resulted in 46 validated items based on the PCA (Privitera, 2017) with an acceptable reliability estimate (Nunnally, 1978). The instrument was effectively reduced with items from six of the seven original components represented. The missing items are related to professionalism, although items associated with professionalism are present across other components. 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.

The Personal Needs component represented the greatest amount of retained items from the merged original components of personal factors and Maslow's hierarchy. Retained items represent human psychological needs for subsistence and safety as an individual and within the

profession, aligning with the conceptual Model of Support for SBAE. This suggests SBAE teachers' basic human needs are not satisfied, and they are perhaps frustrated within the profession (Marsh et al., 2023$_a$; Marsh et al., 2023$_b$; Fisher & Royster, 2016; Ryan & Deci, 2000). 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. Perhaps the need to change tactics to support teachers in meeting these needs exists, further representing the human capital skills needed to be an effective SBAE teacher.

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$_a$; Marsh et al., 2023$_b$; Phipps et al., 2008; Shoulders et al., 2021).

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Emerging Trends for Middle School Agricultural Education in the United States: A Scoping Review

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Emerging Trends for Middle School Agricultural Education in the United States: A Scoping Review

Introduction and Review of Literature

The Smith-Hughes National Vocational Act of 1917 changed the U.S. educational landscape, especially for school-based agricultural education (SBAE) (Herren & Edwards, 2002). With the adoption of this law, high schools were allotted finances from the government to provide education and training in agriculture, home economics, and other industrial trades (Gordon & Schultz, 2020). One year after the adoption of the Smith-Hughes Act (1917), 15,453 high school students were enrolled in agricultural education courses (Gordon & Schultz, 2020). Further, agricultural education was offered in all contiguous states by 1922 (Phipps et al., 2008). According to recent data, 196,556 7th and 8th grade students were enrolled in agricultural education courses in the 2021-2022 school year (National FFA Organization, 2023).

At its creation, agricultural education was limited to males aged 14 and older to align with the requirements established through the Smith-Hughes Act (1917). However, some states began to expand opportunities in agricultural education for middle school students, with the first reported middle school agricultural education program established in 1926 for 8th Grade students in Virginia, where in the same year, they were granted Virginia FFA membership (Rossetti & McCaslin, 1994). It should be noted, however, that FFA membership nationally was not open to middle school students until 1988 (National FFA Organization, 2022b).

Few award programs have been available to middle school students. Within the agriscience fair, middle school students may compete in divisions one or two, depending on project requirements (National FFA Organization, 2018). Meanwhile, of the 26 nationally recognized career and leadership development events, only two have been offered to middle school members: (1) creed speaking and (2) conduct of chapter meetings (National FFA Organization, 2022a). The FFA Discovery Degree can be awarded to a middle school student at the local level. Meanwhile, middle school programs can be recognized at the state and national level through the *National Middle School Model of Excellence Award*. This award program recognizes middle school agricultural education programs that exhibit excellence in the three areas of the program of activities: (1) building leaders, (2) growing communities, and (3) strengthening agriculture (National FFA Organization, 2022c). Therefore, although opportunities have existed for middle school students to be recognized, they have not been equitable to those of older members.

Tucker and McHugh (2022) stated that middle school agricultural programs "serve as a recruitment pipeline, contributing to high school program growth. As students transition into secondary programs, they take their experience with them" (p. 25). These experiences included agricultural interest, career development, and agricultural literacy (Rossetti, 1992). Even so, the students in middle school programs have different experiences than high school students, especially regarding the length of instructional time, student maturity levels, and duplication of instructional topics (Rossetti, 1992). As such, middle school students, teachers, and programs have been underserved (Tucker & McHugh, 2022). This has been evident in the lack of opportunities available to middle school agricultural students, and because of this, middle school agricultural education programs appear to have not met their full potential. Consequently, the

following questions have persisted: What gaps in the literature exist concerning middle school agricultural education? and What changes need to be addressed to advance middle school agricultural education in the 21st Century and beyond?

Conceptual Framework

Despite the widespread adoption of agricultural education's comprehensive three-circle model, it has been criticized for not accurately demonstrating the outcomes and context by which students achieve learning in SBAE (Hughes & Barrick, 1993). More recently, Roberts and Ball (2009) offered an alternative model for SBAE that sought to explain how agriculture can be used as content and context for teaching and learning, which postulated that student knowledge could be achieved across learning domains by using industry-validated agricultural curriculum. Further, Roberts and Ball (2009) opined that student learning resulted from teacher-to-learner, as well as learner-to-learner interactions. The model also depicted the role of the agricultural education teacher as a facilitator of agricultural content and other interrelated educational domains. Roberts and Ball (2009) suggested that the merger of these concepts yielded two key outcomes: (1) a skilled agricultural workforce and (2) successful lifelong learners who are agriculturally literate citizens (Roberts & Ball, 2009). By viewing middle school agricultural education through this framework, we were positioned to examine the trends that emerged from this scoping review and explore how the knowledge of middle school agricultural education has been limited in the literature. We were also able to cast a speculative eye toward the future regarding the appropriateness of organizing and delivering middle school programs from conceptual lenses designed to understand high school students' experiences in SBAE.

Purpose, Significance, and Research Questions

The purpose of this study was to conduct a scoping review of peer-reviewed journal articles that have been published on middle school agricultural education in the U.S. To meet the study's purpose, the following research question guided the investigation: What opportunities and challenges have been reported for middle school agricultural education students?

Methods and Procedures

We conducted a scoping review to synthesize the peer-reviewed journal articles that have been published on middle school agricultural education in the United States. Munn et al. (2018) stated that "scoping reviews are an ideal tool to determine the scope or coverage of a body of literature on a given topic" (para. 5). Further, "scoping reviews are useful for examining emerging evidence when it is still unclear what other, more specific questions can be posed and valuably addressed by a more precise systematic review" (Munn et al., 2015, para 5). To accomplish this, we analyzed each journal article as outlined by the guiding research question to examine emerging themes, opportunities, and challenges.

Search Strategy and Inclusion Criteria

We utilized the EBSCO search engine provided through the Louisiana State University Library Portal. This search engine was limited to the ERIC and AGRIS databases. The search was also

limited to scholarly (peer-refereed) journals with dates set from 1908-2021 to gather as many articles as possible. A Boolean search string was used to investigate for the occurrence of the following terms: “agricultur* education” AND “middle school” OR “junior high” OR “intermediate school.” This search yielded 63 unique publications. Additionally, a search using the phrase “middle school” was conducted through the database for the *Journal of Agricultural Education* and the *Journal of Southern Agricultural Education Research.* This search yielded 33 additional articles. Five duplicates were removed. We reviewed the titles and abstracts of the 91 publications to determine if they met the following criteria for the study: (a) a description of the scope of SBAE middle school students or SBAE middle school teachers, (b) identified needs for SBAE middle school students, and (c) mentioned middle school agricultural programs. As a result of this process, 79 publications were excluded from the analysis. In total, 12 peer-refereed journal articles met the criteria for inclusion in this study.

Analysis Techniques and Trustworthiness of the Study

The 12 articles were then analyzed and coded. To identify the emergent trends regarding middle school agriculture education, the following were identified: (a) type of article, (b) target participants, and (c) article context. The codes were developed following a classification system outlined by St. John and McNeal (2015). This framework was based on a five-level pyramid, with each level increasing in the strength of evidence. The framework included the following categories: (a) practitioner wisdom/expert opinion, (b) qualitative and quantitative case studies, (c) qualitative and quantitative cohort studies, and (d) filtered information: meta-analyses and systematic reviews. Through the use of this framework, our findings emerged.

Findings

Our analysis of the articles in peer-refereed journals for middle school agricultural education revealed important emerging commonalities, gaps, and trends. In total, 12 articles were included in the scoping review (see Table 1). Based on the analysis of the articles, we found that middle school agricultural education has been researched in a variety of settings. For example, more than half of the articles analyzed in this review were conducted using survey methods ($f = 6$; 50%). Additional article characteristics were as follows: expert opinion ($f = 2$; 16.6%), practitioner wisdom ($f = 2$; 16.6%), and case study ($f = 1$; 08.3%). Eight articles were state-specific ($f = 8$; 66.6%), while four were completed nationally ($f = 4$; 33.3%), and one (0.3%) was local in scope.

Table 1

Summary of the Characteristics of Middle School Agricultural Education Reported in Peer-Refereed Literature

Article	Article Type	Participants	Scope	Topic
Budke and Wooden (1971)	Expert Opinion	Range of experts	National	Occupational exploration

Article	Article Type	Participants	Scope	Topic
Brown and Stewart (1993)	Practitioner Wisdom/ Experimental Design	Students	State	Knowledge change based on length of instruction
Duncan et al. (2016)	Case Study	Students	Local	Impact of a school garden on middle school students
Frick (1993)	Expert Opinion	NVATA State Presidents	National	A framework for middle school programs
Fritz and Moody (1997)	Survey	Teachers	State	The state of middle school programs
Golden et al. (2014)	Survey	Teachers	State	Needs of teachers
Jones et al. (2020)	Survey	State FFA Leaders	National	Status of middle school programs
Rayfield and Croom (2010)	Expert Opinion	Teachers	State	Needs of students
Rohs and Anderson (2001)	Survey	Students	State	Motivational of students
Rossetti and McCaslin (1994)	Survey	FFA Executive Secretaries	National	The state of middle school programs
Rudd and Hillison (1995)	Survey	Teachers	State	Teacher characteristics and the adoption of agriscience curriculum
Skelton et al. (2018)	Practitioner Wisdom/Pre- Post Test	Students	State	Science competence of students

The question guiding this study focused on trends published in peer-refereed journals regarding middle school students. The emergent trends were divided into three sections: (a) classroom/laboratory and program characteristics, (b) FFA, and (c) SAE to align agricultural education's comprehensive three-circle model (Croom, 2008). After analyzing the 12 articles in this review, the most frequently reported subject areas for middle school programs were career exploration (f = 4; 33.3%), environmental/natural resources (f = 3; 25%), international agriculture (f = 3; 25%) and leadership/human relations (f = 3; 25%). For this study, all FFA-related topics were included in the leadership subject area (e.g., parliamentary procedure, public speaking, and employability skills). Additional information regarding middle school agricultural education programs included the common grade level of students and the length of programs. The most reported length of instruction included nine weeks (f = 3; 25%), six weeks (f = 2; 16.6%), and one semester (18 weeks) (f = 2; 16.6%). Finally, the grade levels described included 6th (f = 8; 66.6%), 7th (f = 9; 75%) and 8th grades (f = 11; 91.6%).

The impact of middle school programs has also been reported. In this analysis, advantages and disadvantages (f = 3; 25%), knowledge retention and comprehension (f = 2; 16.6%), barriers (f = 2; 16.6%), student motivation (f = 1; 8.3%), school gardens (f = 1; 8.3%), and occupational education (f = 1; 8.3%) were found in the literature. Trends also emerged regarding middle school students' FFA involvement. For example, FFA chapter organization was discussed. It was reported that some middle school chapters were separate from the high school chapters (f = 2; 16.6%) and that some middle school and high school chapters were combined (f = 2; 16.6%). Further, FFA dues were discussed in two articles (f = 2; 16.6%). Jones et al. (2020) reported that 25 state leaders collected dues from middle school FFA members, while seven states did not collect dues. In a study on the status of middle school programs, Rossetti and McCaslin (1994) reported that state-level competitions for middle school students were provided in 17 states, 14 states held their competitions with high school FFA events, and six states held their competitions separately from high school FFA events. In a more recent study, Jones et al. (2020) reported that five states held career development events (CDEs) separate from high school, while 21 states held CDEs in conjunction with high school agricultural education programs.

Trends also emerged from the literature regarding FFA opportunities for middle school students. The most frequent opportunities reported for middle school students included a combination of leadership development events (LDEs) and CDEs, including FFA creed speaking (f = 2; 16.6%), dairy foods (f = 2; 16.6%), livestock evaluation (f = 2; 16.6%), and public speaking (f = 2; 16.6%). Additionally, trends emerged regarding supervised agricultural experience (SAE) programs in the literature on middle school agricultural education. Of the 12 articles included in this review, three articles (25.0%) addressed this topic. In particular, Jones et al. (2020) reported that "of the 32 participating states, 24 (75%) reported that middle school agricultural science students participate in SAEs, while eight states (25%) reported the students did not participate in SAE projects" (pp. 48-49). Finally, in a study conducted by Rayfield and Croom (2010), teachers in North Carolina stated that SAE programs should be *scaled-back* because many of the middle school programs had varying program lengths.

Conclusion, Discussion, Recommendations, and Implications

Limited knowledge has been disseminated in peer-referred journals on middle school agricultural education. Nevertheless, enrollment trends for middle school agricultural education programs have demonstrated a significant increase and diversity in students and programs (Jones et al., 2020). To demonstrate this, we conducted a scoping review of middle school agricultural education and identified existing trends and themes. Through this analysis, major trends emerged regarding (a) classroom/laboratory and program characteristics, (b) FFA, and c) SAE. As a result, we concluded that middle school agricultural education programs and middle school FFA chapters had diverse characteristics. This included (a) subject areas taught at the middle school level, (b) length of the program, (c) grade levels taught, (d) FFA chapter organization, (e) middle school FFA chapter opportunities, and (f) middle school SAE participation.

In this scoping review, the most commonly reported subject areas taught at the middle school level were career exploration, environmental/natural resources, international agriculture, and leadership/human relations, which included FFA-related topics. This conclusion was similar to Rossetti (1994), who reported that the most common topics taught in middle school programs

were plant science and career exploration. We also conclude that middle school SBAE program lengths have varied considerably, with nine weeks emerging as the most frequently reported program length in middle school agricultural education (Brown, 1993; Jones et al., 2020; Rossetti & McCaslin, 1994). To illustrate grades of entry into agricultural education, Jones et al. (2020) reported that eight states had students beginning in 6th Grade, 23 reported enrollment beginning in 7th Grade, and 24 reported enrollment beginning in 8th Grade. We further concluded that the literature on FFA chapters at the middle school level had diverse program characteristics. For instance, some agricultural education programs combined middle school and high school FFA chapters, while others kept them separate. Further, Jones et al. (2020) reported that some states did not allow middle school FFA chapters. It was also concluded that the most frequently reported middle school FFA opportunities were (a) creed speaking, (b) dairy foods, (c) livestock evaluation, and (d) public speaking.

Although considerable diversity existed in the literature on this phenomenon, Rayfield and Croom (2010) argued that middle school agricultural education programs were a critical starting point for many high school agricultural education students. To continue to grow high school agricultural education programs, while also leading middle school students toward a skilled agricultural workforce and agricultural literacy (Roberts & Ball, 2009), we recommend that more attention be dedicated to advancing knowledge on middle school agricultural education students and programs. Regarding future research, we recommend that further investigations aim to describe middle school agricultural education program characteristics more intimately. This scoping review explored the characteristics regarding the length of instruction, subjects taught, and grade levels, but the findings were limited. Therefore, future studies should build upon Brown's and Stewart's (1993) work to analyze the role of the length of instructional time and the knowledge retention of middle school students in agricultural education programs.

There has been little research on the subjects and topic areas that should be taught at the middle school level. Therefore, future studies should seek to provide an update on the appropriate subjects and topics. Further research should also be conducted to understand why subject areas for middle school agricultural education programs vary from state to state. In particular, limited studies have reported middle school programs using industry-validated agricultural curricula (Roberts & Ball, 2009). Therefore, we recommend that future research be conducted on expanding curricular materials and their efficacy in promoting agricultural literacy for middle school students (Roberts & Ball, 2009). Key findings from this scoping review revealed that the experiences of middle school FFA students have varied considerably across contexts. The organization of local FFA chapters has also been reported to be diverse in delivery and scope. Data should be collected and synthesized from each state to evaluate how state FFA associations have included and recognized middle school FFA members to establish best practices to serve this population. We also recommend that future research examine the role of SAE programs at the middle school level. An important question also emerged from this investigation that warranted future study: *Should the outcome of middle school agricultural education be to develop skilled workers and/or agriculturally literate citizens, as espoused by Roberts and Ball (2009)*? Many middle school students are just becoming aware of the variety of career options available to them. Therefore, students at this level may lack career goals (Roberts, 2003). Because of this, should SAEs for middle school students be revised and/or rethought?

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Cooperating Teacher's Perceptions of Their Roles as Mentors: An Exploration Using Theory of Planned Behavior

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Introduction and Literature Review

An overarching theme for agricultural education in the United States has been the lack of qualified individuals to fill positions. Since the inception of the Smith-Hughes Act of 1917, School-Based Agricultural Education (SBAE) Programs have faced issues in finding agriculture teachers to enter the classroom (Hillison, 1987), which, in turn, has led to programs being limited on growth and expansion, or being shut down entirely (Eck & Edwards, 2019). The National FFA Organization (2023) has identified the shortage of agriculture teachers as the most notable obstacle in agricultural education. Agriculture teachers are expected to fill the role of learning facilitator, program developer, scheduler and planner, assessment reporter and classroom manager (Torres et al., 2008). This mountain of responsibilities, coupled with work-life balance and the feeling of burnout, along with mental health and low self-efficacy, has led to many leaving the profession, with the demand for agriculture teachers far outweighing the supply (Solomonson, 2017). The internship has been identified as a crucial time for teacher development and a student teacher's decision to enter the classroom The predominant perception is that the internship is a crucial experience in preparing student teachers to enter and ultimately stay in the profession (Stewart et al., 2017). Cooperating teachers (CTs) are in-service teachers who host and mentor preservice teachers as they gradually take on the role of agricultural educator. CTs are one of the most influential people during the teacher education program (Kasperbauer & Roberts, 2007). CTs are able to advise their STs, offer guidance and leadership and have a direct contribution to the ST's career in education (Stewart et al., 2017). Although the preservice teacher eventually takes on the role of teacher and helps manage programmatic components, their CT continues to mentor them. STs have the ability to ask questions, solve problems, and learn directly from someone with years of experience in their role. Under the guidance of their CTs, STs can develop their skills in the classroom and develop a lasting relationship that has the potential to continue throughout their career. It is critical to evaluate the perspectives of CTs regarding their interest, attitude, and intentions for their role as a mentor. Through this lens, the agricultural education profession can evaluate these factors and determine ways or areas to support CTs, with the potential to positively impact the number of STs who enter the SBAE classroom.

Theoretical Framework

Theory of Planned Behavior (TPB) was the theoretical framework used to guide this study (Azjen, 1991). This framework helps make predictions and explain why people behave the way they do in each situation. The framework of TPB helps provide insight into the factors that play a role in behavioral intentions. In this theory, a person's intentions are the product of three different areas: attitudes toward the behavior, subjective norms, and perceived behavioral control. TPB is the predominantly used model of attitude-behavior interactions (Armitage & Christian, 2003). The first area of TPB is a person's attitude towards a specific behavior (Ajzen, 1991). This measures

how a person may feel about a behavior and, in turn, can determine their positive or negative outlook and the impact on the person's intention to engage in the behavior. In the case of supervising a ST, this would be the CT's attitude towards serving as a CT and mentoring a ST. Just like a person's attitude, subjective norms can also influence a person's intentions. Subjective norms are the beliefs a person has on perceived social pressures to actively engage or not engage in a behavior (Ajzen, 1991). Perceived behavioral controls can measure a person's confidence in their abilities (Armitage et al., 2003). When perceived behavioral controls are employed, they can serve as the control and help predict behavior. People are more prone to be involved in behaviors that they feel they have control over, and don't participate in behaviors that they have no perceived control (Connor & Armitage, 1998). In this study, the CT's attitudes, subjective norms, and perceived behavioral control were measured before and after hosting a student teacher for the capstone student teaching internship and compared to STs intentions to enter the classroom.

Purpose and Objectives

The purpose of this study is to explore CTs' self-reported perceptions of their role as a mentor for STs both before and after the student teaching experience, using Theory of Planned Behavior.

1. Measure the change in CTs' perceptions of personal norms before and after the student teaching internship.
2. Measure the change in CTs' perceptions of subjective norms before and after the student teaching internship experience.
3. Measure the change in CTs' perceptions of perceived behavioral control before and after the student teaching internship experience.
4. Describe the plans of STs to enter a career teaching agriculture.

Methods

This study utilized a quantitative approach to address the research purpose and objectives. The exploratory study measured CT's perceptions of their attitude or personal norms, subjective norms, and perceived behavioral control before and after hosting a preservice teacher for a 14-week student teaching internship experience. STs were also assessed on their plans to enter a career teaching agriculture after their student teaching internship. The data collected in this study was part of a larger research project that explored CTs' needs for professional support in their roles as mentors. The target population for this study included school-based agricultural education teachers who served as CTs, as well as their STs, during the University of Florida, Department of Agricultural Education and Communication Spring 2022 student teaching internship (N = 15 Pairs) and the Spring 2023 internship (N = 16 Pairs). Using a purposive sampling technique, all CTs and STs from the Spring 2022 and 2023 internship who participated in all aspects of the CT support program were recruited for this study. Data were collected before and after the conclusion of the 14-week student teaching internship. The surveys were delivered via email utilizing a Qualtrics link. Constructs in the survey utilized Azjen's (1991) TPB constructs, measuring participants personal norms, subjective norms, and perceived behavioral control related to their role as a CT. Survey participants were asked to rate their level of agreement to for statements in each of the three constructs of TPB utilizing a Likert-type scale: (1) strongly agree, (2) somewhat agree, (3)

slightly agree, (4) neither agree nor disagree, (5) slightly disagree, (6) somewhat disagree, and (7) strongly disagree. To ensure validity, the constructs were vetted by a survey design expert and a team of researchers who served as agricultural education university faculty. Invitations to participate with surveys links were sent out three times for both CTs and STs in 2022 and 2023. Surveys were sent to CTs in the fall semester before and after the student teaching internship. Surveys that asked STs to share their plans to teach were distributed to STs at the end of their spring semester student teaching experience. For the 2022 internship, a total of 14 CTs responded to the fall survey for a response rate of 93%. For the 2022 spring survey, 15 CTs responded, giving a response rate of 100%. For the 2023 internship, a total of 14 CTs responded to the fall survey for a response rate of 88%. The spring 2023 survey had 15 respondents, for a response rate of 94%. Data were analyzed using the Microsoft Excel software to determine mean (*M*) and standard deviation (*SD*)

Findings

For objectives one through three, there was a 100% response rate for all of the CTs in 2021-2022 (n = 15) and CTs in 2022-2023 (n = 16) for both the fall and spring surveys. However, two respondents' data in 2022-2023 were identified as outliers and were removed from the analysis. For objective four, all student teachers in 2021-2022 and 2022-2023 responded.

For objective one, when measuring the change in CTs' perceptions of personal norms before and after the student teaching internship, the 2021-2022 cohort had an increase in agreement to most of the personal norms statements. However, the 2022-2023 cohort had a decrease in agreement to most of the personal norms statements. One statement, *I feel that it's important to talk to the student teacher about how to become an excellent teacher through all phases of their career*, did have a decrease in agreement for both cohorts. While the 2022-2023 cohort had no increase in agreement to any personal norm statements, the 2021-2022 cohort had the highest increase in agreement with *I feel that it's important to talk to the student teacher about how to become an excellent teacher through all phases of their career* (Table 1).

Table 1

Cooperating teachers' perceptions of personal norms.

Personal Norms	2021-2022 (*n* = 15)					2022-2023 (*n* = 14)				
	Before		After		Δ	Before		After		Δ
	M	*SD*	*M*	*SD*	Δ	*M*	*SD*	*M*	*SD*	Δ
I feel a personal obligation to mentor a student teacher.	1.5	.94	1.4	.64	-.1	1.5	.80	1.6	1.0	.1
I feel it's important to provide constructive feedback on performance on a daily basis in an effective and nurturing way.	1.4	.74	1.4	.51	0	1.2	.39	1.3	.48	.1
I feel it's important to use observational data as the basis for feedback sessions.	1.4	.51	1.3	.49	-.1	1.4	.67	1.4	.51	0
I feel an obligation to encourage the student teacher to take the lead in evaluating his/her teaching.	1.3	.47	1.3	.46	0	1	0	1.2	.38	.2

I feel it's important to involve the student teacher in all of my roles as a teacher.	1.1	.27	1.1	.35	0	1.1	.29	1.2	.38	.1
I feel that it's important to talk to the student teacher about how to become an excellent teacher through all phases of their career.	1.1	.36	1.2	.41	.1	1.1	.29	1.3	.49	.2

Personal Norms	2021-2022 (n = 15)					2022-2023 (n = 14)				
	Before		After		Δ	Before		After		Δ
	M	*SD*	*M*	*SD*	Δ	*M*	*SD*	*M*	*SD*	Δ
I feel it's important to share my philosophy and approaches for SAE program development and supervision.	1.4	.50	1.1	.35	-.3	1.1	.29	1.2	.60	.1
I feel it's important to introduce my student teacher to my school community.	1.2	.58	1.0	.00	-.2	1.1	.29	1.1	.28	0
I feel it's important to provide informative and constructive feedback on performance on a planned/weekly basis in an effective and nurturing way.	1.1	.36	1.3	.46	.1	1	0	1.1	.28	.1
I feel a personal obligation to share my philosophy and approaches for FFA advising.	1.2	.43	1	.00	-.2	1.1	.29	1.1	.28	0

Note. (1) strongly agree, (2) somewhat agree, (3) slightly agree, (4) neither agree nor disagree, (5) slightly disagree, (6) somewhat disagree, and (7) strongly disagree

For objective two, when measuring the change in CTs' perceptions of subjective norms before and after the student teaching internship experience, the 2021-2022 cohort had an increase in agreement to five out of the six statements. The 2022-2023 cohort only had an increase in agreement to one of the six statements, *I feel that supervising a student teacher is valued by community leaders*. One statement, *I feel that supervising a student teacher is valued by other agriscience teachers*, had a decrease in agreement for both cohorts (Table 2).

Table 2

Cooperating teachers' perceptions of subjective norms.

Subjective Norms	2021-2022 (n = 15)					2022-2023 (n = 14)				
	Before		After		Δ	Before		After		Δ
	M	*SD*	*M*	*SD*	Δ	*M*	*SD*	*M*	*SD*	Δ
I feel that supervising a student teacher is valued by other agriscience teachers.	1.4	.65	1.8	.78	.4	1.8	1.2	2	1.6	.2
I feel that supervising a student teacher is valued by my administration.	1.6	1.1	1.5	.74	-.1	1.4	.52	1.8	1.7	.4
I feel that supervising a student teacher is valued by my university supervisor.	1.2	.58	1.2	.41	0	1	0	1.1	.28	.1
I feel that supervising a student teacher is valued by other teachers in my school.	1.8	1.1	1.8	1.1	0	1.7	.78	1.7	.75	0
I feel that supervising a student teacher is valued by parents in my school.	2.2	1.3	2.0	1.4	-.2	2	1.2	2.2	1.68	.2
I feel that supervising a student teacher is valued by community leaders.	2.1	1.2	1.7	.80	-.4	2.3	1.4	2.2	2.2	-.1

Note. (1) strongly agree, (2) somewhat agree, (3) slightly agree, (4) neither agree nor disagree, (5) slightly disagree, (6) somewhat disagree, and (7) strongly disagree

For objective three, when measuring the change in CTs' perceptions of perceived behavioral control before and after the student teaching internship experience, three statements had a decrease in agreement in both cohorts: *I am confident in my supervision skills as a cooperating teacher, I can effectively use observational data as the basis for feedback sessions,* and *I can effectively involve the student teacher in the performance evaluation process*. For the 2022-2023 cohort, only one statement, *I have the necessary tools to successfully supervise and mentor a student teacher*, had an increase in agreement (Table 3)

Table 3

Cooperating teachers' perceptions of perceived behavioral control.

Perceived Behavioral Control	2021-2022 (n = 15)					2022-2023 (n = 14)				
	Before		After		Δ	Before		After		Δ
	M	*SD*	*M*	*SD*	Δ	*M*	*SD*	*M*	*SD*	Δ
I am confident in my supervision skills as a cooperating teacher.	1.4	.65	1.5	.83	.1	1.3	.45	1.4	.65	.1
I am supported in my role as a cooperating teacher.	1.1	.36	1.4	.82	.3	1	0	1	0	0
I have the necessary tools to successfully supervise and mentor a student teacher.	1.4	.63	1.4	.83	0	1.3	.45	1.1	.28	-.2
I have the knowledge I need to effectively supervise a student teacher.	1.3	.47	1.5	.92	.2	1.3	.45	1.3	.48	0
I can provide a variety of learning experiences for a student teacher.	1.1	.27	1.1	.52	0	1.1	.29	1.3	.48	.2
I can effectively mentor and support a student teacher.	1.1	.37	1.1	.52	0	1	0	1.2	.38	.2
I can successfully engage in conversations to provide informative and constructive feedback on performance in an impromptu/daily basis in an effective and nurturing way.	1.5	.76	1.5	.92	0	1	0	1.2	.38	.2
I can effectively use observational data as the basis for feedback sessions.	1.4	.50	1.7	.98	.3	1.3	.62	1.4	.51	.1
I can effectively involve the student teacher in the performance evaluation process.	1.3	.61	1.4	.83	.1	1	0	1.4	.51	.3
I can successfully engage in conversation to provide informative and constructive feedback on performance on a weekly basis in an effective and nurturing way.	1.4	.76	1.4	.83	0	1	0	1.2	.38	.1

Note. (1) strongly agree, (2) somewhat agree, (3) slightly agree, (4) neither agree nor disagree, (5) slightly disagree, (6) somewhat disagree, and (7) strongly disagree

When looking at objective four, Table 4 shows the number of STs who planned to enter a career teaching agriculture following their student teaching internship experience.

Table 4

Student teachers' decisions to enter a career teaching agriculture.

Year	Yes	Unsure	No
2022 (N = 15)	93%	0%	7%
2023 (N=16)	69%	25%	6%

Conclusions, Recommendations, and Implications

The purpose of this study was to evaluate self-reported perceptions of CTs in agricultural education, and their feelings toward their role as mentor to STs. Using Ajzen's (1991) Theory of Planned Behavior to frame this study, it was determined that agriculture teachers find some level of agreement with perceptions of subjective and personal norms, as well as perceptions of perceived behavior control, both prior to and after the internship. Amongst the data collected, both groups demonstrated an increased level of agreement on the importance of their role as it relates to their community, with CTs responding that they feel an increased level of agreement that their role as a CT is valued amongst their community leaders.

It should be noted that the majority of statements saw a decrease in the level of agreement, most notably with the 2022-2023 cohort. This difference can be attributed to several factors, including CTs may have had an idealistic mindset when it comes to their roles and skill set to be able to successfully prepare a ST. For the 2022-2023 cohort, the preparation and support mechanisms were increased prior to their internship with the addition of earlier interactions between CTs and STs. This could have led to having a more positive proception going into the internship for CTs. Upon reflection, the CTs have indicated that there is room for additional support during the student teaching experience, with an emphasis on the way the CTs communicated and provided feedback. As reflected in Table 3, CTs, prior to the internship, indicated a high level of agreement in their ability to provide valuable learning experiences for their STs, as well as their ability to provide constructive and meaningful feedback and include their STs in the evaluative process. However, despite resources being provided at the preparatory workshop, there was a disconnect between the information that was provided and the application to the student teaching experience. This disconnect raises the awareness on what additional methods should be taken to provide adequate strategies to CTs, as well as allow for stronger self-efficacy for CTs and their ability to mentor.

It should also be noted that a substantially higher number of STs indicated that they had plans to pursue a career teaching agriculture after completing their internship for the 2021-2022 cohort as compared to the 2022-2023 cohort, further emphasizing the perceived need for additional coaching for CTs to effectively mentor STs and combat the shortage of agriculture teachers. It should also be considered that there were also STs who pursued graduate school instead of entering the classroom immediately (n = 2) during the 2022-2023 cohort. There was not a response available for indicating this decision, therefore respondents pursuing additional degrees responded "unsure" or "no". We recommend that further research be conducted to determine the disconnect between CTs level of agreement before and after the internship. Additionally, we recognize that this data is based on two years of research in Florida and should be conducted with a larger population of cooperating teachers.

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

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

Introduction, Purpose, and Objectives

"As educators, we can take small steps to make sure all students feel welcome and affirmed in our schools regardless of their gender identity" (Cross & Hillier, 2021, para. 1). However, many U.S. teachers leave teacher preparation programs unprepared to instruct and mentor lesbian, gay, bisexual, transgender, and queer (LGBTQ+) youth (Clark, 2010). As such, unsupportive classroom environments have been found to negatively affect truancies, grades, and aspirations for postsecondary education among LGBTQ+ youth (Aragon et al., 2014; Kosciw et al., 2022). Hall (2021) stated that schools should develop strategies that create welcoming and inclusive learning environments. When classrooms are more supportive and welcoming toward students of all sexual orientations and gender identities their gaps in educational outcomes will begin to dissipate (Aragon et al., 2014). The use of gender-neutral language and chosen pronouns in educational spaces are easy ways to help transgender and gender minority students feel welcomed and included (GLSEN, 2023; Matsuno, 2019). Using chosen gender pronouns is the first step toward showing respect for a person's identity and agency by allowing them to share their gender identity to avoid assumptions based on physical appearance (GLSEN, 2023).

Regarding career and technical education, Hall (2021) identified strategies for enhancing inclusivity, including responding to anti-LGBTQ+ language, learning LGBTQ+ terminology, incorporating inclusive language, and using gender pronouns. As teacher preparation focuses on preparing professionals through course experiences to build their pedagogical and content knowledge (Franklin & Molia, 2012), more curriculum and attention involving all areas of diversity are needed (Mayo, 2014). The American Association for Agricultural Education (AAAE) developed the *Standards for School-Based Agricultural Education Teacher Preparation Programs* to serve as a framework for universities certifying SBAE teachers (Meyers et al., 2017). Standard four states that teacher education programs will prepare SBAE teachers to embrace and celebrate diversity (Meyers et al., 2017). Furthermore, the research values identified by AAAE (2023) include "Ensuring Diversity, Equity, Inclusion, and Belonging" (p. 10) that seeks to expand diversity through agricultural education and related evaluation efforts.

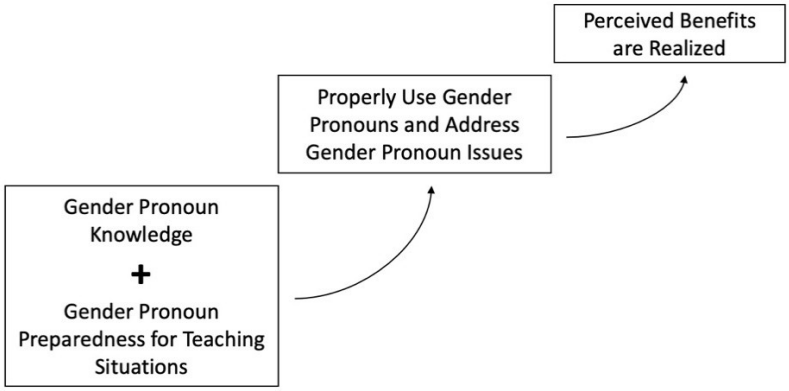
The Phase III results of a longitudinal, descriptive investigation are reported here. The overall goal of our study was to assess preservice teachers' knowledge and preparedness regarding the use of students' gender pronouns in SBAE as they matriculated through their teacher preparation program at Oklahoma State University (OSU), i.e., three consecutive, sequential and required courses. This study's purpose, therefore, was to describe the changes in attitudes of preservice SBAE teachers regarding gender pronouns from a baseline observation at the end of their first agricultural education course to the conclusion of their student teaching internship experience. Two research objectives guided this study: 1. Determine the knowledge of SBAE preservice teachers regarding gender pronouns; and 2. Determine the preparedness of SBAE preservice teachers to properly use gender pronouns.

Conceptual Framework

A three-part conceptual frame guided this study based on Bandura's social cognitive theory (SCT) that posits a person will be more willing to adopt an action or object if they perceive benefits exist with said adoption (Vasta, 1989). The framework included: (1) gender pronoun knowledge and preparedness, (2) proper use of gender pronouns, and (3) the realization of perceived benefits. Curriculum in teacher preparation that brings awareness to the benefits of using gender pronouns and creating classrooms and programs in which students feel comfortable is a pressing need. Other than course experiences, preservice teachers may also engage in campus and community events on issues regarding the inclusivity of LGBTQ+ individuals. It is likely that these experiences also play a role in building their knowledge of gender pronouns and assist in preparing them for situations they may encounter during student teaching or as inservice teachers. However, the extent to which these experiences prepare preservice teachers to use gender pronouns is not well known. Figure 1 outlines the study's conceptual framework.

Figure 1

The Study's Conceptual Framework



Methods

This study was approved by the Institutional Review Board (IRB) at OSU. Data derived from Phases I and II of the study were reported through research poster presentations at AAAE conferences (Price & Edwards, 2022, 2023) but not the findings from Phase III or the trend in preservice teachers' perceptual changes over time. The overall study included three observations that occurred during the matriculation of a cohort of preservice SBAE teachers at OSU. Data were collected at or near the end of three courses in the preservice teachers' preparation program. Participation was voluntary, and students' final grades were not affected by their participation. An anonymous link to a Qualtrics survey questionnaire was sent via an email message to students enrolled in *AGED 3103: Foundations and Philosophies of Teaching Agricultural Education* during the Fall semester of 2021 for the first observation. Regarding observations two and three, links to Qualtrics survey questionnaires were made accessible to participants via a QR code at or near the end of their respective agricultural education, teacher education courses.

The questionnaire included personal characteristics and six statements describing participants' knowledge and understanding of gender pronouns and their perceptions regarding gender pronoun usage in SBAE. Each statement was rated using a 7-point, Likert-type scale ranging from 1 = *Strongly disagree* to 7 = *Strongly agree*. The first observation also included an open-ended question that asked participants to describe their attitudes regarding the use of gender pronouns in SBAE. The second observation's questionnaire included the same Likert-type items as well as an additional open-ended question that asked participants to share if they had undergone any experiences that may have influenced their views since the initial observation. The third observation's questionnaire contained additional open-ended questions asking participants to describe any experiences they had during student teaching that may have influenced their views on the topic, and whether they had followed the media coverage and progression of anti-LGBTQ+ legislation occurring while student teaching.

Forty-five preservice students were invited to participate in the initial observation at the end of the Fall 2021 semester. More than one-half (n = 26) completed the instrument. Potential respondents for the second observation included 29 preservice teachers of the same cohort enrolled in *AGED 4103: Methods of Teaching Agricultural Education* during the Fall semester of 2022. Most students (n = 23) completed the second instrument at the end of the semester and prior to their student teaching semester. The third observation included 25 students 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. This slight attrition and variation in respondents is a limitation of the study.

After data were collected from all three observations, descriptive statistics, including means (M) and standard deviations (SD) as well as the mean difference (MD) from observation one to observation three, were calculated for each item. In addition, responses from the open-ended questions were analyzed to expand on the quantitative findings (Creswell & Plano Clark, 2011). The participants' personal characteristics included gender, age, race/ethnicity, sexual orientation, size of home community, and student type (i.e., traditional or transfer student). 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*.

Results

Scores were compared across the three observations. To determine change in participants' knowledge and understanding of gender pronouns, mean differences (MD) were calculated by subtracting the mean scores in Observation 1 from the mean scores in Observation 3 (see Table 1). At observation three, participants *somewhat agreed* that it is important for SBAE teachers to have gender pronoun knowledge and preparedness (M = 5.13, SD = 1.56, MD = -0.14). Although a slight increase was found from the first to the second observation, the final observation indicated a slightly lower mean score than initially found (see Table 1). Also regarding the third observation, participants *agreed* that their understanding of gender pronouns had increased after the first observation (M = 5.58, SD = 1.22, MD = 0.46) [see Table 1], and participants *somewhat agreed* (M = 4.83, SD = 1.62, MD = 0.45) that they were prepared to address situations regarding

gender pronouns since the first observation, when they had *neither agreed nor disagreed* (see Table 1). Participants also *neither agreed nor disagreed* that their teacher preparation program prepared them to understand and properly use gender pronouns (M = 3.71, SD = 1.49, MD = -0.10), as based on findings from the third observation (see Table 1). After their student teaching experience, participants *somewhat agreed* (M = 4.92, SD = 1.87, MD = -0.85) that it was a SBAE teacher's responsibility to use the gender pronouns the students' chose, even though this was an item that saw decreases at the second and third observations. Participants also viewed it as less important for SBAE teachers to ask students to identify their chosen gender pronouns (M = 4.29, SD = 1.62, MD = -0.71) after completing student teaching internships (see Table 1).

Table 1

Gender Pronoun Knowledge and Preparedness of SBAE Preservice Teachers at the End of Three Agricultural Education, Teacher Preparation Courses

	Observation 1 (n = 26)		Observation 2 (n = 22)		Observation 3 (n = 24)		
Statements	*M*	*SD*	*M*	*SD*	*M*	*SD*	*MD*
Gender pronoun knowledge and preparedness are important as a SBAE teacher.	5.27	1.09	5.48	1.06	5.13	1.56	-0.14
I understand the meaning of gender pronouns.	5.12	1.60	5.52	1.35	5.58	1.22	0.46
I am prepared to address situations regarding students and their gender pronoun preferences in SBAE.	4.38	1.67	4.22	1.59	4.83	1.62	0.45
My teacher preparation program is preparing me to understand and use gender pronouns.	3.81	1.54	3.61	1.58	3.71	1.49	-0.10
SBAE teachers should use gender pronouns aligned with their students' choices.	5.77	1.28	5.48	1.56	4.92	1.87	-0.85
SBAE teachers should ask students to identify their chosen gender pronouns.	5.00	1.80	4.83	1.49	4.29	1.62	-0.71

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

After the study's second observation and before their student teaching internship, more than 75%

of the participants had not had an experience that influenced their beliefs regarding pronoun preparedness and use. Of the five who reported they had, two participants indicated that a lab instructor in their agricultural education courses impacted their views. When asked to share their thoughts on SBAE teachers' use of gender pronouns through an open-ended response item in the third observation, one participant stated: "I think as educators, we should all support our students in all parts of their life." However, another said: "I believe it is most important to follow what their designated gender is according to what their parents/guardians have identified as appropriate." And a student opined that "[gender pronoun use in SBAE] is a very touchy subject and needs to be addressed more."

Although most participants (n = 17) did not report an encounter during student teaching that influenced their beliefs regarding gender pronouns, those who did shared these experiences. One participant stated: "The cooperating teacher I was assigned did not believe in pronouns, and you could tell for some students they did not open up and were not active FFA members since they did not feel seen and heard." Another said: "A student made their preference known multiple times, but my cooperating teacher continuously kept calling [them] by their legal name, which frustrated the student." One participant mentioned that students felt comfortable sharing their chosen pronouns with them but not other students, which impacted the preservice teacher by making them pay more attention to pronouns and how to integrate use of such during interactions with students. Participants did *agree* that they understood the meaning of gender pronouns. We acknowledge that the extensive media coverage of anti-LGBTQ+ legislation discussed in the Oklahoma legislature during the participants' student teaching internships, as well as in other states, may have impacted their perceptions regarding the phenomenon. However, only three students indicated they had followed the media coverage, and one shared that the "[legislation] helped to inform me of what some of my students may be experiencing."

Conclusions, Implications, and Recommendations

After their student teaching experience, participants *somewhat agreed* that gender pronoun knowledge and preparedness were important for SBAE teachers, although the mean score decreased from the second observation to the third and was also lower than the initial observation score. Even though the participants perceived they were more prepared to address situations in SBAE regarding gender pronouns at observation three then at one or two, they still only *somewhat agreed* to having been prepared by their teacher education program, a finding supported by Clark (2010). However, it was found that some participants were open to more training and education on the topic to be better prepared to make their students feel welcome in SBAE. It is recommended that teacher educators at OSU improve the efforts to prepare SBAE teachers to understand and use their future students' chosen pronouns (Cross & Hillier, 2021; Murray et al., 2020). This could be an instructional unit to provide appropriate content on gender pronouns and how to create SBAE programs inclusive of gender minority students to make them feel welcome and supported, which should be perceived as a benefit to students and, therefore, to the teachers themselves (Vasta, 1989). This perception of benefits as associated with an individual's behaviors would be in concert with Bandura's SCT, according to Vasta (1989). Because experiences occurred that influenced the participants' views of pronoun usage in SBAE

during their teacher preparation coursework, this may be an appropriate time to introduce preservice teachers to the concept and provide examples of when they may encounter situations regarding pronoun usage in SBAE and how to properly address such. Examples of these situations may include rooming assignments for overnight trips as well as official FFA dress standards for students with chosen gender pronouns that differ from their assigned sex.

By examining our data through multiple observations following three interventions (courses) over time, several trends were identified. A decrease in agreement was observed regarding whether SBAE teachers should use students' chosen pronouns and if SBAE teachers should ask students to identify their pronouns. This implies that the participants may not have fully appreciated the benefits which could occur to them as associated with the behavior (Vasta, 1989), especially following their student teaching experiences. Whether these less positive views were developed due to the influence of their cooperating teachers should be considered and explored. We, therefore, recommend that teacher preparation programs be more selective regarding the cooperating teachers and schools to which they assign preservice teachers. A more deliberate placement of students regarding this criterion could place future teachers with educators who support using students' chosen pronouns and encourage preservice teachers to adopt that behavior. Regarding course content and experiences within teacher preparation, participants needed additional training in using gender pronouns. As such, our results support the need for more attention toward the aim of AAAE's *Standards for School-Based Agricultural Education Teacher Preparation Programs* standard four to create inclusive programs that build positive rapport, ensuring fairness and equity among students, parents, community members, and other stakeholders (Myers et al., 2017). Another trend we identified was the participants' perceptions of increased preparedness to address situations regarding gender pronoun usage after their student teaching experiences. This indicates that preservice teachers may have encountered related situations while student teaching. However, after student teaching, participants also reported a decrease in their level of agreement that gender pronoun knowledge and preparedness are important to the performance of SBAE teachers. These contradictory findings also warrant further consideration and study.

The study used convenience samples of students enrolled in required teacher preparation courses offered sequentially at one institution and who all had completed their student teaching internship in the same state. The results, therefore, should not be generalized to all SBAE preservice teachers or even other teacher preparation programs in Oklahoma. We recommend that additional research be conducted with a larger population of preservice teachers to better understand the knowledge and preparedness of future SBAE teachers regarding gender pronouns. We also recommend that other SBAE teacher preparation programs replicate this study to determine how effectively they are preparing preservice teachers to properly use gender pronouns. Such replications also could help identify those cooperating teachers and school settings that may either hinder or promote the use of gender pronouns in SBAE. We further recommend the extension of this study to include another observation after its participants have been in the teaching profession for three years to assess how their preparation was applied in their programs and whether changes in attitudes and behaviors had emerged. A similar study should be conducted with SBAE inservice teachers in Oklahoma and in other states.

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Mental Health Awareness: SBAE Teachers' Perspectives

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Introduction/Literature Review

School-based Agricultural Education (SBAE) teachers are uniquely positioned to support students' academic development due to their responsibilities, competencies, and skillset expectations (Baldock et al., 2022; Clemons et al., 2021). SBAE teachers and students foster close and trusting relationships through their interactions via experiential learning (Bowling et al., 2020; Clemons et al., 2021). Due to the nature and closeness of their relationships, SBAE teachers are among the most likely teachers to notice the need for mental health (MH) services among students and support those students' psychological needs (Bowling et al., 2020); however, this may not suffice for a student who requires more direct and comprehensive MH assistance. School-based MH services are an effective way to meet student MH needs and are supported by many parents (Searcy van Vulpen et al., 2018). However, the lack of MH resources in some schools limits the availability of these school programs (Blackstock et al., 2018).

While school services could address students' MH needs, teachers feel they need additional training or more access to resources to help students use school-based MH services effectively (Moon et al., 2017). SBAE teachers are often not provided adequate, empirically supported, and relevant training and resources across career stages (Hall et al., 2022). Therefore, a need exists for additional student MH training for seasoned and new SBAE teachers.

Studies have demonstrated that SBAE teachers and their spouses feel numerous stressors, including a lack of support from school staff and administration (Foor & Cano, 2011; Smalley et al., 2020). These stressors can lead SBAE teachers to experience burnout (Hasselquist et al., 2017) and are also likely to experience emotional exhaustion, given the responsibilities they are expected to undertake (Kitchel et al., 2012). While SBAE teacher burnout has been noted in the literature, some research has shown that training, collaboration, and cooperation among teachers can help to mitigate teacher attrition (Bowling et al., 2022; De Lay & Washburn, 2013; Smalley et al., 2020). Lack of support in meeting students' MH needs may be an additional stressor for SBAE teachers.

Purpose and Research Question

This study aimed to determine SBAE teachers' understanding of MH and MH resources for students and teachers in a public school setting. The research questions for this study are the following:

1. What is the extent of an SBAE teacher's knowledge of MH resources available in the school/community?
2. What are SBAE teachers' perceptions of student MH in the classroom?
3. What strategies or factors are effective as a motivation for SBAE teachers to choose to participate in MH awareness training?

Conceptual/Theoretical Framework

The conceptual framework of this study was adapted from Korte & Simonsen (2018) regarding social support influence on novice SBAE teacher self-efficacy. The framework merged the literature on social support (Cohen & Wills, 1985; House, 1981) and teacher self-efficacy

(Bandura, 1997). Korte & Simonsen's (2018) framework highlighted forms of social support including emotional and appraisal, informational, and instrumental from various sources impacting perceived self-efficacy toward career commitment. In Bandura's (1977) theory of self-efficacy, personal self-efficacy directly affects one's ability to exhibit a desired behavior. Korte & Simonsen (2018) concluded that although all individual supports were not significant, the statistical significance of the overall model affirmed the need for support to alter self-efficacy. This study utilized the framework to examine SBAE teachers' self-efficacy to manage MH needs of themselves or others. Bandura (2009) illustrates a connection between the perception of available support and the development of the four principal sources that affect self-efficacy: enactive mastery experiences, social modeling, verbal encouragement, and emotional arousal. Mosley et al. (2023) provided support ideas for teachers specifically for MH, including emotional and informational support partnered with adequate resources to address MH. The framework of this study assumes these types of support can be provided from various sources, including administration, guidance counselors, school psychologists, school resource officers, and more. Additionally, the framework assumes with these supports in place available to SBAE teachers, teacher self-efficacy when faced with an issue of mental health in students, families, and themselves.

Methods

This study utilized a case study design where all participants, current SBAE teachers, were grouped with other participants in similar counties or school districts to form a case (Sturman, 1997). All participants participated in a semi-structured interview through focus-group design as an interactive discussion led by a moderator among pre-selected participants. Four focus groups were led, lasting between 45 and 60 minutes. Questions were developed using the findings of Mosley et al. (2023). Three of the five researchers involved in this study were former SBAE teachers. Three, including one of the former teachers, had direct engagement with MH and social work initiatives.

All focus groups were completed virtually, and audio recorded for transcription purposes to analyze the data. Each participant was provided a pseudonym to provide anonymity. Each researcher independently analyzed the data using deductive and inductive analytical approaches, and the researchers engaged in open, axial, and selective coding to let findings emerge from the data and to establish relationships among concepts (Creswell, 2013). Trustworthiness was obtained through credibility and comfortability by triangulation of field notes and member checking of transcripts (Lincoln & Guba, 2007). Additionally, a methodological journal was kept by researchers, the researchers participated in peer debriefing, and rich and thick descriptions of data were used (Creswell, 2013). Finally, disclosing positionality addressed researcher bias (Creswell, 2013).

Results

This qualitative study sought to explore SBAE teachers' knowledge, perceptions, and perceived ability to address the MH needs of students. Three major themes emerged from the data coding: the knowledge gap of help-seeking supports, support services, and classroom, school, and community culture towards MH.

Knowledge Gap of Help-Seeking Supports

Teachers looking for ways to help students with MH challenges encounter various factors that either hinder or aid the teachers in seeking and providing the necessary assistance. Financial constraints of the student and school system, lack of resources, and lack of resource training for existing supports are significant barriers. Teachers noted that numerous students who were living in poverty were also presenting with multiple emotional and physical issues. The blending of MH issues with student financial constraints creates confusion among teachers regarding when to help that student. Terrence mentioned, "I would say what skill I would like [to develop] is maybe recognizing mental health issues in my class. Because with so many students and with everything really, I feel like it's labeled as either just behavioral issues or just related to poverty". Moreover, while there are mechanisms in place for helping students, there are restrictions on how teachers can make these referrals, disrupting making verbal contact with the student within a 24-hour period to offer help. Furthermore, a knowledge gap regarding available resources exists among educators and students alike. While resources are available, teachers and students often do not know who to approach or how to find them. Specifically, Carol explained, "I have taken [students] down to the clothing closet… They were like, 'Wow, I never would have known who to go to.'" Many teachers and students are unaware of the exact procedures to follow, leading to potentially crucial resources being underutilized.

Tony acknowledged the role of counselors as a principal resource for assistance, and Terrence mentioned that they remembered, "at the beginning of the year or during orientation training that was online… I think there was a mental health module at the beginning of the year." This uncertainty makes it clear that a more consistent and comprehensive professional learning approach is needed. Carol described their experience working with counselors from organizations outside of the school and how the information given is limited for privacy, "we do have a few outside counselors, but they can't give us their clients' names. So, I can refer to that counselor [only] if the student tells me that's who they go to." However, they also revealed that upon reporting certain situations to counselors, there was a lack of communication regarding outcomes, and they painted a picture describing the emotional and mental toll that teaching has taken on them, emphasizing the enormous gaps in the current support system. Benny highlighted the incredible pressure Ag teachers face, juggling multiple responsibilities, and expressed the need for mechanisms to prevent burnout. They specifically mentioned that:

> I think we as Ag teachers need help with balancing everything. We have our work we have to meet; we're coaching, we're trying to keep up on grades, we're running a greenhouse or we're running a livestock program, we are out in the community doing fundraisers, we're doing X, Y, and Z. How do you keep that from weighing you down and not getting to that point where you just say, "I'm done."?

Understanding the clear distinction between MH crises and non-crises is essential. Behavioral intervention plans, for instance, are tailored strategies that assist students in navigating their academic and personal challenges. Early intervention in MH concerns, like suicide, has become a cornerstone of these restorative schools. Zach discusses training on "suicide, warning signs, and risk factors, protective and preventive strategies, intervention after a suicide," emphasizing the

importance of timely and preventive intervention strategies. Obstacles in development like anxiety, stress, and safety concerns further underscore the significance of a supportive school environment. For example, Sam's school has a school social worker and family engagement specialist who is the "go-to person if a student does not have school supplies or dress code" and they attend to student needs, while also addressing student safety concerns.

Support Services

In support services, various avenues are available to educators and students alike. However, schools are increasingly becoming aware of the MH issues facing students and our participants reported some programs being implemented. Carol explained, "[our] middle school also does a thing called Rethink Ed. Every Tuesday, once a week, they have to do a module on social emotional health things." The role of mentorship has also proven invaluable in this context. Participants discussed mentorship at the middle school level and how it has impacted their students. Lisa explained that their school "participates in a mentoring program, and teachers can report if a student would benefit from a mentor, set up through the counseling office. That mentor comes in once a week and meets with the kids for about 30-45 minutes." They also emphasized the importance of having supportive mentors who could provide guidance and perspective, even if they lacked formal training.

In the evolving landscape of child and adolescent development, the influence of school systems stands out significantly. Susan discussed their school's unique approach to student advisement: "teachers begin advisement with 9th graders and continue these sessions until they graduate." These meetings play a pivotal role in MH discussions, allowing students to express their struggles beyond academic performance comfortably. Discussions during the advisement period can create meaningful conversations for teachers and become a bridge to discuss various issues as they arise. Susan elaborated,

> Certain advisors have reached out to me about students in my classes, saying 'in advisement this kid mentioned this is going on with their family. I've been in several meetings where students, parents, teachers, their counselor, and an instructional coach will talk about more than just [issues occurring in] school. I feel like advisement is another level to that mental health piece, because we know those students. And a lot of the times they'll open up more.

Support services, when effective, offer invaluable emotional support. Sam explained that teachers are encouraged to connect with students on a personal level, drawing on their humanity to understand and support the students' emotional needs by "being human, how we can relate to them, and what our responsibilities are, and how we can give them advice as adults." Collaboration between various stakeholders – from counselors to social/emotional learning coordinators to community resources, demonstrates the potential success of utilizing a united approach in addressing student needs while keeping SBAE teachers from feeling overwhelmed by the large workload expectations of their careers. This is being done in the mentoring program, mentioned by Susan, where teachers can recommend students to benefit from mentorship and receive regular sessions, which denotes the importance of providing targeted support. Susan

explains that this is a long-term commitment, and it is expected that “mentors continue with that one mentee, or they might have two mentees all the way throughout high school.”

Classroom, School, and Community Culture Towards Mental Health

Many aspects of classroom culture define the teaching and learning experiences. For instance, the school where Wendy is a teacher encapsulates a broad range of diversity, with “66% of its student population being Black and 20% White.” They also mention the school is further marked by a varied curriculum offering “things like Spanish and French, and the basics. There are a lot of remedial classes at [school]. But then we have AP classes, as well”, displaying a wide range of student needs and abilities. Such a diverse classroom setting paves the way for a more inclusive learning environment, accommodating different learning and teaching styles.

An essential part of classroom culture is the creation of a safe space. Lisa is a testament to this belief, representing a sanctuary where students can freely express their emotions and feelings. Lisa continues, “More than any computer-generated program or professional training, a genuine one-on-one interaction—where students feel heard, understood, and supported—can make all the difference.” The classroom's dedication to MH emerges not just as a nod to academic performance but as a deeper commitment to the holistic well-being of every student.

While parent involvement is integral to a child's development, there exists a divergence in parental attitudes. Carol noted, “some parents are receptive and understanding, while others can be in denial about their child's struggles”, complicating the communication process between the school and home. The importance of school resources, such as staff equity circles, was underscored as a valuable tool for educators. These circles focus on racial healing, indicating a holistic approach to MH with staff and also allowing for a time of professional learning where, according to Susan, “before school started, we also had to go through gang training, which might not seem like a MH resource, but they gave us lots of numbers and stuff to reach out to people because the people that are involved in the youth detention center and stuff like that”.

The ever-elusive work-life balance remains a struggle for many educators. The repercussions of an especially demanding day can continue into the teacher's personal lives, potentially impacting family dynamics. Vicki explains, “I take it home, and then my husband and the rest of my family deal with the repercussions of me being overstimulated on a regular basis.” Participants highlighted that there's an urgency to shift the focus from merely gathering data for administrative purposes to understanding the work of and addressing the needs of educators before a breaking point is reached. Wendy said, "I'm not worried about data at this point. I'm worrying about my mental health and the kids' mental health because, at this point, somebody is going to explode."

Conclusions/Discussions/Recommendations

Help-seeking serves as the pivotal point for students experiencing MH distress, keeping them from spiraling further into crisis and supporting numerous studies regarding adolescent MH (Kahn et al., 2022; Moon et al., 2017; Stewart et al., 2015). The findings of this study present an evident need for clearer protocols and follow-ups with students post-intervention. Intervention

strategies are not one-size-fits-all and need clear usage protocols and initiatives for post-intervention follow-up. Schlieder et al. (2020) found that two-thirds of adolescent participants of the intervention still reported feeling either a little less, the same amount, or a little more hopeless than before the intervention. The willingness for an adolescent to come forward seeking help regarding MH is widely affected by the community, resources readily available to them, and stigma about MH that they have been exposed to, supporting Stewart et al. (2015).

The findings of this study, including the positive outcomes of proactive, effectively implemented, and consistent advisement intervention in supporting students' MH needs, further support the work of DuBois et al. (2002). Youth mentorship was exemplified as a tool for facilitating proactive prevention and intervention for MH, which, as suggested by Cavell (2021), is a concept that has been included in the literature for decades. The findings posed ideas of support systems in place to offer life advice and take a proactive approach regarding a student's emotional well-being. Previous research (Mahon et al., 2001) supports the connection between feelings of anger, depression, and loneliness with little engagement in positive health practices like nutrition, relaxation, and exercise. Furthermore, school-based initiatives enhanced with empirical training, tools, and resources are crucial for ensuring the success of all school employees in handling student MH needs, as seen in Ratter (2003). The findings of this study supported the conceptual framework that when there is knowledge, training, and support of MH programs available, SBAE teacher self-efficacy is increased with how to address the situations of MH.

One theme is classroom culture, with the foundational concepts of every child feeling seen, heard, and wanted within a classroom setting. This theme contributes to the knowledge base within educational empirical research about the crucial importance of classroom culture development. Morton (2022) says, "creating a positive classroom culture that supports young adolescents through social, physical, and academic development can be complex but support healthy mind-sets." Furthermore, Prios & Balasa (2007) support the importance of these themes by outlining the need of children and adolescents to sustain a positive view of self and ability can greatly impact ethical intention, development of social skills, and academic achievement. Practices discussed by participants revolved around the effects of child and adolescent behavior greatly affecting a teacher's ability to foster a positive classroom culture.

The researchers recommend school personnel pursue measures of educating faculty, staff, and students about any support services geared toward MH. Specifically, these education measures should incorporate specific procedures for accessibility to these services. Additionally, training for faculty and staff to exemplify the importance of developing a positive culture within individual classrooms and utilizing concepts of child and adolescent behavior to ground this training. In conjunction, teacher educators are recommended to preface future teachers with the paradigms and concepts revolving around adolescent MH issues and crises. Familiarity with the topic earlier on can hopefully decrease anxiety and stress revolving around MH.

Finally, recommendations for future research include additional qualitative and quantitative studies with an increased sample of SBAE teachers in different regions of the country. Research concerning training for teachers regarding MH in conjunction with implemented strategies for developing class culture would be beneficial.

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Utilizing the Land-based Learning Model for the Clemson University Cooperative Extension Service Agricultural Safety Program

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Introduction

In 2021, the agricultural sector contributed 5.4% of the United States Gross Domestic Product (GDP), while providing work for 21.1 million full and part-time employees (USDA, 2023). The large number of employees, which included youth and migrant workers, combined with relatively weak regulatory protection for employees (Cooper et al., 2005), make the agricultural sector, along with mining and construction, one of the most dangerous occupations for people to be employed (Hard & Myers, 2006; Reed & Wachs, 2004). While there is information about fatalities from farming operations, data for non-fatal injuries sustained during farming operations is minimal (Missikpode et al., 2015; Rautiainen & Reynolds, 2002; Voaklander et al., 2009). To help bring awareness to the importance of agricultural safety, the Clemson University Cooperative Extension Service Agricultural Safety program was developed in 2019 with the goal of educating South Carolina youth aged 14 – 18 about the hazards that surround the agriculture industry (Lovern, 2023). While this program has shown a positive relationship between attending field days and higher post-test scores after participation (Lovern, 2023), there is still room for program improvement. The Clemson University Cooperative Extension Service Agricultural Safety program field days often occur with School-based Agricultural Education (SBAE) programs. Researchers and community individuals are able to be with the participants for five to six hours to allow for an exchange of safety information from the program leaders to the students (Lovern, 2023). Currently, the program offers field days held at research and education centers to high school students enrolled in School – based Agricultural Education (SBAE) programs and provides professional development for SBAE teachers in South Carolina.

The purpose of this research was to evaluate the programming offered by the Clemson University Agricultural Safety program, utilizing the land-based learning model (McKim et al., 2019). Aligned with the land-based learning model (McKim et al., 2019), we sought to develop a framework to guide the program mission to encourage learning in "lived experiences of place," such as nature and the community of farms, as opposed to the conventional "abstractions of place," seen in textbooks and classrooms. The objectives of this research were to 1) adapt each of the four checkpoints of the land-based learning model (McKim et al., 2019) to conceptualize the a framework to unite the Clemson University Agricultural Safety program as a partner with SBAE programs and their communities and 2) determine curriculum revisions, educational strategies, and place-based needs to enhance the Clemson University Agricultural Safety programs' ability to bring awareness of agricultural safety to SBAE teachers and educate youth enrolled in SBAE programs in South Carolina.

Conceptual Framework

Place-based learning, and later land-based learning, support bridging two common gaps found in standard educational practices (McKim et al., 2019). Gap one is the missing link between students and their interactions with the environment, and gap two is the lack of interactions with the community where students may enact change (McKim et al., 2019). Land-based learning is not brought about through a strict formula or process, but rather it can be achieved through checkpoints (McKim et al., 2019). These four checkpoints include identification, understanding, intervention, and evaluation (McKim et al., 2019). Following the recommendations of McKim et al., (2019) evaluations of land-based learning interventions should be conducted to explore the

approach among diverse communities and learner populations; therefore, the four checkpoints of the land-based learning model were adapted through this research to align with the Clemson University Agricultural Safety program, Figure 2. While the adapted model was designed to be cyclical, we propose learners could move throughout the learning process in a variety of ways, as represented by the arrows between the checkpoints.

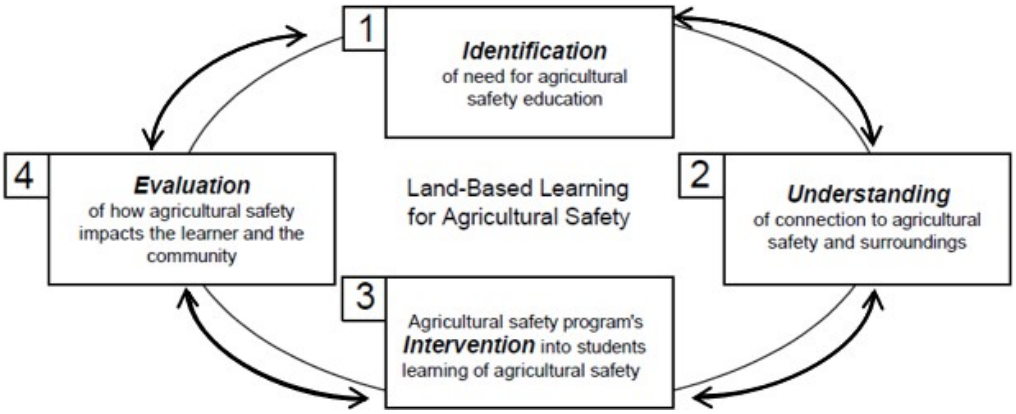

Figure 2: Adapted land-based learning model for the Clemson University Agricultural Safety program

The identification checkpoint involves students and educators identifying a local phenomenon, in this case, agricultural safety, in which they engaged by attended safety field days. During the identification checkpoint, community members are also identified to provide a variety of viewpoints and aid in the educational process (Powers, 2004). During the understanding checkpoint, students learn experientially from their surroundings by being placed directly in the environment (McKim et al., 2019). For this checkpoint, understanding can occur on a farm or during agricultural industry site visits. During the intervention checkpoint, community members and instructors become more involved in the students' learning process (McKim et al., 2019). The intervention checkpoint identified as the Clemson University Agricultural Safety program, can be described as participation in a field day program where instructors demonstrate a variety of safety incidents at learning stations, then lead students to a greater understanding of agricultural safety by answering their questions and presenting them with ideas and scenarios that might not have previously been considered without the opportunity to experience the phenomenon. The final checkpoint of land-based learning is evaluation. The evaluation checkpoint of land-based learning allows the student to consider and evaluate the impacts of their learning with the community or space where the learning took place. The evaluation should be centered around sustainability (McKim at al., 2019). The fourth checkpoint, (evaluation) was appraised by this research through administration of pre- and post-test assessments to all students who participated in the safety field days.

Methods

The first checkpoint (Identification) was achieved through an extensive review of the agricultural injury incident rates from AgInjuryNews.org (Weichelt et al., 2015) in South Carolina, by categorizing and recording the number of incidents in each county to identify topics and areas of need for agricultural safety education in the state. AgInjuryNews.org (Weichelt et al., 2015) was utilized for this research because the resource provided readily accessible information to the public about agricultural incidents in the United States, and it could easily be filtered based on

year and state. The database was filtered to display only injuries in South Carolina. The database included data from the years 2015 to the present, however only the incidents between 2016 and 2022 were included because in 2015 there were no reported incidents for South Carolina. Article titles for each incident reported were interpreted and then recorded into a Microsoft Excel spreadsheet and organized by the population for each year, the total number of incidents, the total number of victims, and the incident categories. Incident categories were cross-referenced with the station topics previously developed for the Clemson University] Agricultural Safety program curriculum. Safety topics included tractor, chain saw, lawnmower/ATV/UTV, safe load, grain bin, and electrical safety.

The second checkpoint (Understanding) was achieved by a qualitative research design using focus groups with SBAE teachers throughout the state of South Carolina. There were no pre-determined requirements for educators to be considered to participate in the focus group. Participation was entirely voluntary and posed no risk to those who participated. Educators were informed about the focus group at the Farmer and Agribusiness Association (FAA) convention welcome dinner the night before the scheduled meeting was held the next day. A brief description of the research and the program was provided to the group, and participants were encouraged to come and share their thoughts and ideas. While the meeting was held in person, the focus groups were recorded using Zoom to collect both audio and video, and to efficiently produce the audio transcription The recording was saved, further transcribed and analyzed to find the common themes among the participants' responses. Questions presented to participants included demographic data, safety competency queries, and information pertaining to the needs and wants of the participants. The focus group lasted approximately one hour, comprising 22 participants and one facilitator.

The third checkpoint (Intervention) was achieved through safety field days that were hosted by the program. The program instructors consisted of the program director and co-director, graduate and undergraduate students majoring in Agriculture Mechanization and Business at Clemson University, and community members in agriculture industry such as electric cooperatives and highway patrol, who intervened in the students' agricultural safety learning process to bring awareness to many facets of agricultural safety. Curriculum was previously designed and followed by each station instructor to meet the learning objectives for each safety station category.

The fourth checkpoint, (Evaluation) was achieved through the administration of pre and post-tests to the students to gauge their agricultural safety knowledge before and after participation in the field day. Pre and post-test scores were analyzed using JMP statistical analysis software to determine statistical significance. Field days were treated as independent samples because each program varied slightly from the others. Paired t-tests were used to compare the mean pre and post-test scores for each field day. The distribution feature in JMP was also used to determine descriptive statistics about pre and post-tests for each field day, including means, standard deviations, and 95% confidence intervals with $\alpha = 0.05$.

Findings

Checkpoint 1 – Identification: In South Carolina, machinery was the most common category of

agricultural incidents and injuries. Machinery incidents encompassed tractor rollovers, power take-off (PTO) entanglements, injuries involving implements, and injuries sustained from other large equipment often found on farms. The second most common category was other, consisting of logging operations and fishing operations. Most of the logging incidents involved logging trucks and passenger vehicles on roadways. All incident totals can be viewed in Table .

Table 1. Agricultural injuries by year for South Carolina

			Categories								
Year	Number of Incidents	Number of Victims	Pesticide/ Chemical	Machinery	Lawn mower	ATV/ UTV	Animal Production	Electrical	Grain	Power tool	Other
2016	8	11	-	6	-	-	-	-	-	-	2
2017	9	21	-	6	-	-	-	-	1	-	2
2018	4	4	-	2	-	-	1	-	-	-	1
2019	12	23	-	3	-	-	-	-	3	-	6
2020	15	19	-	8	-	1	-	-	1	-	5
2021	10	13	-	1	-	-	1	-	-	-	8
2022	8	9	-	5	1	-	-	-	-	-	2
Total	66	100	-	31	1	1	2	-	5	-	26

Incidents were also categorized by the state's geographic region. Among the four regions of South Carolina, tractor and vehicle-related injuries were the most common. See Table 2 for all incidents by region. Yearly agricultural data was also considered for each region. Yearly agricultural data was retrieved as a means to relate the number of injuries to the primary form of agriculture.

Table 2. Agricultural injuries by region for South Carolina

Incident Agent	Regions				
	Region 1	Region 2	Region 3	Region 4	Total
Vehicle	3	5	4	6	18
Tractor	5	3	7	4	19
Other	2	2	3	4	11
Forestry	1	1	-	1	3
Tree/plant	2	1	-	-	3
Livestock	-	1	-	1	2
Machinery	3	1	1	3	8
ATV/UTV	-	-	1	-	1
Building/Structure	-	-	-	1	1
Total	16	14	16	20	66

Checkpoint 2- Understanding: Educators' understanding of place and interconnected systems was determined pertaining to agricultural safety to provide a baseline for how agricultural education teachers in South Carolina utilized resources. A total of five themes were identified through the focus groups that were conducted at the annual Farmer and Agribusiness Association

meeting. The first theme, Presence of Agricultural Safety in the Classroom, revealed that agricultural safety is most commonly taught in high school agriculture mechanics courses. Focus group participants (SBAE teachers) reported, "mostly teaching agriculture safety in their agriculture mechanics classes, and not really getting into a lot in ag science classes." The second theme, General Needs and Support, presented the ideas of the additional support that educators wished to receive from the Clemson University Agricultural Safety program. The overwhelming response from participants was the need for more resources, including visual aids, videos, and online resources, which were more condensed and differentiated for leaners included materials in languages other than English. Confidence in teaching ability for agricultural safety emerged as another common theme. Participants highlighted how some felt more confident in their abilities, while others had concerns about how adequately they were prepared to teach agricultural safety due to their own lack of education. The fourth theme that was identified was Level of Prior Experience of Students. Participants voiced how students who "don't know anything" are not the main concern for the educator but rather "the kid that has spent hours on a piece of equipment." Participants mentioned as quoted by one "the kids that don't have any kind of background knowledge are way easier to teach because they basically only have what is told to them in class." The final theme that emerged was Availability of Resources. Participants discussed the various resources they accessed to teach agricultural safety outside of the Agricultural Safety, [program] resources drawing information from other colleagues inside and outside their school.

Checkpoint 3 – Intervention and Checkpoint 4- Evaluation: The Clemson University Cooperative Extension Service Agricultural Safety program served as the intervention where SBAE teachers were invited to bring their students to field days that were held at five different locations around the state. Pre-post test data was collected and analyzed from five field days. Table 3 outlines the data and results from the analysis. Mean pre and post-test scores were determined to then develop confidence intervals. Confidence intervals were used to determine if there was a statistical difference between mean pre and post-test scores. Four of the five field days produced statistically different mean pre and post-test scores. We caution that a low response rate can cause Type I error (Banerjee et al., 2009) thus, leading to the possibility of the null hypothesis of mean pre and post-test scores having no difference being rejected when it is potentially true in the population. While curriculum for the program was developed, each field day was not delivered in an identical manner. The location, some of the topics at the stations, and the station instructors were different; therefore, the data was analyzed and presented for each safety field day rather than combining data from all five field days.

Table 3. Pre and Post-Test Data for 2022-2023

Field Day	Student Attendance	Sample Size	Response Rate	Pre-Test Mean	Post-Test Mean	Pre-Test Standard Deviation	Post-Test Standard Deviation	Pre-Test Confidence Interval	Post-Test Confidence Interval
1	155	65	41.94%	55.88	70.57	14.04	17.41	(52.40, 59.36)	(66.26, 74.89)
2	90	18	20.00%	50.19	61.49	16.14	15.75	(42.17, 58.22)	(53.66, 69.32)
3	62	34	54.84%	46.45	62.78	17.59	19.30	(40.31, 52.59)	(56.05, 69.51)
4	58	10	17.24%	52.76	90.00	16.66	15.23	(40.84, 64.68)	(78.82, 101.18)

5	113	27	23.89%	46.17	73.33	18.57	19.74	(38.83, 53.52)	(65.52, 81.14)

Conclusions, Discussion, and Recommendations

Using the land-based learning model (McKim et al., 2019), the four checkpoints, Identification, Understanding, Intervention, and Evaluation were adapted and conceptualized through this research. The identification checkpoint was achieved when agricultural incident rates were determined through the use of AgInjuryNews.org. Data was retrieved from the website for 2016-2022 South Carolina agricultural incidents. With the identification of agricultural incident rates, a need was determined for additional curriculum development, such as lesson plans and teaching aids for SBAE teachers, and new educational strategies, such as hands-on activities and tabletop displays, to increase the awareness of agricultural safety in the communities throughout South Carolina.

The overall understanding of agricultural safety was also determined specifically pertaining to SBAE teachers throughout South Carolina, achieving the second checkpoint by understanding needs associated with agricultural safety by better understanding the educators' place and interconnected systems, additional support can be provided by the Clemson University Agricultural Safety program. To expand upon checkpoint two of understanding, additional work, such as trainings and materials provided to SBAE teachers and the station instructors, must be planned and accomplished to ensure that educators are receiving the support, guidance, and instructional strategies, and resources to best educate the youth of South Carolina who are enrolled in SBAE programs.

Checkpoint three (Intervention) and checkpoint four, (Evaluation) were directed through the Clemson University Agricultural Safety program field days. Data analysis from four regular field days and one condensed field day found post-test scores that were statistically higher than pre-test scores. A limitation was identified pertaining to a small sample size. With such a small sample size, generalizing results to the intended population is not recommended. We also recommend emphasizing to SBAE teachers the importance of requiring their students to complete the pre/post evaluation in exchange for the opportunity to attend the field day. Future safety field days should require SBAE teachers to utilize the pre/post evaluation as a formative assessment in their SBAE curriculum for students who attend the safety field days.

By utilizing the land-based learning model (McKim et al., 2019) to identify the Clemson University Agricultural Safety program as the partner for SBAE programs, including their agricultural education students and teachers, a better understanding of curriculum revisions, educational strategies, and place-based needs were developed to continue to increase the awareness of agricultural safety in South Carolina. The Clemson University Agricultural Safety program should continue to utilize the adapted land-based learning model as a framework to achieve the program mission, meet the program goals and measure long term impact. Continued economic support and educational collaboration from various current and future statewide entities is highly recommended to safeguard program sustainability and growth. The program's current outreach abilities should be monitored and changed as needed to continue to meet the needs of South Carolina. All recommendations are provided with the goal to enhance the sustainability of the program and to ensure that youth between the ages of 14 to 18 are receiving

the highest quality education pertaining to agricultural safety in South Carolina. Other states should apply the framework with the four checkpoints in the adapted land-based learning model when developing similar agriculture safety awareness and education programs.

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An Analysis of Thwarted Belongingness and Perceived Burdensomeness Among a State-Wide Agriculture Youth Essay Contest

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Abstract

Multiple studies report a higher risk of suicide among agricultural, forestry, and fishery (AFF) workers than the general population (Kennedy et al., 2021; Klingelschmidt et al., 2022; Monteith et al., 2020) and an increase among teenage youth (Peden, et al. 2005)*. The Interpersonal Theory of Suicide (Van Orden et al., 2010) guided scholars during the axial coding process of 105 essays written by secondary agricultural students. The study sought to answer the research question of "How do secondary students express understanding of thwarted belongingness and perceived burdensomeness?" Within the letters, the essays exhibited an understanding of drivers for suicide and offered support against those drivers for both perceived burdensomeness and thwarted belongingness. The essays reflected the concept of support more often than identifying negative drivers of suicide. Help-giving advice for belongingness was generally more substantive than that for burdensomeness. Although the participants had limited to no training/education on the topic of farmer suicide, the essays exhibited some connection to the concepts of burdensomeness and belongingness. A subsequent finding among the essays was added burdensomeness, which reflects an area for future exploration. To increase the effectiveness of engagement, it is recommended that a program, such as QPR Institute's Question, Persuade, Refer training or LivingWork's SafeTALK training, be implemented.*

Introduction

Suicide has been a persistent tragedy within the United States for decades. While the rate was declining over the past two years, it is still 30% higher than in 2000 (Ehlman et al., 2022). Suicide is currently the 12th leading cause of death in the United States with 45,959 deaths and an estimated 1.2 million attempts in 2020 (AFSP). Multiple studies report a higher risk of suicide among agricultural, forestry, and fishery (AFF) workers than the general population (Kennedy et al., 2021; Klingelschmidt et al., 2022; Monteith et al., 2020). According to analysis of data from the CDC, AFF workers experience five times the risk of suicide than the general population (Miller & Rudolphi, 2022). One study, spanning from 1992-2010, found that the suicide rate among agriculture, fishing, and forestry workers was higher than all other occupations for each of the 17 years of the study (Ringgenberg et al., 2017).

Suicide is not only rising among farmers, but among today's youth as well. In a 2005 study conducted among rural secondary youth in Kentucky and Iowa (Peden, et al. 2005), high level of depressive symptoms within 34% of the sample existed, with 9% reporting they had seriously considered suicide in the last year (Peden, et al. 2005). In 2020, the suicide rate was 14.2% per 100,000 young adults between the ages of 15 and 24, the third leading cause of death among this age group (Center for Disease Control, 2022). Among children ages 10-14, suicide was the second leading cause of death (CDC, 2020). Approximately 14% of today's adolescents experience a mental disorder (World Health Organization, 2021). Visits to pediatric emergency hospitals for mental health related concerns approximately doubled between 2011 to 2020 (Bommersbach et al., 2023). In 2021, a national state of emergency was declared in child and adolescent mental health (American Academy of Pediatrics, 2021). Stress caused by Covid-19 caused children and young adult's mental health to decline, resulting in a national state of emergency (AAP, 2021). Many stressors, outside of a pandemic, affect today's youth.

Many studies have shown a connection between regular communication from a caring individual and mental health, in many forms. The majority of the studies published are in the

domain of healthcare and nursing. In one case study, communication between a nursing student and an older individual residing in a long-term care facility through letter writing decreased the reported loneliness of the older individual (Long, 2023). Another study found expressions of gratitude from patients to their nurses through thank you letters improved professional identity, personal confidence, and motivation (Stirling et al., 2023). It is plausible to consider that notes of appreciation and connection among other disciplines would have similar effects. A decrease in loneliness and an increase in sense of purpose directly relate to constructs in the Interpersonal Theory of Suicide (2010), which formed the foundation of our analysis.

Theoretical Framework

The Interpersonal Theory of Suicide (2010) was the framework that guided the scope of the study. The Interpersonal Theory of Suicide is used to explain the relationship between emotional and cognitive states and desire to suicide, and the distinction between desire for suicide and the capability to engage in suicidal behavior. The two primary constructs of desire for suicide are thwarted belongingness and perceived burdensomeness (Van Orden et al., 2010). Thwarted belongingness encapsulates a failure for an individual to perceive connections to other people; the need for belonging is unmet (Van Orden et al., 2010). In conjunction with this, social isolation is one of the most reliable predictors of suicidal ideation, attempts, and lethal suicidal behavior (Calati et al., 2019). Perceived burdensomeness involves the perception that the individual is a burden to those they are close to – the individual believes that they are so flawed they are a liability to others and experiences thoughts of self-hatred (Van Orden et al., 2010). Sentiments indicating burdensomeness might include shame, self-blame, and feelings of unwantedness or expendability.

Purpose/Research Questions

The purpose of this study was to determine if secondary students with no training in suicide prevention and mental health awareness organically included constructs related to thwarted belongingness and perceived burdensomeness when writing letters to farmers on the topic of suicide, and the nature of these sentiments. Understanding a baseline of student expression of these constructs could help direct future instruction and training on topics related to mental health and suicide in various contexts, including those related to agriculture. The research question which guided this project was: How do secondary students express understanding of thwarted belongingness and perceived burdensomeness?

Methodology

The Kentucky Department of Agriculture facilitates an annual essay contest for high school students with two prompt options: to write a letter to a farmer either thanking them or to extend support in light of the mental health crisis with the theme *"Think of Me, We're Thinking of You"*. The past 3 years' worth of essays were collected by the researchers to be analyzed. This amounted to 105 submitted and readable essays. Original essays were numbered and copied. Identifying information was redacted prior to receival by the researchers – all authors were high

school students from Kentucky, and while some counties and high school names are mentioned in the essays, the researchers do not know more about the authors.

Two researchers coded the essays through the lens of the 2010 Interpersonal Theory of Suicide (Van Orden et al., 2010). The authors began by reading a few essays together and creating a codebook for terms and concepts which related to thwarted belongingness or perceived burdensomeness. Key constructs relating to thwarted belongingness, as identified by the Interpersonal Theory of Suicide, included loneliness, social isolation, pessimism, and low levels of social support. Key words and phrases the researchers identified as relating to thwarted belongingness included: recognition of physical isolation; recognition of mental isolation, such as "lonely," and "long hours alone;" and an inability to spend time with family and friends due to farm obligations.

Theoretical constructs of perceived burdensomeness include liability, self-hate, physical illness, uselessness, belief that they are unwanted/unneeded, and a belief that the self makes things worse and is flawed. Based on these concepts, the researchers identified phrases relating to burdensomeness including "burden," not feeling needed or wanted, and "not living up to expectations," among others, when used in a personable or career sense.

During this creation of the codebook, researchers noticed that many essays also included positive notions related to both thwarted belongingness and perceived burdensomeness. These notions seemed to aim at alleviating the negative circumstances relating to the constructs, and therefore were coded as "positive" factors while the previously mentioned phrases were coded as "negative" factors. Positive factors for perceived burdensomeness included key phrases such as "thank you" and "you are appreciated." Positive factors for thwarted belongingness included efforts on the part of the author to promote social connection within the letter recipient. In some cases, this was a direct offer to come over and help with chores/eat a meal, while in other letters it was a suggestion to spend more time with friends or speak to a counselor.

The researchers used this process to independently code each essay, highlighting the phrases mentioned above, and then compared results. Coded items were broken into four categories: positive and negative perceived burdensomeness, and positive and negative thwarted belongingness. Counts of these coded items were entered onto a spreadsheet by researcher and essay number. Descriptive statistics were used to analyze the data. Interrater reliability between the two researchers' codes was calculated at 90% across all essays.

Findings

Students identified drivers for suicide (negative factors) and offered support against those drivers (positive factors) for both perceived burdensomeness and thwarted belongingness within their essays. The researchers tagged 295 items for positive perceived burdensomeness (39.54%) and 83 items for negative perceived burdensomeness (11.11%). For thwarted belongingness, 260 positive items were tagged (34.85%) and 108 negative items were tagged (14.47%).

When examining perceived burdensomeness, student engagement occurred in the form of both external and internal factors. Internal factors are described as including notions of empathy

by the student for the pressure and stress the farmer is under and the feelings of worthlessness which may result. External factors are defined as expressing an understanding of the occupational conditions which may contribute to feelings of burdensomeness, such as financial hardship and strenuous work. The researchers did not code for external factors since the initial focus was on the affective nature of the communication between the student and farmer; many students listed the responsibilities of farming without making a deeper connection. Far fewer students made the connection between these external factors and the internal factors which might result, such as feelings of inadequacy, shame, or burnout.

The internal factors of perceived burdensomeness which were coded as positive included notions which expressed the value and need for the farmer. In one example, a student wrote "I DO know you are needed. You are appreciated." The terms “needed,” “appreciated,” and “thank you” were all very common among the letters. Those which were coded as negative burdensomeness included phrases which acknowledged the feelings and implications stress and feelings of inadequacy might have on the farmer. One student wrote “I understand the hurt you feel when you go unnoticed and unrecognized,” both attempting to connect empathetically with the farmer and acknowledge how a lack of appreciation might feel. A common theme among some of the codes in this category included the concepts of succession and family legacy – such as in the sentence “You feel like you['re] failing your family legacy.” Positive items were identified much more frequently than the negative items.

Negative factors for thwarted belongingness included a recognition of loneliness, isolation, and sacrifice of social time to complete work. One example of such a student statement is "Farmers spend long, 12-14 hour days on their farm by themselves. That would become extremely lonely." Students tended to offer more support (positive factors) for thwarted belongingness than perceived burdensomeness. Students frequently stated a need for the farmer to interact with family, friends, and even to have the author come over and visit (for letters written to a known farmer). One student wrote, “Go out and socialize with people. Make new friends. Spend time with your loved ones. And try not to think of the farm when you're out having fun.” Many also suggested that the farmer reach out to a therapist or counselor, and additionally recognized the stigma surrounding support-seeking. An example of supporting help-seeking can be seen in “If you ever feel like there is no other option call me, your family, or the hotline and talk to someone about anything you feel is weighing you down,” while the acknowledgement of stigma is seen in “...there is no shame in asking for help or someone to talk to. I am here and I care about you.” While students recognized more negative factors for belongingness than burdensomeness, the emphasis was still placed on positive factors. Responses for belonginess also tended to be more varied in scope and phrasing than the responses for burdensomeness.

Conclusions, Implications, and Recommendations

Many students were able to identify components relating to both burdensomeness and belongingness within their essays. However, their help-giving advice for belongingness was generally more substantive than that for burdensomeness. The age and life stage of high school students are possible reasons for this divide, as many of the factors which lead to the burdensomeness farmers and adults might feel come with a level of maturity, responsibility, and

life experience most highschoolers have not encountered. That being said, the majority of the essays included at least one external factor relating to burdensomeness, an acknowledgement of the occupational stressors endemic to farming and agriculture. This is important to note as it shows a basic understanding that the daily responsibilities of farming might precede internal feelings of perceived burdensomeness for factors outside of the farmer's control. However, most students have probably experienced some form of social isolation and loneliness, and this may have been easier for them to identify, relate to, and try to support thwarted belongingness.

Concepts relating to thwarted belongingness made up 49.32% of coded student responses. Items which emphasized the connections between the letter recipient and others were quite varied in scope. Across and within letters, students' suggestions ranged from spending more time with children and spouses, attending church or community events, reaching out to counselors or therapists, to having the sender (student) come over to share a dinner or help with chores. Many students, at a minimum, included a help or crisis line in the conclusion of their letters and encouraged the recipient to reach out to someone if they ever had thoughts of suicide. Negative factors, or those recognizing factors which may cause a farmer to feel a lack of belonging, focused much more on empathy for the farmer' situation. These sentiments were often paired with external factors which related to burdensomeness (which were not coded for). Student responses to thwarted belongingness tended to seem very genuine and empathetic. Often, multiple suggestions were provided on how to increase social connections, and this is the only area where the letter writers offered direct, in-person support.

Perceived burdensomeness codes accounted for the remaining 50.65% of items. The overwhelming majority of positive items included sentiments such as "thank you" and "you are needed." While there were more of these items identified in the letters, the researchers felt as though the sentiments were less genuine and more routine. There was generally less personal connection to the recipient and a very textbook understanding (and listing) of the external drivers which may lead to burdensomeness. Some, especially those who self-identified as having a farm background or who were writing to a specific farmer in their lives, did express a nuanced, mature understanding of perceived burdensomeness. Letters that reached this level tended to involve discussions of finances or succession and meeting the expectations of predecessors.

Since the researchers have no demographic data available for these essays, it is difficult to discern patterns among those who expressed an understanding of perceived burdensomeness and thwarted belongingness in more nuanced or complete ways. For example, the life experience and maturity of a high school senior is generally much greater than that of a freshman. Those from agricultural backgrounds have a much more personal understanding of what it is like to live as a farmer. Students that may have experienced thoughts of suicide or mental health issues may also be more understanding of how to provide support than those who have not. This study does not capture an understanding of these factors.

While the majority of essays included at least some expression of perceived burdensomeness and thwarted belongingness (coded sections), not all of them did. In addition, one response which the researchers found in a few essays was a reliance on blame-shifting, guilting, and/or religion in what seemed like an attempt to shame a person out of thoughts of suicide. An example of this would be a paragraph explaining how awful the suicide would be on

the survivors, and how difficult it would be for the spouse or children following the suicide. Sentiments such as these often have the opposite of the intended effect, increasing feelings of shame, allowing stigma to be pervasive, and ultimately reducing the likelihood that an individual will seek help.

Students were generally able to connect, at least partially, with the concepts of perceived burdensomeness and thwarted belongingness with no prior training or education on the topic of farmer suicide. This indicates a general level of empathy and understanding for others which may be expanded upon in order to make intervention attempts more successful. In general, students expressed a more broad and nuanced understanding of thwarted belongingness than perceived burdensomeness, however, without more information from the participants it is difficult to conclude why. It is thought that the life experiences and responsibilities of high school students may lend itself more to thwarted belongingness, social connection and isolation, and more constructive advice for how to improve social relations rather than the concept of burdensomeness, especially if the students do not have an agricultural background. A few essays reflect a deep understanding of perceived burdensomeness and have a sympathetic, realistic, genuine approach in their correspondence. However, without more data regarding the participants, the researchers are unable to expand on why some students reach this level of understanding and others do not.

Another limitation of the study is the perspective and interpretation of the essays by the researchers during the qualitative process. Both researchers have a background in Agricultural Education and have prior experience teaching and reading work written by students similar to the authors who wrote the letters used in the study. Two of the authors have completed Question, Persuade, Refer training specific to agricultural populations and one provides these trainings to community members. One author has also been trained in Applied Suicide Intervention Skills Training (ASIST) in a train-the-trainer program. Two authors are from Kentucky and have more experience with the study population and farming than the other author. The qualifications and background of the authors, as with much qualitative work, has impacted how they have interpreted the essays and developed their conclusions. Bias was mitigated through independent coding and subsequently comparing and discussing findings among the authors, which has been described in the methodology.

In order to increase the effectiveness of the engagement of all students, it is recommended that a program, such as the QPR Institute's Question, Persuade, Refer training or LivingWork's SafeTALK training, be implemented. These trainings expand on how to best approach an individual and have the difficult conversation about suicide. The students whose essays are included in this study show a nascent level of understanding which should be fostered in order to empower them to be able to engage in conversations about mental health and suicide.

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Week-Long STEM Immersion in School-Based Agricultural Education

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Introduction, Purpose, and Objectives

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). While 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).

While research has explored SBAE students' interest in STEM (Chumbley et al., 2015; Erickson et al., 2020) and the perceptions of Agricultural education 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' knowledge and their STEM 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), while 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. Therefore, this study aimed to determine the impact of a weeklong immersive STEM curriculum experience on SBAE students' sustainable bioenergy content knowledge and STEM interest. Two 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; and

2. Identify SBAE students' career interest in STEM prior to and after being taught using a sustainable bioenergy curriculum.

Theoretical/Conceptual Framework

This study was grounded in human capital theory. Human capital theory emphasizes the acquisition of knowledge, skills, experiences, and proficiencies that are deemed essential for workforce employability and an individual's overall wellbeing (Becker, 1964; Schultz, 1971; Smith, 2010). Human capital theory emphasizes an individuals' development through education, training, and experiences (Becker, 1964; Nafukho et al., 2004), which ultimately culminates in a more employable individual based on "sector-specific" skill development (Smith, 2010, p. 42). This specific acquisition of knowledge and skills not only benefits the individual who has an increased human capital, but also the organization in which they work or engage and society (Nafukho et al., 2004). While 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 "sector-specific" human capital development. To accomplish this goal, a STEM enhanced curriculum on bioenergy and renewable fuels served as an educational experience for SBAE students. This study, grounded in human capital theory, allowed for the exploration of building SBAE students human capital in the realm of biofuels and renewable energy through a vetted STEM-enhanced secondary education curriculum.

Methods

Students in three rural SBAE programs in [State] during the spring 2023 semester were the accessible population for this study (Privitera, 2020). Each of the three schools were deemed rural according to the National Center for Education Statistics, with eighth through twelfth grade school enrollment ranging from 65 to 234 students (NCES, 2023). Two of the SBAE programs were single-teacher and the other was a two-teacher program, all three served eighth through twelfth grade students, and represented two areas of the state. The three participating programs had five classes per teacher per day, with each class being 50 minutes in length. Induvial class sizes ranged from six to 22 students.

The sustainable bioenergy unit of instruction was delivered by three graduate students pursuing PhD's in Agricultural Education at Oklahoma State University. Each of the graduate students were previous SBAE teachers with five or more years of teaching experience and participated in a two-hour immersive STEM curriculum training prior to their four-day experience at an assigned SBAE program. The two-hour training provided the graduate students with a hands-on introduction to the resources, materials, and activities including the completion of all the immersive labs. The STEM enhanced curriculum itself 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. Topics covered within the curriculum included 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 critical content delivery and relevant laboratory experiences. The curriculum delivery and laboratory experiences utilized STEM-enhanced connections and the scientific method. To support the graduate student SBAE teaching experience, USDA NIFA sustainable bioenergy laboratory kits were prepared for each of the school sites, with a value of $1200 per kit.

A 25-item criterion-referenced examination was utilized 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 (i.e., agriculture, science, math, engineering, technology, a career in agriculture, and a career in STEM).

The primary limitations within this study were related to instructional delivery. It was assumed all students in each SBAE classroom would be in class for all four days to be able 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 the content delivery and immersive experiences. Due to the timing of the sustainable bioenergy unit of instruction, which happened 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 students across three programs who completed the pre-test, content delivery, and the post-test. There were an additional 35 STEM semantic instruments that were removed from data analysis due to incomplete data.

While the Oklahoma State University agricultural education PhD students were trained consistently, the actual delivery of the sustainable bioenergy curriculum, students, classroom resources, and teaching styles may vary from school to school. To keep as much consistent as possible, the accessible population was small due to the limitation of three PhD students delivering the curriculum and the access to SBAE classrooms late in the spring semester. The findings of this study should be viewed with an understanding of the limitations.

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 1-point, for a maximum score of 25 points. Pre-test scores ranged from a low of 4 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 utilized 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 5 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 1

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). To further understand the impact of the sustainable bioenergy unit of instruction, data on a semantics scale focusing on agriculture and STEM (Knezek & Christensen, 2008) were collected prior to and after the unit of instruction. The semantic instrument had five randomized scales (i.e., 1 to 7) for each of the seven items, but for consistency in data analysis, responses were recoded to align with one being negative and seven being positive on the sematic scale. Table 2 provides the mode and percent agreement for the five scale ranges across the seven items. Overall, SBAE students reported an increase across the semantic scale for science, while math, technology, agriculture, and careers in STEM and agriculture remained consistent, and engineering decreased.

Table 2

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

Math 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
A Career in STEM is. . .	Boring to Interesting	4	20.5	4	27.4
	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]The percentage corresponds to the participants 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, $p < .001$). Furthermore, 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

reasonably 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 with regard to 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 agricultural education 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.

Moreover, student interest in science based on reported semantic scores increased across most items in the scale. Therefore, it can be further concluded that students' interest in science increased as a result of the instruction they received in sustainable biofuels. Semantic scores for mathematics, technology, agriculture, and careers in STEM 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. Student enthusiasm was highest for agriculture as reported in both pre-and post-test semantic scores which was 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 found student interest in agriculture and its related careers to have increased as a result of 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, perhaps increasing the current lack of interest in STEM and STEM related careers (Gonzalez & Kuenzi, 2012).

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 (Zimmerman, 1999), thus, indicating enhancement of their human capital as it relates to STEM education (Smith, 2010). 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).

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. SBAE teachers should work to incorporate additional hands-on 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).

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Understanding Concerns of New North Carolina SBAE Teachers Participating in an Induction Program

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Introduction

The ongoing demand for agriculture teachers is a prominent concern across the profession. This is not a recent phenomenon as Hillison (1987) noted the rapid growth of agricultural education in secondary schools during the early 20th century, initiating the teacher shortage. At present, the need for qualified agriculture teachers remains (Smith et al., 2022), raising questions about the best approaches to recruitment and retention. While recruitment efforts have been made on the national level to promote careers in school-based agricultural education (National Association of Agricultural Educators, 2023) and research has been done on what attracts students to the teaching profession (Andreatta, 2023; Korte et al., 2020; Lawver & Torres, 2012), this study focuses on what teacher educators can do to help best support and retain inservice agriculture teachers through the delivery of an induction program in North Carolina.

To support beginning agriculture teachers in North Carolina, DELTA, a 40-hour induction program is in place. The Department of Public Instruction requires agriculture teachers on a restricted license to complete the program within their first three years of employment and those pursuing a residency-based license or provisionally certified beginning teachers may also participate based on personal interest or the recommendation of their local school. Six components are included: a fall and spring conference, a workshop at the summer CTE conference, attendance at fall and spring teacher in-service meetings, and an experience at the State FFA Convention. The fall and spring conferences comprise the bulk of the participation hours and consist of sessions facilitated by a team of mentor teachers, teacher educators, and state staff.

In an effort to develop and facilitate meaningful professional development programming, agricultural education faculty members have employed several approaches, both quantitative and qualitative, to assess needs of early career agriculture teachers. Quantitative approaches have commonly utilized needs assessments to identify the needs of beginning teachers (Birkenholz & Harbstreit, 1987; Garton & Chung, 1996; Washburn et al., 2001). Qualitative inquiries have included an ethnographic approach to explore problems and issues encountered by beginning agriculture teachers (Mundt, 1991) and a case study approach to provide a descriptive account of three beginning agriculture teachers across the span of a school year (Talbert et al., 1994). DiBenedetto et al. (2018) conducted a meta-analysis of teacher needs assessment through the decades that also provided relevant information from the larger teacher profession.

While there has been a wealth of research in agricultural education on the needs and concerns of beginning agriculture teachers and recommendations on the delivery of teacher induction programs, there was a need to conduct research specific to North Carolina. The induction program was started in 2009 and while ongoing evaluation has occurred, there has not been an intentional effort to identify the specific concerns and needs of participants. Additionally with the changes in the educational landscape due to the on-going pandemic and an increase of new teachers across the state, the findings will be valuable in informing the development of future programming. Seeing that teachers participating in the DELTA program may have anywhere from 1-3 years of agriculture teaching experience and come from a mix of certification pathways, it was determined that examining a broad scope of in-service needs and also providing an opportunity to capture immediate concerns would be the most appropriate.

Purpose & Objectives

The purpose of this study was to describe the concerns of teachers participating in the DELTA program. The research objectives that guided the study were 1) Identify DELTA teachers' level of need for content related to SAE/FFA, program management and planning, curriculum and instruction as well as teacher professional development; and 2) Identify and classify categories of teacher's self-reported concerns.

Theoretical /Conceptual Framework

Fuller (1969) initially proposed three phases of concerns: a pre-teaching phase, an early teaching phase, and a late teaching phase. This conceptualization moves across a continuum of concerns from being non-teaching specific during pre-service coursework, to a focus on self during the early teaching phase, and concerns about students during the late teaching phase. Later, Fuller and Case (1972) presented an expanded version of teacher concerns that included seven categories: concerns about self (non-teaching concerns), concerns about self as a teacher (where do I stand?; how adequate am I?; how do pupils feel about me? what are pupils like?), and concerns about pupils (are pupils learning what I am teaching?; are pupils learning what they need?; how can I improve myself as a teacher?). A revised three-stage model was later proposed including only concerns about self, concerns about task, and concerns about impact upon students (Conway & Clark, 2003; Parsons & Fuller, 1974).

Methods

The design for this study was descriptive. The accessible population was all teachers who attended the 2022 December ($N = 31$) and 2023 March ($N = 28$) DELTA teacher in-service trainings. Frames were obtained through the registration platform used by the DELTA program yielding a final target population of $N = 36$. Because of the small size, a census was sought. The instrument was shared via Qualtrics in mid-March 2023 with two follow up attempts. The accepting sample was $n = 22$ creating a final response rate of 61%.

The scale data were collected using a modified version of the researcher-created instrument first developed by Roberts and Dyer (2004). The instrument sought to gather inservice needs in areas related to FFA/SAE, curriculum and instruction, program management and planning as well as professional development. These items were rated on a Likert-type scale anchored as no need (1), a little need (2), a moderate need (3), a strong need (4) and a very strong need (5). Roberts and Dyer (2004) had reported reliability for the included constructs; however, since we removed a few items from their constructs, we ran post-hoc reliability. Reliabilities for our study are reported as follows: FFA and SAE (8 items) = .84, Curriculum and Instruction (20 items) = .97, Program Management and Planning (14 items) = .96, and Teacher Professional Development (4 items) = .95. For the second section of our instrument, we used the open-ended response section from Stair (2012). The item was "When you think about teaching, what are you concerned about? (Do not say what you think others are concerned about, but only what concerns you now.) Please be frank." The third section gathered demographic characteristics of the participants.

The scaled items were calculated as construct grand means as well as individual item frequencies and percents. We collapsed responses of very strong need and strong need into a category we titled high need, consistent with the analyses of Roberts and Dyer (2004). We also calculated a grand mean for the construct, again following the guidance of the 2004 study. For the open-ended responses in section two, many respondents gave us multiple items in bullet or paragraph form. We broke the participant responses into individual items to allow for coding. We used the pre-existing codes of nonteaching, self, task and impact as guided by our framework. We coded first as individuals and then met as a research team to ensure alignment and resolve any items where there was a disagreement in coding.

There were also responses where we would have benefitted from the opportunity to follow up with participants to explore the statement. For example, one of their concerns was "PBMs". Our state has recently gone to a performance-based measurement as the assessment at the end of the agriculture courses. It is unclear from their very short response if they are concerned with understanding, organizing, teaching to, being evaluated on the data from, impact on students from, or something else related to PBMs. Without more information, it is impossible to narrow down which teaching related concern category into which this brief response would fit and was thus coded into multiple categories.

Results/Findings

The first objective of this study was to identify the level of concern for DELTA teachers. We addressed this objective through statements related to four constructs. There were eight items in the FFA and SAE construct and each were identified by participants as areas they needed content support. Three items were identified as having a high need by over half of the participants. These items included developing supervised agricultural experience opportunities (68.18%), supervising SAE programs (68.18%), and preparing the program of activities and national chapter award applications (59.09%). The overall grand mean for the FFA and SAE construct was 3.23 (*SD* = 0.82).

The construct related to curriculum and instruction included twenty items, all of which participants indicated were needed (see Table 1). The grand mean was *M = 3.21 (SD = 1.04).* Half of the items were identified by at least half of the participants as having a high need by the participants. The highest need areas included modifying lessons for special needs and ESOL students (72.72%), managing student behavior (59.09%), and teaching in laboratory settings (59.09%).

Table 1
Participants with a high need for DELTA content related to Curriculum and Instruction *(n = 22)*

Item	*f*	%
Modifying lessons for special needs and ESOL students	16	72.72
Managing student behavior	13	59.09

Teaching in laboratory settings	13	59.09
Motivating students (teaching techniques and ideas)	12	54.55
Developing critical thinking skills in your students	12	54.55
Integrating state performance tests and Performance Based Measurements	12	54.55
Teaching problem-solving and decision making skills	11	50.00
Modifying curriculum and courses to attract high quality students	11	50.00
Developing a core curriculum for agricultural education	11	50.00
Changing the curriculum to meet changes in technology	11	50.00

The grand mean for the program management and planning construct was the highest of the four areas at $M = 3.34$, $SD = 0.98$. The construct consisted of fourteen items, with nine of those items being recognized as having a high need by participants (see Table 2). The top areas of concern for participants included fundraising (59.09%) and writing grant proposals for external funding (54.55%).

Table 2
Participants with a high need for DELTA content related to Program Management and Planning *(n = 22)*

Item	*f*	%
Fundraising	13	59.09
Writing grant proposals for external funding	12	54.55
Conducting needs assessments and surveys to assist in planning agriculture programs	12	54.55
Planning and maintaining a school land lab	12	54.55
Developing business and community relations	12	54.55
Completing reports for local and state administrators	11	50.00
Building the image of agriculture programs and courses	11	50.00
Recruiting and retaining quality students	11	50.00
Establishing a public relations program	11	50.00

The grand mean for the professional development construct was $M = 3.01$, $SD = 1.29$, which was the lowest of the four constructs. This construct consisted of four items, all of which were identified as having a high need by less than half of the participants. The areas recognized

with the highest need included time management tips and techniques (45.55%) and professional growth and development (45.55%).

For the second objective, participants provided forty-four individual concerns when asked "When you think about teaching, what are you concerned about?" We coded the open-ended statements into the four categories of concerns. Due to the vague nature of some statements, we chose to have some statements recognized in multiple categories of concerns, increasing the total number of concerns to forty-nine. There were twenty-five task concerns (51.02%), fourteen self concerns (28.57%), seven impact concerns (14.29%), and three nonteaching concerns (6.12%).

Task concerns were the most prevalent among the participants and focused on items that required teacher time or decisions. Examples of these task concerns included, "I also love to be outside but finding labs and activities for students to do outside can be SUPER time consuming and expensive in some cases," "control of students during lab situations," and "the pressures administration puts on a beginning agriculture teacher that have nothing to do with the job they were hired to do." Examples of self concerns included items such as "Safety. I have been assaulted twice this year," "I am concerned about the longevity of this career. Between teaching classes, FFA, maintaining lab area (greenhouses, barns, livestock, etc.), engaging with and serving the community, as well as any additional responsibilities given to teachers locally at their school, it is difficult to imagine surviving year 1, much less 10, 20, or 30 years," and "Time management. I feel pressured from other chapters to push myself. I know that jealousy is the thief of joy, and I am new and starting out."

Conclusions/Discussion/Implications/Recommendations

In line with the recommendations from Grieman (2010), the conclusions of this study will be valuable in providing a targeted approach to teacher induction. The highest area of overall need was related to program management and planning including items related to fundraising, grant writing, managing laboratory facilities and connecting and managing community partnerships. The lowest overall area of need was teacher professional development which may be related to the fact that these teachers were receiving this instrument because of their attendance at a professional development.

SAE was the highest need area among the FFA and SAE items. DiBenedetto et al. (2018) found this need has appeared in multiple teacher needs assessments from the 1980, 1990s and 2000s. Disberger et al. (2022) also reported that teachers sought support in the implementation of SAE. There is opportunity here as the national re-launch of SAE for All is driving SAE-related professional development not only at conferences like DELTA, but also at the state's fall in-service teacher meetings and the statewide summer conference sessions. All teachers in the state are being encouraged to integrate foundational SAEs into their courses and provided with practical resources to do so.

ESOL and special needs modifications were the highest identified area in curriculum and instruction. A meta-analysis of agricultural needs assessment by DiBenedetto et al. (2018) determined this was an emerging need that began to appear in the 2000s. While Stair et al.

(2010) indicated that teachers were confident in their abilities to accommodate students with specific needs, they disagreed that they received helpful preparation through in-service opportunities. This finding was supported by follow-up research conducted by Stair et al. (2016). As such, trying to keep current on strategies and approaches for supporting students with special needs and delivering relevant professional development is critically important. It might also be beneficial to incorporate in-service offerings delivered by certified ESE and/or ESOL teachers.

Motivating students showed up on both the open-ended response and was rated highly on the likert-type scale. This is in alignment with Roberts and Dyer (2004) who found student motivation to be the third highest need item on the curriculum and instructional items. Our current DELTA curriculum does address motivating students but tends to talk about strategies for hands-on learning and applied and/or lab-based activities which teachers indicated can be limited by budgets. Fundraising and grant writing were both rated highly on the likert-type scale but when combined with the understanding offered from the open-ended data, the need appears to be less about wanting ideas for fundraising or grant sources and more about the need for funding to provide opportunities for hands-on learning and engaging opportunities.

Managing student behavior showed up on both the open-ended feedback and the likert-type scale, which is in alignment with the quantitative findings of Stair et al. (2012). We do spend time in the DELTA curriculum on managing student behavior, but it is a critical component for teachers feeling in charge of their own learning environment. Continued emphasis in this should include not only traditional classroom management content but ideas for managing students outdoors and in other agricultural labs like greenhouses, shops and within animal handling facilities. We also need to continue to offer student engagement strategies and reinforce that engaged students are less likely to demonstrate behavior that needs to be managed by the teacher.

One interesting self-concern that surfaced in the open-ended responses was related to teacher safety. One teacher indicated they had been assaulted twice during the school year so far (data were collected in March). While this is outside of the programming content within the DELTA program, administration, policy makers and teacher educators need to be aware of the environment in which teachers are expected to carry out their job.

A number of participants had questions of longevity related to the workload, the salary, the profession of teaching, as well as the past performance of their current school's program in regards to teacher retention. These concerns are valid. The DELTA curriculum is presented in part by a team of teacher educators and state staff who are well aware of the challenges that these teachers are facing, but the presentation team also includes 5-6 current classroom teachers who have navigated the long-term realities of the classroom agriculture teacher. We currently do not expressly tackle these concerns within DELTA, but should consider how to bring them forward.

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An Empirical Exploration of Communication Channel Use for Prospective Graduate Students in a College of Agricultural Sciences

Introduction, Purpose, and Objectives

Recruitment of graduate students from diverse backgrounds is of paramount importance for colleges of agriculture (COA) due to the demand in the workforce for university graduates with agricultural expertise (Fernandez et al., 2020), especially those with graduate degrees (Chakraborty et al., 2017). However, there is a distinct difference between attracting and retaining undergraduate students compared to graduate students, which has led to the emergence of graduate enrollment management (GEM) as a distinctive discipline focused on the graduate student lifecycle experience within a university (Balayan et al., 2022). Influential factors in graduate students' institutional selection include gender, socioeconomic status, and marital status (Lei & Chuang, 2010). Personal experiences at undergraduate institutions (Lin et al., 2022) and levels of self-efficacy to succeed in research programs (Clark et al., 2017; Sowell et al., 2015) have also been shown as influential in graduate students' program selection. Informational needs of prospective students can also vary by type of degree pursued. For example, in one study, Chen (2008) found international graduate students pursuing a professional degree were looking for different factors in an institution than students pursuing a research degree. Students pursuing different levels of graduate education may also have distinct motivations, such as needing a degree to reach specific career aspirations or wanting to advance in their current career (English & Umbach, 2016; Shellhouse et al., 2020).

Students' choice of institutions may be largely dependent upon funding and availability of part-time education programs (Lei & Chuang, 2010; Shellhouse et al., 2020). Specifically within state university systems, some students are funded by employee education tuition assistance programs (Shellhouse et al., 2020). Students who receive this tuition assistance are also enrolled part-time in universities because they must work full-time to receive funding (Shellhouse et al., 2020). It is possible students in tuition assistance programs may use distinct communication tools when searching for graduate degrees because they are limited by the number of degree programs available to them. Therefore, there is a need to better understand communications processes of prospective students in COAs to tailor efforts in recruiting graduate students with nuanced characteristics. Because this study sought to enhance strategic communication about science and educational opportunities happening within COAs, the current study was in alignment with a key value of the American Association for Agricultural Education (AAAE)'s research values: Advancing Public Knowledge of AFNR Systems (AAAE, 2023).

The purpose of this study was to explore the differences in communication channel use between graduate students with a variety of factors in a college of agriculture at a research-heavy, land-grant university. The study was guided by the following research objectives:

1. Describe the communication channels used by graduate students in a college of agriculture at the time they were searching for graduate institutions.
2. Describe frequency of communication channel use of graduate students in a college of agriculture at the time they were searching for graduate institutions.

3. Describe the relationships between frequency of communication channel use for the most-used communication channels and current degree pursued, enrollment status, and funding type.

Conceptual Framework

Audience segmentation was the conceptual framework used for this study. Utilized in social marketing, audience segmentation focuses on selecting a specific subgroup of the population whose behavior communicators seek to change (Weinreich, 1999). Rather than taking a mass media approach to broadly reach everyone in a population, audience segmentation identifies a subgroup, researches their specific needs, and then tailors communications accordingly to make the most effective use of limited resources (Slater, 1996). Carroll et al. (2022) used audience segmentation to identify the communication channel preferences of potential Extension clientele in order to deliver information effectively to the target audience. Findings revealed communication preferences varied significantly according to age and gender, with older respondents preferring internet communication and females more than males preferring communication from friends and family (Carroll et al., 2022). Audience segmentation has been used in the graduate education space to determine the cultural factors which affect students' decisions to study abroad, revealing undergraduate students, professional graduate students, and research graduate students select different factors when choosing to study at Canadian universities (Chen, 2008). The current study utilized audience segmentation to determine if the degree level, enrollment, and funding characteristics of graduate students were associated with their use of communication channels when searching for a graduate program.

Methods

A quantitative research design was used to address the research objectives of the study. A web-based survey instrument was administered through Qualtrics, an online survey platform, to the target population – graduate students at a college of agriculture in a research-heavy land-grant university. The study was approved by the University of Georgia Institutional Review Board (Protocol #00007201).

The survey instrument included demographic questions about students' country of origin, their highest level of education achieved, the degree which they were currently pursuing, and the degree program in which they were enrolled. To determine communication channel use, respondents were asked in a check-all-that-apply format to select all communication channels they used when seeking a graduate institution for the degree they were currently pursuing. Communication channels were derived from qualitative research on prospective graduate student communication preferences (Byrd & Lamm, 2023). To measure frequency of communication channel use, respondents were asked to imagine they had gone back in time and were searching for a program for their current degree and had eight hours to dedicate to the program search. They were instructed to indicate how much time they would allot to each communication channel in a provided list, where the total time allotted had to equal eight hours. Channels in the frequency of use section were expanded by individual social media channels to give researchers' a deeper dive into students' social media time use. Respondents could also indicate they did not

need additional time. Students were also asked demographic questions. The survey instrument was reviewed by subject matter experts and adjusted according to recommendations.

In accordance with Dillman et al. (2014), students were sent pre-notice emails from their department heads. The survey was distributed four times over the college's graduate student email list with one invitation email and three reminder emails according to protocols recommended by Dillman et al. (2014). Responses were obtained from 121 graduate students. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 29. Detailed demographics of respondents are described in Table 1. Frequencies and descriptive statistics were used to describe the communication channels used by respondents and the frequency of communication channel use.

Table 1

Demographics of Respondents (N = 121)

	F	*%*
Gender		
Male	43	35.5
Female	69	57
Non-Binary/Third Gender	1	0.8
Preferred Not to Answer	8	6.6
Race/Ethnicity[a]		
White	65	53.7
Asian	28	23.1
Black or African American	7	5.8
Hispanic or Latino/a/x	7	5.8
Other or Preferred to Self-Describe	5	4.1
Preferred Not to Answer	4	3.3
Current Degree Sought		
Ph.D.	76	62.8
Master's Degree	44	36.4
Type of Funding		
Any Type of Assistantship/Fellowship	97	80.2
Any Type of Tuition Assistance Program or Self-Funding	23	19.0
Enrollment Status		
Part-Time Students	14	11.6
Full-Time Students	106	87.6

Note. [a]Respondents were permitted to select more than one option.

Spearman's rank-order correlation coefficient tests for relationship were run to determine if non-parametric relationships existed between degree pursued, funding status, and enrollment type and frequency of communication channel use for the top three communication channels (Leclezio et al., 2014). Non-parametric testing was selected for the study because the data did not meet normality assumptions. The strength of relationship in a Spearman's rank-order correlation

coefficient is measured by the correlation coefficients, which can range from -1 to +1. Values closer to the absolute value of 1 indicate a stronger relationship. Leclezio et al. (2014) classifies the strength of the relationship as the following: ≥ 0.70 = very strong, 0.40 - 0.69 = strong, 0.30 - 0.39 = moderate, 0.20 - 0.29 = weak, 0.01 - 0.19 = no relationship.

Results/Findings

Sixty-nine percent of respondents said they used Department/Program Websites when searching for graduate programs, 62% indicated they used Graduate School Websites and 58.7% utilized email communication (see Table 2). Respondents' least-used communication channels were Google Scholar or ResearchGate (14.9%), Academic Journal Articles (14%), Other (14%), and YouTube (5%). Other types of communication channels used specified further by respondents' fill-in-the-blank answers included advice from previous students and friends currently enrolled in the program (*F* = 6), pre-existing relationships with faculty members who became students' advisors (*F* = 4), undergraduate experiences working within a lab (*F* = 3), and recommendations from previous advisors/word of mouth through academic networks (*F* = 4).

Table 2

Communication Channels Used During Graduate Program Search (N=121)

Communication Channel	Yes		No	
	F	%	*F*	%
Department/Program Websites	84	69.4	37	30.6
Graduate School Websites	75	62	46	38
Email Communication	71	58.7	50	41.3
Individual Faculty Members' Lab Websites	53	43.8	68	56.2
In-Person Visits	51	42.1	60	57.9
Video Calls	30	24.8	91	75.2
Phone Calls	26	21.5	95	78.5
Social Media	24	19.8	97	80.2
Conferences and Events with Professional Societies	20	16.5	101	83.5
Google Scholar or ResearchGate	18	14.9	103	85.1
Academic Journal Articles	17	14	104	86
Other. Please specify.	17	14	104	86
YouTube	6	5	115	95

Respondents indicated if they were given eight hours to explore graduate programs, they would allot an average of more than one hour to using Departmental/Program Websites (*M* = 1.67, *SD* = 1.13), Graduate School Websites (*M* = 1.32, *SD* = 1.22), Faculty Lab Websites (*M* = 1.25, *SD* = 1.32), and Email Communication (*M* = 1.02, *SD* = .94; Table 3). Respondents indicated they would spend the least amount of time using social media sites including Instagram (*M* = .09, *SD* = .57), YouTube (*M* = .08, *SD* = .36), Facebook (*M* = .07, *SD* = .22), and TikTok (*M* = .01, *SD* = .07). Respondents indicated they would use their time with other communication channels including in-person meetings or visits, national association job boards, speaking with friends/past students/faculty in the program, and reviewing the course list.

Table 3
Frequency of Communication Channel Use

Communication Channel	*M*	*SD*
Departmental/Program Websites	1.67	1.13
Graduate School Websites	1.32	1.22
Faculty Lab Websites	1.25	1.32
Email Communication	1.02	0.94
Academic Journal Articles	0.58	0.84
Video Calls (e.g., Zoom or Skype)	0.51	0.78
Google Scholar or ResearchGate	0.40	0.92
Phone Calls	0.31	0.61
Other. Please specify.	0.31	0.91
LinkedIn	0.22	0.58
Twitter	0.12	0.38
Instagram	0.09	0.57
YouTube	0.08	0.36
Facebook	0.07	0.22
TikTok	0.01	0.07

Spearman's rank-order correlation coefficients were used to determine if relationships existed between respondents' frequency of use of the top three communication channels and three independent variable groups. As respondents moved from part-time to full-time enrollment there was a negative, yet weak, relationship between Enrollment Status and frequency of Graduate School Website use ($r_s(119) = -.29$, $p = .001$). There was also a weak positive relationship between Enrollment Status and frequency of Faculty Lab Website use ($r_s(119) = .23$, $p = .012$). There was no relationship between Enrollment Status and frequency of Departmental/Program Website use ($r_s(119) = -.09$, $p = .036$).

As students moved from master's degree to Ph.D. was no relationship between Degree Pursued and frequency of use of Graduate School Websites ($r_s(118) = -.06$, $p = .547$) or Departmental/Program Websites ($r_s(118) = -.13$, $p = .159$). Though the p-value is significant between Degree Pursued and Faculty Lab Websites ($r_s(118) = .18$, $p = .047$), according to Leclezio et al. (2014), the correlation coefficient is too small to indicate a relationship.

As participants moved from Assistantship/Fellowship funding to Tuition Assistance/Self-Funding there was a weak positive relationship between Funding Source and frequency of Graduate School Website use ($r_s(118) = .29$, $p = .002$). There was also a negative moderate relationship between Funding Source and frequency of Faculty Lab Website use ($r_s(118) = -.31$, $p = < .001$). There was no relationship between Funding Source and frequency of Departmental/Program Website use ($r_s(118) = .12$, $p = .207$).

Conclusions, Implications, and Recommendations

The study sought to understand the communication channels prospective graduate students used when searching for programs within COAs. Before discussing the implications of the findings, it is important to recognize the limitations. The study was conducted at a single university using convenience sampling. Therefore, the results are not generalizable to the larger graduate student population in COAs and future studies should aspire to reach a more representative sample. Additionally, there was a low response rate from part-time students that limited interpretation of the findings related to enrollment status.

Recognizing the limitations, the results indicated respondents used a variety of communication channels to search for graduate programs, with the most respondents using Graduate School Websites, Departmental/Program Websites, and Email Communications. Respondents reported the communication channels they would dedicate the most time to were Departmental/Program Websites, Graduate School Websites, and Faculty/Lab websites. Finally, the non-parametric correlation tests revealed significant relationships between Enrollment Status and frequency of use of communication channels. Participants were more likely to dedicate less time to Graduate School Websites if they were enrolled part-time rather than full-time, while they were likely to dedicate more time to Faculty Lab Websites if they were enrolled full-time. This could be because students enrolled full-time are able to dedicate more time to research in a lab than part-time students. Additionally, students with a Funding Source related to state tuition assistance programs were more likely to spend time on Graduate School Websites, while the only negative, moderate relationship existed between Funding Source and use of Faculty Lab Websites. Therefore, indicating Assistantships/Fellowships are more strongly related to student's use of Faculty Lab Websites.

Because most non-parametric relationships had weak relationships, if any at all, further research is needed to determine if COAs should tailor their communication strategies to different types of prospective graduate students. Future research should seek to increase the number of respondents at a variety of research-intensive COAs so inferential tests such as ANOVAs and t-tests may be used to determine if differences existed between groups. Additional background variables should be examined along with the existing variables to further segment groups and determine if tailored communication will be effective in reaching specific audience segments.

Departments in COAs may use the findings to inform faculty members about how to best structure their websites, making sure to include information about funding and assistantships while emphasizing research experiences in their labs available with full-time enrollment. Graduate schools may want to provide user-friendly, tailored web design with easy-to-navigate information about the nuances between part-time and full-time enrollment and tuition assistance programs because students who need this information are audiences of particular importance. Despite enrollment status, having accurate, timely scientific information available on departmental and faculty lab websites is important and could enhance COAs ability to attract a future generation ready to take on the agricultural challenges of the next century.

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Exploring Participants' Perspectives During an Agriculturally Focused Short-Term Study Abroad: A Q-Methodology Study

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Introduction, Framework, and Purpose

The globalization and increased cultural diversity of the agriculture, food, and natural resources industry amplifies the demand for exposing the next generation of agricultural leaders to international experiences (National Academies of Sciences, Engineering, and Medicine [NASEM], 2021; Redwine, 2014; Redwine et al., 2018; Roberts et al., 2019). Typically, short-term study abroad (STSA) experiences in agriculture aim to meet this need by creating a high-impact learning environment for young people (Redwine, 2014). Many benefits beyond cultural exposure exist such as changed attitudes toward global dynamics, increased empathy for social service, interpersonal growth, greater self-confidence in personal ability, as well as a shift toward cultural competence development (Houser & Bornais, 2023; Parsons, 2010; Raby, 2007; Rampold et al., 2020). With the wide array of issues and topics covered in STSA experiences in agriculture as well as the diversity of program design offered to student participants, the development of a relevant curriculum is needed (Bruening & Shao, 2005). Although the recognized benefits of STSA have been captured in the literature, understanding the perceived takeaways of participants could allow for a better understanding of how to design and align the intended outcomes of STSA programs with participant desires and industry needs.

Each year, the National FFA Organization organizes the International Leadership Seminar for State FFA Officers (ILSSO), an STSA. The experience aims to develop participants' understanding of global values and diversity, formulate a plan to effectively communicate and interpret their learning to their constituents, and cultivate empathy and awareness regarding both domestic and global conditions through a guided experience. Most research conducted about student perceptions of international short-term experiences, and ILSSO specifically, have been qualitative and quantitative in nature (Humphrey, 2023). A need still exists to better understand the student perspectives of STSA from an operant subjectivity standpoint (i.e., Q-methodology). Therefore, the purpose of this study is to explore the subjective experiences of 2023 ILSSO participants in Costa Rica. This study was framed with social capital theory and aided in the development of statements in the concourse (Coleman, 1988).

Methodology

Developed by William Stephenson in 1935, Q-methodology was chosen for this study to explore the subjective viewpoints of participants toward their experiences on ILSSO (Watts & Stenner, 2012). A concourse, which is a set of opinionated statements surrounding a particular topic, was developed (McKeown & Thomas, 2013). These statements were developed theoretically from existing literature and naturalistically (Coleman, 1988; Dixon, 2018; Humphrey, 2023). The development of naturalistic statements occurred from reflections of previous ILSSO participants. The study began with the development of approximately 75 self-referent statements to form the concourse, which was sampled to identify the final Q set of 42 statements. To categorize the concourse, the principle of homogeneity (Brown,1980) guided the identification of the greatest similarities and differences in opinion among the statements. A 3x4 Fisher's Balanced Block Design (FBD) was used to categorize statements (Brown, 1980) and resulted in four categories: cultural, agricultural, future direction, and social-emotional experiences.

Q Set, P Set, and Procedures

Prior to sorting, the 42 statements in the Q set were numbered and each was printed on an individual card. For example, the statement, “I’ll be less lost in college, thanks to this experience,” was included in the future direction category. The statement, “I believe that if every student was required to travel abroad, the world would be a better place,” was included in the cultural category. Another statement, “This experience changed my identity as an agriculturalist,” was included in the agriculture category. Lastly, the statement, “Traveling with the group is one thing, but I would be too scared to do this on my own,” was included in the social-emotional category. In Q methodology, the p set is the participant group of the study (Watts & Stenner, 2012). The seventy-four participants for this study included state FFA officers ages 18-21 participating in the National FFA Organization’s ILSSO which took place in Costa Rica in January 2023. Twenty-five states were represented during this experience. Participants were asked to sort the Q set according to the condition of instruction: “What are your thoughts about this experience?” Participants sorted the statements according to the procedures outlined by Watts and Stenner (2012). The facilitation of sorting occurred as a large group with all participants sorting simultaneously while in Costa Rica on the final day of the experience.

Data Analysis & Limitations

Data were analyzed using KADE software (Banasick, 2019). Significance for this study was determined using the formula $(1/\sqrt{n})*2.58$, where n is the number of statements in the Q set (Brown, 1980). Thus, the significance level for this study was calculated $(1/\sqrt{38})*2.58$ resulting in 0.418, which was increased to 0.45 to highlight more distinctive viewpoints. A two-factor solution was determined to provide the greatest difference of opinion. A factor array is a composite Q sort representing each factor (McKeown & Thomas, 2013). When interpreting results, statements for the two factor arrays were organized in order by *z*-score from +5 to –5. Interpretation of the factors requires analyzing patterns within the broader context of each factor array as opposed to focusing on the individual placement of each statement. Factor interpretation requires examining patterns within the broader context of the factor arrays rather than the individual placement of each statement (McKeown & Thomas, 2013).

One limitation of this study is the large p set. Designed to identify defined and distinct viewpoints, it is recognized that smaller populations are most recommended by Q methodologists (Watts & Stenner, 2012). However, to avoid participants on the trip feeling excluded from the activity, the researchers offered the opportunity to participants who desired to sort for this study. We recognize this may have impacted the ability to reveal nuanced and unique viewpoints after data analysis and contributed to the large number of confounding sorts. Additionally, because post-sort interviews were not conducted with exemplar sorters for each perspective, we were not privy to contextual and personal explanations that would have been beneficial, therefore limiting the depth of our interpretation of the resulting two factor arrays.

Findings

Two perspectives were interpreted for this study: *Global Professionals* and *Industry Professionals*. Of the 74 total sorts, 45 defined one of two factors, meaning the sort reached the significance level on only one factor. Three total sorts did not reach significance on either factor. The remaining 26 sorts were confounded, meaning they reached significance on more than one factor (McKeown & Thomas, 2013). These two perspectives emerged based on the examination

of each factor array, researcher field notes, and participant post-sort written statements located on the demographic survey. Distinguishing statements are those where the grid position is statistically different at the .01 significance level among at least one pair of factors (Watts & Stenner, 2012). Consensus statements are those ranked similarly between factors (Watts & Stenner, 2012).

Global Professionals

The *Global Professionals* factor array is defined by 30 sorts. Of these 30 sorts, the "most like me" and "most unlike me" statements are shown in Table 1.

Table 1

Most Like Me and Most Unlike Me Statements for Global Professionals

No.	Statement	Array Position	Z-Score
	Most Like Me Statements		
1	**Because of this experience, I will be more intentional in my life about engaging with people from other cultures.**	**+5**	**1.59**
6	**My appreciation of cultural diversity has noticeably increased.**	**+5**	**1.49**
16	This experience made me a better advocate for global agriculture and agricultural education.*	+4	1.34
7	**I understand the concept of being "open-minded" on a whole new level.**	**+4**	**1.25**
2	**I now see how leadership development and cultural awareness are connected.**	**+4**	**1.09**
	Most Unlike Me Statements		
9	Learning a new language was a waste of time for this experience.*	-4	-1.71
4	International travel is overrated because I'm never comfortable enough to enjoy it.*	-4	-1.69
11	I would have appreciated this experience more if I wasn't forced to eat different foods.*	-4	-1.62
10	**I only tolerated cultural differences so I could travel to a different country. Learning about another culture is not why I attended this experience.**	**-5**	**-2.17**
8	**I would have learned just as much through a US-based travel experience.**	**-5**	**-1.77**

Note. Bold indicates distinguishing statements. *signifies a consensus statement.

Embracement of Global Awareness

For the *Global Professionals*, cultural appreciation and a desire to become more engaged with other cultures in the future was evident. The experience shifted their perspectives of others and the world around them. Increased awareness of other cultures remained one of the *Global Professional*'s biggest takeaways from the trip. On the demographic sheet, one participant wrote,

> I've started to realize that I started to embrace the change we all had on this trip. My social awareness has risen and I'm thankful that it has. Life is short and we should all embrace the pura vida lifestyle.

Statements supporting this idea are listed below with distinguishing statements in bold.

No.	Statement	Array Position
6	**My appreciation of cultural diversity has noticeably increased.**	**+5**
7	**I understand the concept of being "open-minded" on a whole new level.**	**+4**
40	**This experience made me a more compassionate person.**	**+3**
5	**My perceptions of the United States have changed a lot after this experience.**	**+3**

Change in Personal Perspectives

Not only did the experience allow participants to gain some level of cultural appreciation, but it changed how they viewed themselves as individuals. Another participant wrote, "The ones most like me were in the areas of a changed perspective of ag, myself, cultures, and life! The entire opportunity was life changing…" Statements supporting this idea are listed below with distinguishing statements in bold.

No.	Statement	Array Position
2	**I now see how leadership development and cultural awareness are connected.**	**+4**
32	**My life has more possibilities than I realized before this trip.**	**+2**
41	**I am way more adaptable than I thought!**	**+2**
10	**I only tolerated cultural differences so I could travel to a different country. Learning about another culture is not why I attended this experience.**	**-5**

Industry Professionals

The *industry professionals* factor array is defined by 15 sorts. Of these 15 sorts, the "most like me" and "most unlike me" statements are shown in Table 2.

Table 2

Most Like Me and Most Unlike Me Statements for Industry Professionals

No.	Statement	Array Position	Z-Score
	Most Like Me Statements		
38	**The relationships I built during this experience went deeper than surface level.**	**+5**	**1.93**
35	**The relationships I have made because of this trip are mutually beneficial.**	**+5**	**1.68**

16	This experience made me a better advocate for global agriculture and agricultural education.*	+4	1.62
42	**The best part of traveling abroad was getting to know the group I traveled with.**	**+4**	**1.53**
19	**I gained respect for agricultural practices that are not conventional to me.**	**+4**	**1.48**
	Most Unlike Me Statements		
9	Learning a new language was a waste of time for this experience.*	-4	-1.53
3	I never did feel comfortable in a different country*	-4	-1.52
23	**I'm embarrassed that my perception of agriculture was so limited.**	**-4**	**-1.53**
10	**I only tolerated cultural differences so I could travel to a different country. Learning about another culture is not why I attended this experience.**	**-5**	**-1.75**
4	International travel is overrated because I'm never comfortable enough to enjoy it.*	-5	-1.82

Note. Bold indicates distinguishing statements. * signifies a consensus statement.

Networking

While *Global Professionals* focused on the destination, *Industry Professionals* found the people they encountered along the way to be one of their biggest takeaways. Whether making connections with fellow participants, trip chaperones, or Costa Rican industry leaders, these exchanges continued to bring meaning to the experience. Statements supporting this idea are listed below with distinguishing statements in bold.

No.	Statement	Array Position
30	**The relationships I have made because of this trip are mutually beneficial.**	**+5**
15	This experience majorly contributed to my personal networking efforts.	+3
28	My social network of professionals has largely expanded by studying abroad.	+3
18	This experience made me a better leader among my peers.	+2

Expanded Respect for Global Agriculture

The *Industry Professionals* emphasized how the experience presented a desire to support global agricultural whether that related to production practices or development of policy. Having the opportunity to examine agricultural issues within a global context specifically and gaining insights into the diversity of the industry worldwide was pivotal for this group. Statements supporting this idea are listed below with distinguishing statements in bold.

No.	Statement	Array Position
16	This experience made me a better advocate for global agriculture and agricultural education.	+4

15	Agricultural policy is more than regulations on how to do something. It's compassion and a broad understanding of global systems.	+3
28	This experience gave me a deeper connection to agriculture.	+3
26	I have the confidence to work alongside any professional in crafting agricultural policies.	+2

Conclusions, Implications, and Recommendations

This study sought to explore the subjective experiences of state FFA officers participating in the 2023 ILSSO in Costa Rica. Results indicated two distinct perspectives regarding participants' thoughts about their experiences: *Global Professionals* and *Industry Professionals.* The *Global Professionals* began to question the ways in which they view themselves and became more sensitive to the values, norms, and behaviors of those of another culture. The *Industry Professionals* appreciated the networks created between participants and viewed these relationships as being valuable as it relates to their future success. Although the design of this study did not seek to measure the development of participants' cultural competency, the *Global Professionals* began to question their own perspectives and demonstrated motivation to be purposeful about their future engagement with cultural differences suggesting some development of cultural understanding (Rampold et al., 2020; Roberts et al., 2019). STSA programs such as ILSSO provide a unique opportunity to serve participants as it pertains to the development of building social networks related to a future career within their respective industry as seen in the experiences of the *Industry Professionals* (Coleman, 1988; Houser & Bornais, 2023). Despite the ILSSO program's emphasis on leadership and agriculture, participants primarily valued cultural development and social networking. This highlights the potential for future STSA programs with a variety of educational and technical focuses to develop cultural understanding and networking opportunities for participants.

Although it is recognized the participants came from a variety of unique backgrounds, we also acknowledge that perhaps their shared experiences at this level of positional leadership in the National FFA Organization resulted in a more homogenous p set than anticipated; therefore, resulting in less diversity among viewpoints. Post-sort interviews with exemplar sorters should be conducted in future studies to explore a more detailed understanding of each factor array. Our recommendations for future research include longitudinal studies within Q methodologies and deferred experience assessments of participants' perceived takeaways of STSA experiences. These studies would allow for a better understanding of the subjective viewpoints of the impact of their STSA experience.

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Growing Together with Wheat: Evaluation of the Norman Borlaug Youth in Agriculture Program

Introduction, Purpose, and Objectives

The developmental period of adolescence is denoted by youth exploring their identity, developing their individuality, and discovering potential adult roles (Dickey et al., 2020). This developmental phase is crucial for youth to acquire essential life skills that will be beneficial to their health and well-being as they transition into adulthood (Nasheeda et al., 2019; Sawyer et al., 2018). Adolescents will need to be equipped with analytical thinking skills, ability to actively learn, and capacity to effectively solve complex problems through collaborations to be competitive within the workforce (Li, 2022; Rios et al., 2020). Further, adolescence is pivotal for the maturation of essential competencies for establishing cross-group relationships (Watkins et al., 2007).

Cohesive, positive relationships among diverse members of our communities are imperative for a high functioning society (Watkins et al., 2007). While middle adolescence is a time when youth develop the cognitive skills that allow for them to gain a deeper understanding of others, it is also a point in youths' life that peer-group relationships begin to strengthen which can yield to negatively intensified between group behavior (Watkins et al., 2007). Some of the adverse behaviors can include negative connotations, beliefs, attitudes, or intentions towards peers due to their membership of a specific social group (Brown, 2010; Tropp et al., 2022). As these behaviors continue to progress into adolescence and adulthood, it can lead to the development of intergroup tensions as well as social exclusion (Grapin et al., 2019; Tropp et al., 2022). A vital solution to preventing the development of intergroup bias is to provide spaces for positive, youth intergroup interactions in both educational and organizational environments (Tropp et al., 2022)

Out-of-school time (OST) program is defined as programming that is attended by youth when school is not in session (Centers for Disease Control and Prevention, 2022). A renowned OST program, National 4-H, is the most prominent youth development organization as it serves over six million young people every year (National 4-H Council, 2023). Active youth participation in OST activities, such as 4-H, has been linked to learning interpersonal competencies such as teamwork, leadership, communication, and social skills (Durlak et al., 2010; Hansen et al., 2019; Larson et al., 2005). Through an agricultural setting, the 4-H program was fundamentally established on experiential learning principles which allow youth to apply and transfer knowledge of essential life skills (Borden et al., 2014).

Agricultural education-based programs possess a multifaceted framework as these programs aim to enrich youth through improving their agricultural knowledge, increase awareness of local problems, invoke social activism, and incorporate various elements of positive youth development such as leadership and teamwork skills (Delia & Krasny, 2018; Rogers et al., 2020; Russ & Gaus, 2021). Russ and Gaus (2021) discovered agriculture education programs have the ability to develop youths' appreciation and respect for civic engagement by deepening their understanding of the community and social justice as well as improving their

leadership skills. Further, agriculturally based programs facilitate the development of agricultural literacy in youth (Bradford et al., 2019; Pinkerton et al., 2021; Powell et al., 2008). By being agriculturally literate, youth are empowered to make informed decisions regarding their food choices, critically evaluate agriculture information, and effectively form opinions on agricultural practices and policy (Spielmaker & Leising, 2013)

The Norman Borlaug Youth in Agriculture Program (NBYAP) is an academic enrichment program for outstanding high school students from around Texas. NBYAP is classified as an OST program as it is delivered by Texas 4-H (Hansen et al., 2019). This youth development program readily aligns to two of the American Association for Agricultural Education (AAAE) values, increasing prosperity through innovation in AFNR systems as well as nurturing positive youth development through AFNR systems (AAAE, 2023). Texas is constantly experiencing rapid urban development as it is home to six of the fastest growing cities as well as five of the most populous cities in the Nation (United States Census Bureau, 2023). Thus, this program immersed urban and rural youth in problem-based learning (PBL) by inspiring participants from unique backgrounds to collaborate to solve complex challenges facing Texas agriculture. The issues brought to the forefront of the program ranged from food insecurity to environmental and agricultural policy. Program directors provided fundamental resources through inviting Texas A&M University professors and pivotal leaders that are pioneers in their disciplines to support youth through the PBL based curricula that was rooted in the innovative spirit of Norman Borlaug. Students learned first-hand about the needs of urban and rural communities of Texas along with the critical role food and fiber play in combating major societal issues.

From November 2022 to May 2023, youth participated in the NBYAP that took on a three-phase format that was informed by the process of wheat production. The phases, Planting Season, Growing Season, and Harvesting Season were each three day, in-person sessions that encompassed a variety PBL of activities. The participants were able to partake in virtual professional and personal development sessions between each in-person phase of the program. Youth were provided an opportunity to develop invaluable civic, social and leadership skills. The program provided a connection point for agricultural conservation, artistic expression, cultural understanding, and advocacy education. Thus, creating agricultural advocates in rural and urban Texas. The purpose of this study was to evaluate the effectiveness of the pilot of the NBYAP. Specifically, the research team aimed to address the following questions:

1. Does participation in the NBYAP's PBL curricula elicit a positive change in youths' agricultural knowledge in the realm of agricultural impact, biotechnology, livestock reproduction and nutrition, methane and wheat production, and the poultry industry?

2. By participating in the NBYAP, do youth change their perception of the rural-urban connection?

Conceptual Framework

PBL involves approaching the acquisition of knowledge through a constructivist lens by centering learning around a real-world problem (Jonassen, 1997; Burris & Garton, 2007). The purpose of PBL is for students to actively collaborate with peers as well as develop critical thinking skills and learning strategies through problem solving (Dochy et al., 2003; Yew & Goh, 2016). Though PBL was originally founded as a teaching strategy for the medical field, secondary educators have implemented the PBL framework into classrooms in order to enhance youths' transfer of knowledge and skill development (Lonergan et al., 2022; Wilder, 2015).

A defining characteristic of PBL is the students' active inquiry towards defined goals. The categories of PBL goals can be outlined as: (a) actively constructing new knowledge, (b) solving relevant problems, (c) developing skills needed for self-directed learning, and (d) initiating effective collaborations (Chen & Hong, 2016; Lonergan et al., 2022). There are four key elements to implementing PBL into curricula. The first involves embracing a non-linear direction of learning by allowing for students to explore various ideas, directions, and theories to the problem (Barrows, 1986; Davidson & Major, 2014). The second component entails incorporating authentic problems that are not only current, real-world problems, but also culturally relevant to students (Barrows, 1986). The third element is one of the reasons that PBL is distinctly different from other learning techniques as it calls for teachers to act as facilitators by only providing guidance and resources (Davidson & Major, 2014). Lastly, the fourth construct involves ensuring that the PBL curricula is personal by connecting students' learning styles to the activities as well as allowing students to have sufficient room for creativity (Ghani et al., 2021).

Methods

This study was approved by Texas A&M University Institution Review Board (IRB) in May 2023. Participants were 35 high school youth from across Texas that were admitted to the NBYAP program. The demographic background of the entire youth sample is outlined in Table 1.

Table 1

Demographic Characteristics of NBYAP Participants

Characteristic	*f*	%
Age		
15	2	5.7
16	8	22.9
17	14	40

18	11	31.4
Gender		
Female	26	74.3
Male	9	25.7
Race/Ethnicity		
African American or Black	7	20
Asian	2	5.7
Caucasian or White	17	48.6
Hispanic or Latino	9	25.7
Residency		
Rural	18	51.4
Urban	17	48.6

Note. $N = 35$. The reported age is derived from the first data collection at the commencement of the program.

To examine whether the NBYAP program elicited change in participants' agricultural knowledge as well as their perceived rural-urban connection, Qualtrics surveys were distributed during the three phases of the NBYAP program. All participants responded to all questionnaires across the three data collection time points, except for missing responses of one participant for the last phase of rural-urban connection questions. The current study analyzed data using SPSS version 26. The analysis primarily involved a repeated measure Multivariate Analysis of Variance (MANOVA) to examine mean-level differences among the three waves of data collection. Additionally, Bonferroni multiple comparison tests were employed to determine specific differences between each time of data collection.

All variables evaluated in this study were self-reported on a 7-point Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *somewhat disagree*, 4 = *neither agree or disagree*, 5 = *somewhat agree*, 6 = *agree*, 7 = *strongly agree*). Participants with a higher mean score on the Likert scale signified a greater level of agriculture knowledge along with a higher level of rural-urban connection. Agricultural knowledge encompassed seven different dimensions of agriculture: wheat production (α ranges from .716 to .937), biotechnology (α ranges from .730 to .887), livestock nutrition (*α* ranges from .825 to .860), livestock reproduction (*α* ranges from .520 to .883), methane production (*α* ranges from .789 to .952), poultry industry (α ranges from .90 to .915), and impact of the agricultural industry (α ranges from .435 to .831). The rural-urban connection consisted of five different questions addressing beliefs about the interaction of rural and urban communities and agriculturists (α ranges from .640 to .720). For example, youth were asked to self-rate their opinion on the statement, *"rural agriculturists could benefit from positive relationships with urban community leaders."* There were four demographic questions which

addressed the participants' age, gender, race and ethnicity, and residency (rural versus urban). The first wave of data collection of agricultural knowledge and rural-urban connection occurred before the Planting phase, and the second wave of data collection was conducted directly following the Planting phase. The third wave assessment of agricultural knowledge was done before the Harvesting phase, and the third wave assessment of rural-urban connection was carried out after the Harvesting phase.

Results

Research question one aimed to examine whether NBYAP can improve youths' agricultural knowledge across seven different dimensions. Time exerted a significant linear and quadratic effects on wheat production (F (1,34) =51.503, $p < .001$, partial $\eta^2 = .602$, observed power = 1.000; F (1,34) =63.245, $p < .001$, partial $\eta^2 = .650$, observed power = 1.000), biotechnology (F (1,34) = 7.685, $p = .009$, partial $\eta^2 = .184$, observed power = .768; F (1,34) = 4.446, $p = .042$, partial $\eta^2 = .116$, observed power = .535), livestock nutrition (F (1,34) = 32.138, $p < .001$, partial $\eta^2 = .486$, observed power = 1.000; F (1,34) = 23.779, $p < .001$, partial $\eta^2 = .412$, observed power = .997), livestock reproduction (F (1,34) = 23.041, $p < .001$, partial $\eta^2 = .404$, observed power = .997; F (1,34) = 5.221, $p = .029$, partial $\eta^2 = .133$, observed power = .603), poultry industry (F (1,34) = 20.339, $p < .001$, partial $\eta^2 = .374$, observed power = .992; F (1,34) = 11.584, $p = .002$, partial $\eta^2 = .254$, observed power = .911), and agriculture impact (F (1,34) = 14.070, $p = .001$, partial $\eta^2 = .293$, observed power = .954; F (1,34) = 15.682, $p < .001$, partial $\eta^2 = .316$, observed power = .970). Specifically, there was a significant increase in these variables from T1 to T2 and from T1 to T3. However, no significant increase was found from T2 to T3. Research question two aimed to determine whether NBYAP can stimulate a change in the rural-urban connection of youth. Time had a significant quadratic effect on rural-urban connection (F (1,33) = 8.31, $p = .007$, partial $\eta^2 = .201$, observed power = .799). Table 2 outlines the youths' mean score at each data collection time point.

Table 2

Mean Scores of Youth Participants during the NBYAP Program

Variable	Observation 1	Observation 2	Observation 3
Agricultural Knowledge			
Agricultural Impact	5.93	6.49[a]	6.43[a]
Biotechnology	5.76	6.29[a]	6.26[a]
Livestock Nutrition	5.26	6.25[a]	6.19[a]
Livestock Reproduction	5.84	6.33[a]	6.40[a]
Methane Production	4.46	6.06[a]	5.96[a]
Poultry Industry	4.81	5.91[a]	6.02[a]

Wheat Production	3.54	6.12[a]	5.73[a]
Rural-Urban Connection	6.57[a]	6.83[b]	6.70[a,b]

Note. $N = 35$. Observation 1 occurred at the beginning of the NBYAP before the Planting Phase session. Observation 2 occurred directly following the conclusion of the Planting Phase session. Observation 3 occurred at the beginning of the last in-person session, Harvesting Phase, for the agricultural knowledge constructs. For the rural-urban connection, observation 3 was at the conclusion of the Harvesting Phase. Responses were measured on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).
[a,b] Shared letters indicate no significant differences (LSD used for pairwise comparisons $p < .05$).

Conclusions, Implications and Recommendations

This evaluative research project sought to unearth the potential effect of a PBL youth program on rural and urban youths' understanding of agricultural along with their perceptions of rural-urban connections. As American agriculture continues to evolve, it is essential that youth have a deep understanding of the technology, processes, and systems that have an impact on our food and fiber industry (Hess & Trexler, 2011). Based on the findings from this study, the inaugural NBYAP engendered an increase of agricultural knowledge across all youth. Specifically, the program effectively increased youths' understanding of the wheat production process, impact of the agricultural industry, awareness of biotechnology's relation to the agricultural industry, livestock nutrition and reproduction, the poultry industry, and the role of methane production from the beginning to conclusion of the NBYAP. These findings closely mimic that of other PBL curricula employed by 4-H (Bush et al., 2019).

4-H programs play a pivotal role in bridging the gap between rural and urban communities by fostering a sense of shared purpose, promoting mutual understanding, and encouraging collaboration between these traditionally distinct environments (Ferrari & Sweeney, 2005; Hobbs, 1999). In this program, a positive change in the rural-urban connection occurred from the start to end of the Planting Phase; however, there was no change from commencement to conclusion of the NBYAP. This could be attributed to youth already gaining an understanding of the importance of collaboration and connection with their counterparts.

Through initiatives such as the NBYAP that involve both rural and urban youth, it allows for 4-H to create opportunities for young individuals from diverse backgrounds to interact, learn from one another, and appreciate the interdependence of rural and urban areas (Murrah-Hanson et al., 2022). Further, 4-H youth programming offers a wide array of opportunities for youth to develop essential life skills as well as academic activities that allow them to explore STEM and agricultural-based fields (Borden et al., 2014). It is essential for 4-H personnel along with youth development researchers to collaboratively continue to evolve curricula so that it enables youth to engage in 21st century problems, network with other youth, and foster personal and professional development (Bush et al., 2019). Extension personnel should utilize the pilot of the Texas NBYAP as a guide to assist in the development of innovative 4-H programs and activities that focus on cultivating a sense of unity that transcends rural-urban boundaries, ultimately contributing to the creation of more resilient and interconnected communities.

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Characteristics and Leadership Identity Development of CALS Leadership Institute Graduates

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The next generation of agricultural leaders will play a crucial role in navigating industry challenges and solving complex problems (Weeks & Weeks, 2020). One way to prepare the future workforce is through leadership development programs. Recently, there has been an explosion of leadership programs focused on increasing the competencies and preparedness of graduates for their future careers (Morgan et al., 2013). We must ensure programs designed to equip those students are effective, rooted in scholarship, and inclusive of students diverse in experience and background. One of these is the University of Florida's (UF) College of Agricultural and Life Sciences (CALS) Leadership Institute (LI). This is a 17-month program, which consists of three—two-credit semester-long—courses that aim to engage students in leadership and organizational development, mentoring, service experiences, and an international service and learning experience (CALS, n.d.). This program strives to develop 12 pre-determined leadership competencies to prepare students to tackle global challenges while engaging in lifelong leadership. While the CALS LI and other like programs are often well supported and funded by college administration, many do not invest in thorough evaluation but instead rely on anecdotal evidence and employment success as indicators of program value or effectiveness. However, evaluation can provide evidence of program value and identify opportunities for growth and improvement (Lamm et al., 2016).

The purpose of this study was to describe longitudinal program participation and leadership identity development over 12 cohorts of CALS LI. This exploratory study aimed to uncover trends in CALS LI students. The following questions guided this study:

1. What are the characteristics, experiences, and motivations of CALS LI students?
2. What are the themes of CALS LI graduates' personal visions and missions?
3. What are the leadership identities of CALS LI graduates based on their personal visions and missions?

Theoretical Framework

This study used the Komives et al. (2005) leadership identity development (LID) model as a theoretical foundation. The LID model posits as one grows in their own leadership identity (Komives et al., 2005), they transition from a hierarchical view to a more relational view of leadership (Wielkiewicz et al., 2012). The LID model through six phases, including stage one- awareness, stage two- exploration/engagement, stage three- leader identified, stage four- leadership differentiated, stage five- generativity, and stage six- integration/synthesis (Komives et al., 2006). Theoretically, it is expected that students enter college having already experienced stages one and two (Wagner, 2011). Additionally, the transition from stage three to four hallmarks the movement from a hierarchical view to a more systemic or relational view of leadership (Wielkiewicz et al., 2012), which reflects a more contemporary view rooted in collaboratively solving complex challenges. A broadened view of leadership, encouragement to develop oneself, group and developmental influences, and changing views of self in relation to others with reflective learning and meaningful involvement can all aid in the progression through leadership stages (Komives et al., 2005; 2006). The model is developed as a helix where students often return to previous stages while progressing (Komives et al., 2005). While individuals move

at different paces through the model, Priest et al. (2018) posed mentoring, coaching, and advising as methods for aiding students in progression. Odom and Dunn (2023) propose leadership courses with transformative pedagogies aid in leadership identity development. The LID model is an appropriate theoretical framework for this study and program evaluation as CALS LI includes leadership coursework, personal reflective development, mentoring, and service/experience-based opportunities for leadership growth.

Methods

For this descriptive, longitudinal study, we used a qualitative approach to analyze the professional development portfolios (PDPs) from 12 cohorts of students (N =141) enrolled in CALS LI at UF from 2009-2022. We conducted a qualitative content analysis (Krippendorff, 2018) of students' PDPs (n =130)—the cumulative final project for the 17-month experience. These consisted of an introductory essay, personality assessment results, global vision report, reflections on service and leadership competency, and a resume. We calculated frequencies and programmatic sums for students' demographic information (sex and major), core values, personality assessment results, previous professional experiences, and future aspirations to identify trends. For personality assessments, we counted students' top five strengths and their dominant True Color. In instances where the two colors were tied, we included both in the count. For the free response items in the portfolios (vision/mission and motivation to apply), two members of the research team first employed consensus coding (Cascio et al., 2019) on three cohorts of portfolios. We used iterative-inductive thematic analysis to establish a common codebook and then employed deductive coding methods to complete the qualitative analysis. Finally, we quantified codes to identify the most prevalent elements. To address the second research question, we employed a similar consensus coding process to first identify a shared codebook and then deductively assigned codes to students' vision and mission statements, leaving room for the addition of new codes, as appropriate. Then, using a rubric developed with the described stages of the LID model, we quantitized (Nzabonimpa, 2018) students' vision and mission statements and computed averages for each cohort and a grand mean to reflect. Given that this longitudinal data spanned over 13 years, there were missing or incomplete data. We were unable to access 11 student portfolios, either because they were not provided or because theirs was an e-portfolio with an inactive link. In some instances, portfolios were available, but some were more complete than others. We made every effort to provide a rigorous, comprehensive characterization of members with the information provided. To facilitate more authentic assessment, we did not completely remove cases with missing information, but took a pairwise deletion approach and included all cases with information relevant to the specific item.

Results

In Cohorts 1-12 there were 43 males and 98 females representing 22 of 23 majors (all but geomatics) in CALS and three majors across UF. The top three majors, agricultural education and communications (f =17), biology (f =17), and food and resource economics (f =16), made up 35.5% of all graduates. When analyzing students' motivations to apply, we identified 14 unique codes, according to which responses were deductively categorized. The primary reasons students applied to the program were: gain leadership experience (f = 71); develop their resume and support future career goals (f = 32); encouragement from a previous graduate or mentor (f = 32);

build a network and friendships (*f* = 26); study abroad (*f* = 26); or for self-exploration (*f* = 20). We identified academic and career aspirations, which we outlined in Table 1. Across the cohorts (*n*=130), 80.8% of students indicated they had a desire to pursue an advanced or graduate degree (*f* =150) at some level. Additionally, 50.8% aspired to obtain a doctorate or equivalent professional degree. We identified 14 unique career categories. The three most frequently cited career fields or occupations were: healthcare/medicine (e.g. doctors, nurse practitioners, dieticians, etc.) (*f* =30); government (e.g. policy writers, staffers, aides, military, etc.) *(f* =29); animal care or veterinary medicine (*f* =14).

Table 1
Academic and Career Aspirations (n=130)

	f	*%*
Any Graduate or Professional Degree	105	80.8%
Doctorate or Equivalent	66	50.8%
Human Health or Medicine	22	16.9%
General Ph.D.	15	11.5%
Veterinary	13	10.0%
Law	12	9.2%
Dental	2	1.5%
Pharmacy	2	1.5%

In analyzing students' values, we found the most frequent were family (*f* =28), honesty (*f* =17), faith (*f* =17), and integrity (*f* =16). Many of the value statements were relational (e.g., loyalty, respect, kindness, compassion, trust), while others were oriented toward work or growth (passion, responsibility, education, ambition) and or living a full, holistic life (health, happiness, adventure, spirituality). Personality assessment results are summarized in Table 2. Most students' dominant True Color was Gold (*f* = 47; 34.1%). The most prevalent strengths quadrant represented was Executing (*f* =179; 31.6%).

Table 2
Personality Assessment Results

	***n* of Portfolios**	***f***	***%***
True Colors	120		
Gold		47	34.1%
Blue		35	25.4%
Green		30	21.7%
Orange		26	18.8%
Strengths Quadrant	119		
Executing		179	31.6%
Strategic Thinking		161	28.2%
Relationship Building		154	26.9%
Influencing		74	13.3%

Note. Students' top five strengths were provided and included in the count.

Vision and Mission Statement Themes

For vision and mission statements, we identified six major codes and seven secondary codes. Major codes, their operational definition, and frequencies can be found in Table 3. Major codes were almost equally represented across vision and mission statements. Student statements were most frequently values-oriented (*f* = 47), where they discussed, through values, what kind of person they wanted to be. We identified more diversity among secondary codes. The two most prevalent were impact/influence (*f* = 79) and fulfillment (*f* = 33) where students indicated a desire to have an impact on the world or others around them, either personally or professionally; and to live a fulfilling, purpose-driven life. Less prominent trends were indicated by a need for recognition, family/relationships, spirituality/faith, and promoting the betterment of a group.

Table 3
Trends in Student Vision and Mission Statements (*n* =123)

Theme	Description	*f*	%
Values-Oriented	Pertaining to their overall character, values, and beliefs	47	20.9%
Academic/Professional	Emphasizes academic or career pursuits, professional goals, etc.	46	20.5%
Holistic Life	Emphasizes multiple facets that contribute to what they envision to be a fulfilling life.	44	19.6%
Growth	Emphasizes their personal commitment to learn, develop, gain new skills, etc.	44	19.6%
Service-Oriented	Emphasizes a need or desire to serve, educate, or give to others.	38	16.9%
Community-Team	Emphasizes a desire to equip peers, foster community, learn from others.	5	2.2%

Note. Vision and missions were assigned one major code, but each major code could have been assigned to both a vision and/or a mission statement, so percentage was based on (*f* = 224).

Leadership Identity

We used deductive coding methods to analyze the contents of students' (*n* =123) vision and mission statements and then determined a LID score for each student before computing each cohort's minimum, maximum, mode, mean, and standard deviation (Table 4). The total mean score for all participants was 3.58 (*SD* = 0.98, *Mode* = 3). While there is variation in the means, we did observe an upward trend of higher mean scores from cohort seven onward.

Table 4
Descriptive Statistics of Each Cohort's LID Scores (n =123)

Cohort	*Min*	*Max*	*Mode*	*Mean*	*SD*
Cohort 1	1	4.5	3.5	3.50	1.16
Cohort 2	2.5	4.5	3.5	3.58	0.80
Cohort 3	1	4.5	3.5	3.20	0.95
Cohort 4	2	4.5	4	3.27	0.85
Cohort 5	2.5	5	3	3.09	0.70
Cohort 6	1.5	4.5	3	3.05	0.76
Cohort 7	2.5	6	3	4.14	1.35

Cohort 8	3	5	4	3.83	0.66
Cohort 9	2	5	3	3.58	0.93
Cohort 10	3	6	3	4.00	1.02
Cohort 11	3	6	3	4.03	1.03
Cohort 12	2	5.5	3	3.59	1.09
Total	1	6	3	3.58	0.98

Conclusions, Discussion, and Recommendations

In looking at the representation of students across CALS who participated in the program, enrollment was overwhelmingly female, centralized in three majors, and appeared to be those students who were perceivably high achieving, with demonstrated records of professional and extracurricular involvement. These trends were not surprising; and supported by research in academia and industry suggesting undergraduate females outnumber males in agricultural sciences (Hightower, 2012; USDA NASS, 2017). This aligns with enrollment in CALS at UF, where females make up 61.8% of undergraduate students (UF Institutional Planning and Research, 2023). The majority of students were situated in the social or natural sciences, which makes sense considering the natural integration of leadership principles in these majors. However, evidence calling for leadership integration in STEM and related sciences would suggest these students might benefit more from leadership development outside their academic context (Geesa et al., 2021). Another related observed pattern was students' ambitious academic and career aspirations, where the vast majority indicated their plans to obtain advanced degrees (80.8%) and pursue careers as physicians, government officials, business owners, industry professionals, etc. These goals reflected dominant personality assessment results—Gold and Executing. Those with the Gold True Color tend to be organized, thorough, dependable, and punctual (Neff, 2015). Similarly, the Strengths executing domain tends to represent those who get things done and are task-, goal-, and accomplishment-oriented (Rath & Conchie, 2008). These characteristics coincided with the achiever strength, which was the most prevalent among CALS LI participants and students enrolled in CALS leadership courses, at large (Gold et al., 2023). We saw similar trends in students' vision and missions, which were largely self-oriented toward their own values, character, and goals.

The mean and mode LID score placed students between the "Leader Identified" and "Leader Differentiated" stages. Because individuals move between stages, we assigned a LID score to assess where individuals may fall with regards to stages rather than assigned a stage to each student (Bush et al., 2023; Komives et al., 2009). In depictions of their vision and mission statements, students identified themselves as leaders, in various capacities. Many conceptualized leadership around their future careers and discussed *their role* in the future development, success, or influence of those around them. This indicates the CALS LI curriculum and experiences successfully supported the development of students' leadership identity development. While these visions and missions are created during early modules in the program, we would ideally expect students to update these in a final, cumulative project to reflect more relational views. The program's existing curriculum is designed to teach students these higher-order concepts and move students to a more relational view of leadership. In a study by Rosch and Coers (2013) agricultural students exhibited lower levels of participation in leadership training events and less growth in leadership capacity through participation in organizations.

Additionally, students in colleges of agriculture—especially those with a background in FFA and 4-H—are often trained early on to associate leadership with roles, like an officer team which may explain reasoning for lower levels (Bush et al., 2023). It is important for CALS LI coordinators and individuals conducting similar leadership programs to consider what obstacles (e.g. previous experiences) might keep students from advancing higher-level leadership concepts from comprehension to application. We suggest leadership educators and program coordinators spend time assessing students' orientation toward leadership prior to beginning programming and invest time early on to debunk hierarchical views. Additionally, program leaders should consider opportunities for peer and social cognitive learning, providing them opportunities to recognize value in shared leadership, learning from others, and prioritizing group, over personal development (Komives et al., 2009). Following these activities, curriculum should include intentional, in-program reflection touchpoints and transformational pedagogy (Odom & Dunn, 2023) to help students process new perspectives on leadership and any tension this might hold with previous assumptions. We also recommend individuals working with youth leadership programs include more discussion of relational leadership views in programming.

While this evaluation characterized who has participated in CALS LI, the greater value of this assessment was an indication of who has not participated. Consideration of aspirations and personality trends likely suggests those students who have historically been part of CALS LI were those who are already high achieving. While not intentional, including criteria for participation that relies on leadership experience or academic achievement could exclude those students who might not have had equitable opportunities, prior to the program. The question becomes, are we aiming to further develop existing student leaders or build leadership capacity within CALS and the agricultural industry? Leadership development and other career readiness skills included as competencies for CALS LI are needed for future advancements in the agricultural industry (Crawford & Fink, 2020; Weeks & Weeks, 2020). Individuals designing leadership development programs for college students should thoughtfully consider barriers that might inhibit students from participating and the pathways that lead to a higher likelihood of participation. We recommend CALS LI leaders and individuals with similar programs develop a multifaceted strategic recruitment plan to ensure cohorts are rich in diverse backgrounds and experiences. Based on our findings, future recruitment for CALS LI should aim to increase participation of males, STEM or physical science majors, and those with more diverse backgrounds. This trend of a homogeneous cohort also exists in the Wedgeworth Leadership Institute aimed at developing leadership capacity in the agricultural industry in Florida. The program director of Wedgeworth Leadership Institute shared a more diverse group is typically nominated but does not apply for the program (C. Chiarelli, personal communication). Therefore, we recommend future research aim to explore reasons why individuals choose not to apply or engage in these opportunities and identify if trends exist with specific demographic groups (i.e. gender, race, and academic classification (first-gen, transfer, four-year, etc.)).

We recommend future research be conducted to support more comprehensive program evaluation, with feedback from current students, stakeholders, and program alumni. This could assist in further identifying opportunities for expanding participation, program improvement, and continued leadership identity development. Additionally, a national comparative study of undergraduate leadership development programs at land-grant universities would be valuable to examine similarities, differences, and gaps in program objectives and outcomes.

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

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Introduction, Purpose, and Objectives

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 of SBAE in which teachers are expected to operate (Haddad et al., 2022; Traini et al., 2021). This complexity and the resulting expectations placed on educators can lead to them choosing to vacate the profession altogether (Lemons et al., 2015; Solomonson & Retallick, 2018). One such area in which teachers are expected to perform job-specific tasks is FFA advisement.

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, 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).

Research indicates all jobs require both general and specific tasks (Smith, 2010). This is especially true in the profession of teaching SBAE. 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 the 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 that SBAE teachers are expected to perform, especially in FFA. Identifying a comprehensive list of such 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, this study's purpose and objective was to identify the tasks SBAE teachers are expected to perform regarding advising an FFA chapter.

Theoretical/Conceptual 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 that individuals tend to acquire specialized skills as they move toward work they prefer, giving rise to "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, because of enhanced HC, is associated with improved results for employers (Lepak & Snell, 1999). As such, HC 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 such (Autor & Handel, 2013). Autor et al. (2003) found that 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.

Methodology

This study was a part of a larger investigation (Best et al., 2023). The study's purpose focuses 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 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 that 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. 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 (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), 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 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 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.

Findings

Round 1

Panelists identified 296 original tasks associated with the roles and responsibilities of a SBAE teacher regarding 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 regarding 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.

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). Tasks achieving at least an 80.00% consensus of agreement during Rounds 2 (70 tasks) or 3 (10 tasks) were compiled into a final list of tasks associated with teaching SBAE in FFA. In total, 80 tasks populating 12 themes reached consensus of agreement.

Conclusions, Implications, and Recommendations

Three overarching themes emerged in the study as conclusions related to FFA. 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 within SBAE. 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 claim include motivating students to apply for awards; assisting students in developing degree, star, and proficiency applications; preparing for and assessing student skill development in CDEs, LDEs, speaking, and agriscience fair events; attending FFA convention; and facilitating award recognition for student success. This aligns with Jones's and Edwards' (2019) description of the role of competition in SBAE programs. It is likely that teachers' involvement in competitive events stemmed 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 the student learning experience and promote positive experiences with FFA opportunities. 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 that 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 within the community, fostering connections in the local community, and managing alumni relations. This 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 inservice 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 in which they need additional support as it relates to FFA. Studies should be replicated across all other states to determine each state's expectations for the FFA tasks they expect SBAE teachers to include when advising an FFA chapter. Further, the findings of this study may better inform potential teachers of the specific FFA 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, it is recommended that additional research ensue regarding the person-environment fit regarding various communities' expectations of the FFA tasks found in this study. Further, using the tasks identified in this study might help aspiring teachers determine communities' 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, it is recommended that teacher preparation programs assess the 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. It is also recommended that teacher preparation programs evaluate their classes and include the FFA tasks found in this study in their teacher preparation programs for pre-service teachers. Moreover, informing preservice teachers of the specific tasks associated with FFA advisement will help these students to better prepare for their clinical teaching experience and potentially motivate them to acquire the knowledge and skills required to accomplish those tasks. In addition, the

study's findings can better inform decision makers of potential professional development topics relevant to advising an FFA chapter for teachers of all experience levels. It is recommended that the 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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An Agricultural Assessment of Social Studies Teachers in South Carolina

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Introduction

As the global population continues to rise, it becomes clear that there is a disconnection between the public and their knowledge of agricultural practices (Kovar et al., 2013). Population expansion and urbanization lead to more significant gaps in literacy and exposure to food systems and farming. As people move to more urban areas, there are fewer firsthand experiences with agriculture (Clemens et al., 2018; Kovar et al., 2013). Agriculture research, education, and infrastructure support has significantly decreased since the 1980s and 90s. Fifty percent of the world's active economic population was involved in agriculture in the 1980s. This number dropped to 38% in 2014. This downsizing was supported because agriculture was not seen as an international growth sector during infrastructure growth in the 1970s. Reflecting this shift in support, programs focusing on agricultural education and training (AET) were not the focus during this time in the United States (Jones et al., 2017). As a result, agricultural and related areas are not seen as providing many career opportunities compared to other disciplines. Because of this misconception, there is a push for incorporating agricultural education into the standard education curriculum to teach students about the opportunities in agriculture and shift negative misconceptions about this field of study (Jones et al., 2017).

Teaching agricultural issues and related science inside classrooms provide students with real-life scenarios and hands-on experience to apply knowledge to prepare students to use current 21st-century skills (Knobloch, 2008). Motivation to teach these topics depends on the teacher's perception of the topic's usefulness, their perceptions of the issues, and how much time and effort they are willing to expend to teach about said topics (Knobloch et al., 2007). Teachers who have more experience with agricultural practices are more likely to incorporate agriculture into their curriculum. Organizations like the Farm Bureau, 4-H, the National FFA Organization (FFA), and Cooperative Extension agencies have programs for agricultural education and outreach in the classroom (Mars & Ball, 2016; Vallera & Bodzin, 2016). Unfortunately, not all students have access to agricultural programming, therefore working to embed agriculture as a context in core content areas is essential. The purpose of this study was to determine the impact of an immersive program for South Carolina social studies teachers, known as Studies of Occupation, Culture, and Innovations toward Agricultural Literacy (SOCIAL), on their awareness and potential integration of agricultural literacy. Three research objectives guided this inquiry:

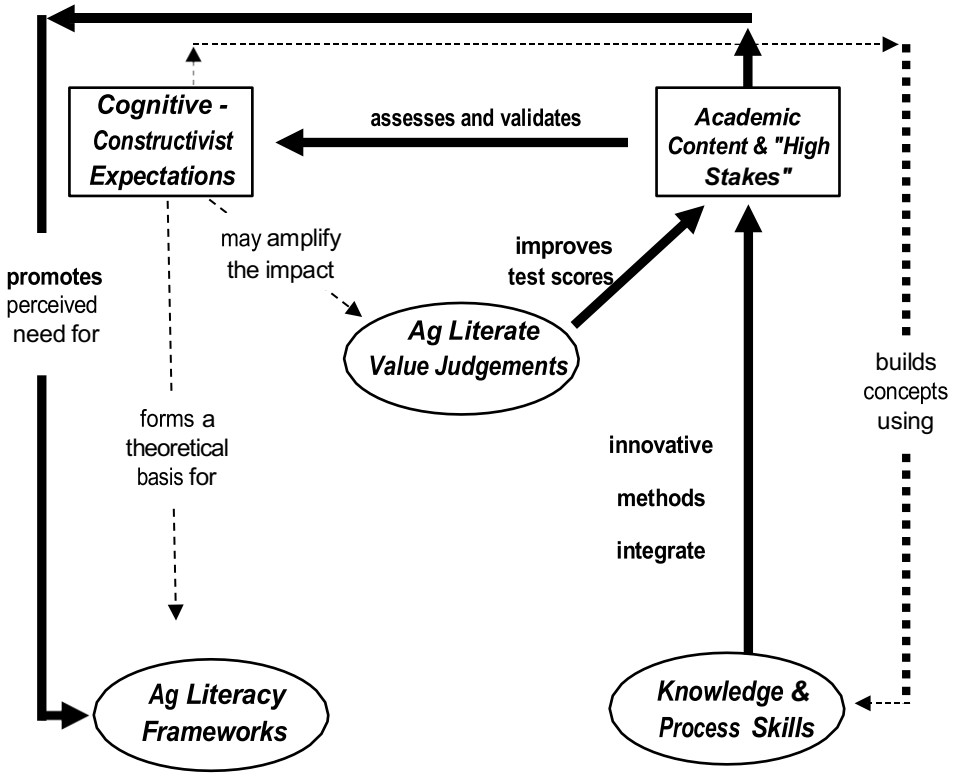
1. Describe the demographic characteristics of participants in the SOCIAL (Studies of Occupation, Culture, and Innovations toward Agricultural Literacy) tour;
2. Determine participants' agricultural awareness before and after the SOCIAL tour, and
3. Identify agricultural literacy themes participants viewed as valuable to integrate into their curriculum following the SOCIAL tour.

Conceptual Framework

This study is guided by the agricultural literacy theory outlined by Powell et al. (2008). This study addresses the connection between middle school teachers' experience teaching social studies and their knowledge about historic agricultural events and practices in South Carolina. Middle school social studies teachers' knowledge and skills play a pivotal role in their agricultural literacy, ultimately impacting the core content they teach. This study will focus on inductive learning of agricultural literacy through the social and historical knowledge of agriculture in South Carolina that social studies teachers utilize, framed by the conceptual framework of Powell et al. (2008). Utilizing this framework can help rework the existing curriculum to showcase how agricultural decision-making and problem-solving involve knowledge in current standards taught (see Figure 1; Powell et al., 2008).

Figure 1

Paradigm Shift Promoting a Shared Vision of Agricultural Literacy.



Methods

This study employed a convergent parallel mixed methods design (Creswell & Pablo-Clark, 2011) to better understand the agricultural literacy outcomes of SOCIAL participants. The frame of the study was based on e-mail addresses of public, private, and charter middle school teachers

in South Carolina during the 2021-2022 academic year. An invitation to apply to become a Fellow in the SOCIAL Academy was sent via e-mail to each of the teachers on three different dates. The invitations included a link to a survey (Qualtrics, 2022) requesting demographic information and the completion of an essay. A total of 13 participants were honored as Fellows in the SOCIAL Academy ($N = 13$).

Quantitative Methods

A survey instrument was created utilizing the agricultural literacy assessment developed by Knobloch and Ball (2003) to address objectives one and two. Reliability was estimated using Cronbach's alpha method ($r = 0.89$ - 0.94) for part A of the survey (Knobloch, 1997, p. 57). Data analyzed for objective two included the ten items adapted from Knobloch & Ball (2003). The Cronbach's alpha for the 10 constructs in this study was calculated ($r = .82$), which is deemed acceptable (Nunnally, 1978). For this study, the reliability of the pre- and post-instruments, Cronbach's alpha statistics resulted in standardized item alphas of $\alpha = .82$ and $\alpha = .87$, respectively, which is identified as good internal consistency (Cortina, 1993).

The survey followed a 4-point Likert-type scale where participants indicated how much they disagreed or agreed with ten statements, using: Strongly Disagree (1), Disagree (2), Agree (3), and Strongly Agree (4). Analysis of the pre- and post-survey data was analyzed using SPSS Version 27 software. Research objective one employed descriptive statistics (i.e., frequencies and percentages). The pre and post-test data were analyzed using a paired-sample *t*-Test to compare scores before and after the weeklong SOCIAL tour to gauge changes in perceptions about agricultural practices to address the second research objective. To determine the effect size of the findings, a Hedges' *g* analysis ($n < 50$) was used for this study. Sawilowsky's (2009) convention for effect size was used as the framework to determine effect (i.e., .01 = very small, 0.2 = small, 0.5 = medium, 0.8 = large, 1.2 = very large, and 2.0 = huge).

Qualitative Methods

Photo elicitation was utilized to address the third research objective. Participants shared photos throughout the weeklong farm tour experience to convey what was most important to them in more diverse terms than interviews alone can provide (Boron, 2013). Photo elicitation is vital for researchers who "… want to capture participants' feelings, thoughts, intentions, previous behaviors or the ways in which people organize their mental understandings and then connect these understandings to their world." (Richard & Lahman, 2015, p. 4). Each participant uploaded three photos with a 100-maximum-word summary to respond to the prompt: *What did you find the most impactful about today?* after the end of each tour day. The participants ($N = 13$) were required to upload three pictures a day with a reflection for each picture (195 photos and reflections expected). Participants who uploaded a photo but no corresponding reflection, or a reflection but no corresponding photo were removed from the study. A total of 60 photos with corresponding reflections were received and analyzed.

Photographs and reflections were coded as one single unit. The first round of coding followed Saldana's (2016) pre-coding techniques. The second round of coding utilized initial coding method that "…breaks down qualitative data into discrete parts, closely examines them, and

compares them for similarities and differences" (Saldana, 2016, p. 115). The third round of coding utilized a focus coding process that identifies the most reoccurring categories in the data (Saldana, 2016). The research team individually coded themes and then collaborated to finalize themes observed from the photo and reflection submissions (Baker et al., 2017).

Results/Findings

The first research objective was to describe the demographic characteristics of participants in the SOCIAL program. Ten participants completed the pre- and post-tour surveys ($n = 10$). Respondents ranged from 21 to 60 years of age, with the majority (60%) being female ($n = 6$). All participants were white non-Hispanics and five (50%) earned a master's degree, three (30%) earned a doctorate, and two (20%) earned a bachelor's degree. All 10 were currently social studies teachers in South Carolina and were selected to participate in the SOCIAL program through a competitive application process.

Research objective two aimed to compare participants' agricultural literacy before and after the SOCIAL tour through their pre- and post-tour scores. There was a significant increase ($df = 9$, $p < 0.05$) from pre- to post-tour survey grand means ($M = 3.58$ with $SD = .193$ and $M = 3.85$ with $SD = 0.126$ for pre- and post-tour surveys, respectively). To determine effect size of the findings, a Hedges' g analysis was used since the $n < 50$ for this study. The effect size for this analysis ($g = 2.44$) was found to exceed Sawilowsky's (2009) convention for a huge effect ($d > 2.0$).

The findings for research objective three identified five agricultural literacy themes participants viewed as valuable: (a) twenty-first-century agricultural production, (b) a need for agricultural literacy, (c) dissemination of information, (d) sustainable agricultural practices, and (e) the historical impact of agriculture on South Carolina after a three round coding process following the conventions of Saldana (2016).

Theme #1: Twenty-first Agricultural Production

Participants' first day on the farm tour was at Edisto Research and Education Center (REC) where they engaged in precision agriculture. For many participants, this was their first exposure to agriculture in the field. Throughout the day, participants learned about drone technology and other precision agriculture equipment and their influence on modern agriculture practices. Multiple participants acknowledged how farmers benefited from modern technology use in agricultural production. The main benefit participants discussed was how technology and modern agriculture practices can save farmers money: (a) "This cost-saving technique [Precision Agriculture] could keep farmers in business." (1); (b) "This [Precision Agriculture] saves farmers money since the entire field doesn't need to be fertilized at the same level." (1); (c) "It [Precision Agriculture] makes economic sense for the for the farmer…" (12). On day 4, participants were exposed to topics on Integrated Pest Management (IPM) and turf management at the Pee Dee REC. Participant 1 mentioned that IPM is "…about maximizing profits for the farmers…" and "… Lowering management costs drives profit…."

Theme #2: A Need for Agricultural Literacy

Throughout the tour, participants remarked on various agricultural knowledge they lacked. Participants acknowledged how little they knew about crops grown in South Carolina, how

agricultural production is interdisciplinary, and how Clemson University Cooperative Extension Service research benefits both producers and South Carolina community members. Participants discussed the interdisciplinary aspects of agricultural work. Participant 7 stated, “Agriculturalists incorporate their knowledge of both science and math with this process [crop and soil science research].” and “…clear communication is vital.” Participants also discussed the importance of Clemson University Cooperative Extension Service research and community outreach to South Carolina producers. Similar to participant observations about technology, participants linked Clemson University’s Cooperative Extension services as a resource for grower success.

Theme #3: Dissemination of Information

In participating in the SOCIAL event, the participants agreed to create a plan to share their experiences during the event with their students through their photos and reflections. During the five-day tour, teachers recognized that students would be interested in many areas of modern agriculture practices. One area of interest the participants thought their students would be interested in is the economic impact agriculture has in the United States and worldwide. Outside of economic interest, participants saw benefits in touring various SOCIAL locations again with their students to introduce them to agriculture in South Carolina. Throughout their reflections, participants also remarked on several ways agriculture could benefit students in their career aspirations: (a) “Students may want to go into this field because clear communication is vital.”; (b) “Researchers are seeking to have a greater understanding of this [microplastics] impact. Students can think about a career that focuses on studying microplastics.” (7); (c) “Students may want to earn a degree in turf grass management and develop environmentally friendly golf courses that are more sustainable in regard to irrigation.” (7); and (d) "I would really like to show my female students some role models from the trip such as Dr. Whitmire and her two very impressive USC grad students” (12).

Theme #4: Sustainable Agricultural Practices

Throughout the five-day tour, participants expressed concerns over urbanization’s impact on natural resources and animal habitats. The use of water in modern agricultural practices and tourism was another concern of the participants. Participant seven commented on turf management while touring the Pee Dee REC: “…perhaps unsustainable use of water was concerning to me at the site. I realize that growing turfgrass is important for tourism in South Carolina, but can we develop sustainable practices?” Participants also expressed concerns over plastic pollution. Participant five remarks on the benefits of pollinators, along with how urbanization and habitat loss has negatively impacted pollinator numbers: “Farmers are in dire need for the arrival of pollinators to jump-start the fertilization process…Also developing scrub area that attracts birds, bats, and other animals that may be unintended pollinators. With the ever-expanding development of human habitat, the decline of pollinator habitat is alarmingly steep.” However, throughout the tour, participants acknowledged researchers’ and farmers’ efforts to farm sustainably to combat the negative impact of agricultural practices on the environment. Participant one comments, “Contrary to what people think, farmers desire to use the least amount of pesticides and irrigation possible” when learning about IPM benefits at the Pee Dee REC.

Theme #5: Historical Impact of Agriculture on South Carolina

After struggling to find a stable cash crop, rice was discovered to thrive in the Lowcountry of South Carolina. Enslaved laborers were brought to South Carolina because of their “…technical

knowledge and skills in rice cultivation and irrigation…" and to bring "…established knowledge systems with them to the Lowcountry". As a result, the Gullah heritage grew in the Lowcountry. Participants' reflections documented the role of agriculture in South Carolina's history (Figure 7). Participant nine comments on the Gullah-Geechee community's influence on South Carolina culture and development:

> "Carolina Gold Rice is also a key ingredient in many traditional Southern dishes. These efforts to Carolina Gold Rice shine a spotlight on South Carolina food-ways and the influence of the Gullah-Geechee on American cuisine! I can add to this effort to replenish South Carolina's Carolina Gold Rice production while studying the Gullah Geechee and their enormous contribution to both the economic and cultural development of South Carolina."

Conclusions/Discussion/Implications/Recommendations

There was a significant change in participants' perceptions of agriculture pre- and post-tour experience. This is evident through the significant positive change in participants' pre- to post-tour survey scores as there was a statistically significant ($p < .05$) positive change in participants' perceptions. This change in perception is supported by previous research, as Perticara and Swenson (2019) identified how attending a farm tour can lead to a change in "…behavior, knowledge, and/or attitude." Participants also saw value in agricultural literacy after attending the SOCIAL tour, as there was a positive change in participants' agricultural literacy based on the SOCIAL Academy summer tour with a large effect.

Participant reflections showcase the public's continued need for agricultural literacy as they reflect on what they gained and learned from the five-day SOCIAL tour experience. Participants felt a connection to sustainable agricultural practices and the care the industry puts into its work. Participants showed an increase in awareness about modern agricultural practices and their impact on the environment after the tour. Participants experienced a paradigm shift over the course of the study tour as participants discussed various ways that agricultural topics could be taught inside their classrooms, aligning with previous research (Powell et al., 2008). The expressed interest teachers provided about sharing job opportunities and experiences within their classrooms supports the idea that nontraditional agricultural educators can increase a child's agricultural literacy in non-agriculture classrooms (Perticara & Swenson, 2019).

While this study was limited to 12 middle school social studies teachers in South Carolina who participated in the SOCAIL experience, the participants are representative of the state, as over 80% of teachers in the state are white non-Hispanics and majority female according to the South Carolina Department of Education (2023). Therefore, the findings of this study should be considered for potential transferability to states hosting similar programs with comparable characteristics and aims.

Participants were most intrigued by sustainable agricultural practices throughout the tour, thus future programming should aim to focus on sustainable practices and the potential implementation as a context across core content areas. Additionally, school-based agricultural education teachers could utilize this by incorporating more sustainable agricultural topics into their outreach programs, potentially attracting more people to adult education opportunities and developing additional school cite collaborations. Future research would benefit from following up with the teachers inside their classrooms to assess the agricultural literacy of students after

being exposed to their teachers' experiences and the teachers' efficacy to integrate agriculture as a context within social studies classes. This could provide a clearer answer on the effectiveness of learning about these experiences on students' own perceptions and beliefs about modern agricultural practices through behavioral changes in classroom implementation.

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Living as an Imposter: An Exploration of the Lived Experiences among Multiracial Youth in Secondary Agricultural Education

Introduction

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. Forty-six percent of the current multiracial population is under the age of 18 (Parker et al., 2019). Despite this, limited literature exists on multiracial people in education, and even less literature regarding multiracial youth in education. In Millville et al. (2005), multiracial 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 multiracial 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).

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. Some literature benchmarks intermarriage as part of assimilation (Rumbaut, 1997; Waters & Jiménez, 2005). Rumbaut (1997) suggested that intermarriage further dilutes ethnicity and that these children want to be more American than Americans. 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. Johnston and Nadal (2010) infer that the message conveyed to these multiracial individuals is that "being monoracial is the norm or ideal, and that being multiracial is substandard or different" (p. 127). The existing literature on multiracial people tends to focus 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).

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. Imposters 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 Dr. Clance and Dr. Imes in 1974, to describe people that doubt their abilities and competencies.

Clance (1985) mentions six dimensions in which individuals experiencing IP display certain characteristics: 1) *The Impostor Cycle;* 2) *The Need to be Special, to be the Very Best*; 3) *Superwoman/Superman Aspects*; 4) *Fear of Failure*; 5) *Denial of Competence and Discounting Praise*; and 6) *Fear of and Guilt About Success.*

Although schools vary vastly from state to state across the United States, they all are continuously increasing in racial diversity, making it imperative for schools to increase their awareness of said diversity as well. This awareness should also expand to extracurricular activities associated with the schools, such as organizations involved with 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 and lead to internal attributions or blaming themselves, to make sense of discrimination (Bernard et al., 2018).

Research indicates that IP scores are higher for 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). 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 from secondary agricultural education programs and to determine if feelings of Impostor Phenomenon existed regarding their multiracial backgrounds. The significance of this study was to investigate whether Impostor Phenomenon, concerning 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. The broad focus of this qualitative case study was to explore the lived experiences of multiracial graduates from secondary agricultural education programs. The primary research question sought to determine what elements of racial Impostor Phenomenon 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. Crabtree & 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. A case study facilitates the exploration of a phenomenon within its context using a variety of data sources (Baxter & Jack, 2008). 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 to obtain participants of multiracial backgrounds. In an email, a Qualtrics survey was distributed to gauge interest in participating in the study. Twenty-seven participants were interested in participating. When given the opportunity to schedule a time, only nine individuals 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 the chance to explore important issues" (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. 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. 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 verbal and nonverbal cues seen in the recordings, as well as changes in pitch, disfluencies like "umm," and long pauses as they indicated various emotions

(Tracy, 2013). 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 she 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 Impostor Phenomenon.

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. Participants were asked to answer interview questions as related to their own youth experiences in agricultural education programs during grades 9 to 12. 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.

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

Rather than seeking to be special or seen as geniuses like in IP, participants in the study who are suffering from racial IP expressed a desire to be treated like everyone else. Some participants wish to be treated and seen as person aside from their racial identity, although they realize that the nuance of their multiracial identity created a visual difference when among a homogenous demographic.

Rachael shared her desire for a sense of belonging among her peers. 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 agriculture 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 in the racial IP 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.

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. 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 at the expense of being true to her identities. When asked if she felt like she could incorporate both her identities 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 and 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.

Denial of Competence & Denial of 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). 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 will be 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.

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

Every participant exhibited at least two of the six dimensions of the Impostor Phenomenon, qualifying each participant of impostorism (Clance, 1985). 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 add elements to Imposter Phenomenon, thus becoming racial Imposter Phenomenon. Monoracial labels, stereotypes, and standards enhanced pressure through monoracial racism. Those who felt like racial imposters also experienced a lack of role models within secondary agricultural education. Unfortunately, the lack of multiracial role models caused many multiracial students to lack guidance in navigating their unique racial statuses.

When it comes to racial IP, the denial of competence not only came from the participants but also from those around them; thus, implying that social acceptability of multiracial heritage is not present (Millville et al., 2005). Racial IP individuals are fearful that they are not the "norm" due to their possession of multiple races (Johnston & Nadal, 2010). To respond to these feelings of impostorism, educators are encouraged to attend professional development (PD) sessions focused on multiracial students while state staff are expected to seek professional development opportunities that prepare teachers for a classroom enrollment of students that are products of multiracial homes.

To help multiracial students feel more welcome in FFA culture, the researcher recommends giving all students equal and equitable opportunities. We can support multiracial students by promoting their positive potential and actual achievements (Cargo et al., 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).

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