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Research Conference Co-Chairs

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Poster Chair

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Texas A&M University

2019 Western Region AAAE Research Conference Research Paper Review Process

The 2019 Western Region AAAE Research Conference Call for Papers was issued via the AAAE listserv in April 2019 with a submission deadline of June 1st, 2019. Authors were invited to submit abstracts via FastTrack™ at <http://aaae.expressacademic.org/login.php>.

The 2019 Western Region AAAE Research Conference received 65 reviewable abstracts. Personal identifiers were removed from research papers before released to invited reviewers through the FastTrack system. Authors were notified of papers acceptance at the completion of the review process. Abstracts were blind-reviewed by designated panel of reviewers for the conference. A total of 30 abstracts were accepted for presentation.

Our appreciation to Andrew Thoron, the AAAE Conference Manuscript Submission and Review Manager, for providing technical assistance and overseeing the paper review process using the FastTrack system. We also want to thank the panel of reviewers for this hard work to review the manuscripts. Finally, thank you to all of the AAAE members for their submissions.

2019 Western Region AAAE Research Panel of Reviewers

Thank you to the professionals listed below who volunteered their time and expertise in the review process.

Rebecca Lawver	Utah State University
Courtney Gibson	Texas Tech University
Kasee Smith	University of Idaho
Matthew Mars	Arizona State University
Greg Thompson	Oregon State University

Western Region AAAE Research Conference History

Year	Location	Chair(s)	University
1982	Austin, TX	Gary E. Briers	Texas A&M University
1983	Rio Rico, AZ	Phillip A. Zubrick	University of Arizona
1984	Oklahoma City, OK	David Cox James P. Key	Cameron University Oklahoma State University
1985	Boise, ID	John E. Slocombe	University of Idaho
1986	Las Cruces, NM	Paul R. Vaughn	New Mexico State University
1987	Logan, UT	Gilbert Long	Utah State University
1988	Ft. Collins, CO	Ramsey Groves	Colorado State University
1989	Sparks, NV	Joseph G. Harper	University of Nevada, Reno
1990	Fresno, CA	James. G. Leising	University of California, Davis
1991	Seattle, WA	Marvin D. Kleene	Washington State University
1992	Cody, WY	Carl L. Reynolds	University of Wyoming
1993	Bozeman, MT	Van Shellhamer	Montana State University
1994	Honolulu, HI	David Cox Frank C. Walton	University of Arizona University of Hawaii
1995	Phoenix, AZ	Glen M. Miller	University of Arizona
1996	Moscow, ID	Jim Connors	University of Idaho
1997	Stillwater, OK	James White	Oklahoma State University
1998	Salt Lake City, UT	Gary S. Straquadine	Utah State University
1999	Corpus Christi, TX	Lance Keith Jacqui Lockaby	Texas Tech University Texas Tech University
2000	Las Cruces, NM	Brenda SeEVERS	New Mexico State University
2001	Carmel, CA	William Kellogg J. Scott Vernon	Cal Poly, San Luis Obispo Cal Poly, San Luis Obispo
2002	Spokane, WA	Michael K. Swan	Washington State University
2003	Portland, OR	Gregory W. Thompson Brian K. Warnick	Oregon State University Oregon State University
2004	Honolulu, HI	Martin J. Frick Michael K. Swan	Montana State University Washington State University
2005	Prescott, AZ	Billye B. Foster Edward A. Franklin	University of Arizona University of Arizona
2006	Boise, ID	Lori L. Moore	University of Idaho
2007	Cody, WY	Carl L. Reynolds	University of Wyoming
2008	Park City, UT	Rudy S. Tarpley Brian K. Warnick	Utah State University Utah State University
2009	Lake Tahoe, NV	Vernon Luft	University of Nevada, Reno
2010	Great Falls, MT	Shannon K. Arnold Carl G. Igo	Montana State University Montana State University
2011	Fresno, CA	Mollie Aschenbrener	California State University, Chico

Western Region AAAE Research Conference History

(Continued)

Year	Location	Chair(s)	University
2012	Bellingham, WA	Michael Swan	Washington State University
2013	Lubbock, TX	Lori Moore	Texas A&M University
		Theresa Pesl Murphrey	Texas A&M University
2014	Kona, HI	Scott Burris	Texas Tech University
		Jon Ulmer	Texas Tech University
2015	Corvallis, OR	Misty Lambert	Oregon State University
		Jonathan Velez	Oregon State University
2016	Tuscon, AZ	Edward A. Franklin	Arizona State University
2017	Fort Collins, CO	Michael J. Martin	Colorado State University
2018	Boise, ID	Kasee Smith	University of Idaho
		Kattlyn Wolf	University of Idaho
2019	Anchorage, AK	Kattlyn Wolf	University of Idaho

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A Phenomenological Examination of the Experiences of Early Women in Agricultural Education

Makenna Ellinghaus, University of Idaho
Kasee L. Smith, University of Idaho
RyAnna Meacham, University of Idaho
James Connors, University of Idaho

Historically women have had some barriers when entering the agricultural education profession. When women began to join the profession in larger numbers, many experts stated women would have a difficult time finding teaching jobs no matter their skill level or experiences. In 2009, men still filled the large majority of agricultural education positions in the country. In the last decade, researchers in agricultural education have noted a large shift in preservice and early career agricultural educators, with more women entering the profession. In the last 30 years many communities have welcomed female agricultural educators, which begs the question, what had changed? This study was a phenomenological examination of women who joined the profession as one of the first five women in their respective states. Semi-structured interviews with n = 9 early female agricultural educators revealed a number of similarities to entry. Themes emerging from data analysis included: blazing their own trail, being the most qualified, struggles with work-life balance, influence of male mentors, and an acknowledgement of the evolving profession. Results not only highlight important experiences of women in the profession, but recommendations for gender inclusivity in agricultural education.

Introduction/Conceptual Framework

In a climate where men once dominated the workforce, agricultural education has made great strides in the last two decades to provide equal opportunities for women to become agricultural educators or teacher educators in agriculture education (Baxter, Stephen, & Thayer-Bacon, 2011). This field traditionally followed stereotypical gender roles, with men holding most of the agricultural educator positions up to the late 1990's (Foster, 2001). Early women who entered the profession broke ground to allow easier career entry for the women agricultural teachers and teacher educators. One of the defining events related to the path opening for female agricultural educators was the National FFA Organization (FFA) changes in 1969 which provided for female membership (National FFA Organization, 2018,). Although there is evidence that women played a role in agricultural education prior to women joining the FFA (Moore, G., 2019), on a formal level, women were not included in the leadership, education, and skill development that the agricultural education classroom provided (Foster, 2003).

In the early part of the 21st century, gender roles were set by marital status (Kulik, 1999). Example, if a married woman entered the workforce she would leave to care for her children and return when her family obligations lessened (Foster, 2001). In 1947, only 31% of women had an occupation outside of the home, while, 87% of their male counter parts were employed (Blau & Kahn, 2007). Overtime there was a drastic shift in the number of women choosing a career. In 2000 a roughly 60% of women and 74% of men had full-time occupations (Blau & Kahn, 2007). Historically, when women make first entry into a male-dominated career they face tangible barriers to entry (Baxter, Stephen, & Thayer-Bacon, 2011). Teaching has long been a female-dominated role at the elementary and secondary level, but teaching agriculture was largely male-

dominated until after the turn of the century (Enns & Martin, 2015; Foster, 2003). In 2003, 15.77% of nationwide agriculture educators at a secondary level were female (Foster, 2003) and in 2009 males still out-weighted women two to one (33%) (Enns & Martin, 2015). As early as 1971, there were perceptions that the entry to agricultural education would be difficult for women (Bradley, 1971). Bradley (1971) stated “the women’s liberation movement has not moved in the direction of vocational agriculture teachers (p. 33). Bradley (1971) continued noting that women would have a difficult time finding a job teaching agriculture no matter their grades or experience. He continued to explain school administrators and community were not ready to welcome a female agriculture educator. While the barriers were steep, women continued to enter the profession and become both agriculture educators and teacher educators in agriculture.

The framework used for this project the Feminist theory presented by Grant and Osanloo (2014). This theory allows researchers to approach gender roles in society through an analysis of factors related to gathering the experiences of those who broke traditional gender roles. Patriarchy lead to gender norms and gender roles. Gender norms lead to women’s position in society through social factors, political factors, and institutional factors. Through gender roles lead to gender discrimination, then into oppression which lead to a male dominance industry and the experiences of the women in the industry (Grant & Osanloo, 2014).

Purpose and Research Question

There have been a significant change in the gender representation in the field of agricultural education (Foster, 2003) from the time women were allowed FFA membership and today (Foster 2001; National FFA Organization, 2018). Little has been studied to gather the experiences of the women who first broke gender norms and became agricultural educators. Gathering this information could be helpful in examining the entry into the profession today, the large-scale shift in agricultural educators’ gender (Kantrovich, 2010; NAAE, 2016) and the inclusivity policies in place within agricultural education and surrounding organizations (US Department of Labor, 1965).

The purpose of this phenomenological study was to examine the lived experiences of women who were among the first to enter the agricultural education profession. To guide this study, we worked to answer the following research question? What were the experiences of female agricultural educators who entered profession as one of the first in their state or region?

Methods

This study was conducted using qualitative phenomenological methods. Creswell (2007) suggested using a phenomenology is in order when the purpose of the research is to gather the lived experiences of individuals who experienced a common situation or phenomenon. The purpose of this study was to examine the shared experience of respondents who were among the first in their state or region to be hired as a secondary agricultural educators.

Prior to recruiting participants, we developed an interview protocol which was derived from the literature and historical documentation of females entering the agricultural education profession. The University of Idaho provided Institutional Review Board approval of the study and funding

for the project was provided through the Office of Undergraduate Research at the University of Idaho. Participants were recruited through contacting agricultural education staff in all western states for name recommendations. All eligible participants taught secondary agricultural education and were one of the first five women to be hired in the state. From the list of eligible participants, respondents were selected to gather a wide variety of regions, length of time teaching, and current role/involvement in agricultural education. Contact information was obtained for potential respondents ($n = 20$), and contact was made via email or social media messenger. From the final list of potential respondents $n = 9$ were available within the study window to complete interviews. Creswell (1998) recommended interviewing between five and 25 individuals to gain an accurate view for a given phenomenon, and Morse (1994) noted that data analysis is appropriate with as few as six interviews.

Data collection occurred via telephone interviews ranging in length from 10:00 to 45:55 minutes. Interviews were audio recorded and then transcribed verbatim using an online transcription service. Transcribed interviews were separated into unique data points for analysis. From the nine completed interviews, $n = 593$ data points. Data were coded by three separate researchers using open and axial coding procedures employing the constant comparative method (Glaser, 1965; Strauss & Corbin, 1998).

We took several formal steps to establish trustworthiness in this study. First, each member of the research team developed a formal reflexivity statement to identify prior biases which may have existed in regard to this topic. There were four researchers directly involved with the project, all female. One of our team is an undergraduate student, two are graduate students, and one is a faculty member all within the agricultural education arena. Common amongst reflexivity statements were positive views of female agricultural educators and positive interactions with both male and female agricultural educators. In addition to reflexivity statements, we employed the concepts of reflexive journaling, member checking, peer debriefing, audit trails, and triangulation of analysis to add to the study trustworthiness (Creswell, 2007; Lincoln & Guba, 2014).

Findings

Through the data analysis process, we identified four themes related to participants' experiences as early women in agricultural education: *Blazing their own trail*, *Be the most qualified, not the most qualified female*, *Work-life balance*, *male mentorship*, and *the profession is evolving*.

Theme 1: Blazing their own trail

The nine women who participated in this study all noted they never expected to be treated differently when entering into the profession. There were overwhelming comments related to an unawareness of changing societal norms, only an acknowledgement of a desire to have freedom to pursue their own career path. Many of the respondents did not even notice that they were among one of the firsts in their respected state or region. Participant 2 said, "*I never knew that women weren't supposed to be doing what we were doing.*" All respondents shared that they jumped right in and found their own way to being successful in the profession. Making strong professional networks also emerged as a concept for many participants, who sought opportunities to ask questions and continue to grow. While all found their way into the profession, each found their own method of entry, for some it was a switch of major while at their University, others it

was a combination of the passion of agriculture and education, and for some it was a career change.

Theme 2: Be the most qualified, not the most qualified female

As data were analyzed, it became apparent that all respondents identified as an agricultural educator, not as a specifically female agricultural educator. Participant 4 commented that she felt like “one of the guys” in her agricultural education interactions. Responses included comments about being the best agricultural educator they could be and were not blinded by gender roles. Participant 8 said,

I think if you show the effort, and you work hard, it will show through, male or female, if you’re going to sit there and be like ‘oh, I can’t do this’ it really has an impact on how people think about you and treat you.

Respondents also commented that they knew working hard was always going to be a part of the job and not something that would be excused or expected because of gender. It showed that through hard work they were able to convey to all they were the best candidate for the job and the best educator for the program. While going through the hiring process some participants noted there were some biases which caused issues in hiring. Others experienced the opposite and noted that they were hired because they were the best candidate for the job and were what the school and program needed. Some noted that they felt any bias toward them was not because of their gender, but because they were new to the profession and that the initiation experience was similar for new agricultural educators regardless of gender.

Theme 3: Work life balance

Respondents noted the importance of finding balance in the profession. Numerous comments were made about the importance of finding a balance between a personal and professional life. Many noted the tension between the commitment level required to be good at the job and the requirements of family life. Several respondents commented on the importance of having a supportive spouse who was willing to step outside of traditional male gender roles to assist in household responsibilities. It was interesting that three of the respondents chose not to have children, commenting on the demands of the job as a potential deterrent. Participant 1 said,

work-life balance is hard initially and I think that's why a lot of women drop out in [State] because they never get to that point where they're profiting from their previous work...you know, it's extremely demanding and I never had children.

There were important notes made that many had supportive spouses of their profession or were aware of the job that they were in. Another important note is some chose not to have children for various reasons, but some for the commitment to the job and trying to find the balance.

Theme 4: Male Mentorship

Within every interview the concept was mentioned that there a strong impact was made my male mentors and supporters who pushed them into the profession and then took a vested interest in their success. For some it was their father, for others it was agricultural educators or university faculty. These mentors and supporters were ones who defended them and helped them out while entering the profession. They were ones who helped them with curriculum, CDEs, and other things that they needed help in with joining into the profession. Participant 2 recalled that years after her hire, she was made aware that male mentors in a neighboring school stood up for her when she was first hired and the community had questions about what the “new female

agriculture teacher” was doing. She commented that these individuals were “very supportive of me, and didn’t undermine me... and defended me.”

Theme 5: The profession is evolving

All respondents commented on the changes in the profession, citing that there are more demands for teachers than at their time of entry. Many mentioned changes in the students over time, and how the dynamics between teacher and student has changed since their time in the classroom began. Others made note of policy changes and their effect on the methods through which teachers enter the profession. All respondents commented on the gender shift in agricultural education, and noted some level of personal satisfaction in knowing that there was a place for women in agricultural education all along.

Conclusions/ Discussion/ Implications

The experiences of those who were among the first women in agricultural education allow us to draw several conclusions of interest for the profession. First, while there is evidence in the literature to suggest difficulties for women entering the profession in the early 1970s (Bradley, 1971, Enns, K. J., & Martin, M. J. 2015), most of the women in this study did not recall overwhelming biases against them. In fact, some respondents mentioned that being a female may have been a benefit to their hire. The women we contacted for this study all noted mostly positive experiences being women in the profession, and although each respondent mentioned some situations which made them uncomfortable, none of them mentioned being offended or feeling as though they were not welcome. This finding leads to a couple of questions: Was their ability to not take offense something that contributed to their ability to feel comfortable? There are noted difficulties in the literature for women entering the profession. Why were these women less affected by difficulties?

Another conclusion we drew from the data was that all respondents had strong commitment to the profession. All respondents noted work-life balance issues, even though none of the interview protocol questions specifically asked for respondents to comment on work-life balance. This finding allows us to suggest that perhaps work-life balance has always been a concern for female agricultural educators. Many respondents noted the influence of traditional child-rearing roles in their planning for agricultural educator responsibilities, which aligns with the gender role implications of Grant and Osanloo’s (2014) views of persistent barriers for women who break societal roles in their occupation. More work is to be done in this area as we examine whether differences exist in workload for male and female agricultural educators. Understanding this topic more completely could provide insight to help teacher educators and leadership in agricultural education develop programming related work-life balance professional development. As the landscape of agricultural education changes, and the gender roles rapidly shift to a place where there is the potential to have more women in the profession than men, we can learn from the lessons of those who were first women to walk this path. These individuals blazed trails for the current and future women in the profession, and while there may be many lessons left to be learned about gender roles and inclusion in agricultural education, these women may hold the knowledge we need to take steps in the right direction.

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Another Survey “Opportunity”? The Phenomena of Survey Refusal and Fatigue Among Livestock Farmers

Katie M. Abrams, Colorado State University
Chelsea Bonser, Colorado State University

The advent of online survey tools coupled with increased federally mandated agricultural research in the last decade has led to increased survey refusal rates among farmers. Such a phenomenon is concerning to scholars, policymakers, businesses, and many other decision-makers who rely on good survey data to inform decisions to enhance agricultural security, sustainability, and vibrancy. This study explored the experiences and opinions of individuals participating in agricultural survey research to understand survey refusal and fatigue. We conducted 14 in-depth interviews with feedlot managers, swine producers, and government field staff involved in survey administration. The findings revealed an imbalance between costs and benefits of participating in the surveys used as a focal point in the interviews (i.e., a classic violation of social exchange). This stemmed from a variety of factors, including distrust, general survey fatigue, weak communication, and a lengthy and complex survey. Recommendations to address refusal and fatigue include reducing producer burden by improving process efficiency and improving communication about study goals and impacts.

Introduction and Theoretical Framework

It may come as no surprise that survey refusals have increased significantly in the past two decades. “It was not uncommon for a study conducted twenty years ago to have encountered one refusal for every one or two completed interviews, while today experiencing three or more refusals for every one completed interview is commonplace” (American Association for Public Opinion Research [AAPOR], 2014). With state and federally mandated research on agricultural practices and businesses up significantly in the 2014 and 2018 Farm Bills (Congressional Research Service, 2019), on top of the proliferation of survey research in the private and nonprofit sectors (Grimes, 2012), producers are likely more burdened than other populations when it comes to survey requests. As early as 2002, Pennings, Irwin, and Good, noted this felt burden: “many of the comments by farmers in the telephone interviews appeared to be a plea for relief from the flood of surveys that inundate them on a daily basis” (p. 276).

Survey refusals and fatigue are two distinct but related phenomena. An AAPOR (2014) report detailed the characteristics and costs of refusals. Survey refusals happen when the individual is unreachable, the individual is contacted but does not receive enough information to decide to participate, or the individual is contacted and specifically declines to participate. Refusals result in large monetary costs to the organization due to the increased labor needed to try to convert refusals and/or in data analysis techniques to mitigate the effects of nonresponse bias. Another cost the report mentions is the impact on participants themselves; many feel pressured by survey refusal conversion tactics that seek to persuade participation. Although survey refusal conversion tactics are acceptable, a delicate line exists in which the researcher must respect a potential participant’s privacy with additional contact attempts. Furthermore, repeated contact attempts may bring about ethical or legal concerns for research, such as participant harassment. Finally, refusals also lead to concern about the validity of survey results (AAPOR, 2014).

Refusal rates can increase when populations experience survey fatigue more frequently. Survey fatigue occurs when respondents tire or become bored of the tasks involved in completing the survey (Ben-Nun, 2008). As a result, respondents more frequently skip questions, answer “don’t know”, choose answers in the same column (i.e., “straight-line”), give cursory responses, and/or do not complete the survey (Ben-Nun, 2008).

Scholars have outlined ways to reduce fatigue and refusal primarily under the guidance of social exchange theory, which suggests designing a survey study that reduces the perceived cost of responding to the questionnaire and increases perceived rewards and perceived trust (Dillman, Smyth, & Christian, 2014). Tactics for reducing refusal include tailoring introductory letters/scripts that identify the sponsor, explain the research significance, detail benefits or incentives, and assure confidentiality (Dillman et al., 2014). Best practices also include offering multiple ways or modes for respondents to participate (Dillman et al., 2014). Survey timing can be important, too, due to farmers’ seasonality of work (Willcox, Giuliano, & Israel, 2010). Direct payment incentives, especially those included with the survey invitation, have been also shown to decrease refusal among farmers (Pennings et al., 2002). The incentives do not, however, decrease item nonresponse (Willcox et al., 2010). Fatigue can be prevented through effective survey instrument design, which is a science and an art all its own (see Dillman et al., 2014).

The advent of low-cost, user-friendly online survey tools has increased survey research volume in the past decade, and with it, more entities conducting poorly designed surveys and/or eroding people’s trust by disguising marketing ploys as legitimate survey research (Grimes, 2012). Even if a survey’s recruitment and design are executed following best practices, previous experience with survey fatigue could increase survey refusal, especially among agricultural producers (Pennings et al., 2002). Academics and others conducting research with this population would benefit from more research on the producer’s perspective to better understand how to adapt their research to mitigate the consequences of survey refusals and fatigue.

Purpose, Context, and Research Questions

This study explored the experiences and opinions of individuals participating in agricultural survey research to understand survey refusal and fatigue among livestock farmers. We focused more on refusal but bring in fatigue since it can be related. The USDA Animal and Plant Health Inspection Service (APHIS) conducts nationally representative producer surveys through its National Animal Health Monitoring System (NAHMS) studies to monitor livestock health and management. Studies are conducted on the major commodities (swine, beef, dairy, poultry) about every five years and other commodities are studied at longer intervals (USDA APHIS, 2019). Specialty studies, such as the one on antimicrobial use on swine and feedlot operations in 2017, may be conducted more frequently. Respondents are recruited via telephone, and surveys are administered in person by APHIS veterinary medical officers (VMOs). We assessed their most recent survey recruitment, design, and administration procedures for the antimicrobial use studies. Although the survey seemed long, we found they generally follow Dillman and colleagues’ (2014) best practices, yet NAHMS still noticed an uptick in survey refusals. The context of the NAHMS studies provided a case study through which to achieve this study’s purpose. The central questions that drove this inquiry were:

1. What are producers’ perceptions of and experiences with NAHMS studies?

2. What are VMOs' experiences with producers as it relates to conducting NAHMS studies?
3. What are barriers to producers participating in government-sponsored livestock surveys?
4. What would incentivize or improve producers' experience participating in surveys like those in the NAHMS studies?

Methods

In-depth interviews are a common method used in phenomenological approaches within qualitative inquiry. One of the key benefits of in-depth interviews is they allow for participants' experiences and perceptions to be explored in their own terms without abstract measures and for their descriptions to be further probed and clarified (Marshall & Rossman, 2014). When it comes to selecting and sampling interview participants, purposive sampling is best suited to identifying individuals who have had experiences relating to the phenomenon to be researched (Robinson, 2013). We intended to focus on individuals' experiences and opinions pertaining to the NAHMS 2017 antimicrobial use studies specifically in addition to other NAHMS studies. In pursuit of that, we limited our sample to VMOs involved in survey administration and cattle feedlot and swine producers. To match the antimicrobial use studies sampling frame, we recruited feedlot managers with cattle capacity between 50 to over 1000 head, and swine operation managers with more than 1000 head of hogs. We contacted them through commodity organization contacts and then used snowball sampling. We interviewed nine producers: four swine and five feedlot. Two of each type of producer had *not* participated in a NAHMS study within the past five years. This sample included representation from the top three swine production states and the top five cattle production states (USDA NASS, 2012a,b). Five VMOs were included from a list of seven provided by NAHMS. Participants were assured confidentiality and the interviewer clearly delineated their role as an independent researcher to enhance participants' feelings of trust. Interviews were conducted by phone and lasted 45 to 60 minutes. The 14 interviews were transcribed and then coded for key ideas, topical markers, examples, and themes relevant to the purpose using thematic analysis (Rubin & Rubin, 2013).

Findings

For RQ1-3, themes that emerged were: distrust in federal government, unclear or negative value proposition, complex/lengthy survey, and overall survey fatigue.

Pertaining to the theme of distrust in federal government, producers described feelings of suspicion or skepticism that the NAHMS studies were in their best interest. For some, these feelings were ascribed to broad-brush beliefs about the federal government and its perceived ulterior motives. As a VMO summarized, "Private individuals do not appreciate government representatives asking a lot of questions."

Related to the theme of distrust was a notion that the value of such studies was unclear or negative for producers. In instances when participants defined the value as being unclear, participants discussed either not believing or not knowing whether the findings would be communicated in a useful way to intended audiences, or that the study would have a valuable impact on anything important to them. A feedlot manager summed this theme up well when she said, "Okay, you want all this information, but exactly what does it mean and how is it going to be used and how is it going to be taken?" A VMO echoed this same sentiment when she said, "We had some questions come through [like], 'What kind of answers are we going to see come out of these studies?'" Some felt their participation to be or would be an undue burden, and that

their time and information was more valuable spent elsewhere. Another feedlot manager described how she and her husband feel about NAHMS and other federal studies:

“We are inundated with surveys, interviews, visits, phone calls from NASS (National Agriculture Statistic Service). It gets to the point where my husband doesn’t want to participate at all. I suspect in the cases of an anticipated NAHMS interview, he would agree just to keep NASS from calling constantly, then wouldn’t do it when [Veterinary Services] called. He has gotten to the point that his opinion and his time are valuable too. Most of this stuff takes quite a bit of time and he gets little, if any, value from it.”

In the sample, this theme of unclear or negative value proposition was prevalent among feedlot managers. Swine producers, however, were more likely to point out an intangible benefit tied to moral obligations to be transparent, particularly about antimicrobial use. A swine producer said he viewed his participation as a way to provide consumers and special interest groups more transparency. He elaborated, “I know some guys have a fear of letting the government know stuff, but if it’s anonymous and can be guaranteed that it’s gonna stay that way, [I don’t mind].”

Regarding NAHMS surveys specifically, fatigue was evident in their descriptions of the survey length and complexity. As a VMO summarized, “Some of the questions were so in depth and detailed, and they had wanted the producers to have pages and pages of records researched, and none did that. They didn’t look up anything so I don’t know how accurate their answers were.” A swine producer agreed, “I remember it being a cumbersome process, a pain. Could have been handled better using some technology.”

A broader theme that emerged is best described as *general* survey fatigue. We distinguish this from the traditional concept of survey fatigue because it instead refers to the population being tired/bored of “opportunities” to participate in surveys in general. Producers and VMOs described experiences and opinions that illustrated producers are asked to participate in surveys too frequently and for little value, which then leads to refusal. A VMO summed up this theme: “I think they’re just feeling inundated, ...and especially [our NAHMS survey], where it’s so long, it’s even more. I guess it just loses its shine when they have so many to do through the year.”

Related to RQ4 about incentivizing participation, producers cared little about material incentives, while VMOs offered ideas of various kinds of reports or analyses that could be given to producers as a token of appreciation. However, what can be surmised from the interviews, is the best strategies forward to incentivize participation would be to reduce the burden of participation through shorter or more efficient data collection and to clearly communicate the importance and value of participating in tangible and meaningful ways. VMOs suggested forming research partnerships with state-level entities and others doing related kinds of surveys to reduce the survey volume and enhance trust and credibility. Another suggestion from VMOs and producers was to pair data from other valid sources (e.g., electronic records) along with offering an online option to complete the surveys. Regarding communication, it was evident in producers’ responses that good recruitment is insufficient; they require additional evidence of effective communication and impact of these studies with other stakeholders like consumers, non-governmental organizations, media, and policymakers. Furthermore, producers’ desired to understand how the study could potentially have favorable implications for them. A swine producer best described this when he said,

“Well, I think that the producers have to understand the benefits of it. They need to convey the benefits of it. Why are we doing this? And somehow overcome this, ‘I don't want the government looking into what I'm doing, because I don't know how they're gonna use it against me.’ [With] some producers, you're just not gonna overcome that, but you gotta try and put a very positive light that it's benefiting our entire industry.”

Conclusions, Implications, and Recommendations

Dillman and other scholars who have studied and advanced survey design methods point to the importance of the social exchange involved in surveys. Surveys should be thought of as a mutually beneficial conversation between researchers and participants and be designed to lower the perceived cost of participating while increasing the perceived reward and trust (Dillman et al., 2014). The findings in this study revealed an imbalance between costs and benefits of participating (a classic violation of social exchange) in NAHMS and other government surveys stemming from multiple factors, including distrust, general survey fatigue, weak communication, and, in the case of NAHMS specifically, a lengthy and complex survey. For a minority of producers, feelings of government distrust and skepticism may continue to discourage them from participating. Relationship-building and co-sponsorship efforts with entities potentially more trusted by producers is one way this could be overcome (Abrams & Bonser, 2018; Telg et al., 2018). As noted in the literature and described by those interviewed for this study, survey refusal is a key problem. Survey fatigue itself could be the main contributor to producers' reduced interest and investment in participating, which then results in other reasons to surface that defend their emotional position (e.g., government distrust, unclear value proposition). Despite great efforts and care by NAHMS personnel to create a well-designed survey, communication regarding clear benefits of participating and the perceived and felt burden of participating thwarted recruitment. Also, a perceived lack of existing evidence that these studies were communicated well and/or impacted anything important to producers made them skeptical of the value of participating.

Findings suggest there is more value to be had in two key efforts. First, reduce producer burden by shortening surveys and making the process more efficient. Approaches include offering an online option (completable over time as producers are available), reducing survey volume by partnering with other researchers, leveraging existing data to reduce questions asked, and incorporating electronic records data. The latter two approaches, however, have unresolved privacy implications (Coble, Mishra, Ferrell, & Griffin, 2018). Second, improve communication about the intent and impact of the surveys. Communicating the intent is even more critical when the topic could be deemed sensitive in nature like antimicrobial use. To enhance impact, our previous research offers recommendations on communication approaches to make NAHMS studies, and those similar in nature, more useful to stakeholders who would make use of reports in more meaningful ways to farmers (Abrams & Bonser, 2018). Moreover, the findings in this study suggest tracking how these federal survey data are used to be able to incorporate messaging describing the impact of potential future studies in recruitment materials. Researchers, businesses, and organizations should critically reflect on their survey opportunities for this population in light of these findings and recommendations to protect the future legitimacy of this method of research.

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Saving People from Injuries in the Workplace: A Behavior-Based Safety Photo-Elicitation Study

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The Bayer organization has seen a growing number of workplace injuries in recent years throughout their agricultural operations. Due to this increase, they began the implementation of a behavior-based safety (BBS) program in their U.S. Crop Science Division operations in 2017. To better understand the effect of this program on employees at the initial sites where the program was implemented, various research studies were conducted. Using photo-elicitation interviews (PEIs) and narrative inquiry, this study sought to examine the use of the BBS program at one cottonseed delinting site from the perspective of its employees. Results of this study found the BBS program did have an impact on participants' ability to recognize and think about safe, at-risk, and barrier issues in their workplace. It was also found that participants' perceptions of safety issues were influenced by their role and duties at the site. Further research is needed to more fully understand the impact and effect of BBS programs across sites within the Bayer organization and in other agricultural worksites. Further research is also needed to more fully understand the aspects of the program that had the most impact at this site.

Introduction/Theoretical Framework

Over 5,000 people died from agricultural work-related injuries in the U.S. from 2003 to 2011 making agriculture one of the most dangerous industries in the nation (Occupational Safety and Health Administration [OSHA], 2017). The Bayer organization has seen a growing number of workplace injuries in recent years in their own operations, including their Bayer Crop Science Division where workplace injury rates doubled in just a three-year period (Bayer, 2017). Safety professionals have learned that employees cannot rely on their organization alone to keep them safe (Geller et al., 2001).

For the last 30 years, behavior-based safety (BBS) programs have been implemented across the United States. The implementation of BBS programs in industrial organizations has been seen to help protect employees by shifting the focus from organizational structures to a focus on safe behaviors performed in the workplace (Geller et al., 2001). In BBS, employees are trained to identify and gather data on important at-risk behaviors in their workplace through peer-to-peer observations. They then provide positive feedback to address necessary changes, reinforce safe behaviors, and help employees understand why a behavior was performed and how it could be corrected (Stricoff & Groover, 2012). Additionally, employees seek areas that could pose as barriers to safety or safe behaviors. These barriers are discussed with management and recommendations for corrections in the workplace are made. With both behaviors and barriers, the goal is to mark observed safety issues consistently and consecutively over a minimum of a two-week period (Agnew & Daniels, 2010). BBS programs, when implemented effectively and sustained by organizational members, can contribute to long-term safety performance (Geller,

2001), which is a primary goal of Bayer's Crop Science Division in North America. BBS's implementation in the agricultural sector could reduce the growing safety issues seen in the industry; however, little research has been done on the use of BBS programs within the agricultural industry resulting in a lack of understanding of its effectiveness in the field.

This study was guided by Bandura's social-cognitive theory which explains human motivation and behavior through agentic capabilities such as self-efficacy – one's belief in their own ability to execute behaviors that produce performance attainments – and collective-efficacy – the shared beliefs of a group of people in their combined power to produce results (Bandura, 2000, 2001). The overarching meta-theory triadic reciprocal determinism proposes that behavior, internal personal factors, and the external environment explain human functioning (Bandura, 1997). The context in which social-cognitive theory is used is important because all environments, including agricultural production environments, are unique in some way (McCormick, Alavi, & Hanham, 2015). This study examined the environmental workplace influences that contributed to participants' identification of safe and at-risk safety-related behavior using the BBS program.

Purpose and Research Questions

Very little is known about BBS program effectiveness in the agricultural production industry. A BBS program was implemented at the Bayer Crop Science Division cottonseed delinting plant in Littlefield, Texas after it experienced five work-related injuries from 2012 to 2016. This study sought to examine the use of the BBS program and its influence on the perceptions of safety behaviors at this site from the perspective of the employees. Understanding the ways in which employees view safe and at-risk behaviors in their workplace is the first step toward correcting those behaviors. The following research questions guided this study:

RQ1: How and what do participants recognize as safe, at-risk, or barrier issues in their work environment?

RQ2: How do participants' perceptions of safe, at-risk, or barrier issues differ based on their work positions (e.g. front-line employee, supervisor, manager)?

Methods

This study was conducted using photo-elicitation interviews (PEI), which insert photographs into the research interview (Harper, 2001). PEIs allow participants to articulate their implicit thoughts and feelings (Mannay, 2010) and, with participant-generated photos, empower participants by positioning them as the expert in the interview (Rose, 2016). An opportunity sample of eight participants was selected out of the 25 employees from the Littlefield, Texas cottonseed delinting plant. These participants were selected because they were among those required to be trained in the BBS program and represented a variety of positions within the site in order to gain a more holistic view of the program as suggested by Creswell and Poth (2017). Participants selected consisted of one manager, four supervisors, and three front-line employees with a range of 3-10 years of experience at the plant. Further, the Aubrey- Daniels' International BBS program requires roughly 25-30% of the total population from multiple job levels to be trained in BBS during the first year of the program, which is represented in this sample.

Participants were given a disposable, color camera in February 2017 and were asked to take photos of safety-related behaviors and barriers in their daily work environment during a two-

week time period. A researcher-developed instructional document, modeled after Ibanez (2004), provided guidelines as to how their photos should be composed. Participants took photos to reveal what they observed to be either safe or at-risk operation areas, work stations, equipment, or behaviors in their physical work environment. Along with their photos, participants were asked to keep a field journal to record their thoughts of what they observed, the locations of the images taken, and the reasons they chose to take the photos as suggested by Tinkler (2013).

Once developed, participants were given the opportunity to review their individual photos before their PEI took place, as suggested by Ibanez (2004), to eliminate any “regret” photos or photos not meeting the guidelines of the instructional document. One-on-one, semi-structured interviews with each participant and their photos were then conducted, and participants were asked to describe why they took each photo with as little guidance as possible so they could speak freely about their photo choices as suggested by Stanczak (2007). Interviews were audio-recorded, transcribed verbatim, and entered into MaxQDA where codes and themes were developed based upon participants’ responses. Rose (2001) suggested using codes for working with large data sets that contain visual data, such as photos and video. Open coding for this research was thematically-based to complement the PEI methodology with narrative inquiry (Saldana, 2016). All participants were given pseudonyms to protect their confidentiality.

Findings

Findings for Research Question One

Research question one sought to determine how and what participants identified as safe, at-risk, or barrier issues in their work environment. Two themes emerged from research question one: (a) participants’ ability to recognize safe, at-risk, and barrier issues in the workplace; and (b) participants’ ability to think about safety solutions in the workplace.

Participants’ ability to recognize safe, at-risk, and barrier issues in the workplace.

Participants demonstrated an improved ability to recognize safety-related issues in their workplace and attributed this to the implementation of the BBS program at their site. Several participants took photos depicting instances of at-risk behaviors showing safety equipment that was improperly stored or areas not properly cleaned up in the plant. They recognized, however, that these instances occur less frequently following the BBS program and felt they were now more aware of these issues when they saw them. Bobby explained, “I must say that this is becoming less prevalent in the workplace since BBS.”

Several employees also took photos demonstrating their recognition of safe behaviors in the plant, particularly in the use of safety signage that promoted safe behaviors and equipment that they now understand is there to keep them safe on the job. Zack explained how an E-Z loader demonstrated and promoted safe practices and believed this equipment was much more appreciated and understood by plant employees following BBS training. He explained, BBS has helped us to realize where and when to use these in case we have to move bags manually – they help because that can be pretty hard on somebody’s back when lifting from the ground up. Since BBS, my awareness has increased to where I notice these things more often.

Participants' ability to think about safety solutions in the workplace. Many participants also demonstrated an improved capacity to think about safety solutions in their work environment as a result of BBS implementation. One example of this theme involved some participants' concern that too many people took a short-cut between two pieces of equipment that posed a high at-risk issue. Zack indicated that since the BBS program was implemented his knowledge and awareness of safety in the workplace has strengthened, and he suggested remedies for this area during his PEI. He explained, I've opened my eyes about safety concerns since doing BBS, and this has helped me to view different safety concerns for our other employees too, not just myself. So, it's helped me to look at the environment more in safety. I figured we need to put another barrier across this area to be safer.

Findings for Research Question Two

Research question two sought to determine how participants' perceptions of safe, at-risk, or barrier issues differed based on their work positions (e.g. front-line employee, supervisor, manager). One theme emerged related to this research question: participants' perceptions of safety issues were influenced by their role and duties in the workplace.

Participants' perceptions of safety issues were influenced by their role and duties in the workplace. A difference was seen in the ways in which front-line employees took notice of safety behaviors compared to other employee positions in the plant. The front-line employees, who work on the plant floor daily, noted the biggest change in their perceptions of safety issues in their workplace thanks to the BBS training they received. Two of these front-line employees, Bobby and Tom, both noted the seed elevator belt mechanism as an area that showed a major improvement brought forth after the BBS program implementation from an ergonomic and efficiency standpoint compared to their normal routine. Bobby explained, I enjoy this piece of equipment compared to how we used to do this. Things like this are more appreciated after learning BBS, and I feel that we are looking for things such as this to be safer in the workplace.

Other front-line employees took photos of a skid-steer loader that presented a potential area of risk where someone might slip, trip, or fall when entering and exiting the machinery due to damage to the step. According to John, this was not something he was aware of or even thought about before the BBS training. As he explained, "We pay more attention now with BBS – or I do. This is something I wouldn't have noticed before, but now I see that it seems small but is a big deal." He further explained how the BBS training has helped him understand the importance of recognizing these types of hazards and provides an opportunity for him to communicate with others about a potential danger in their work environment. He added, Open communication with BBS has helped this team a lot. Before, I was really just concerned about me. Now I'm like "Whoa, I know about this, so I need to communicate it to everyone in case they have to drive the skid-steer". Now I am concerned about others after doing BBS. I work with them and want them to be safe, and they want me to be safe. You begin to care for them. They trust you'd communicate a small little issue like this that they don't know about to keep them from getting hurt.

Interestingly, another employee who does not operate the skid-steer as part of his job duties also took a photo of this piece of equipment. This employee, however, focused on the durability and low tread of the tires as safety concerns rather than the damage that presented a fall hazard for those operating the equipment further demonstrating how the perceptions of employees differed according to their job duties and impacted how they view safe and at-risk areas in their work environments.

Conclusions and Recommendations

Overall, the BBS program seemed to change the way participants viewed their work environment and safe and at-risk behaviors, as well as their thought processes toward safety. Participants' ability to recognize behaviors and issues in the workplace is likely a result of their change in awareness to safety. Bandura's (1986; 1997) triadic reciprocal determinism helps to explain how the interaction of the participants' personal development, behavioral change, and the influence of the work environment increased safety performance and reduced safety-related behaviors in the workplace. The participants' awareness of the safe and at-risk areas in their plant, along with the use of positive reinforcement and communication, contributed to a reciprocal relationship that has affected their overall safety performance.

Further, their ability to more effectively recognize safety concerns and behaviors gives insight into their increased safety knowledge and awareness, which contributes to an increased self-efficacy about safety and furthers their engagement in collective-efficacy with each other. This in turn creates collective-action that helps to prevent injuries in the workplace through both their individual and group efforts (Bandura, 2000). Participants' improved ability to identify safety-related behaviors indicated that they see their work environment differently than before BBS was implemented, and some of their photos and interviews revealed a new thought process was occurring related to resolving at-risk issues. This was indicative of the evolution of their safety awareness, because they were more concerned about how to correct the problem and offered suggestions for improved safety. Instead of just noticing or being aware of the issues, the participants were also thinking about how to correct them to prevent injuries.

Another major finding of this study related to the differences in safety observations based on the work roles and responsibilities of the participants. Although everyone received the same BBS training focused on positive reinforcement and safety-related behaviors, the ways they used this knowledge in their work roles differed. Many participants commented on similar issues or took similar photos, however, not all employees saw things the same way. Given this context, it is important that organizational members possess an understanding of how different positions and roles in the workplace contributed to differing views of the physical work environment and the safe and at-risk behaviors identified by those members.

Several recommendations can be made based on this study. As one of the most dangerous industries in the nation (OSHA, 2017), it would also be beneficial for other agricultural organizations to explore implementing BBS programs to help reduce injury rates and possibly save lives. Additionally, organizations should look beyond traditional approaches to develop heightened safety programs in the future, including talking to a variety of employees within their organization to better understand what is needed to ensure maximum safety in the workplace. Further research should focus on better understanding how BBS contributes to the development of employees' safety awareness along with their increased inclination to notice and prevent

safety-related incidents in the workplace. A replication of this study at other sites could allow Bayer to better understand employees' perceptions of safety and would provide a more holistic understanding of the effects of the BBS program in reducing injuries within the organization.

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An unfolding affliction: A snapshot of Twitter activity about the rural opioid epidemic

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Beginning in the mid-1990s, many factors have contributed to the rise of opioid drug abuse in the United States. For rural America, higher rates of injury sustained in farming, mining, and manufacturing jobs coupled with lack of pain management options have given rise to dramatic increases in opioid prescriptions. For information on health issues, many turn to online sources. In particular, social media provide opportunities to communicate about health issues and concerns. The Health Belief Model (HBM) is used to explain change in health behavior and accounts for susceptibility perceptions and degree of severity on the issue. Communication is central to health beliefs and behaviors and holds potential to inspire people to act. This study provides a snapshot of Twitter content about the rural opioid epidemic for the first five months of 2019. As a testament to the complexity of the issue, results indicated a variety of stakeholders are engaged on Twitter, and various thematic content has been shared. Accounts with the highest numbers of rural opioid-related tweets tended to have lower numbers of followers. Smaller organizations and health educators actively involved in addressing this issue should foster partnerships with media outlets to extend their information's reach.

Introduction / Theoretical Framework

The medical community's growing interest in pain management in the mid-1990s led to encouragement of proper evaluation and treatment of pain symptoms (Campbell, 1996) and the late 1990s saw the introduction of prescription opioids to market. Pharmaceutical companies marketed opioids as a humane treatment option for pain (Tucker, 2004), and assured doctors that those prescribed opioid pain relievers would not become addicted (United States Department of Health & Human Services, 2018). Concurrently, medical students and trainees were taught to be more reliant on opioids for pain treatment and management (Jones et al., 2018).

Drastic increases in opioid-related deaths over a few short years culminated in a public health emergency in 2017. This declaration was the result of staggering statistics that indicated a quintupling of opioid-overdose deaths since 1999 (Hedegaard, Warner, & Miniño, 2017). In 2017, nearly 57 million persons filled at least one opioid prescription, and pharmacies dispensed more than 191 million opioid prescriptions (Centers for Disease Control, 2018a). While the implementation of prescription drug monitoring programs and acts of legislation have reduced the overall number of prescribed opioids (Dowell, Zhang, Noonan, & Hockenberry, 2016), deaths due to opioid overdose continue to rise in the United States (CDC, 2018b).

For rural communities, the lack of pain management options such as physical therapy only heightened the spread of opioids, as doctors sought to find solutions to manage their patients' pain. The prevalence of farming, mining, and manufacturing jobs in rural counties corresponds with higher rates of injury (U.S. Department of Labor, 2017). In turn, job-related injuries could increase instances of pain and opioid prescriptions (CDC, 2017b). Improper pain management practices (U.S. Department of Health & Human Services, 2018), and stressed economic conditions (Cicero, Ellis, Surratt, & Kurtz, 2014) may contribute to increased opioid use in rural

areas. The tight-knit nature of rural communities has contributed to faster distribution of opioids, as close social-networks allow for easier access to the drugs (Keyes, Cerda, Brady, Havens, & Galea, 2014). For farming communities in particular, the impact of spreading opioid abuse is clear. One recent study found three out of four farmers or farm workers were impacted directly by the epidemic (American Farm Bureau Federation, 2017). *The New York Times* detailed the story of an Ohio farmer whose children had all battled opioid addiction (Healy, 2017). Two of the three had died of overdoses, and the last struggled with addiction. While concerned for his surviving child, he also worried about the future of his 3,400-acre farm.

As issues such as those mentioned above arise, the internet provides an increasingly important means for accessing information. In fact, internet use is so popular that only 10% of American adults do not use it (Anderson, Perrin, Jiang, & Kumar, 2019). Health information is frequently sought by internet users. In 2013, 59% of U.S. adults searched for health information online and most sought information about a specific medical issue or disease (Fox & Duggan, 2013).

Used by at least 73% of U.S. adults (Perrin & Anderson, 2019), social media platforms have the potential to facilitate feelings of connection among users and allow users to control what information is shared. They also offer opportunities to communicate about health issues (Moorhead et al., 2013). Twitter, a free social networking platform, offers opportunity for health promotion. On the issue of tobacco use, past studies have demonstrated that those who sought to quit smoking looked to Twitter for social support (Prochaska, Pechmann, Kim, & Leonhardt, 2011), but while some state tobacco control programs attempted to use social media to share resources, the reach was low (Duke, Hansen, Kim, Curry, & Allen, 2014).

While social media in regard to health information is not without limitations, Moorhead et al. (2013) credits social media for increased accessibility to health information, social support, and opportunity to influence health policy. In their analysis of tweets related to opioid behaviors, Chan, Lopez, and Sarkar (2015) found a vast majority of the content was generated from individual accounts, with many expressing personal experience with opioids.

Persons experiencing stigmatized illnesses tend to avoid health education and care (Berger, Wagner, & Baker, 2005). Those afflicted with serious mental illnesses have turned to social media in the past to share their experiences and discuss information with others facing similar health concerns. Online peer interaction had positive benefits such as greater social connectedness and increased awareness of strategies for coping with the challenges of mental illness (Naslund, Aschbrenner, Marsch, & Bartels, 2016).

The Health Belief Model (HBM) served as the conceptual framework for this study. As one of the most commonly used frameworks in health behavior, HBM is used to explain change and perpetuation in health behavior and interventions (Janz, Champion, & Stretcher, 2002). HBM components include perceptions of susceptibility, severity, benefits, barriers, cues to action, and self-efficacy (Janz et al., 2002). HBM suggests for persons exhibiting high-risk behaviors, perceived susceptibility must occur before commitment to change the behavior is activated (Janz et al., 2002). Communication plays a vital role in nearly all components of the HBM. For example, “perceived susceptibility” requires populations at risk be defined, which is a function

of communication (Champion & Skinner, 2008) Additionally, “cues to action” may be triggered by promotional materials or media publicity (Champion & Skinner, 2008).

Purpose / Objectives

The purpose of this study was to gain an understanding of who and how the rural opioid epidemic was discussed on Twitter. The following research objectives guided the study:

- RO1: Determine the tweets and Twitter accounts with the greatest potential reach.
- RO2: Describe the top trending themes guiding Twitter conversation.
- RO3: Describe the Twitter accounts with the greatest volume of tweets.

Methods

Data for this study were collected using Meltwater, a social media monitoring platform that allows the user to monitor and analyze social media coverage through the use of informational dashboards (Vance, 2018). Twitter was selected for analysis as unlike many social media platforms, most tweets are public, and as many journalists and news organizations use it to interact with readers (Boyle & Zuegner, 2012). In Meltwater, Twitter data is limited to the most recent 12 months. As the rural opioid epidemic is an on-going issue, the date range of January 1 – May 1, 2019 to provide a current snapshot of the issue.

A search was conducted in Meltwater to collect U.S. Twitter content utilizing keywords “rural” and “opioid” and using at least one of the following terms or phrases: “health,” “healthcare,” “epidemic,” “farm,” “CDC,” or “Centers for Disease Control.” Data were exported to an Excel file containing 1,538 tweets for analysis. Descriptive statistics allow the researcher to organize, summarize, and describe observations (Ary, Jacobs, Irvine, & Walker, 2018). Variables measured in the study were trending themes, top tweets by reach, and top accounts by volume.

Findings

Meltwater calculates reach using the number of potential viewers exposed to the content. Collectively, the 1,538 tweets included in this study had a potential reach of 15,780,920. Research objective one was to determine the tweets and corresponding Twitter accounts with the the greatest reach. The tweet with greatest reach, more than 2 million, was composed and shared by @PBS in early April about an upcoming program that focused on the physician shortage and opioid crisis in rural America (Table 1).

No other individual tweets analyzed exceeded one million in reach, although 32 tweets had reach between 100,000 and 600,000. Additionally, the Johns Hopkins School of Public Health shared six tweets about the rural opioid epidemic which totaled more than 434,000 in reach for each tweet. Other posters with reach surpassing 100,000 included the foundations, many news organizations, journalists, elected officials, activists, candidates for office, and one researcher.

Table 1

Descriptive Data for Twitter Accounts with the Largest Reach

Account	Average Reach per Tweet	Number of Tweets	Total Reach Potential
@PBS	2,256,484	1	2,256,484
@Surgeon_General	580,576	2	1,161,152
@unfoundation	572,524	1	572,524
@JohnsHopkinsSPH	434,181	6	2,605,086
@StarTribune	360,967	1	360,967
@ggreenwald	270,979	1	270,979
@DailyMail	183,634	1	183,634
@seattlepi	183,264	1	183,264
@wbir	178,860	3	536,580
@Sen_JoeManchin	177,205	1	177,205

Research objective two was to describe the top trending themes guiding Twitter conversations about the rural opioid epidemic. Meltwater generated 20 total trending themes in the timeframe under investigation. In addition to the top 10 themes (Table 2), themes of rural health care, mental health, physician shortage, care, jobs, rural communities, and poverty were also detected.

Table 2
Top Trending Themes and Number of Mentions in Tweets (N = 5,999)

Theme	Number of Mentions (n)
Opioid epidemic	1,250
Rural America	685
Rural hospitals	521
Good jobs	396
Antitrust laws	395
Plan	395
Attorney General	393
Nursing homes	393
Opioid crisis	310
Opioid addiction	148

The third research objective was to describe the Twitter accounts with the greatest volume of tweets regarding the rural opioid epidemic. The Johns Hopkins School of Public Health was the account with the largest reach, despite a lower number of total tweets sent. The accounts identified as top influencer by tweet volume presented relatively low numbers of followers, as well as a lower degree of potential reach (Table 3).

Table 3
Top 10 Accounts by Tweet Volume

Source	Number of Followers	Number of Tweets
@RobRey2020	3,661	20
@RHRGateway	1,163	10
@ruralhealth	2,677	7
@People4Bernie	116,000	6
@ProjectECHO	3,978	6

@ruralhealthinfo	2,977	6
@JohnsHopkinsSPH	437,000	6
@HealthCareHeds	1,393	5
@monitor_PH	756	5
@NorthwestState	1,372	5

Conclusions, Implications & Recommendations

The findings indicated variation between top accounts by reach and leading accounts by tweet volume. A tweet from PBS garnered the most reach, greatly surpassing other accounts, demonstrating the potential to spread issue information to millions of people through well-followed accounts. Accounts that share information more frequently can also have greater reach potential overall, as evident in the series of tweets from Johns Hopkins School of Public Health.

While the accounts with largest reach potential were all mostly well-known, the accounts with largest tweet volume were, for the most part, more obscure. It is possible the personal account owners with high volume of tweets included in this study seek social support (Prochaska et al., 2011) or strategies to cope with the effects of the rural opioid epidemic (Naslund et al., 2016), while the more well-known or organization-focused account owners may have simply sought to share information or news.

The variety of Twitter accounts analyzed and the multitudes of varying themes uncovered in this study suggest the magnitude of complexity surrounding the rural opioid epidemic and provide evidence that diverse stakeholders are involved in the issue. It is promising to see leaders in education, news media, U.S. government, and activists all providing content about the rural opioid epidemic. The engagement of the U.S. Surgeon General, and several elected leaders may demonstrate potential for future policy development. Further, the prominence of tweets from multiple news organizations and journalists suggest ongoing developments or changes within the issue. However, despite being cited in other tweets in this study, the Centers for Disease Control and Prevention did not share any information from its own account specifically about the impacts of the opioid epidemic to rural America. Also largely missing from the conversation were universities, colleges, and healthcare representatives. As social media offer a platform for communicating about health issues (Moorhead et al., 2013), these organizations are encouraged to be more active on Twitter to promote resources and information to those who seek it.

The timeframe of this study does not allow for finite conclusions, but instead provides a snapshot of recent social media conversation about the rural opioid epidemic. As such, future studies should investigate other timeframes to detect any potential changes in trends or conversation leaders pertaining to this issue. Unfortunately, similar to other drug-control programs' social media efforts, many top accounts by volume analyzed in this study experienced low message reach (Duke et al., 2014). Those managing the top accounts by volume are clearly committed to resolving the issue, yet the impacts of their efforts to share information on Twitter are largely ineffective. The smaller organizations should seek partnerships with media organizations to further disperse their information which will help to correct for their lack of followership.

Finally, health educators should strive to build relationships with news outlets in order to share information with a broader audience. As communication is a key component of the Health Belief Model, it is imperative that health educators and researchers work with media outlets to effectively address perceptions of susceptibility to and the severity of the rural opioid epidemic (Janz et al., 2002). The news media hold the potential to inspire action on the issue that may lead to its eventual resolution (Champion & Skinner, 2008). University Extension may also be helpful in building the connections between education, research and media organizations.

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Collaborative Curriculum Design on Local Invasive Species Alleviates Barriers to Implementation of Authentic Science Experiences in High School Classrooms

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Teachers face significant barriers to inquiry-based high school agriscience curriculum implementation. We created a collaborative two-and-a-half-day curriculum redesign workshop to help teachers integrate authentic science activities into existing invasive species lessons. The workshops included content sessions focused on active university research on invasive ecology, and time for teachers to revise their lessons with the help of education and agriscience researchers. Of 15 teachers in 2017 and 10 in 2018 who attended the workshop, to date, eight have implemented the revised lessons in their classrooms and participated in follow up interviews about the remaining barriers to implementation. We identified themes of standardized testing, district mandates, time, and collaboration with other educators as barriers to implementation for these teachers. Following the professional development courses, several of the barriers were reduced for these revised lessons, especially those related to preparation time. We suggest continued research investigating barriers to implementation, while adapting traditional professional teacher development courses to address these obstacles.

Introduction

The creation of authentic learning experiences within the field of agriscience is a vital element for future generations' motivation to learn (Hume & Coll, 2010; Rivet & Krajcik, 2008; SENCER, 2014; Spell, Guinan, Miller, & Beck, 2014). Unfortunately, teachers who lead scientific instruction face technical and institutional barriers to proper lesson execution, despite self-reports of value of professional development materials (Johnson, 2006; Penuel, Fishman, Yamaguchi, & Gallagher, 2007; Zhang, Parker, Koehler, & Eberhardt, 2015). In parallel, agricultural educators search for ways to integrate more traditional STEM content and practices into their coursework (Thoron & Myers, 2008) to continually improve the preparation of our future agricultural workforce.

For years, U.S. agricultural and science education reforms have emphasized the need for contextualized, authentic education, best defined as content embedded in everyday situations relevant to learners' lives (National Commission on Excellence in Education, 1983; National Research Council (U.S.), 1996). Despite this long-term emphasis, little research exists on the success of contextualized programs (Rivet & Krajcik, 2008). Historically, emphasis in science curricula has been on discrete facts rather than contextualized knowledge (National Research Council, 2012; Rivet & Krajcik, 2008; Thoron & Myers, 2008), and students lack engaging opportunities to experience how agriscience is done (Bruner, 1996). Limited formal school STEM preparation is a major contributor to problems employers face in finding a skilled STEM labor force (Carnevale, Smith, & Melton, 2011).

Traditionally, teaching involves giving students information directly, emphasizing one right answer. Curriculum is fixed, assessment is summative, and work is individual. Discussion is

limited, leaving little time at the end of a lesson for questions (Bok, 2015). However, in scientific learning, tradition is encouraged to be challenged with constructivist lesson plans where students work with others and turn mistakes into opportunities – learning via the construction of meaning from experience (Bierema & Merriam, 2014). Following teacher training, an expert-novice paradigm in the classroom is possible through improved content and pedagogy training (Saroyan, 2000). Identifying the relationship between topics discussed during a class session to the students' questions complements constructivist learning theory by providing educators an avenue to generate a constant conversation with the class without isolating individual students.

The potential value of community-level problems such as invasive species to provide this framework is often overlooked. Real-world natural resources problems such as invasions of non-native species require creative solutions integrating and weighing multiple sources and types of data from science, engineering, math, and social studies (Netherland & Schardt, 2009). Invasive species cost governments millions in loss of crops, recreational activities, and environmental damages estimated to cost billions annually (Pimental, Zuniga, & Morrison, 2005). Finally, while knowledge, skills, and abilities are necessary, they are not sufficient to promote student desire to become STEM workers and engaged citizens. Students must have awareness of potential STEM careers and envision themselves as capable and enthusiastic participants in those careers (Bajema, Miller, & Williams, 2002). Rural youth in particular have limited role models and career aspirations due to their smaller communities with different cultures than urban environments. While teacher professional development is regarded as essential to improving student achievement, data are only recently emerging for what effective professional development looks like (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007).

Research suggests teachers face several barriers in implementing new curricula. Confidence, pedagogical familiarity, and reluctance regarding science curricula creation and adaptation is a documented issue, as well as difficulties implementing investigation-driven class sessions in tandem with district-mandated content objectives (Johnson, 2006, 2007; Lakshmanan, P. Heath, Perlmutter, & Elder, 2011; Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2010; Sandholtz & Ringstaff, 2014; Supovitz & Turner, 2000). A lack of available resources and other institutional barriers such as standardized testing are also commonly cited problems (Arora, Kean, & Anthony, 2000; Bauer & Kenton, 2005; Keys & Bryan, 2001). Co-design solutions involving peer mentoring (*Academic & Classified Employee Support Mentoring Network @ UW Oshkosh*, n.d.; Cooper, n.d.; Sweeny, n.d.), and opportunities to reflect on practice (Darling-Hammond, Chung Wei, Andree, Richardson, & Orphanos, 2009; Tran & King, 2011), have not been widely empirically studied (Penuel et al., 2007; Zhang et al., 2015). Collaborative curriculum design has shown promise for improving teacher content knowledge (Tammen, Faux, Meiri, & Jacque, 2018).

The university has provided traditional content-based professional development for teachers, and lessons and materials for students, on invasive plants and their management since 2005. Our assessments demonstrate that teachers value the content and even wish for a follow-up workshop. Our approach in the current project was to design professional development that reduces implementation barriers through teacher co-design of lessons, with content built around authentic research into current local invasive species problems to increase student invasive plant ecology knowledge and practices related to authentic research, as well

as science identity. We brought together teachers, scientists, and education researchers to re-design existing high school science lessons to include authentic research on local invasive species to maximize implementation of lessons in classrooms and enhance student agriscience literacy.

Our theoretical framework is ultimately a bricolage (Kincheloe & Berry, 2004), involving elements of constructivism (Driver, 1995) for the student lesson revisions, as students build on existing knowledge, and socioculturalism (Vygotsky, 1978) and communities of practice (Lave & Wenger, 1991) for the teacher professional development, as the teachers work together with each other and professional researchers to re-design the lessons.

Purpose and Objectives

We examined the effectiveness of a collaborative curriculum redesign workshop to include authentic agriscience experiences. For this project, we use this definition of authentic research: “working on a problem of personal interest for which there is no known answer, gathering and analyzing raw data, and reporting results to have an impact on a real-world audience,” (Schack, 1993, p. 29). Our work addresses Question 4 of Research Priority 3 of the AAAE National Research Agenda: “What methods, models, and programs are effective in preparing people to work in a global agriculture and natural resource workforce?” as we help the teachers to create lessons that they can truly implement in their classrooms. We had two research questions: What barriers to implementing the revised curriculum did teachers face after the workshop? What barriers did teachers feel like were lower after the workshop if not eliminated?

Methods

Fifteen teachers in 2017 and ten teachers in 2018 attended a two-and-a-half-day residential workshop on campus at a large southeastern public university. Teachers represented agriculture, environmental science, and biology courses from all grades 9-12. The workshop included short presentations on current invasive species ecology research from agronomy faculty, inquiry-based instruction lesson planning from education researchers, and field trips to local sites of research experiments and invasive species infestation. Approximately half of the total hours were devoted to teacher collaborative work to redesign their lessons and presentations with feedback. After the summer workshop, teachers implemented the lessons in their classes in the following school year. Following completion of the lessons, teachers were invited to take part in a 45-minute interview asking about the reaction of the students and remaining barriers to implementing the lessons. Author 2, a faculty member in education research with ten years experience in qualitative research designed and conducted the interviews. To date, five teachers from 2017 (30%) and three from 2018 (30%) completed interviews. Using constant comparative analysis (Glaser, 1965), we identified themes related to our research questions both expected and emergent themes. Together the two authors created a codebook, and author 1, an education graduate student, coded the transcripts while consulting with author 2 on questions.

Results

For research question 1, teachers mentioned facing all the barriers identified in the literature after undertaking our professional development, plus one, physical proximity for collaboration, which was not identified beforehand. In particular we discuss the following themes related to barriers to implementation that remained and teachers discussed in-depth: standardized testing; district mandates; time; and collaboration with other educators.

Standardized testing, while valuable in assessing student relationships nationally and other norm-referenced interpretations, is a barrier that remained for participants. Kelly, who teaches Cambridge AICE learners, said that students “need to have a little bit more project based [work] because their test is all essay ... there’s just so much accountability and testing and all this takes away from the other enrichment types of activities.” Regardless of the student level, standardized test was touched upon by nearly every participant as a negative.

Participants reported district-mandated content objectives that served as barriers to authentic science investigation. “District mandates are really what our curriculum map looks like,” ninth and tenth grade honors biology teacher Kira explains, “and of our reporting categories, our lowest one is still life and ecosystems.” Amber, an AP biology teacher adds, “it’s more about covering the standards on a block schedule.” District restrictions also prohibit field work, said AP Environmental teacher Leslie.

Teachers reported time for planning and collaboration was scant. Some educators are forced to use their lunch break to collaborate, such as Ramona, a freshman and sophomore biology teacher who explained, “just collaborating with others 45 minutes a week. That’s all we really get now, realistically, and I tend to meet with my department at lunch to bounce ideas off each other.” Eugenia also noted this limitation. “[our curriculum] doesn’t allow the open communication or flexibility and you’re only meeting 45 minutes basically once a week, three weeks a month.” She sums up saying, “it doesn’t give a lot of time. So if you’re not physically near the people you need have those conversations with, [communication] tends to not ever happen.” Most of teachers we interviewed touched on time as a recurring issue.

Teachers also mentioned a recurring barrier we did not identify in the literature, namely proximity to other educators of similar fields to collaborate and exchange teaching strategies. “There was no one at my school ... so that could be the issue if someone’s new to an area,” says Kelly when discussing how she felt isolated when brainstorming peers to collaborate with, “and it’s hard to come up with a partner. I think it’s great to work with somebody else just to bounce ideas off each other and develop something.” Many of the teachers found it difficult to collaborate within their own schools. “I don’t have that many contacts ... that are going to understand what I’m talking about,” middle and high school biology teacher Ethan said. “[Peer discussion] was really, really helpful for someone like me who doesn’t have anyone at my school to collaborate with ... or understand the issues that I’m having because science is a whole different beast than a lot of other subjects.”

In addressing Research Question 2, we identified various barriers that were diminished following workshop attendance: time to design or revise lessons, collaboration, and standardized

testing. “They’re getting experience on how they think up their setup and how they’re figuring out their experimental designs and how they each modify them,” Eugenia explains regarding teacher benefits from the workshop, “some firsthand experience with the actual research or having a helping scientist like I think your programs that you do with the high school kids are phenomenal.” In regards to the value of in-person advice, Kira adds, “knowing where they come from and knowing their expertise has much validity in there,” after being asked about lesson plan development during the workshop. Amber also gained time during the school year during the workshop activities by explaining, “when you gave us time and then we had to get up and present, and actually having to put it all together and present, that was helpful.” Ethan added, “we practiced together in a group and then we worked on our own lessons and had all of you there to aid in me not getting stuck,” in contrast to his normal setting where there are few contacts to interact with effectively. Ramona explained how the projects impacted the standardized testing barrier, saying her students “had to actually think about the problem and the solutions in the future. And I think a lot of times they don’t make that connection in science. I think they just like to memorize what they need for the test.” Every participant shared the value of on-site collaborative curricula development, alleviating the proximity barrier and helping educators implement the lessons while tending to district-mandated content objectives.

Conclusions and Recommendations

We successfully assisted teachers in creating lessons that involved more authentic science experiences while incorporating local invasive species issues. We lowered the impact of some barriers to implementing these in their classrooms for this lesson on an important natural resources issue. However, while for this individual lesson, many of the barriers of preparation time were virtually eliminated, we did not eliminate all the barriers to authentic science experiences completely. In particular, teachers still face issues related especially to standardized testing, district mandates, time, and resources for collaboration. While the literature currently groups many of these barriers under lack of time for teachers, we feel that this is a disingenuous representation, especially when time may be allocated for professional development but may not be used to its advantage. Our research is qualitative and therefore faces the accompanying limitations (Dooley, 2007), though we feel transferability to other high school agricultural and life sciences contexts can be identified.

Future research involves continued investigation of barriers to implementation and specifically, how collaborative curriculum professional development can be spread by participants to others. Traditional professional development that continues to only provide content to teachers without addressing some of the barriers is likely to continue to fail to adequately prepare teachers to incorporate authentic agriscience experiences. Examining the proximity of agriscience teachers, both in agricultural and science programs, to other similar educators could also be investigated. Finally, future research must involve investigating student success with the lessons as an outcome of lower barriers to implementation.

We suggest developing more professional development that draws on the expertise of teachers to collaboratively co-design in order to meet their particular district and curricular standards, particularly for authentic contemporary issues that may not fit neatly into current content

standards. If teachers cannot find partners in their schools or districts, teacher educators must explore alternative ways to promote these partnerships, such as virtual communities. Collaboration between agricultural educators and science educators, to provide visibility for the former and real-world context for the latter, may help address this (Barrick, Heinert, Myers, Thoron, & Stofer, 2018).

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Are they communicators? Scientists' perceptions of their science communication abilities

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Project requirements or institutional demands have forced scientists to communicate their science to broad audiences. Yet, scientists often receive little training related to communication skills, making it difficult and unpleasant for them to reach the public. The study described herein sought to examine what abilities scientists believe indicate effective science communication and to what extent they possess such abilities. To assess this, we developed a survey instrument using the Science Communication Learning Goals Model and Dillman's best practices for instrument development. We selected a purposive sample of Texas A&M University faculty whose primary appointment was in a science-based college (N=1,755). We achieved a 15% response rate with 266 completed responses. Results indicated that respondents were most confident in their ability to clearly interpret and explain scientific information and to provide accurate information so that people can make informed choices. Respondents believed they lacked the ability to convert complex ideas into understandable concepts, present to the public, and develop personal connections with an audience. Considering that these communication abilities are essential to the public's understanding of science and enhancing support for the scientific community, scientists' perceived lack of ability indicates a direct cause for the disconnect that exists between scientists and the lay public. This information will assist in developing skills-based resources for Texas A&M University faculty in the science-based colleges.

Introduction

Public groups without a science background often have strong and influential opinions about scientific concepts they perceive to be controversial (Boulter, 1998). Sometimes, these opinions evolve into misconceptions that impede support for the scientific community (Boulter, 1998). Often times such misconceptions about scientists and their research can be attributed to the lack of effective communication between the scientific community and the public. Another contributor is the absence of readily-available and easily-understandable information for mass consumption, as most scientific material is filled with technical jargon that is incomprehensible and tedious for the public. For example, agriculturalists involved in beef production may assume that words such as “crossbreeding” or “culling” are common knowledge; yet, the majority of the population do not have working definitions of these terms (Brownell, Price, & Steinman, 2013).

Besley, Dudo, Yuan, and Ghannam (2016) defined science communication training as “any activity wherein someone from the scientific community—often a natural scientist with no formal communication background—receives sustained guidance on how to communicate effectively ... or engage[s] in a structured practice communicating about science” (p. 357). Through qualitative interviews, they found that science communication trainers believe scientists

attend training programs with long-term personal goals, yet trainers often teach scientists communication skills that do not align or prepare them to achieve such goals (Besley et al., 2016). Trainers often prioritize building knowledge and often fail to address fostering excitement, building trust, and reframing issues (Besley et al., 2016). However, before knowing what scientists need to learn to become more effective communicators, we must understand the level of knowledge scientists possess (Baram-Tsabari & Lewenstein, 2013).

Conceptual Framework

The study aligned with the six constructs of Baram-Tsabari and Lewenstein's (2017) science communication learning goals model that was adapted from the U.S. National Research Council's six strands of learning science in informal environments (Bell, Lewenstein, Shouse, & Feder, 2009). Science communicators who are *affective*, the first construct, experience excitement, motivation, and support for science communication. Those who have *content knowledge*, the second construct, understand and use specific science communication concepts, arguments, and models. Effective science communicators can also use scientific communication *methods*, the third construct, meaning they implement written, oral, and visual communication skills to foster constructive dialogues with non-science audiences. Furthermore, science communicators who have mastered *reflection*, the fourth construct, can reflect on science communication's role in society and make sense of their personal learning experience. Those who value *participation*, the fifth construct, actively involve themselves in scientific communication activities and engage in effective conversations with non-science audiences. Lastly, those who root their *identity* in science communication, the sixth construct, can contribute to the field of science communication.

Purpose

The purpose of the study was to examine the abilities scientists believe indicate effective science communication and to what extent they possess such abilities. Understanding such through the lens of a scientist produced insight into how science communication training opportunities can be tailored to best meet scientists' needs. McCroskey and McCroskey (1988) wrote that although self-reports do not reflect actual performance or ability, they serve as a legitimate research approach in the communications discipline. Such information offers a deeper understanding of communication behavior (McCroskey & McCroskey, 1988). We need to ensure that, when scientists do engage with the public, the communication is effective and efficient and serves the needs of the receiver, which involves more than scientists having the ability to engage with the public and to construct messages. It further involves scientists developing interpersonal and relational abilities, understanding science controversies, and learning how to facilitate public discussion. The literature related to science faculty and their science communication skills and abilities is limited, thus, emphasizing the need for further investigation.

The purpose was achieved using two objectives:

1. Identify which abilities related to science communication scientists feel most confident they possess and which abilities they need professional assistance to learn; and
2. Describe which aspects of science communication scientists believe they are most confident in implementing.

Method

The study is part of a larger research study; therefore, the methods described herein may be similar elsewhere.

The quantitative study described herein used descriptive survey methodology (Fraenkel, Wallen & Hyun, 2019) to examine the abilities scientists believe indicate effective science communication. We surveyed 1,755 research scientists of all ranks in the colleges of agriculture, engineering, science, and veterinary medicine and biological sciences at Texas A&M University, a large research institution. More than half of the respondents were males, and more than half were Caucasian. We achieved a 15% response rate with 266 completed responses. To incentivize participants, we donated two dollars for each completed questionnaire to the food bank on campus.

We developed a survey instrument that aligned with the science communication learning goals model (Baram-Tsabari & Lewenstein, 2017) and included questions that represented the learning objectives within each construct. The process to develop the instrument also relied on guidance from previous literature on science communication. We achieved content validity through an independent examination of the instrument by each member of the research team to ensure the items were consistent with the conceptual framework used, and we made necessary changes to the initial instrument based on collective feedback. We also conducted a pilot study to ensure reliability of the instrument and to verify that participants understood the material. Results from the pilot study warranted changes to the wording and formatting of several questions. The final instrument contained 51 questions, addressed 6 constructs as well as demographic information, and took participants approximately 22 minutes to complete.

Results

Respondents indicated they had wide range of science communication skills and abilities and assessed their skills as problematically low on a variety of abilities essential to science communication. For example, 49.62% ($n=132$) of respondents ranked their ability to demonstrate themselves as trustworthy and credible sources of scientific information to the public as below average or poor, 59.02% ($n=157$) of respondents ranked their ability to convert complex ideas into understandable concepts for the public as below average or poor, and 54.14% ($n=144$) of respondents ranked their ability to present to the public as below average or poor. Respondents also indicated they had difficulty maintaining public engagement as 46.24% ($n=123$) ranked their ability to use effective storytelling tools to engage the public (e.g. engages the imagination, uses common structures for narrative) as below average or poor.

Additionally, respondents suggested they find it challenging when attempting to build personal connections with those who do not have a science background as 42.11% ($n=112$) ranked their ability to develop personal connections with the public based on shared scientific experience and values as below average or poor. Similarly, respondents indicated they have trouble creating tailored messages as 42.11% ($n=97$) ranked their ability to create messages that meet the public's needs and wants as average and 35.34% ($n=94$) ranked their ability as below average or poor. Respondents also indicated they need professional training on how to develop appropriate communication strategies as 37.6% ($n=100$) ranked their ability to develop communication

strategies for delivering project findings as average and 30.45% ($n=81$) ranked their ability as below average or poor. Results show that respondents find it difficult to engage with the public through hands-on activities as 30.45% ($n=79$) ranked their ability as average and 33.46% ($n=89$) ranked their ability as below average or poor.

Respondents, however, did indicate more confidence in their ability to use principles of risk communication as 28.2% ($n=75$) indicated their ability to implement these principles were above average or excellent. Respondents also indicated more certainty in their management and evaluative skills with 28.95% ($n=77$) ranking their ability to manage a science communication project as above average or excellent and 25.19% ($n=67$) ranking their ability to evaluate effectiveness of science communication strategies as above average or excellent. Respondents are split, however, in their ability to facilitate public discussions as 37.97% ($n=101$) ranked their ability as average, 16.54% ($n=44$) ranked their ability as above average or excellent, and 23.69% ($n=63$) ranked their ability as below average or poor. Similarly, 35.71% ($n=95$) of respondents ranked their ability to mitigate science controversies as average, while 22.93% ($n=61$) ranked their ability as above average or excellent and 19.92% ($n=53$) ranked their ability as below average or poor.

Relative to respondents' ability to effectively engage with the public, they expressed confidence in their capability to relay and understand scientific information with 62.41% ($n=166$) ranking their ability to interpret scientific information clearly as somewhat above or far above average. In addition, 62.78% ($n=167$) ranked their ability to explain scientific information clearly as somewhat above or far above average, and 63.91% ($n=170$) ranked their ability to provide accurate information so people can make good choices as somewhat above or far above average. Participants also indicated they were confident in their ability to increase public understanding of science or research topics and processes as 49.62% ($n=132$) ranked their ability in this category as somewhat or far above average. Respondents suggested they were confident in their ability to communicate the relevance of science to people as 51.88% ($n=138$) ranked their ability to do so as somewhat above or far above average. They similarly ranked their ability to communicate the importance of science to people as 53.76% ($n=143$) placed themselves as either somewhat above or far above average in their ability level. On the contrary, respondents expressed less confidence in their ability to engage with the public in back-and-forth communication as 31.20% ($n=83$) ranked their ability to do so as average and 12.41% ($n=33$) ranked their ability as somewhat below or far below average.

Conclusions

Respondents at a large research institution are apprehensive about their ability to communicate about their science in a way that is easy to understand and well received by the public. Respondents in our study were most confident in their ability to manage a science communication project, use principles of risk communication, and evaluate the effectiveness of science communication strategies. Yet, they were least confident in their abilities to convert complex ideas into understandable concepts for the public, present to the public, and demonstrate themselves as credible sources of scientific information. Scientists' lack of confidence is disheartening as university faculty have lead the way in scientific expertise across disciplines, from agriculture to medicine. Yet, it seems as though the public's continued diminish of scientists' expertise has impacted scientists' perceived confidence.

We recognize this finding could be the result of many things, so there would be value in further investigation.

Furthermore, respondents were most confident in their ability to comprehend and explain scientific information but suggested a need for professional training to re-frame messages in simpler terms for more people to understand, to develop personal connections with the public based on shared scientific experience and values, and to use effective storytelling tools to engage the public (i.e. engage the imagination, use common structures for narrative). Thus, scientists need training related to structuring narratives and telling stories that maintain public engagement and ensure comprehension. In addition to the training needs described above, respondents need training on how to build their relational skills, which will involve developing empathy and the ability to be aware of what is going on in another person's mind. This will not only assist with maintaining public engagement and building personal relationships, but it will also help scientists convey themselves as trustworthy and credible and cause them to be viewed this way from a consumer perspective.

We recommend future research be conducted to determine if scientists' perceived skill level and ability related to various science communication practices aligns with their actual competence. This will help us understand further how to appropriately build training materials that are of maximum value and provide insight as to why scientists might perceive their ability a certain way. Perceiving communication efforts accurately and evaluating them effectively is an important aspect of science communication. When scientists interact with the public, it is important they interpret audience reactions and adjust their message and approach accordingly. We also recommend research be conducted to understand the public's perceptions of scientists' skill level and ability related to different science communication practices and approaches, such as those reported in our study. It would be interesting to compare scientists' perceptions of their communication competence to the public's perspectives. This information would aid in the development of training materials that enhance science communication in all disciplines.

The first step to mitigating a problem is understanding the problem. Therefore, if the problem is the lack of communication between the scientists and the public, we must understand the problem and where it originates. We perceive that part of the communication gap starts with the lack of communication training for scientists. Therefore, the first step in closing the gap between the science and the public is investigating science communication from the scientists' perspective. We chose to start with Texas A&M University because it is a large land grant institution with a national and international presence. In understanding the communication barriers here, we can develop communication training for scientists in all regions of the world and in the many sub-disciplines of the larger science discipline.

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Dissonance in the Ranks: A Study of California Early Career Agriculture Teachers Who Left the Profession

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Abstract

Early career agriculture teachers (ECAT) are the most vulnerable among us who are at risk for departing the profession prior to retirement. The most current research perspectives focus on their intentions to leave, and rarely do researchers venture into the realm of those who have left the profession. A case study was conducted on early career agriculture teachers who departed the profession prematurely with the purpose of understanding how their context impacted their goals while teaching. Engeström's (1987) cultural-historical activity theory (CHAT) frames this study to understand how situated context influences early career agriculture teachers' decisions to leave. People in the ECATs community circles were the most prevalent agent that influenced their daily lives and were simultaneously the largest source of dissonance. Reasons early career agriculture teachers left the profession are given, but primacy is given to a systems-based perspective of teacher experiences during their time in the profession.

Introduction/Theoretical Framework

It is no secret that agriculture teacher attrition is a topic of historic concern (Kantrovich, 2010). Common understanding in the profession is that the role of an agriculture teacher is much more complex than that of their peers (Terry & Briers, 2010; Torres, Ulmer, Aschenbrenner, 2008), which leads to many potential reasons for dissonance during the career life of an agriculture teacher. As roughly 70% of all agriculture teachers who leave the profession prematurely do so voluntarily (Smith, Lawver, & Foster, 2018), the nuance behind how a teacher arrives at the decision to leave becomes of interest.

Recent research on teacher retention in agricultural education has been focused on teacher intentions to leave (Sorensen, McKim, Velez, 2016; Tippens, Ricketts, Morgan, Navarro, 2013) and commitment to the profession (DeLay & Washburn, 2013; McKim, Sorensen, Velez, & Henderson, 2017; Sorensen & McKim, 2014). There has been particular interest in the impacts work-life balance, workload, and collaborative ability agriculture teachers experience around turnover intentions and commitment to the profession. Few studies have ventured further to examine why some agriculture teachers depart the profession voluntarily prior to reaching retirement age (Lemons, Brashears, Burris, Meyers, & Price, 2013; Smith, Wolf, Billington, Thapa, 2018). However, with such a high percentage of voluntary leavers we are well past the time of exploring intentions, short on knowledge about the triggers that impact early departure, and in need of a better understanding about facets of the system of agricultural education that may provide continued strain on the career of an early career agriculture teacher.

This study was based in the frame of cultural-historical activity theory (CHAT) synthesized by Engeström (2015, 2001, 1987). He offers a perspective on how evolutions in work-based activity take place through complex social and cultural contexts, which mediate outcomes to goals and

sometimes the outright evolution thereof. Specifically, he outlines an activity system (Figure 1) as a part of cultural-historical activity theory (CHAT).

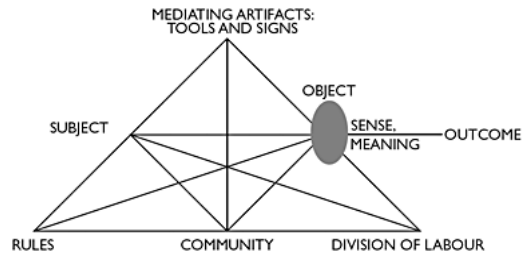


Figure 1. An activity system outlined by Engeström (2001).

Within this activity system *subjects* (e.g. early career agriculture teachers) engage in activities towards achieving an *object* (goal) which is impacted by mediating artifacts, rules, community, and divisions of labor. *Mediating artifacts* are the resources (e.g. curriculum & professional development) utilized by subjects in their efforts to achieve their object. *Rules* (e.g. credential requirements or school start time) are means and norms by which subjects are governed or directed as they engage in activities. *Community* (e.g. peers, students, parents) refers to people or groups engaged in the activity system whose actions may also influence the object and the subject's progress towards it. Finally, the *division of labor* illuminates community members' interdependent roles (e.g. agriculture teachers serving as FFA advisors and administrators evaluating the teacher). Primary to analysis of an activity system are the interactions between elements that occur during the process of striving toward the object of the activity system.

Therefore, in this study, ECATs are seen to be impacted by many different facets of the education system in addition to their personal lives. They are each unique. Each of them comes from varied backgrounds and with varied motives for entering a career as an agriculture teacher. Most importantly, ECATs cannot be separated from their context, and they are situated at the intersection of social and cultural phenomena (both personal and professional) that impacts the evolution of their career.

Objectives

The objectives for this study were to: 1) codify a system of agricultural education that teacher leavers interacted with during their time teaching and 2) understand the greatest area(s) for dissonance. Understanding where dissonance occurs leads naturally to the next step of figuring out how the dissonance can be resolved. Engeström (2001) terms this *knotworking* as a description of the social and cultural processes that take place to evolve the activity system into one the subject can function within to achieve their goals.

Methods

This study was conducted through the analysis of multiple cases within California. Merriam (2009) defines a case study as, "an in-depth description and analysis of a bounded system" (p. 40). The binding criteria in this study was the population of early career agriculture teachers (years 1-5) from California who left the teaching profession voluntarily between 2007 and 2018.

These teachers may have been employed in some other branch of education, but not as secondary agriculture teachers--for which they had been originally prepared.

By these criteria a list of 85 teachers was generated from California Agricultural Teachers' Association archives and distributed to agriculture education faculty at university teacher preparation programs and state agriculture education staff for verification. A recruitment survey was generated to solicit participation and administered via Dillman's (2009) method of quantitative data collection to increase response rates. In addition to the email, a link was distributed through a social media group to maximize coverage of the population and include any potential cases for whom we might not have had adequate contact information. A total of 124 contacts were made, which yielded 57 responses (18 email; 39 social media) (46% response rate). After cleaning the data for completed responses and eliminating duplicates a sample of 26 useable cases was generated. The case was bounded by other purposive criteria including: duration of teaching, teacher preparation institution, gender, and education level. Follow up emails were sent to 10 of the individuals for participation in the study. Five individuals responded and coordinated time for an interview. They serve as the sample for the case presented.

Data was analyzed using the Dedoose™ coding platform. A codebook was generated a priori utilizing the major tenets of an activity system (Engeström, 1987). Theoretical coding (Maxwell, 2013) was applied deductively by examining the experiences in each participant's statement for alignment with theoretical codes (i.e. mediating artifacts, objects, rules, etc.). Coded data were then examined for repeating phenomena and themed into the most prevalent examples across all cases. To mitigate bias the interview protocol was developed with several test subjects, reviewed by a panel of experts. To increase trustworthiness, the findings were reviewed a second time to intentionally look for data that were contrary to the initial findings (Yin, 2017).

Findings

There were two major themes that emerged from the data, in the context of the larger activity system: community was a significant component of their activity system, and the most contradiction in activity (dissonance) occurred with community members. To understand each case within context their demographic characteristics are included in Table 1. The *subject* of all activity systems was each early career agriculture teacher who had voluntarily exited the profession. In fact, each participant had moved entirely out of education, either working in the periphery of education (i.e. non-government organization) or opting to remain home as a stay-at-home parent.

Table 1
Demographic Breakdown of Participants

Participant	Gender	Years of Service	Education Level	Current Occupation
Annie	Female	2	Bachelors	Stay-at-home parent
Sarah	Female	5	Bachelors	Stay-at-home parent

Jose	Male	4	Bachelors	Agricultural Sales
William	Male	4	Masters	Educational NGO
Steve	Male	2	Masters	Government

Note: To maintain anonymity, specifics about current occupation are generalized.

The *community* of people surrounding these participants was relatively consistent, but central to the most enjoyable and most contentious aspects of their lives and careers. Community members consisted of agricultural teaching partners, science teachers, administrators, guidance counselors, school support staff, students, parents, university supervisors and school community supporters (e.g. agricultural boosters). Students seemed to serve as the most proximal undertone for positivity that gave each of the ECATs purpose for their work. Similar in proximity but discussed by the participants in more depth was the connection to colleagues; namely, teaching partners. William describes his time with one of his colleagues as, “Carlos and I would spend a lot of time together before, during and after school ... you just naturally formed a close relationship.” However, a strong relationship with a teaching partner did not stop conflict from arising as both William and Jose talked about having frank conversations with their colleagues about their positionality within the department or being negatively impacted by their colleagues at some point in time.

Participants also talked about other colleagues on their school campus--usually in a positive tone, parents and community members, their university supervisors, and students as other central agents to the work they did as agriculture teachers. Colleagues on campus were either “very supportive” and “awesome” or “terrible.” While these sentiments were generally reserved for administrators, other support staff (including counselors) and colleagues were talked about in a tone of positivity. Steve recalled “the senior (12th grade) counselor used me as a resource to help kids do resumes, get them into college,” which aided in his ulterior motive of helping disenfranchised students have opportunity for growth.

In addition to those at work, every participant talked about their family (spouses, children, siblings, parents) having an impact on them during their career. Whether it was impactful words or meaningful life events, family members played a pivotal role in the career of ECATs. Indeed, it was children and a progressing relationship that pulled Sarah and Annie away from the profession, respectively. Sarah became emotional when recalling the fact that her son took his first steps while she was at work. But this theme was not limited to the women; Jose was also conflicted about the future of his relationship. Jose described openly that, “the reason I got out was basically due to the fact that my relationship was starting to suffer.”

Also central to the work that ECATs did were the mediating acts of varying roles (*divisions of labor*) held by members of their identified communities. They often looked on administrators and counselors as providing beneficial leadership and a collaborative environment for growth, which connotes the beneficial relationships that helped the ECATs strive for their goals. Even so, there were instances of administrative imposition where these early career agriculture teachers were imposed on at the will of poor administration or policies that were not conducive. William recalled from his first teaching site, “[at] no point in that whole time there I felt like I was tee'd

up to find success” largely because of the principal’s leadership style. Sarah also recalled the imposition of school district policies on her ability to involve her family in her career stating that, “you’re not allowed to take your children in the ag vehicle...I had to arrange specifically for someone else to bring them.”

In addition to the benefit and hindrance of administration, participants talked about the norm of parents helping *and* hindering the establishment of the ECAT as an authority. Annie recounted that she “had the parents that were extremely helpful and that always volunteered for everything and supported me in whatever decision that I was going with for the program. And then I had the parents that tried to sway me certain ways and weren’t always the nicest or kindest or most helpful.” Steve echoed this contention between himself and parents in county fair settings with student’s supervised agricultural experience (SAE) projects. He said, “I had a few different parents that thought they were the FFA advisor ... and that was a constant bone of contention and butting heads. Me trying to run a program with my kids while they were interfering.”

Throughout their time teaching each of the participants felt strains and tensions that evolved over time. This dissonance either prolonged the development of meaningful connection with their family or hindered their growth as a professional. For Jose, a family business opportunity arose to work closer to home and spend more time with his growing family. The opportunity was easier to take because of the constant tension between colleagues’ expectations of him and his own feelings about his exhaustive efforts. Not feeling like he had been able to reconcile his department’s expectations with his own ultimately made it appealing to depart the profession and take the new opportunity. In the other cases where immediate family was the most salient reason to leave teaching secondary agriculture (Annie and Sarah) the participants stated they could definitely see themselves returning to the profession when their obligation to family was not so intense. However, when there was an opportunity to make a broader impact at a higher level, in the case of William and Steve, they said that while they valued their time teaching they would likely not return to the classroom. While each of them jumped at an opportunity to leave, they talked fondly about their time teaching secondary agriculture.

Conclusions & Recommendations

The purpose of this study was to understand the actors and agents that most closely exemplified the activity system of early career agriculture teachers who departed prematurely from the profession in California, and understand the most salient areas of dissonance within that activity system. Each of the participants talked at length about the impact their teaching partners, administrators, and parents had on their ability to do their job and achieve their professional goals. Students commonly served as the glue that held these participants in the profession, but this connection was eventually overwhelmed by the struggle for validation that made the ECATs feel like they were doing what they expected of themselves. In true fashion to Engeström’s (2015) work, the most dissonance is derived from activity that is inhibited by the division of labor in conjunction with the community members who assume those contradictory roles. Recognizing this is the first step to critically examining the system in which we recruit, prepare, and foster all agriculture teachers, but early career agriculture teachers more immediately. Therefore, it is recommended further research be conducted to:

1. Explore how the profession (both agricultural education and education writ large) can act on being more inclusive of the needs of ECATs (i.e. those starting a family).
2. Expand our understanding of how agriculture teachers interact with their community members, most importantly parents and administrators that cause the most dissonance, and explore systematic corrections (or support for resolution) relative to that dissonance that might keep early career agriculture teachers in their positions.
3. Explore the nature of teacher preparation institutions, and how they might provide practical experiences that are conducive to the more efficient and applicable education of preservice and novice teachers.

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Sources of Agricultural Background Among Florida Residents Includes Variety of Everyday Experiences

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In recent years, the American population has continued its shift from rural and farm lifestyles to urban and metropolitan residencies. Whereas previously nearly 30% of the United States population lived or worked on a farm, today that number hovers nearer 2% of people living in rural areas or working in agriculture or related fields. At the same time, rural land development is increasing dramatically. With these changes, the average person's experience in agriculture is no longer defined completely by occupation or residence. How then is modern agricultural experience gained? In this study, we asked residents of Florida to share their knowledge about agriculture in a series of focus groups on agritourism. By breaking down the focus group data by trends and themes in the interviewees' responses, we can begin to redefine agricultural background and use this new information in audience analysis and segmentation. Beyond jobs in the agriculture industry and residence in rural communities and on farms, this study takes note of knowledge and exposure gained from everyday, nonformal, or informal experiences such as education, family tradition, travel, consumerism, and gardening.

Introduction

Contemporary issues facing Americans involve agriculture more than ever, including climate change, public health, and land use. Yet agricultural literacy and trust in agricultural science required to weigh in on these issues still faces challenges (Landrum, Hilgard, Lull, Akin, & Hall Jamieson, 2018; Lundy, Ruth, Telg, & Irani, 2006), and direct experience with agriculture is declining. In the United States, farm and rural community residents have declined in recent years to about 20% in 2010 (U.S. Census Bureau, n.d.). While half of the American workforce in 1870 was employed in agriculture (U.S. Bureau of the Census, 1975), as of 2017, only 1.2% of the workforce was employed in agriculture, forestry, fishing, and hunting ("May 2017 National Occupational Employment and Wage Estimates," n.d.). Agricultural literacy is of interest to researchers regarding a person's ability to make informed decisions related to sustainability or agricultural policy (Laqua, Nair, & Mills Jr, 2016). Historically, agricultural experience has influenced college students' literacy and perceptions of agriculture (Birkenholz, Harris, & Pry, 1994). However, one recent study of U.S. adults indicate over half of respondents reported no experience in agriculture, in school or out (Stofer & Schiebel, 2017).

In agricultural education, communication, and extension, measurement of agricultural knowledge and experience is an important step in audience analysis. Audience analysis can not only identify a communicator's publics, but it can also determine the audience's needs and the most effective communication methods to meet those needs (Huang, Lamm, & Dukes, 2016). Identifying subgroups can help extension agents and communicators create programs and reach specific audience segments according to their unique characteristics (Huang et al., 2016).

Researchers have acknowledged the role of experience for several audiences. With schoolchildren, the influence has been mixed, with some evidence suggesting that experience does play a role in perceptions and knowledge for older students (e.g. Burris, 2013), and other evidence suggesting that experience plays less of a role for urban elementary school students (Hess & Trexler, 2011). Other research with adult public stakeholders (Stofer and Schiebel, 2017), and location in urban vs. rural environments (Lewis, 2013) have indicated agricultural experience impacts one's knowledge and perception of agriculture. Recent studies may not take into account experience, even enrollment in high school agricultural courses (Dale, Robinson, & Edwards, 2017), and the variety of experiences with agriculture one may have is expanding. To date, there seems to have been no attempt to create a comprehensive typology of experiences such that a common instrument can be used across studies or for audience segmentation.

To use an audience segmentation approach, one must understand what prior knowledge their audience has, as well as how their audience gained this knowledge. Research on agricultural literacy has explored both how an individual's background affects literacy (e.g. Pense & Leising, 2004) and how literacy affects attitudes toward agricultural issues (e.g. Laqua et al., 2016). Analysis of an audience's agricultural literacy can be more in-depth when there are tools to determine how and when people gain their agricultural literacy. To determine the backgrounds and experiences that shape a person's agricultural knowledge, researchers and communicators must examine more than the demographics of employment, residence, and education to form a clear picture of their audience's interactions with agriculture. Once researchers identify these experiences, they can segment audiences into subgroups that are easier to target and reach, to address the AAAE Research Agenda Priority 1: Public and Policy Maker Understanding of Agriculture and Natural Resources (Enns, Martin, & Spielmaker, 2016).

Although people gain agricultural experience in various ways, there is not a significant amount of literature that attempts to collate these forms of experience. Because of these considerations, the literature surrounding agricultural experiences falls into many different categories and areas of study. Researchers have studied formal learning experiences in agriculture in detail over the years for their effects on agricultural literacy. In addition to formal agriculture courses, some students experience agriculture outside the classroom but with supervision and connections to course credit through Supervised Agricultural Experiences, especially in urban schools (Rubenstein, Thoron, Colclasure, & Gordon, 2016). Outside the classroom, however, is where most of a U.S. adult's life and learning occur (Falk & Dierking, 2010). Learning can occur simply based on where one lives, and such experiences can result in differences including between urban and rural adults, and those who lived on farms and their "non-farm neighbors" (Frick, Birkenholz, & Machtmes, 1995, p. 44).

Purpose and Framework

Because this study is exploratory but designed to answer a specific purpose, our framework is pragmatism (Thayer, 1982), choosing our methods to fit our question rather than using the methods and framework of a particular theory. The purpose of this study was to qualitatively assess the breadth of agricultural experiences of adults in Florida.

Method

We collected the data for this study during a series of focus groups on agritourism that took place during the late spring and summer of 2016. We conducted the focus groups in five different cities in Florida over ten sessions; two sessions each in the northwest (NW), northeast (NE), central (C), southwest (SW), and southeast (SE) parts of the state. There was a total of 76 participants, ages 18-75. An outside firm recruited the focus groups from a proprietary opt-in panel searching for adult state residents with an interest in agritourism. Groups ranged in size from five to ten participants, and moderators from our research group conducted the discussions. The overall focus group questions asked participants about their experiences with and preferences for agritourism, defined for the participants based on legal definitions from state statutes. We audio recorded the discussions and used an outside service for transcription to text.

Focus groups averaged eight participants each, distributed roughly evenly geographically. Most participants identified as female (55%). Participants skewed older, with 40% over age 65, 28% age 55 to 64, 23% age 35 to 54, and only 5% of participants in each of the ranges of 18-24 and 25-34. Most of the participants had at least some college; only 5% had no college, and 28% had a graduate or professional degree. Five percent of participants indicated they were Hispanic/Latinx, 22% were Black or African American, and 67% were White. Eighty percent of respondents reported income less than \$150,000 per year for their household, with approximately 20% each for less than \$25,000, \$25,000-\$49,999, and \$50,000-74,999, and 28% \$75,000-\$149,999. Our participants were older than the overall state population. By race/ethnicity, they roughly reflect the state, with the exception of the percentage of Hispanic/Latinx, which was very low relative to the overall state demographics. Level of education at the high school level was similar to the state, but those with four-year degrees or more were over-represented in our groups. Participants also had more income than state residents overall.

For this study, our analysis focused on the portion of the focus group that contained the discussion prompt, “Describe your knowledge of agriculture, and tell me how you gained that knowledge.” We coded the data using constant comparative analysis (Creswell, 2013). Due to our interest in the breadth of responses as well as commonalities, we also identified sources that may have been mentioned by only one participant but were answers to the question of how the participants gained their agricultural knowledge. The faculty member first author from a department of Agricultural Education and Communication has over eight years’ experience analyzing qualitative data. An undergraduate researcher from the same department worked with the faculty to find and refine themes. The undergraduate coded the majority of the data after building an initial codebook with the faculty member based on co-coding of an initial focus group section on agricultural experience. We used both expected codes (Miles & Huberman, 1994) from the authors’ own experiences in agriculture as well as prior literature and emergent codes (Bogdan & Biklen, 2007) for analysis. The faculty member and undergraduate met weekly during the coding process to discuss findings, resolve issues, and finalize the codebook and definitions. During writing, the undergraduate consulted with the faculty researcher’s entire lab group to ensure themes were clear and establish confirmability (Dooley, 2007). We provide thick, rich descriptions for dependability and reliability. Finally, for credibility, the moderators asked focus group participants at the end of each session if a summary the moderator provided was accurate, including for the question of agricultural experience, to provide member checking.

Results

In addition to our expected themes of education, experience through work, and residence, we found the following themes about participants' sources of agricultural knowledge: stages of life, who they know, and consumer experiences. Only two participants reported they had no experience with agriculture at all. One of those did report he had interest in nutrition, recognizing the connection of agriculture to food at the very least.

For education, we discovered two sub-themes: education inside a school setting and education outside a school setting. More participants reported informal learning than formal learning experiences. Formal education included any classes or clubs in a school setting, including FFA programs, agriculture classes, natural science classes related to agriculture, home economics classes, and college-level courses. These experiences, unlike the out-of-school educational activities, were typically restricted to participants' grade school years. Informal learning included experiences through agritourism, agricultural clubs including 4-H, museums, books, and the media. These experiences ranged from involvement in structured programs to self-directed learning through available resources. For example, one participant mentioned visiting an open house put on by a local agricultural club (NE, 6/01).

The theme of participant residence referred to living in both rural and urban areas both currently or previously. For example, one participant stated that they lived in an "agriculture-free [urban area]" growing up (NW, 4/27). Other participants who had lived in rural areas could name details about the crops grown in their area. Some participants reported that their time living in a rural area increased their knowledge of agriculture, such as, "I grew up [in an urban area], and then later on moved up to rural America, so I figure I learned a lot about it" (SE, 6/08). Participants reflected on how moving from one town or region to another impacted their experiences or involvement with agriculture. One stated, "I grew up in [another state] so I know a lot about farming apples, and in Florida just what I see on the news about crops and when it gets cold" (NE, 5/26).

Participants' interactions with agriculture in their jobs not only mentioned working on a farm but also included responses that referred to instances where participants engaged in an agricultural experience as part of their job. For example, one participant (SW, 6/02) described collaborating at a local extension office to build a community garden while working at a YMCA. Another participant (SW, 6/15) was a chef who bought food directly from farms and grew herbs for himself. One reported teaching wildlife and agriculture programs (SE, 6/08).

The next theme we found was participants' stages of life, such as childhood, parenthood, or retirement. For example, some participants began their explanations with the phrase, "I grew up..." and listed their experiences from their childhood first. Some participants gained agricultural experience during retirement, when they reportedly had more time to get involved in agriculture, such as the participant (NW, 4/27) who volunteered at a community garden or the participant (NE, 5/26) who bought a farm after retiring. The community garden volunteer stated, "I've been exposed more in the past 3 years to more agriculture than I ever have been before." Other participants became more interested in engaging in agriculture while they were raising children, such as the participant (SW, 6/02) who gardened while her kids were young.

Participants also reported experience through relationships with people they knew. While participants may not have had experiences in agriculture themselves, they heard stories and information from friends and family members. The relationships with their friends and family also provided opportunities for participants to experience agriculture, like the participant who traveled to their friend's vineyard (NE, 6/01) or the participant who learned about produce from their friend who was a distributor (NE, 6/01). A central area participant (5/05) who grew up in an Amish community reported strong ties to agriculture. Participants also learned agricultural skills from family members, like the participant in the southwest (6/02) whose grandmother taught them how to garden and can food.

While not every participant reported experiences in agricultural food production commercially or personally, there were several participants who recognized their role in agriculture as consumers. These participants recognized that by purchasing food, they were a part of the agriculture industry, such as the participant who stated, "agriculture to me was whatever we went to the grocery store, and groceries" (SE, 6/08). Other participants reported buying food from a farmer's market or directly from a farmer.

Discussion

From our focus group analysis, we see that there is a wider landscape of agricultural experiences than what researchers collect in standard demographic data such as education level, location of residence, and industry of occupation. Our participants reported experiences from informal education, interacting family and friends, different stages of life, and consumerism. Within expected experiences based on residence, we note that moving plays a role in experience, especially moving from rural to urban locations or vice versa. Within experiences related to work, we found participants who interact with agriculture through work though their industry is not considered agriculture. Also, a change of situation may have prompted people to look at agriculture more critically by comparing their new situation to their previous one. Participants also recognized a distinct disconnect from agriculture in most urban areas, at least in the past.

The limitations of this study are mainly related to the scope of the data gathered. Because we conducted the focus groups in five cities of only one state, and those that responded to a recruitment for a study specifically about agritourism, we may still be missing experiences from other parts of the U.S. population. In addition to the sample limitations, this study focused on only one open-ended question asked to the participants as part of a larger project. We did not attempt to reach data saturation on this topic due to the nature of the larger study.

In the future, we recommend researchers conduct more in-depth research, both qualitative and quantitative, with a larger sample size, sampling from multiple states and asking more than one question. We may even see more sources of experiences found as answers come from larger and more geographically diverse samples of participants. Future studies in particular could examine differences among states or regions given a larger sample of data. Our data can help researchers understand how audiences have experienced agriculture and how these experiences have impacted their perceptions and agricultural literacy. With continued research in this area, we can

better understand the experiences that impact agricultural knowledge and perceptions, and design initiatives to improve public understanding.

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Mentoring Impacts on Oklahoma Induction Year School-Based Agricultural Education Teachers: A Modified Delphi Study

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For the past 15 years, no structured mentoring program has been offered for Oklahoma school-based agricultural education (SBAE) induction year teachers. This study sought to find consensus among an expert panel representing Oklahoma SBAE regarding the impact on induction year SBAE teachers without a structured mentoring program. Sixty-two unique statements representing eight themes met consensus among the panel. Oklahoma SBAE induction year teachers and their programs are negatively impacted from the lack of structured mentoring program. The planning, funding, and implementation of a mentoring program for Oklahoma SBAE induction year teachers should be a focus of professional development.

Introduction, Review of Literature, and Theoretical Framework

Requirements for induction year and mentoring activities for school-based agricultural education (SBAE) teachers differ across state lines (Franklin & Molina, 2012). Beginning in 1980, Oklahoma induction year teachers were supported by a cohort of university faculty, school administration, and veteran teachers (House Bill 1706, 1980). This program was widely welcomed by Oklahoma teachers (Simms, 1983). However, the structured mentoring program for induction year teachers was defunded through state budget cuts in 2004 (McKean, 2013). In subsequent years, no structured mentoring has been offered to induction year SBAE teachers.

Solomonson, Korte, Thieman, Retallick, and Keating (2018) included teacher preparation and development as a contributing factor to the retention or attrition of a SBAE teacher. The induction year requires the most intensive professional development of any career stage (Katz, 1972). According to Moir (2003), “quality induction programs promote greater teacher retention, breaking the cycle of attrition, which saves money for school districts and ensures that teacher shortages do not dictate hiring policy” (p. 1). Peiter, Terry, and Cartmell (2005) suggested mentoring, or the professional development relationship formed between experienced and novice colleagues, as an effective and efficient method to assist SBAE teachers in navigating the many challenges they encounter during their induction year. According to Joerger (2002), professional development for induction year SBAE teachers may “ensure elevated levels of personal satisfaction, student achievement scores and success” (p. 11). The induction year can have lasting impacts throughout a teacher’s novice years (Katz, 1972).

Katz’s (1972) stages of development and training needs of preschool novice teachers served as the theoretical foundation for this study. Katz (1972) described the professional development of novice teachers in four stages. Mentoring was identified as a vital training need throughout the survival and consolidation developmental stages. These stages begin in the preservice teaching phase and continue into year two of professional teaching experience (Katz, 1972). According to Katz (1972), “exchanges of information and ideas with more experienced colleagues may help teachers master the developmental tasks” (p. 6).

Purpose and Objectives

This study was grounded in the third research priority identified by the American Association for Agricultural Education (Stripling & Ricketts, 2016). The purpose of this research was to describe the expert panel's perceptions regarding a lack of structured mentoring for Oklahoma induction year SBAE teachers and their programs. The objectives were to:

1. Identify goals of a workplace mentoring program for Oklahoma induction year SBAE teachers via a panel of experts.
2. Describe an expert panel's opinion on outcomes of a mentoring program for Oklahoma induction year SBAE teachers.
3. Determine the impact of mentoring on SBAE induction year teachers in Oklahoma as determined by a panel of experts.

Methods

The modified-Delphi was chosen to achieve the purpose and objectives. As described by Hsu and Sandford (2007), the Delphi is "a widely used and accepted method for achieving convergence of opinion concerning real-world knowledge solicited from experts within certain topic areas" (p.1). It has been widely implemented in the field of agricultural education (Martin & Frick, 1998).

An expert panel ($N = 42$) was identified from Oklahoma SBAE personnel. The 12 experienced SBAE teachers were chosen for their involvement in the previous mentoring program. The seven agricultural education state CareerTech staff were chosen for their daily interactions with novice and experienced Oklahoma SBAE teachers. Seven teacher educators from three Oklahoma post-secondary institutions were included for their role in developing future agricultural educators. Second-year Oklahoma SBAE teachers ($n = 9$) were included in the panel to give voice to novice teachers' concerns. School administrators familiar with SBAE programs ($n = 7$) added administration viewpoints to the panel. Participants were contacted through email and provided a link to complete the instrument. Demographic data revealed round one respondents were 86.36% male. SBAE teachers composed 45.45% of the sample with 22.73% state CareerTech staff, 18.18% university professors, and 13.64% school administrators. These individuals have an average of 10.90 years of experience in their current position and 15.10 years of teaching experience. All but four were traditionally certified. 68.18% had experience in structured mentoring programs, either as a mentor, protégé, or both. 86.36% participate in professional development activities at least once every few months.

In round one, the panelists were asked three open ended questions to address the objectives of the study. Panelists also responded to seven demographic questions. Panelists provided comments relating to the following questions.

1. What are the overarching goals of a workplace mentoring program?
2. What are three major outcomes of a mentoring program that are beneficial to a first-year teacher?
3. How does the absence of a structured mentoring program impact a first-year agricultural education teacher?

Responses were narrowed to unique statements and grouped into like themes (Diaz, Warner, & Webb, 2018). Responses from 25 panel members were collected in this round for a response rate

of 59.52%. Only those who responded to the previous round were invited to participate in the subsequent round (Mantooth & Fritz, 2006).

Round two sought to collect the panel’s level of agreement on a six-point, summated scale to the 67 statements generated as a result of round one. Panelists were also given the opportunity to provide additional feedback on each of the eight themes identified from round one responses (Roberts, 2006). Regarding consensus, *a priori* levels of 80% (Roberts & Dyer, 2004) and 90% (Easterly & Myers, 2017) were averaged for a consensus level of 85%. Items that at least 85% of the expert panel marked as somewhat agree, agree, or strongly agree were considered as meeting consensus. Items receiving less than 50% agreement were dropped from the study (Easterly & Meyers, 2017). Items scoring 51% to 85% were included in the round three instrument that was distributed to 21 (50% response rate) round two participants.

Round three sought to reach consensus or reject the remaining 14 statements. Panelists were asked to agree or disagree with each item (Easterly & Meyers, 2017). Comments for each of the eight themes were collected. Sixteen respondents (38% response rate) participated throughout the three rounds. Panels greater than 13 members are considered reliable (Dalkey, 1969).

Findings

Round one produced 73 unique statements. The first question produced 11 statements, question two produced 30 statements, and the third question produced 32 statements. Statements were grouped into eight themes. Emerging themes from these statements were *building mentoring relationships, effective emotional management, effective SBAE program management, impact to agricultural education profession, improving student learning, increasing teacher retention, introduction to school climate, and reinforcing effective teaching behaviors.*

In round two, each response from round one was subjected to a six-point summated scale to assess the level of agreement. Of these statements, 55 reached the consensus threshold of 85% agreement, four failed to be agreed upon by half the respondents and were dropped, and 14 were included in round three for final approval or rejection from the panel.

In round three, seven statements met final consensus. Combined with the 55 statements from round two, the final list of consensus includes 62 statements that 85% of the panel agree are true of mentoring SBAE teachers. All eight themes from round one met consensus (see table 1).

Table 1.
Final Consensus List in Themes and Questions

Theme	Question	Item
Building Mentoring Relationships	1	-Develop new and returning teachers
		-Extend professional networks
		-Gain meaningful professional relationships
		-Observe master teachers
		-Pair experienced and novice teachers
		-Support new teachers
		-Active partnerships for periodic feedback
	2	

			-Assist new teachers set goals
			-Build lasting professional relationships
			-Collegiality with fellow teachers
			-Improve abilities to mentor in the future
			-Increase teacher collaboration
			-Readily available advice and opinions
	3		-Informal mentoring already in place
			-Lack of support
			-More likely to make uninformed decisions
			-Professional isolation
			-Time Consuming
Effective Emotional Management	2		-Encourage a healthy work-life balance
			-Improve self-efficacy
			-Improve teacher morale
			-Improve teacher satisfaction
	3		-Become overwhelmed with job related activities
			-Erode self-confidence
			-Feelings of helplessness
			-Foment feelings of burnout
			-Hasten job-related apathy
Effective SBAE Program Management	2		-Additional organization
			-Improved time management
			-Greater general program knowledge
			-Strengthen community connections
			-Understand allocation of money
	3		-Contribute to program failure
			-Miss deadlines
			-Negative community impacts
Impact to Agricultural Education Profession	3		-Creates an attitude of unimportance of new teachers' success
			-Greatly enhances the responsibility of others to provide training
			-Limits teachers' start in the profession
			-Negative impact on the profession
Improving Student Learning	2		-Ability to teach students from diverse backgrounds
			-Effective classroom management
			-Improved student engagement
			-Improving student learning
			-Increase student achievement
	3		-Affects student success
Increasing Teacher Retention	1		-Increase retention rates
	2		-Increase teacher retention into the second year of teaching

Introduction to School Climate	1	-Inform new and returning teachers about school procedures
	2	-Clarify expectations -Improve communication with stake holders -Provide knowledge of how a school functions
	3	-Lack of clarity regarding school functions
Reinforcing Effective Teaching Behaviors	1	-Enhance classroom instruction skills -Gain insight to teaching abilities -Increase teacher success
	2	-Accountability to instructional goals -Deliver effective and effective lessons -Continue education in content area -Improve self-awareness of teaching performance
	3	-Assessment of teaching -May contribute to poor or under performance -Time management for effective teaching

Conclusions and Recommendations

Objective one sought consensus regarding goals of mentoring SBAE teachers in Oklahoma. The first question provided the most agreement from the panel in round two ($M = 4.92$, $SD = 0.83$). All statements met consensus. Therefore, panelists concur mentoring program goals reflect school climate, teaching behaviors, building mentoring relationships, and teacher retention.

The second objective described the expert panel’s opinion of the outcomes of a mentoring program for SBAE teachers. The second question generated the smallest average standard deviation ($M = 4.82$, $SD = 0.74$), indicating close agreement among the panel. All but one statement met consensus. The panel agreed there is a wide range of mentoring outcomes for induction year SBAE teachers, mirroring findings from Katz (1972) and Darling-Hammond (2010). This variety highlights the wide-ranging impacts for induction year teachers. They believe all areas of an SBAE program may benefit from a structured mentoring program.

Objective three describes the panel’s opinion on the impact of mentoring for Oklahoma SBAE teachers. The panel had the most disagreement on the third question. Of the 32 unique statements generated, 22 met consensus. This expert panel believes a lack of mentoring negatively impacts Oklahoma induction year SBAE teachers. However, there is some disagreement over specific concerns, providing a line of inquiry for future research.

While the panel recognized Oklahoma’s induction year SBAE teachers commonly utilized informal mentorship, they also identified the shortcomings of current induction orientation practices. One member noted “new teachers seek advice from those who’s advice is not always sound or valuable” while another wrote “first year teachers get a lot of advice from different points of view. The message is not consistent.” One panel expert summed up the importance of building mentoring relationships with “new teachers don’t know what they don’t know. Sometimes they don’t know to ask or even what to ask.” It is recommended that the

implementation of a structured mentoring program be further investigated for Oklahoma SBAE induction year teachers with the goal of reflecting all themes expressed in expert responses.

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Assessing the Dimensional Validity of the University Florida Critical Thinking Inventory (UFCTI) in Chinese: A Confirmatory Factor Analysis

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Abstract

The importance of assessing critical thinking (CT) has been emphasized extensively by numerous administrators and faculty in higher education worldwide. In a contemporary international agricultural sustainable development environment, agricultural students need to deal with controversial issues in international settings. With the increasing number of Chinese students studying in the U.S., educators need to be aware of the importance of supporting students within the intercultural classroom environment. The diversity of cultural backgrounds results in different ways of thinking. Thus, it is necessary to explore the way in which students think to facilitate issues involving international stakeholders. The purpose of this study is to evaluate the construct validity and reliability of the Chinese version of the University Florida Critical Thinking Inventory (UFCTI) on a sample of Chinese undergraduate agricultural students studying in China. UFCTI measures CT styles with two constructs: engagement and information seeking. Confirmatory Factor Analysis (CFA) was applied to examine the hypothesized factor structure. Construct validity and reliability results were supported with the construct reliability (CR), average variance expected (AVE), McDonald's omega, and Cronbach' alpha values, which indicate high validity and reliability for the Chinese version of this instrument.

Introduction

Critical thinking (CT) plays a powerful role in professional and personal life. Current research about student CT at all education levels has permeated the education literature worldwide (Yeh & Chen, 2003; Ku & Ho, 2010; Lun, Fischer, & Ward, 2010; Tiwari, Avery, & Lai, 2003). Rudd, Baker and Hoover (2000) posited "CT is a reasoned, purposive, and introspective approach to solving problems or addressing questions with incomplete evidence and information and for which an incontrovertible solution is unlikely" (P.5). CT is often regarded as a core competence needed by graduates in an era of globalization. Countries across the globe strive to improve their educational systems to prepare their citizens for the challenges of the 21st century. Chinese students are the greatest source of international students who study abroad, accounting for 33% of total international students in the U.S. (Institute of International Education Open Doors Report, 2018). Thus, it is imperative that U.S. universities admitting students from China learn to teach from the Chinese students' strengths, particularly as students are matriculating into the U.S. higher education system. (O'Sullivan & Guo, 2010).

Embedding appropriate teaching strategies into the diversity or intercultural learning environment is very important to facilitate effective international agricultural education. Research indicates that the way of thinking varies across cultures (Brown, 1998; Zhang & Sternberg, 2011). The

incongruence between students' cognition style, behaviors, and the educational contexts pose challenges for educators to improve CT (Tan, 2017; Lun, 2010). Some professors and educators found that Chinese students have challenges with demonstrating CT for classroom engagement (Dong, Anderson, Kim, & Li, 2008; Durkin, 2008; Chen, 2017). In order to increase student's interaction, agricultural educators need to strive to explore the way students think to enhance academic performance. By understanding how students approach complex issues, it is hoped that educators can incorporate different teaching strategies and methods to enhance students' CT by encouraging learning engagement and truth seeking attitudes.

Researchers developed the University Florida Critical Thinking Inventory (UFCTI) to measure CT style on a continuum between seeking information and engagement. (Lamm & Irani, 2011). They defined CT style as the way that an individual calculates the outcomes of thought processes and research probable solutions to a problem (Lamm, 2015a, 2015b). UFCTI has been widely used in agricultural education, communications and extension (Putnam, Lamm, Lundy, 2017; Gorham, Lamm, & Rumble, 2014; Leal, Rumble, & Lamm; 2017). The instrument consists of 20 items and uses Likert-type scales that range from 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, and 5 = *Strongly Agree*. This inventory has sound psychometric properties and good reliability as it has been tested and revised for more than 10 years (Lamm & Irani, 2011). However, the UFCTI has not been translated into Chinese.

Purpose

The purpose of this study is to translate the UFCTI from the English (its original language) into Chinese, and to ascertain the reliability and validity of the UFCTI Chinese version for broader adoption among Chinese agricultural administrators and faculty.

Methods

The UFCTI was translated from English to Chinese by a panel of bilingual educators after acquiring the permissions from the developers. Six Chinese experts in higher education served participated in the translation process from English to Chinese to ensure content validity. A sample of 148 undergraduate agricultural students in China were invited to complete the translated version in an online format. Structural equation modeling (SEM), implemented in Mplus Software (Muthén & Muthén, 2008) was used to analyze the participants' responses on the Chinese version. Specifically, Confirmatory Factor Analysis (CFA), was applied to examine a hypothesized factor structure which described associations of latent constructs with the items, and correlations between latent constructs (Milfont, & Fischer, 2010). In order to determine the reliability and validity of the UFCTI Chinese version, the analysis primarily focused on examining internal consistency (reliability) and construct validity. Cronbach alpha (α) was used to estimate the internal consistency of the items, and McDonald's omega (ω) was used for measurement of the general factor saturation (i.e., factor reliability). In addition, composite reliability (CR) and average variance extracted (AVE) were used to estimate the construct validity. CR values greater than .60 indicate adequate reliability at the construct level. Item reliability was assessed by the loadings of the items on their respective constructs. An absolute standardized loading of items greater than .05 is considered a good reliability. The criteria of assessing the fit of the CFA model included the

comparative fit index (CFI), the Tucker-Lewis Index (TLI), and the root mean squared error of approximation (RMSEA). If CFI is greater than 0.90, it indicates adequate fit to the model (Hu & Bentler, 1999). TLI has the same cutoff values as the CFI (Schumacker & Lomax, 2004). If the Root Mean Square Error of approximation (RMSEA) is less than .08, it indicates adequate fit; if the value is less than .05, it suggests an excellent fit (Browne & Cudeck, 1992).

Results

Table 1 presents standardized factor loadings and unstandardized factor loadings of the items, reliability and validity measures. The Cronbach's α for the *engagement* dimension was .84, indicating good internal item consistency, and the Cronbach's α for the *seeking information* dimension was .92, indicating excellent internal item consistency. The McDonald's ω for the engagement dimension was .82 and the seeking information dimension ω was .92, indicating both constructs have high factor reliability ($>.70$). The CR value for engagement dimension was .89, and the CR value for the seeking information dimension was .92. Both CR values indicated good reliability at the construct level. In terms of item reliability, the items' absolute standardized factor loadings were all well above .05. AVE was used to test the convergent validity that estimates the amount variance explained by the construct related to the amount of variance attributable to error. AVEs in this study were .41 and .48. Both were less than .05, which indicates that more errors are found in the items than variance explained by the latent factor structures that items associated with. Thus, the results indicated that the UFCTI Chinese version has an adequate level of item reliability and construct reliability. The fixed-factor scaling methods (McArdle & McDonald, 1984) was implemented such that the (latent) variances and means of each dimension were fixed to 1 and 0, respectively. The hypothesized model (Figure 1) showed adequate fit to the model: CFI=.95, TLI=.94, and RMSEA= .05, confidence interval [CI = .04, .07]. Overall correlations for all the items had small to large positive linear relationships ($r = .21-.67$). All of the relationships among the items had positive correlations and were significant at .001 alpha levels. This indicates that the relationships among the items follow good simplex patterns within the main ideas.

Conclusion/Recommendations/Implications

This study provided a valid UFCTI Chinese version which was designed to measure Chinese agricultural students' CT styles. This study strengthens the importance of cultural context for assessing CT styles. Therefore, future research on assessing CT may provide insights about how to incorporate useful perspectives into international and multicultural agricultural education programs. The Chinese version the UFCTI will be useful to improve the intellectual understanding for the Chinese students so as to diminish the intercultural education challenges. Further, by understanding the Chinese students CT styles, educators will be able to efficiently support students based on their critical thinking styles. Improving the intercultural understanding can bring different resources, perspectives, and knowledge to the internationalization of agricultural education. The sampling bias should be a concern in this study because the samples were collected at a single university. Future research should be repeated with students in different fields of study from multiple universities in China.

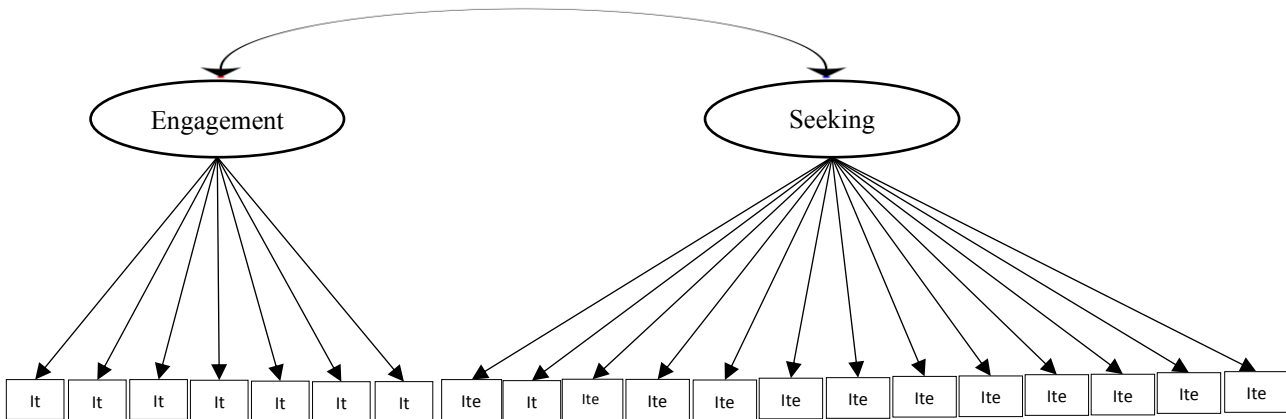


Figure 1 Hypothesized factor structure^a and correlations among latent constructs.

^aItem 1 = Opportunities to solve problems, Item 2 = Interest in many issues, Item 3 = Relate to a wide-variety of issues, Item 4 = Finding answers to questions, Item 5 = Good problem solver, Item 6 = Confident in conclusion, Item 7 = Present issues clearly, Item 8 = listen carefully, Item 9 = Enjoy learning, Item 10 = Importance to be well-informed, Item 11 = Ask lots of questions, Item 12 = Willing to change opinion, Item 13 = Consider facts without biases, Item 14 = Enjoy learning, Item 15 = Get along with people, Item 16 = Search for truth, Item 17 = Find right answers, Item 18 = Find multiple solutions, Item 19 = Ask questions in decision-making, and Item 20 = Problems have numerous solutions.

Table 1

Factor loadings and reliability measures

Constructs	Items	Mean	SD	UFL	SFL	AVE	CR	α	ω
Engagement	1. I look for opportunities to solve problems.	4.12	.82	.64	.79	.41	.89	.84	.82
	2. I am interested in many issues.	3.78	1.02	.56	.55				
	3. I am able to relate to a wide variety of issues.	3.46	.89	.52	.64				
	4. I enjoy finding answers to challenging questions.	3.65	.84	.50	.59				
	5. I am a good problem solver.	3.37	.90	.50	.56				
	6. I am confident that I can reach a reasonable conclusion.	3.70	.81	.55	.68				
	7. I present issues in a clear and precise manner.	3.66	.89	.61	.70				
Seeking information	8. I listen carefully to the opinions of others even when they disagree with me.	3.78	.94	.61	.65	.48	.92	.92	.92
	9. I enjoy learning about many topics.	3.72	.97	.68	.70				
	10. It is important to be well informed.	3.57	.90	.53	.59				
	11. I ask lots of questions in a learning environment.	4.22	.89	.63	.72				
	12. I am willing to change my opinion when I am given new information I find to be credible.	3.91	.91	.58	.64				
	13. I try to consider the facts without letting my biases affect my decisions.	3.95	.83	.59	.72				

	14. I enjoy learning even when I am not in school.	3.61	.88	.49	.56				
	15. I can get along with people who do not share my opinions.	3.67	.90	.63	.70				
	16. I search for the truth even when it makes me uncomfortable.	3.77	.90	.62	.69				
	17. I will go out of way to find the right answers to a problem.	3.84	.82	.64	.78				
	18. I try to find multiple solutions to problems.	3.70	.81	.59	.73				
	19. I ask many questions when making a decision.	3.80	.89	.64	.72				
	20. I believe that most problems have more than one solutions.	4.09	.84	.63	.75				

Note. SD = standard deviation; UFL = unstandardized factor loading; SFL = standardized factor loading; AVE = average variance extracted; CR = composite reliability; α = item reliability of each measure for Cronbach's α ; ω = McDonald's omega coefficient.

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Personas of Agricultural Education Supporters: A Q-Method Study

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In this study, we utilized a Q-method research design to examine the perspectives that existed related to school-based agricultural education (SBAE) supporter personas in Idaho. Deci and Ryan's (1985) Self-Determination theory served as the framework for our study. Our participants included a diverse set of 49 individuals who give their time, talent, or resources to support Idaho SBAE programs. Participants performed a series of operations that resulted in a correlation between their viewpoints. Three common viewpoints, or personas, resulted from the data called: Developers, Amplifiers, and Visionaries. SBAE teachers should recognize that different personas of supporters exist and provide tailored experiences that benefit the students and supporters.

Introduction

Researchers, lawmakers, and educational leaders support that educational partnerships can improve school functioning, increase student interest in post-secondary training, prepare students for careers, and increase U.S. economic competitiveness (Alleman & Neal, 2013; Epstein, 2011; Ferguson & Lamback 2014; Sanders, 2003). The renewed significance of partnerships is evident in recent discussions surrounding education reform, community development, and workforce readiness (USDOE, 2012; Executive Office of the President, 2009; Fuller & Raman, 2017). Collaboration with parents, industry, and community members is a foundational and required component of School-based Agricultural Education (SBAE) programs (Albrecht & Hinckley, 2012; H.R. 2353, 2018; Tillinghast, Ramsey, & Terry, 2014). In SBAE programs, partnerships exist in the form of community, industry, or government-affiliated entities or individuals who give their time, talent, and resources to assist teachers and students (Masser, 2014).

Agricultural teachers value the support they receive from supporters (Masser, 2014; Solomonson & Retallick, 2018). Yet, new and experienced teachers indicated that managing supporters is challenging (Boone & Boone, 2007; DiBenedetto, Willis, & Barrick, 2018; Solomonson & Retallick, 2018; Sorensen, Tarpley, & Warnick, 2010). Further investigation is needed to help agricultural educators and administrators effectively recruit and retain SBAE program supporters (Masser, 2014). Understanding the needs and preferences of SBAE supporters could provide insight to equip teachers to implement and maintain strong educational partnerships (Bussell & Forbes, 2001; Phillips & Little, 2002; Rochester, 2010).

Researchers have explored SBAE partnerships from the perspective of agricultural teachers, but supporters play a crucial role in the creation and sustainability of educational partnerships (Clary & Synder, 1999; Decker & Decker, 2003; Rochester, 2010; Studer, 2016). Due to a lack of published literature in SBAE disciplines, researchers in general education partnerships, volunteer

management, and agricultural extension provided foundational literature related to supporters' preferences and experiences (Culp, 2012; Epstein, Simon, Salinas, & Jansorn, 2009; Penrod, 1991; Rochester, 2010; Sanders, 2001, 2003; Studer, 2016). Common elements crucial to recruiting and retaining volunteers include satisfied motivations, collective program goals, strategic selection and preparation, consistent management and support, thorough evaluation, and purposeful recognition (Culp, 2012; Decker & Decker, 2003; Dodd & Boleman, 2007; Epstein et al., 2009; Sanders, 2003). We used the subjectivity of our participants to test these concepts when applied to SBAE supporters.

The framework for our study was Deci and Ryan's (1985) Self Determination theory (SDT). Deci and Ryan (1985) posited that intrinsic factors, such as interests and care, and extrinsic factors, such as rewards and evaluations, facilitate a person's motivation. They examined how biological, social, and cultural conditions facilitate or undermine human capacity for growth and engagement (Deci & Ryan, 1985). Deci and Ryan (1985) suggested that humans have three basic psychological needs including a desire for some control over their lives and behavior, a desire to have knowledge and competence, and lastly a desire to have connection and relationships (Deci & Ryan, 2017). In this study, we examined SDT factors with individuals' subjectivity in reference to conditions that support or undermine their attainment of these needs.

Purpose/Objectives

The purpose of this research study was to examine the perspectives that existed related to SBAE supporter personas. Specifically, this study aimed to meet the following objectives:

1. Describe the personas of selected SBAE supporters in Idaho.
2. Identify the training and communication preferences of selected SBAE supporters in Idaho related to personas.
3. Identify the motivations of selected SBAE supporters in Idaho related to personas.

Methods/Procedures

We used a Q-method research design to meet the objectives of this study. In this method, a set of participants analyzed and sorted a set of statements into a forced quasi-normal curve (Stephenson, 1935). This resulted in a correlation between participants based on the similarities and differences of their statement placements, or Q-sorts (Watts & Stenner, 2012). We utilized a pre-sorting questionnaire and post-sorting interview to achieve a detailed understanding of participants' Q-sorts (Watts & Stenner, 2012). In the questionnaire participants' used Likert-type scales to provide their training and communication preferences and Volunteer Function Inventory (VFI) score to measure their motivation (Clary et al., 1998). Post hoc analysis of the VFI instrument resulted in a sufficient Cronbach's alpha coefficient score ($\alpha = .79$).

To generate the statements, or Q-set, we surveyed literature relevant to concepts of shared knowledge and meaning which were supporter experiences and preferences for supporting SBAE programs (Watts & Stenner, 2012). After exploring literature in agricultural education,

extension, and volunteer management, we generated Q-set statements related to information including management, communication, evaluation, and recognition. Through revision and face validity testing, we obtained a set of 40 statements that were balanced among literature sources and provided coverage of all applicable content areas (Watts & Stenner, 2012).

We selected participants by examining the Q-set and estimating the number of expected viewpoints related to motivation, industry-ties, affiliation, and life cycle of support (Watts & Stenner, 2012). Based on this examination, 11 supporter viewpoints were generated and defined. We contacted Idaho agricultural teachers to request participant recommendations and a description of each supporter. We contacted all identified, potential participants to request their involvement with a goal to obtain four to five participants for each defining viewpoint (Van Exel & de Graaf, 2005). Our final P-set consisted of 55 participants with varying degrees of relevance, experience, and perspective related to the concepts we were exploring (Watts & Stenner, 2012).

Participants met at a scheduled time in five locations across southern Idaho for the data collection process. They completed a demographics survey and the Q-sort procedure. During the Q-sort procedure, participants ranked the Q-set statements based on their psychological significance (Watts & Stenner, 2012). They placed statements that were most meaningful or important on the positive side of the curve and statements that were least meaningful on the negative side. During post-sorting interviews, we explored each participant's wider perspective and discovered the rationale behind their sort (Watts & Stenner, 2012).

We analyzed the questionnaires using SPSS and reported descriptive statistics for communication and training preferences and the VFI scores. In Q-sort analysis, using a prearranged frequency distribution standardized the ranking procedure and enabled convenient data analysis (Watts & Stenner, 2012). We used PQMethod software to examine the location of ranked statements in relation to other items to identify similar types of participants (Schmolck, 2014). We calculated a correlation matrix to show the level of agreement and disagreement between sorts (Watts & Stenner, 2005). We then identified similar groupings of shared meaning and key viewpoints the participant groups held in common to serve as our factors (Van Exel & de Graaf, 2005). We made an *a priori* decision to only extract factors with an eigenvalue of 1.00 or higher to indicate a factor's statistical strength (Guttman 1954; Kaiser, 1960). Based on PQMethod factor loading results, we then used Brown's (1980) calculation to manually extract factors based on a 0.408 level of significance of two or more Q-sorts in each factor. Using eigenvalues and alternative factor extraction solutions to take a holistic view of the data, factors one, two, and three met this criterion and were extracted. This led to 69% of the study variance being accounted for in three factors (Watts & Stenner, 2012).

Results/Findings

A total of 49 Q-sorts were intercorrelated and factor-analyzed with 26 sorts loading significantly to one of three factors. We interpreted each factor through a careful and holistic inspection of distinguishing Q-set statements, the items in the exemplary sorts, and post-sorting interview data (Watts & Stenner, 2012). Significant differences between factors were interpreted by referencing

z-scores at a $p < 0.01$ level. It is critical to understand and report the distinctive characteristics that are unique to each factor (Watts & Stenner, 2012).

Objective 1: Describe the personas of selected SBAE supporters in Idaho.

Persona one supporters were called *Developers*. These individuals value working with supporters with diverse viewpoints and did not seem to believe the teacher and supporters need to share the same vision for the program. We interpreted that these supporters viewed the community and SBAE program as an integrated system focused on students. Developers reported not wanting public appreciation. Persona two supporters were called *Amplifiers*. These supporters placed high importance on helping students gain knowledge on agriculture and career success. Amplifiers desired to support SBAE programs because they saw specific program areas and outcomes they could enhance. They were more likely than other supporters to desire public recognition for their support and welcomed an evaluation of their contribution.

Persona three supporters were called *Visionaries*. These supporters were most likely to believe that supporters should be chosen, interviewed, or invited to support the SBAE program. Visionaries expected a sense of teamwork between the supporters and agricultural teacher. They were likely to begin supporting programs because they saw changes that could be made. Supporters in this persona did not seem to desire recognition for their support. Through interpretation of Q-set statements that all participants ranked similarly, we found that all supporters felt positively about helping students find careers in agriculture and about their role in helping students achieve personal success. The supporters in this study felt negatively about public recognition but spoke positively about personalized appreciation.

Objective 2: Identify the training and communication preferences of selected SBAE supporters in Idaho related to personas.

Developers and Visionaries preferred to use text message, face-to-face, and email communication methods ($M = > 4.0$). Amplifiers preferred to use text message ($M = 4.25$) and email ($M = 4.13$) communication. An informal discussion and written document were preferred training methods by Developers ($M = 4.18, 4.36$) and Amplifiers ($M = 4.50, 3.63$). Visionaries preferred an informal discussion ($M = 4.29$) and formal training program ($M = 3.86$). Of the supporters who served as exemplary sorts for persona interpretation, ($n = 18, 69\%$) preferred to be prepared for their role by an agricultural teacher.

Objective 3: Identify the motivations of selected SBAE supporters in Idaho related to personas.

Based on their VFI scores, supporters in all three personas expressed altruistic motives to act on their beliefs and concerns through volunteering (Developers, $M = 6.17$, Amplifiers, $M = 5.88$, Visionaries, $M = 5.77$). Developers were also motivated by learning and sharing knowledge ($M = 5.25$) and least motivated by advancing their career ($M = 3.16$). While Amplifiers were least motivated by reducing guilt ($M = 1.70$), Visionaries were least motivated by social factors ($M = 1.71$).

Conclusions/Recommendations/Implications

A selected group of Idaho supporters placed meaning on their interaction with SDT factors while supporting SBAE programs by completing a questionnaire and Q-sort procedure (Deci & Ryan, 1985). Three distinct supporter personas were discovered through this examination. Teachers and researchers should recognize the three unique viewpoints of supporters in this study and the collective viewpoints shared by the entire P-set of participants.

Regarding Developers, we recommend that recruitment efforts focus on their potential to influence students, the community, and agriculture. They should spend time learning about student projects or helping teams prepare for a CDE and be given projects that require new skills and problem solving with other supporters. We recommend that teachers be open-minded when working with these individuals. They will likely appreciate feedback focused on their task or project rather than on them as a supporter.

When recruiting Amplifiers, practitioners should showcase program success and outline future goals that supporters can contribute to. They may desire to choose a specific task that aligns with their skillset. We recommend that these supporters be involved in the evaluation process and given ideas on how their contributions could be improved. These supporters may want public recognition, if they represent a company, but they will likely desire small gestures to feel personally appreciated. Visionaries may need to be asked to engage with SBAE programs and would likely appreciate a teacher or alumni member to get to know them personally. Teachers should consider interviewing these individuals to understand their specific skill set and harness their intentional involvement. These supporters may want to be part of a team that communicates with one another often and shares a common vision.

Across all personas, supporters were motivated by values and exhibited a desire to not advance just SBAE programs and students, but also the agricultural industry. They did not expect everyone to get along, preferred informal training methods, and felt unsure that all meetings need to be efficient. Researchers support the altruist nature of the participants' motivations but argue that a pleasant environment and well-planned management are among factors that increase volunteer commitment (Clary & Snyder, 1999; Culp, 2002; Fritz, Barbuto, Marx, Etling, & Burrow, 2000; Penrod, 1991; Rochester, 2010). SBAE supporters may have unique intrinsic motivation and require less structure than initially conceptualized.

Supporters felt unsure about expecting feedback and evaluation regarding their support. Evaluation is an important component of general education and agricultural extension partnerships (Culp, 2012; Dodd & Boleman, 2007; Epstein, 2009). These supporters may feel negative or unfamiliar with the word "evaluation" in relation to their role and therefore require more open dialogue and positive reinforcement surrounding the effectiveness of their support. Supporters felt negatively about receiving public recognition. Recognizing those who volunteer their time to an organization is important (Culp, 2012; Dodd & Boleman, 2007; Phillips & Little, 2002). However, private forms of recognition to show genuine appreciation were favored by this group. We recommend additional forms of recognition such as conversations about the impact of

their support, sincere respect, stories of student success, timely communication, and small gestures. (Dodd & Boleman, 2007; Penrod, 1991; Tillinghast et al., 2014).

Based on the results of this study, our first recommendation for research is to refine the concourse and Q-set and replicate this study to better enable study participants to organize statements based on their personal experience and perceptions. The second recommendation is to further explore the experiences and preferences of SBAE program supporters from the supporters' perspective to uncover important findings related to commitment, motivation, and supporter life cycle. Our final recommendation is to continue exploring motivations of SBAE program supporters to understand the distinguishing characteristics that influence their motivations. The results of this study can serve as a basis for effective partnership implementation and further exploration into the distinguishing characteristics of SBAE supporters.

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Development and Validation of Agricultural Literacy Instruments for Adult Populations

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This quantitative study developed and validated two summative agricultural literacy assessments, for post-12th grade adults, using the National Agricultural Literacy Outcomes (NALOs) as benchmarks. The need for the assessments was born out of previous research that showed despite programs dedicated to agricultural literacy, many adults remained at low or very low levels of literacy. Additionally, no literacy assessment had been developed or validated using the NALOs. The study employed a modified Delphi model and PISA-based proficiency scoring for item development. Two expert panels created 45 questions for validation. The validation used a convenience sample to survey Utah State University students between the ages of 18-23 and was evaluated using factor, item, and discriminant analysis. Results finalized two 15-item instruments and determined both had an acceptable reliability, were adequate for model fit, and valid agricultural literacy assessments for the NALO benchmarks. A keystone of the Judd-Murray Agricultural Literacy Instruments (JMALI) is the use of proficiency stages to determine scoring. The proficiency stage level determines an exposure, factual literacy, or applicable proficiency level of agricultural literacy. The results suggest JMALIs have the potential to assist stakeholders as tools in improving agricultural literacy.

Introduction

Agriculture provides food, clothing, and shelter for a global population. Beyond the essentials, agriculture—its products and the people who grow, sell, and buy them—contribute significantly to most of the world’s cultural, environmental, political, even religious parameters. Remarkably, relatively few people work directly in the field of agriculture. Only “about 2% of American are involved in production agriculture” (American Farm Bureau Federation, 2017, “Fast Facts about Agriculture,” para. 4), which means 98% of Americans are doing something else. Remarkably, the consideration for where human essentials are from and how they are produced, processed, marketed, and sold may be as limited as the actual number of production growers.

The absence of agricultural literacy has generated efforts to improve the amount and type of agricultural education for students and adults. Literacy benchmarks and assessment instruments were developed to determine the level of literacy obtained or maintained by K-12 student populations (Frick, 1993; Leising, Pense, & Igo, 2000; Powell, Agnew, & Trexler, 2008). However, relevant literature showed a lack of consistency regarding what criteria and constructs

determined literacy levels. Furthermore, although validated assessment instruments were found in the literature (Leising et al., 2000), they were based on older frameworks and definitions not designed to meet current needs. The development of the National Agricultural Literacy Outcomes (NALOs) (Author(s) & Leising, 2013) established a valid framework to provide consistency for determining the literacy level of adults (post high school or grade 12 equivalency). Although, until now, a valid instrument for adults, based on the NALOs, had not yet been developed.

This research sought to build an effective assessment to determine what recent high school graduates (young adults) know by evaluating their proficiency of the NALO standards. Generally, summative assessments are conveyed with a pass or fail. A failing score conveys that a student “knows nothing.” This scoring system is inadequate for adults because they cannot function in a “blank slate” of experience. Therefore, the Judd-Murray Agricultural Literacy Instrument (JMALI) model is adapted after the well-defined Programme for International Student Assessment (PISA) that assesses students “to produce estimates of students’ proficiency in relation to the skills and knowledge” within a domain (OECD: Programme for International Student Assessment, 2016, p. 276).

Within the learning stages, skills are scaled from low levels of proficiency to high levels. An adult’s ability determines their place on the proficiency scale, ranked by how frequently they answer questions correctly that are more or less difficult in either knowledge or application. By including prior research from Joplin (1981) and Roberts (2006), the scale encompasses three proficiency levels. The lowest level of understanding is called exposure, the next level is factual literacy (i.e., adult can display understanding related to content knowledge or Joplin’s challenge skills), and the highest level is identified as applicable proficiency (i.e., adult can communicate understanding and the value of the standard). Regardless of the results, all adults will exist on the continuum scale of learning, showing agricultural literacy is not something you “do or do not have.” Figure 1 illustrates the theoretical framework for the JMALIs.

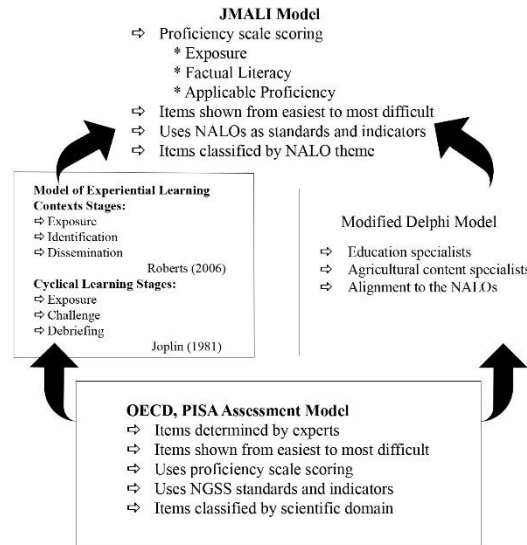


Figure 1. Theoretical Framework for the Judd-Murray Agricultural Literacy Instruments

Purpose & Objectives

The NALO standards are based on relevant theory and peer-reviewed research (Frick, 1990, 1993; Leising et al., 2000; Powell et al., 2008). Brandt (2016) emphasized that the NALO benchmarks should be used to increase uniformity in any future agricultural literacy assessments. Therefore, the first purpose of the study was to develop an instrument to measure agricultural literacy in adults. The second purpose was to validate the instrument (JMALI). The overall objective was to develop and validate a summative agricultural literacy assessment instrument, based on the NALOs, for adults who have completed the twelfth grade (or equivalency) in the United States.

The study addresses the following questions:

1. Does JMALI summatively measure the grade 12 benchmarks of agricultural literacy as defined by the National Agricultural Literacy Outcomes?
2. Is JMALI a valid and reliable measure of proficiency stages of agricultural literacy?

A key component of an effective organization is demonstrating and meeting, through data measurement, the desired educational outcomes. Indeed, the AAAE National Research Agenda, states the need to find methods, models, and programs which best educate the public and policy makers. The statement follows with “rigorous outcome data, beyond local focus, but extended in state-wide, multistate, and even national models will assist in long term effective program development” (Roberts, Harder, & Brashears, 2016, pg. 16). Consequently, the development and validation of JMALI provides the means for agricultural programs to assess K-12-driven

agricultural instruction, while assisting in the determination of identifying learning gaps, program deficiencies, funding priorities, and growth potential.

Methodology

The following three phases present the path for validating the JMALI. Phase One: Instrument Construction. The researcher formed two expert committee panels and used a modified Delphi method. Panel members (i.e., six teaching specialists and five content specialists) were selected on their ability to demonstrate proficiency in the domain of the project. The Delphi panel work resulted in a 45-item Qualtrics survey, with a target population ($N = 600$) of Utah State University students between the ages of 18-23.

Phase Two: Data Collection. In September of 2018, a convenience sample of general education students and courses were selected because of the number of first-year students enrolled and the ease of working with familiar instructors. The data collection was conducted over a three-week period.

Phase Three: Instrumentation Validation. The researcher analyzed the instrument results using factor analysis and reliability measures. The quantitative analysis included: Exploratory Factor Analysis (EFA), Item Analysis, Confirmatory Factor Analysis (CFA), Difficulty Indexing, and Discriminant Analysis (DA). The analysis resulted in the validation and reliability of two 15-item agricultural literacy assessments.

Results

Research Question 1: The 45 items from the Delphi panels were submitted to the sample population. Keywords, ideas, phrasing, context, and modes of application were identified in each question and how they related to the NALO benchmark demands. Additionally, panel members developed items using guidelines for effective summative assessment. Delphi-driven development leads to outcomes that match the standards, are appropriate for the grade level and context, and are consistent in tone and scope. Delphi panel selection is the most important part of the process because it determines the quality of the items (Jacobs, 1996; Judd, 1972; Taylor & Judd, 1989). Panel selection for this study was a significant consideration, for both item quality and its contribution to validity. From existing research Goodman (1987) clarified that point, “if the panelists taking part in the study are representative of the group or the area of knowledge then content validity can be assumed” (pg. 731). Messick (1993) and Sireci (1998) also stated that content validation provides evidence of and critical components of construct validity. Consequently, the standardized nature of the NALOs, in combination with the defined measures of the proficiency scale, and the Delphi model construction, provided the consistency required for obtaining and maintaining trend data, one of the critical functions of summative processes.

Based on these evaluative factors, two separate 15-item JMALI instruments can summatively measure the grade 9-12 agricultural literacy benchmarks of the NALOs.

Research Question 2: Following data collection, survey items were coded, 0 for an incorrect response and 1 for a correct response. Items were analyzed for descriptive measures using SPSS (Version 25) and cross-validated using SAS (Version 9.4). Descriptive results showed the highest survey score obtained for total correct responses was 34 out of 45 items ($max = 34$, $min = 4$, $M = 21.34$, $SD = 5.44$, $N = 515$). The maximum score was used to determine the participant proficiency stages, based on the proficiency scale from PISA literature (2016, pp. 280-281), standardized testing parameters, and statistical best practices. Participants who scored $\geq 80\%$ of the maximum score (≥ 27) represented proficient participants; participants who scored $\geq 50\%$ of the maximum score (≥ 17) represented the factual literacy participants, participants who scored $< 50\%$ of the maximum score (< 17) represented the exposure level of proficiency.

The participant proficiency stage results defined the parameters for EFA, which reduced data to a smaller set of variables to explore a theoretical model. A linear equation model was developed and used for both EFA and CFA analysis. Three latent variables, representing each of the proficiency stages, were analyzed against each of the NALO themes. The EFA technique showed the relationships between the proficiency stages when measured against the number of correct and incorrect responses, while controlling for the variables related to the NALO themes. The EFA results determined which survey items were in the correct proficiency stage. The CFA determined an observed correlation matrix of all 15 items, by forcing them to load on each of the factors (proficiency levels) while deliberately ignoring the structure of the independent variables (NALO themes). Essentially, the equation treated themes as if they “did not exist,” to estimate how well the proficiency levels fit within the model. Results clarify that the equation model for both instruments fit adequately ($\chi^2/df = 1.51$ and 1.43 ; *Adjusted GFI* = .95 and .96; *RMSEA* = .03 and .02; *CFI* = .94 and .93; *NFI* = .93 and .92). A regression analysis was conducted to lend structural relevance to the model. Those results showed the predictor variables of JMALI were significantly, or nearly significantly, associated (load) on their respective proficiency stage factor. The consideration of covariance was an important component of the linear equation model. Consequently, the covariance values were tested to see if their differences from zero were significant. In both cases, the *p*-values were below .0001. Those variations, however, indicated very little, to almost non-existent, shared variance among the variables—or a considerable amount of unique variance among the variables.

Internal consistency and scale reliability were measured with Cronbach’s alpha and Difficulty Indices. Results showed that the alpha numbers were low, but those results were affected by numerous factors. The difficulty indexes were measured by examining across the three proficiency stages, rather than with a high and low split. The results showed positive

associations and a satisfactory distinction between all proficiency stages, and a very good distinction between the exposure and proficiency levels. Thus, indicating an acceptable level of internal consistency and reliability for both instruments.

Finally, due to some limitations that exist when conducting CFA with a non-orthogonal model and using a 0/1 coding system, a discriminant analysis (DA) was used to clarify the existing results. This was done by determining the maximum score achieved on both instruments and then using the proficiency scale to determine the stages. The results showed that all classification percentages for both instruments were extremely high in their classification accuracy, and well-within the range of $p < .05$. Equally strong cross-validation results confirmed this information. There is strong evidence, based on the combination of these outcomes, that the proficiency stages are properly classified, indicating users can accurately use either [instrument] to determine a proficiency level in agricultural literacy.

Conclusions

Doefert (2003) maintains that the true implications of agricultural literacy can only be seen as we study populations over an extended period of time. Up until now, a current and reliable tool, using the NALOs was not available. Looking ahead, the development of the NALOs provided the educational goals, but the validation of both JMALIs can offer stakeholders a path to knowing *what* is known about agriculture. These instruments also enable an immediate route for meeting AAAE National Research Agenda goals and two of the priority objectives for the National Center for Agricultural Literacy that includes assessing the knowledge of diverse population segments and evaluating agricultural literacy programs for program impacts (National Center for Agricultural Literacy, 2017).

Considering the significance of having a valid assessment, it is important to note that the scope of the JMALIs is not to offer detailed insight regarding adult knowledge or the full context of the NALOs. In fact, the NALOs are far too detailed to be accommodated in a baseline assessment. However, the instruments offer a starting-point measurement for a wide variety of audiences. The strength of the alignment to the cumulative NALOs offer users the ability to gain a sense of where knowledge is and where it is not. Meaning, there is enough content connection to indicate either a potential information gaps or proficient understanding. Additionally, this study concludes that due to the design, JMALIs can serve both as a summative adult assessment, and as a formative assessment for 9-11th grade students. The proficiency stage model allows for showing student progress over time. Stakeholders with younger audiences will benefit as JMALI assessment outcomes lead to improved instructional adjustment decisions. Formative assessment leads to decisions predicated on the best available information. “In-classroom” adjustments can be made in real-time due to the simplicity and ease of use of these instruments. Researchers and

stakeholders should use these instruments to acquire short-and-long-term data serving to influence both programs and future policy.

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An Assessment of Factors Affecting Volunteerism in the Texas 4-H Program

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Abstract

The purpose of this study was to describe the factors affecting adult volunteers' motivations in the Texas 4-H youth development program in order to target approaches for recruitment and retention of volunteers. This study sought to describe demographic characteristics and identify motivational factors according to the Volunteer Function Inventory (VFI). This study was descriptive in nature. All volunteers for the Texas 4-H youth development program were included in the target population. Convenience sampling was conducted on an accessible population of 6,287 volunteers. A total of 1,225 respondents completed the survey, resulting in a 19.5% response rate. The respondents completed a 45-question online survey using Qualtrics™. The two-part survey included the VFI, a 30-question previously developed instrument, and a 15-question demographic section. Texas 4-H volunteers' main motivators were their values and understanding of the program; they were not motivated to volunteer for the program based on the career or protective function. Volunteers were mainly white, female, and college educated. Most volunteers did not have previous affiliation to the program prior to their child's enrollment. Texas 4-H volunteers serve the program to fulfill their desire to help others not out of guilt or for career benefits.

Introduction/Theoretical Framework

When the 4-H youth development program began, it was backed by the need for increased agricultural education across the country (Van Horn, Flanagan, & Thompson, 1998). Through the past century, the program has evolved into one focusing on youth life-skill development, citizenship, and leadership (Borden, Perkins, & Hawkeye, 2014). The 4-H program today is a reflection of current societal needs taught through hands-on learning approaches. Adult volunteers are crucial to this approach of life-skill development (Smith & Finley, 2004). Wessel and Wessel (1982) indicated adult volunteers have been pertinent to the success of the 4-H program since its inception. White and Arnold (2003) indicated the importance of volunteers, “the implementation of programs relies almost exclusively on the work of thousands of dedicated adult volunteers” (para. 1).

Although 4-H youth development is heavily reliant on these individuals, there has been a decay in available volunteers nationwide. The National 4-H Council (2016, 2017) records annual reports each year, and within the one year time-lapse of 2016 to 2017 there was a 100,000 volunteer loss reported. A total of 600,000 volunteers were recorded in 2016, (National 4-H

Council, 2016), and 500,000 volunteers were reported for the program in 2017 (National 4-H Council, 2017). During this time, the number of youth enrolled in the program remained constant (National 4-H Council, 2016, 2017). However, the decline in volunteer numbers nationally is not new. Culp III (1997) recorded an annual one-third turnover rate in volunteers for 4-H. In order to mitigate this growing issue, we need to determine motivation of volunteerism in youth programming. “Information about the ‘who’ and ‘why’ of 4-H volunteerism enables managers of the 4-H volunteer program to plan effective programs to better identify, recruit and retain leaders” (Rohs, 1998, p. 98).

Katz (1960) posed a functionalist theory, which was predicated by Maslow’s (1943) Hierarchy of Human Needs and McClelland’s (1961) trichotomy of needs. Relying on the theory of psychological consonance, claiming individuals have the ability to balance their reliance on cognitive function and reaction to emotional imbalances, functionalist theory looks at underlying functions in individual’s motivations. Katz (1960) stated, “If an understanding of the nature of attitudes and the conditions for their change depends upon a knowledge of their functional bases, then it becomes of first importance to identify the underlying motivational patterns” (p. 201). These motivations can be manifested in individuals and groups of people (Katz, 1960). Although Katz (1960) pointed to the necessity of determining motivational patterns, he did not provide an instrument to do so.

Clary et al. (1998) created the Volunteer Functions Inventory (VFI), utilizing theories of Katz (1960), Maslow (1943), and McClelland (1961). This inventory looks at motivations as six different functions. Clary et al. (1998) stated, “people can and do perform the same actions in the service of different psychological functions” (p. 1517). This means an individual’s motivations are fueled by different needs they possess. The functions utilized in the VFI include: values, understanding, social, career, enhancement, and protection (Clary et al., 1998).

Purpose/Objectives

The purpose of this study was to describe the factors affecting adult volunteers’ motivations in the Texas 4-H youth development program, in order to target approaches for recruitment and retention of volunteers. Objectives for this study were:

1. Describe the demographic characteristics of the volunteers in the Texas 4-H youth development program.
2. Identify motivational factors of Texas 4-H volunteers utilizing the VFI.

Methods/Procedures

This study was a descriptive design to assess top motivations in Texas 4-H youth development program volunteers. The target population of this study included all Texas 4-H volunteers. However, the accessible population were those volunteers enrolled by October 19, 2018, a total

of 6,287 volunteers. Convenience sampling was utilized to address complexities researchers faced in accessing the population. Fraenkel, Wallen, and Hyun (2015) indicated convenience sampling is used when a population is conveniently available to the study. In this case, researchers utilized Texas 4-H volunteers through the Texas 4-H director in an indirect way.

Following Dillman, Smyth, and Christian (2014), the accessible population was sent five invitations to complete the online Qualtrics™ questionnaire. The study began on October 19, 2018 and was concluded December 3, 2018. Invitations were sent via email. The initial email was sent at the beginning of the study, October 19th, and reminder emails followed on October 24th, November 2nd, November 16th, and November 30th. This method provided a response rate of 19.5%, or 1,225 accepting participants. Using Lindner, Murphy, and Briers' (2001) first method, early and late respondents were compared to control nonresponse error. Early respondents were those individuals who responded prior to the second email. Comparisons showed no significant differences.

The VFI (Clary et al., 1998) was used in this study to measure top motivation functions. This instrument was a 30-question Likert-style questionnaire with a scale from one to seven. One indicates the response as “not at all important/accurate” and seven indicates the response as “extremely important/accurate,” (Clary et al., 1998). The 30 questions were allocated as five questions per function: protective, values, career, social, understanding, and enhancement. In addition to these questions, 15 demographic questions were used. These included classification of gender, race, socioeconomic status, children enrolled in 4-H, projects volunteered for, how many hours volunteered, number of years volunteered, and other volunteer opportunities taken.

A panel of experts was used to establish content and face validity of the instrument. Reliability of the VFI was pre-established through several studies completed by Clary et al. (1998). Cronbach's alpha coefficients were documented for each function: career $\alpha = .89$, enhancement $\alpha = .84$, social $\alpha = .83$, understanding $\alpha = .81$, protective $\alpha = .81$, and values $\alpha = .80$. Generalizability of this study is cautioned due to non-randomization and Texas 4-H volunteers being a specific population. However, demographic characteristics of this study are thoroughly identified and, in this instance, Fraenkel et al. (2015) state “interested others can judge for themselves the degree to which any findings apply” (p. 105). Volunteers in the 4-H program typically remain similar across states.

Results/Findings

The first objective for this study was to describe demographic characteristics of Texas 4-H youth development program volunteers. Table one describes the demographic characteristics of participants. Volunteers for 4-H in Texas are mainly white (non-Hispanic) ($n = 1,076$, 89.9%), female ($n = 925$, 76.6%), and married ($n = 1,080$, 89.6%). They all mostly live in rural areas ($n = 586$, 48.7%) and are educated. Participants also identified information about their 4-H backgrounds. A majority of individuals had children enrolled in the 4-H program ($n = 1,015$,

84.0%). However, most individuals had no prior membership with the 4-H program before their child’s enrollment ($n = 642, 53.1\%$). Additionally, volunteers had only been serving for one to five years ($n = 499, 41.3\%$).

Table 1
Demographic Characteristics of [State] 4-H Volunteers

Characteristic	<i>f</i>	%
Female	925	76.6
White (non-Hispanic)	1,076	89.9
31-40 Years-Old	282	23.0
Married	1,080	89.6
Bachelor’s Degree	485	40.2
Rural (less than 2,500)	586	48.7
\$50,000-\$74,999	251	22.2
Children Enrolled in 4-H	1,015	84.0
No Previous 4-H Membership	642	53.1
Volunteered for 1-5 years	499	41.3
Volunteered for 0-5 hours/month	408	33.9

The second objective was to identify motivational factors of Texas 4-H volunteers using the VFI. Table two reports the mean and standard deviation of each VFI function. All six of the VFI functions comprise five of the 30 questions included in the instrument. The six functions are protective, values, career, social, understanding, and enhancement. Clary et al. (1998) included these items in the protective function, “By volunteering I feel less lonely” and “Volunteering is a good escape from my own troubles” (Clary et al., 1998). Questions for the values function include the following items, “I feel it is important to help others” and “I feel compassion toward people in need” (Clary et al., 1998). The career function contains, “Volunteering experience will look good on my résumé” and “I can make new contacts that might help my business or career” (Clary et al., 1998). The social function includes, “My friends volunteer” and “People I’m close to want me to volunteer” (Clary et al., 1998). Clary et al. (1998) also identified questions for the understanding function, “I can explore my own strengths” and “I can learn more about the cause for which I am working.” The final function, enhancement, includes items such as, “Volunteering makes me feel important” and “Volunteering makes me feel needed” (Clary et al., 1998). The five questions scores are averaged to give a measure from one to seven for each of the six functions. This average score shows the level of motivation each function has for the individual respondent.

Table two shows the grand means established from the VFI’s constructs. Sixty-six respondents were removed prior to reporting grand means due to incomplete data information, giving us ($n = 1,159$) for this reported data. The largest average, 5.79, was found in the values function ($SD = 1.08$). This was followed by the understanding function ($M = 4.88, SD = 1.53$). The lowest

average, 2.32, was found in the career function ($SD = 1.56$). The second lowest was found in the protective function ($M = 2.60$, $SD = 1.39$) of the VFI.

Table 2

Overall Importance of VFI Functions in [State] 4-H Volunteers (n = 1,159)

VFI Function	<i>M</i>	<i>SD</i>
Values	5.79	1.08
Understanding	4.88	1.53
Social	3.89	1.56
Enhancement	3.66	1.64
Protective	2.60	1.39
Career	2.32	1.56

Conclusions/Recommendations/Implications

From objective one, it can be concluded volunteers in Texas 4-H fit profiles of volunteers in other studies. Many studies have found individuals who volunteer for 4-H are mainly female, white, college educated, and rural living (Culp III, McKee, & Nestor, 2005; Rohs, 1984; Smith & Finley, 2004; Wolford, Cox, & Culp III, 2001). Additionally, Fritz et al. (2003) found majority of volunteers had children in 4-H, while Culp III et al. (2005) found only half of volunteers had prior membership in the 4-H program. These findings are supported with this study. Although over 80% of individuals had youth in the program, over half were not members of 4-H as youth. This is showing a trend of decreased prior enrollment in 4-H volunteers. These individuals may be generations removed from the program; however, they are involving their youth in the 4-H program and in turn become involved themselves. Most individuals reported only volunteering for one to five years. This low number of accumulated years could be due to new recruitment in the program.

In objective two, we found individuals are most motivated by the values and understanding function, while they are least motivated by the career and protective functions. It can be concluded individuals are most likely motivated by their humanitarian efforts to help people and are least motivated by career benefits of the organization. Other 4-H studies also identify values as a top motivation function (Eason, Morgan, Duncan, & Ricketts, 2011; Schmeising, Soder, & Russell, 2005). The second highest motivation function was understanding. Texas 4-H volunteers are generations removed from the 4-H program, and because of this, they need to learn more about their roles in the organization and the mission of the 4-H program. Ultimately, Texas 4-H volunteers are motivated by their humanitarian and altruistic efforts to help others in the causes they care about.

The career and protective functions are the least motivating of Texas 4-H volunteers. The career function states individuals are motivated by the ability to obtain career benefits and the

protective function says individuals volunteer to protect their ego. Volunteers do not want to work for the 4-H organization nor see career benefits as a goal in their motivation to serve 4-H. Additionally, volunteers do not serve Texas 4-H out of guilt or protection from their ego.

This study should be replicated in other states, regions, and nationally to compare top motivational functions. In this study, program affiliation was considered a demographic characteristic; however, future studies should look at affiliation as a motivation to volunteer. The generation gap between volunteer involvement, their prior knowledge, and their children's knowledge should be studied. Additional studies should also include a more concrete definition of motivation in the 4-H program.

It is recommended volunteer administrators ask individuals to volunteer and those individuals recruited need to be more than just the parent and mom groups we currently have in the program. Smith and Finley (2004) described how difficult it was to find individuals to volunteer, and Loblely (2008) asserted individuals do not volunteer because they were not asked. Diversifying the group of individuals past parent groups will increase reach of the program and enhance youth engagement experiences. Administrators should also look at more than just alumni groups, as over half of the individuals did not have previous ties to the program.

Clary et al. (1998) indicated recruitment and retention should be targeted to an individual's motivation. Volunteer administrators should focus on an individual's values and their understanding of the organization for recruitment and retention in the program. Volunteers should be notified of opportunities which fit their values and enhance their understanding of the organization's mission. Finally, in order to build lasting, sustainable relationships among volunteers and the 4-H organization, volunteer administrators should refrain from the use of "guilt-tripping" individuals to serve the program.

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Chew on This: Monitoring the Social Media Conversation Surrounding Lab Grown Meat

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Lab grown meat is a new technology being developed as a potential alternative protein source. Although some research has been done about public perception of lab grown meat, no studies to date have analyzed social media content regarding this topic. This paper sought to analyze the Twitter messages discussing lab grown meat using Meltwater, a social media monitoring software. A relevant keyword search from August 28, 2018 to February 28, 2019 collected over 11,000 Twitter messages. Sentiment of messages was analyzed with 47% of messages being neutral. Meltwater identified trending themes that were all closely tied to lab grown meat, and top content posters with the most amount of potential reach were identified. All top posters were found to be news entities or organizations instead of personal Twitter accounts. Further discussion as well as suggestions for future research are included.

Introduction/Literature Review

Although a new technology, there is growing interest about lab grown meat both in the public and in research. A new study showed that two-thirds of people would try eating *in vitro* meat (Wilks & Phillips, 2017). Lab grown meat has been presented as a “win-win,” because it provides the benefits of meat without negative drawbacks (Lee, 2018). Producing meat in a laboratory would be more energy efficient, more environmentally friendly, and more humane than conventional animal husbandry practices (Bhat, Kumar & Fayaz, 2015; Penn, 2018). Fewer animals in production systems would decrease incidence of zoonotic diseases such as bird flu and Spanish flu, as fewer people are in contact with fewer animals (Shapiro, 2018). To produce one pound of meat, lab grown meat requires no feed inputs, 43.6 gallons of water, and less than a square foot of land (Penn, 2018). New Harvest, a research institute dedicated to funding research of lab grown meat stated, “Cellular agriculture could be how we safely and sustainably feed our growing global population” (New Harvest, n.d.). This, plus the elimination of the need for animals to be harvested, are benefits of this new technology.

There are currently many barriers and challenges that are facing this new science. The first is certainly cost. The first lab grown burger produced in 2013 cost approximately \$300,000 to create (Bhat et al, 2015). However, if lab grown meat could be produced cost effectively, scientists hope the issue of feeding a growing population and the increase in the demand for meat could be eliminated (Wilks & Phillips, 2017). Marketing of lab grown meat as meat has proven controversial. The Missouri Department of Agriculture passed legislation on August 30, 2018

enacted a requirement that “products must include a prominent statement on the front of the package, immediately before or immediately after the product name” if the product is plant-based, veggie, lab-grown, lab-created or comparable (Missouri Department of Agriculture, 2018, para. 5). The environmental benefits of lab grown meat remain a topic of contention in the scientific community. Some studies show lab grown beef would decrease energy consumption by 45% and use 99% less land (Shapiro, 2018). However, a BBC article published in February 2019, summarized a study showing how methane, a greenhouse gas emitted from cows, is less harmful to the environment than carbon dioxide, a greenhouse gas emitted from energy production used to grow lab grown meat (McGrath, 2019).

As this issue gains more public attention, there is a need to better understand what is being said and who is saying it. Social media monitoring is the “continuous systematic observation and analysis of social media networks and social communities” (Fensel, Leiter, & Stavrakantonakis, 2012, p. 3). It is a tool used to “listen” to what people are saying about a topic on the web and across multiple social media platforms (Fensel et al., 2012). Social media monitoring was chosen because, unlike traditional monitoring, social media monitoring allows for real time information with the most relevant issues to date (Bekkers, Edwards, & de Kool, 2013). Analysis of social media users’ preferences and priorities allows researchers to understand social networks and predict trends in offline behavior (Munro, Hartt, & Pohlkamp, 2015).

The conceptual framework for this study is sentiment analysis and opinion leadership. Sentiment is defined as suggesting “a settled opinion reflective of ones feelings” (Mejova, 2009). Sentiment is accompanied by polarity – either being positive or negative toward an issue or product (Pang, Lee, & Vaithyanathan, 2012; Pang & Lee, 2008). Sentiment is important because when making a decision, humans care what other people think about the issue (Pang & Lee, 2008). Humans want to know if their peers feel positively or negatively about topics they themselves are unsure about (Pang & Lee, 2008). Sentiment analysis allows us to answer questions and better understand how opinions are spread in discussions and adopted by others (Mejova, 2009). Decisions and future debate topics surrounding new food technology can be better understood using sentiment analysis (Munro et al., 2015).

Previous research has found key influencers (i.e. opinion leaders) play a significant role in conversation around controversial scientific issues due to their influence on social media (Xu, Yu, & Song, 2018). Opinion leaders may influence opinions of others through the two-step flow theory of information flowing from mass media to opinion leaders to the rest of the population (Xu et al., 2018). Opinion leaders are characterized as having a better understanding and higher level of knowledge about a topic than a non-opinion leader (Parks, 2013). Because Twitter allows for such diverse interactions, opinion leaders on Twitter are often able to gather support and gain momentum rather quickly (Park, 2013). While several studies have been done on

opinion leaders for plant biotechnologies, (Xu et al., 2018) no studies to date have been done about Twitter influencers' discussion of lab grown meat.

Purpose and Research Objectives

The purpose of this study was to describe Twitter conversations about lab grown meat. The specific research objectives were as follows:

1. Determine the potential social reach and volume of lab grown meat content on Twitter.
2. Determine the percent of positive, negative, and neutral messages about lab grown meat on Twitter.
3. Determine the trending themes of lab grown meat on Twitter.
4. Determine the top posters on Twitter providing content about lab grown meat.

Methodology

A descriptive, quantitative content analysis was conducted using the social media monitoring program Meltwater. Data collection dates of August 28, 2018, to February 28, 2019, were selected, and the keywords "lab grown meat," "lab-grown meat," "*in vitro* meat," and "clean meat" were entered into Meltwater. The social media monitor was run accessing all relevant Twitter posts. The posts were analyzed via widgets provided by Meltwater.

Results

RO1: Determine the potential social reach and volume of lab grown meat on Twitter.

Potential social reach was a measure of potential viewers of the Twitter content, and social media volume was the number of Twitter posts about lab grown meat. Potential reach remained relatively low except in several sporadic spikes, while social volume was much more variable across the selected time frame. Potential social reach and social volume did not follow each other in the times that there were spikes in the number of each (Figure 1).

Social Reach vs. Social Volume

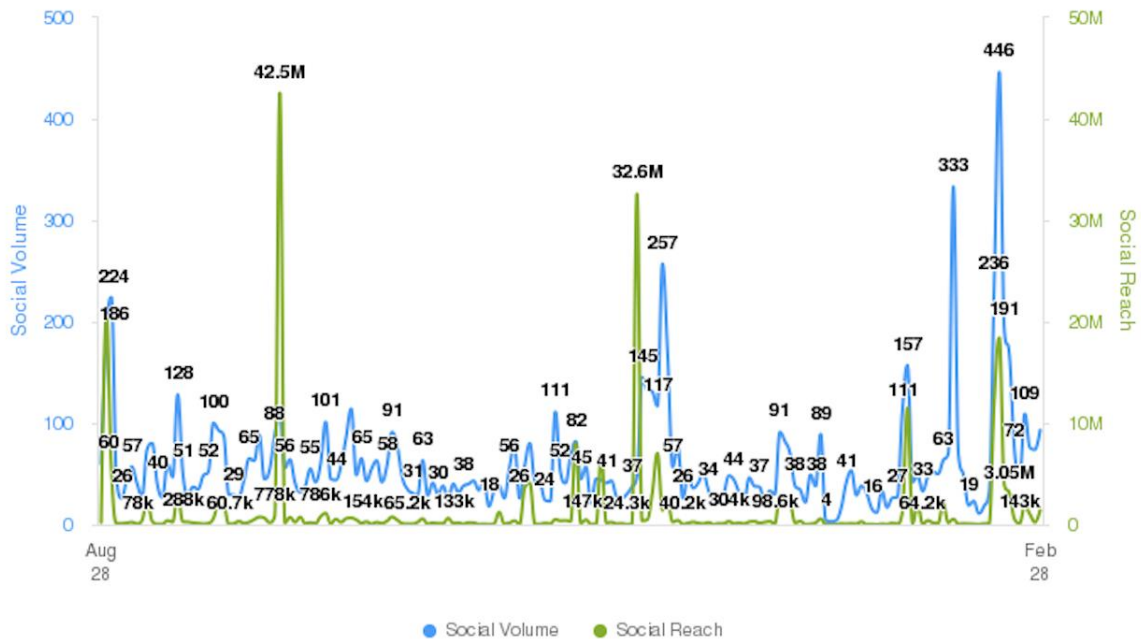


Figure 1. Social media volume and potential reach of lab grown meat on Twitter

RO2: Determine sentiment of lab grown meat on Twitter.

Sentiment was a measure of attitude associated with each tweet. Meltwater uses natural language processing to label messages as positive, negative, or neutral. Of the 11,100 posts analyzed via our search parameters, 33.1% of posts were positive, 19.9% of posts were negative, and 47.0% of posts were neutral towards lab grown meat. Figure 2 depicts a Meltwater chart used to visually represent the division of sentiment scores.

Sentiment

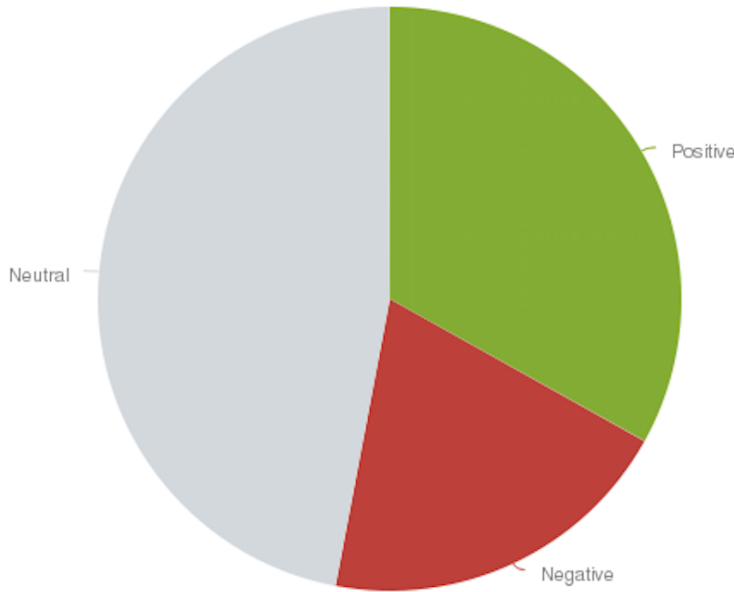


Figure 2. Positive, negative, and neutral sentiment of Twitter posts about lab grown meat.

RO3: Determine what the trending themes of lab grown meat are on Twitter. Top trending themes were words most commonly found when the keyword search was completed. Meltwater identified seven top terms during the selected search dates (Table 1). Each identified term was related to lab grown meat. “Grown meat,” “lab grown meat,” and “clean meat” make up 76% of the top mentioned posts.

Table 1.

Top Seven Trending Themes and Number of Mentions on Twitter

Trending Theme	Number of Mentions
Grown meat	4,400
Lab grown meat	1,400
Clean meat	1,100
Meat	709
Future	702
Environment	393
Plant	373

RO4: Determine the top posters on Twitter providing content about lab grown meat.

Meltwater considers the top posters to be the Twitter accounts that posted about lab grown meat and had the greatest potential social reach. Table 2 depicts the top 10 accounts posting about lab

grown meat that have the greatest reach of content with reach being defined as the number of potential viewers. The top 10 Twitter accounts were all new publications or publishers of educational content. The *New York Times* had the greatest potential reach, which was more than double the next highest-reaching Twitter account.

Table 2.

Top Twitter Accounts and Sum of Potential Reach

Twitter Account	Sum of Potential Reach
New York Times @nytimes	42,000,000
The Wall Street Journal @WSJ	16,200,000
Times of India @timesofindia	11,300,000
TED Talks @TEDTalks	11,100,000
WIRED @WIRED	10,300,000
The Guardian @guardian	7,430,000
Food & Wine @foodandwine	6,630,000
Sky News @SkyNews	4,650,000
Scientific American @sciam	3,670,000
Newsweek @Newsweek	3,300,000

Conclusions/Discussion/Recommendations

Although reach should be interpreted with caution as it is only a figure of “potential” reach, the results show how a small number of posters can have a very large audience. Social volume and social reach did not vary together or spike at the same time. Potential reach remained low except for four large spikes, whereas social volume experienced much more variability across the selected search dates. The four spikes in potential reach all occurred on days when one or more news articles about lab grown meat were published indicating increased attention to the topic. Nearly half of Twitter posts coded for sentiment were neutral, which could be a result of the large number of top posters being news outlets that strive to remain neutral and objective.

The top themes Meltwater identified in Twitter messages were all tied closely to lab grown meat. The top themes were in regard to the nomenclature of lab grown meat itself and is a notable attribute because no one name has been decided upon by a company or industry. Previous literature has shown a variety of names including “*in vitro* meat,” “lab grown meat,” “cultured meat,” and “clean meat” (Shapiro, 2018; Penn, 2018; Bhat, Kumar, & Fayaz, 2015). This shows that most people refer to lab grown meat as “lab grown meat,” “grown meat,” or “clean meat” with “*in vitro* meat” not being mentioned in the top themes. “Plant” was also included in the trending themes but is relevant assuming it is used in conjunction with lab grown meat as an alternative protein source. In a sixth-month period, Meltwater was able to collect over 11,000 Twitter posts, with the top 10 posting accounts cumulatively reaching a potential of over 116

billion viewers on Twitter. The top posters identified were all news organizations which indicated the conversation is not being driven by any one individual.

Future research into how people perceive lab grown meat and their willingness to engage in consuming the product should be conducted. Other opportunities for research include a more in-depth analysis of people's perceptions of lab grown meat, and what influence social media content might have on the public's acceptance of this technology. More in depth social media analysis should be conducted for a longer period of time to see if the top posters change or remain the same. Future communications practitioners should note the significance of the implications of novel information being consumed online on the future of new technologies as well as public funds going towards purchasing new technologies such as lab grown meat (Yeo, Xenos, Brossard, & Scheufele, 2015).

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That's Not a Real Farm: Exploring the Agricultural Visual Vocabularies of Graphic Communicators

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As consumers become increasingly more removed from the agricultural industry, stereotypical or inaccurate images of agriculture only aid in strengthening consumer misconceptions of the industry and its practices. Understanding how graphic communicators develop their visions of the agricultural industry could help us better understand the visual messages provided to the public. This qualitative phenomenological study of graphic communicators and their visual vocabularies of agricultural practices sought to understand the influences that shaped their perceptions of agriculture. Using semi-structured photo elicitation interviews, participants shared that their personal exposure to agricultural images and experiences played a large role in influencing their visual vocabularies of the industry. Many also noted the influence of picture books from their childhood on their memories and knowledge of the agricultural industry. Future research should further explore the factors that influence the development of visual vocabularies for graphic communicators tasked with depicting agricultural topics.

Introduction/Theoretical Framework

Consumers lack an understanding of agriculture and the modern practices that make food and fiber plentiful, healthy, inexpensive, and ethical because they are so far removed from agriculture. According to the American Farm Bureau Federation (2019), farm and ranch families comprise just 2% of the U.S. population. The further away from the farm today's consumers become, the less knowledgeable they are of how their food and fiber is produced making them more susceptible to messages that may portray less than accurate information of the agricultural industry.

A non-realistic view of agriculture is often perpetuated through the images and symbols of the pastoral fantasy in advertising and marketing messages. Pastoral fantasy, according to Alpers (1982), is "longing after innocence and happiness that its universal idea is the Golden Age...that mode of viewing common experience through the medium of the rural world" (p. 437). Even in the 1960s, Marx (1963) and others pointed out the fallacy of pastoral fantasy imagery used for consumer products as taking advantage of "the yearning for a simpler, more harmonious style of life" (p. 6). Marx (1963) blamed the continued use of pastoral imagery on advertising copywriters and the idea that Americans tended to buy products that appeared in rugged rural settings in advertisements. The modern advancements of today's farming and ranching techniques are so far removed from how Old MacDonald ran his farm that it is little wonder that

today's consumers can be swayed by messages that only non-GMO vegetables or antibiotic-free chickens are safe to eat.

Most often marketing and advertising messages, even for organizations or products closely related to the agricultural industry, are created by individuals or teams of professional graphic communicators, designers, and artists who were not trained as agricultural communicators and often have limited personal connections or experience with the agricultural industry. These graphic communicators rely on what John-Steiner (1997) referred to as “the bag of memories” (p. 68), which are the recorded visual memories used to construct their own understanding and meaning of ideas and concepts, which is often directly tied to the images they create. Today, this is more commonly referred to as someone's visual vocabulary (Giorgis et al., 1999).

For many, these stored memories and visuals are linked to memories and experiences reaching back into infancy and childhood (John-Steiner, 1997; Bates, 1979). Images and what children see play a large role in their early learning and idea development (Dooley, 2010; Phillips et al., 2010). One of the most prominent sources of images children are exposed to are picture books full of rich, detailed illustrations (DeLoache, 2002). Research has shown that children make deep connections while reading and viewing picture books that relate to their knowledge development later in life (Torr, 2004). One of the most popular and longest running series of picture books available to children over the past 50 years are Little Golden Books. As a staple in many children's early reading, the images portrayed in Little Golden Books cover a wide array of topics, including agriculture.

With so few Americans closely connected to agriculture, their views of the industry are likely shaped by second-hand exposure or experiences throughout their life. Little research has been conducted on the influences that shape the visual vocabularies of graphic communicators, particularly related to a specific topic or industry such as agriculture. Better understanding these visual memories and their connections to the work of graphic communicators could lead to the creation of more realistic representations of the agricultural industry in advertising and marketing messages.

The theory of semiology guided this study. Semiology is the study of symbols and their meaning and focuses on a signifier and a signified. The signifier is the thing – the object or symbol – while the signified is the “mental representation of the ‘thing’” (Barthes, 1977, p. 42). According to de Saussure (1959), signs are used to communicate messages, and we live in a world in which we decode signs found within images, actions, and words. Images take precedent when combined with text and are used to create perceptions about a subject (Barry, 1997), which makes the relationship between how pictures and text work together in children's books complex. Sipe (1998) explained that text and illustrations have a “synergy” and would be incomplete if not for each other and brought forth a theory variation based on the “semiotic concept of transmediation or the translation of content from one sign system into another” (p. 97).

Purpose and Research Questions

The purpose of this study was to explore the influences that shaped the visual vocabularies of graphic communicators and examine their reactions to pastoral images from Little Golden Books and photographs of modern agricultural practices in an effort to better understand the development of their visual vocabularies on agricultural topics. The following research objectives guided this study:

- RO1: Examine the environmental influences on graphic communicators' visual vocabularies about agriculture.
- RO2: Identify the influence early childhood pictorial books play in developing graphic communicators' visual vocabularies about agriculture.
- RO3: Describe how other influences shape graphic communicators' creative choices in their professional design projects.

Methods

This study utilized a qualitative design using a phenomenological approach. According to Creswell (2007), phenomenology focuses on not the life of the individual, but their experiences. One-on-one, semi-structured photo elicitation interviews (PEIs) were conducted with ten graphic communicators outside the academic field of agricultural communications about their understanding of agricultural images. Purposeful, criterion sampling was used to recruit participants from the membership of a professional organization for graphic communicators in Lubbock, Texas. The criteria used to select participants included that they (a) be a visual communicator working full-time at an agency or in-house agency, (b) have a degree or at least eight years of experience in graphic communication, and (c) were from a variety of graphic fields including print designers, web designers, social media designers, copywriters, art/creative directors, and videographers.

A researcher-developed interview guide was used to guide the interviews. In addition to questions about the development of and influences on their visual vocabularies, participants were shown 11 sets of images pairing illustrations from Little Golden Books with photographs of modern agricultural practices depicting similar scenes. This exercise was conducted at the end of the interview to not influence participants' answers to earlier questions. Interviews were audio-recorded and transcribed verbatim. Field notes were also taken by the researcher during the interviews. Data were entered into *ATLAS.ti* for iMac for analysis. Data was analyzed using open and axial coding utilizing the constant comparative method as suggested by Creswell (2013).

Findings

Findings for Objective 1: Environmental Influences

Two themes emerged in environmental influences: family influences and the location where the participants were raised. All the participants were never far from agriculture in their youth, but none were farmers, and none of their parents were farmers. They saw agriculture and the processes either through the car window on the way to school or as part of a holiday outing.

Family influences. The ten graphic communicators I interviewed had at least a two-generation or more removal from the employment of agriculture. Out of ten participants, eight reported their grandparents and extended family as their primary exposure to agriculture. All the participants were exposed to some degree to agriculture with some more than others. When referencing her exposure to agriculture, Sophia stated, “So, I wasn't around it but maybe it was more around me.” Most participants recalled spending time in rural areas visiting family, which helped to shape their visual memories. As Ethan recalled,

I spent a lot of time in my childhood in Tennessee going back and forth when we'd go for vacation. I didn't live there, but that was how I started forming my vision of a farm and barns is what I saw in Tennessee.

Location. All of the participants reported some memories of agriculture in their childhood. The proximity of agriculture to all the participants gave them a basic knowledge of and experience with the industry. Alex recalled, “My neighbors just down the street had a son my age. They were big into farming. I hung out with him a lot, and I would help him do stuff [on their farm].” Aiden lived in a small town and saw agriculture every day. “I grew up next door to a cotton field, so I had an idea of what was going on. Basically, right across my backyard alley was a cotton field.” Similarly, Sophia explained her experience growing up in a small, rural town, “You can't grow up in West Texas without dating a farm boy or your best friend's dad is a farmer, so it was never very far from me.”

Findings for Objective 2: Influence of Early Childhood Pictorial Books

Several participants noted they recalled seeing illustrated images of agriculture as children in various books. When shown the illustrations from Little Golden Books, many either remembered the images from their own childhood or noted they are now reading the same books to their children. When shown the illustrations from Little Golden Books and the photos of modern agricultural practices, participants' reactions were mixed. Sophia did not connect with any of the illustrated images because they did not represent what a real farm looked like to her.

You had to drive by cotton to get school. When you see that every day and then you look at a book and they're like this is a farm with a horse and a cow, like I thought that's so silly there's not a horse and cow in a cotton field; there's not [a] chicken. So ‘farm’ to me never meant animals in the cotton because that's what I grow up with.

Other participants felt the modern images of agriculture were not in line with their visual images of rural agriculture either. To some, the more modern equipment and practices were not what they expected to see on a farm or ranch. As Max stated,

It [the helicopter] is detracting from looking like a farm. When I see a helicopter, I wonder if it is military, or the news, because that's who flies helicopters. If I saw a crop-dusting plane, it would make it look like a farm because I've seen them flying around as a kid.

Others related the images they were shown with specific childhood experiences. When shown a photo of a modern dairy, Sophia immediately thought back to a school field trip from childhood. "When I was probably in first grade, they took us to a dairy, and it was frightening...I've had some bad farming experiences as a child! I am a little jaded."

Findings for Objective 3: Other Influences

Participants described several influences that impacted their creative choices including the creative/proofing process and their choice of media. In the graphic communication world, the client is at the top of the food chain. They have a great deal of influence on the result of a design project. The other influences that molds the creative process was which media the graphic communicator chose. Most graphic communicators chose a specialty area early in their career.

The creative/proofing process. Many participants described the process each design project goes through to assess the content, graphics, correct errors, and to make sure the messaging is clear. Most of them described a creative process that involves multiple people but confessed to their preference for working alone. As a result of the creative/proofing process, they explained that vision the graphic communicator had at the beginning of the project could potentially be transformed by the other people who critique it. The client also could alter the project and even wholly reject the initial concept. As Ava described, "If the [clients] like it, then [her boss is] a lot more likely to go with it even if it's not his favorite."

The participants who worked in agencies reported that much of their process involved research and collaboration with clients, particularly when working with an industry or product they were unfamiliar with. When describing a client who was in an industry outside of his agency's knowledge base Ethan stated, "Man, it took a few months for us to really learn their products, what they do every day, and how we were going to promote them."

Media choice. The visual vocabularies of the participants were evident by their chosen creative path. The participants who were illustrators by occupation tended to prefer the illustrated, pastoral images when comparing the Little Golden Book images to photographs of modern farming practices. Max, an illustrator, said, "I am going to prefer illustrated over real-life

pictures every time.” Similarly, the participants who were specialized in video and photography preferred the photographs.

Conclusions and Implications

The formation of our visual vocabularies is a complex process that defies definition. Research shows that images are hard-wired into our consciences from a very young age thanks to our exposure to pictorial books (DeLoache, 2002; Dooley, 2010). The participants in this study expressed that their early experiences and exposure to agriculture helped to shape their visual vocabularies as did their exposure to picture books depicting agricultural images. The images we see as children, both illustrated and real-life, stay with us into adulthood and shape the way we see our world. Care should be given to the images presented about the agricultural industry, especially to children as they are developing their knowledge from such a visual basis.

An increased emphasis on graphic communication in programs of agricultural communications could help bridge the gap between inaccurate visual messages and the lack of agricultural knowledge depicted in marketing and advertising messages. Students who have knowledge and experience in the agricultural industry, or grew up on a farm, ranch or in a rural community, could bring valuable insight and perspective to graphic agencies creating images that more accurately represent the industry and its practices. This could help correct some of the misinformation received by consumers in today’s marketing messages. Additionally, having knowledgeable artists work on more realistic illustrations for children’s pictorial books could help educate future generations of consumers more effectively.

A replication of this study in larger, urban agencies, especially those that handle national campaigns reaching more consumers, would provide more insight into this topic. A study of agencies and graphic communicators who currently represent agricultural industry giants, such as Bayer or John Deere, would also add to the knowledge gained in this study. More in-depth studies of the visual vocabularies of a larger population of graphic communicators could help the industry better understand the perceptions of the people who create visual content that influences consumers.

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Extension Professionals' Competencies in Educational Tools and Information Technology

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Abstract

Assessing Extension professionals' competencies related to educational tools and technology is important given constant changes in audiences and technology. Effective use of educational technology tools can help enhance delivery methods of Extension programs. This study focused on the competency area of educational tools and information technology and identified areas of professional development of 87 Extension professionals using a competency-based model. Descriptive and inferential statistics were used to meet three research objectives of identifying professional development themes, assessing Extension professionals' perceived ability to perform competency items, and assigning priority levels to competency items. Principal Component Analysis revealed three Professional Development Themes – Curriculum Design and Learning, Traditional Teaching Methods, and Tech-Ed Tools. Results showed Extension professionals needed additional training to develop measurable teaching objectives, apply teaching and learning principles, design an educational curriculum, engage with participants through social media, and create online courses for clients. Most competency items of Curriculum Design and Learning, and Tech-Ed Tools had above average priority levels. However, competency items under Traditional Teaching Methods were ranked as normal priority. Recommendations included training in those competencies listed as an essential priority and developing easily accessible educational resources for Extension faculty.

Introduction and Theoretical Framework

Cooperative Extension responds to a wide range of critical, social, economic, and environmental problems facing society. Extension professionals are often challenged to use innovative educational methods to deliver quality Extension programming to diverse audiences (Maddy, Niemann, Lindquist, & Bateman, 2002). Thus, they are expected to possess the skills and core competencies needed to deal with these complex issues. Several studies emphasized the need to use a competency-based model in Extension (Harder, Scheer, & Place, 2011; Liles, 2004; Scheer, Cochran, Harder, & Place, 2011; Suvedi & Kaplowitz, 2016). Given the multidimensional and expanding roles of Extension, there is a need to ensure Extension professionals are equipped with the core competencies needed to effectively meet the needs of stakeholders. According to Harder et al. (2011), constant technological changes can affect professional development and educational delivery methods. Therefore, it is important to consider Extension professionals' effective use of technology to deliver quality Extension programs (Suvedi & Kaplowitz, 2016). This study sought to identify areas of professional

development by assessing Utah State University (USU) Extension professionals' perceptions of their ability to perform competencies related to Educational Tools and Information Technology.

Competency broadly refers to the knowledge and skills needed to effectively perform in a given role (McClelland, 1973). According to McClelland (1973) assessing competencies is a useful method to assess the potential for superior performance. The competency-based model provides a framework to assess organizational capacity and performance by assessing individual core competencies (Scheer et al., 2011). McClelland (1973) described four assumptions of the competency approach; observable performance measures, realistic definitions of competencies, criteria that relates to real outcomes like occupation and education, and public solutions to develop competencies. A competency approach may result in an increase in organizational performance since employees' abilities for job success are assessed (Harder et al., 2011).

Purpose and Objectives

This research connects with priority three of the American Association for Agricultural Education (AAAE) National Research Agenda. Specifically, this study aligns with "what competencies are needed for an agriculture and natural resource workforce" (Stripling & Ricketts, 2016, p. 31). The purpose of this study was to identify priority competencies for professional development training for USU Extension professionals in the area of educational tools and information technology. Objectives were to (a) describe underlying competency themes of educational tools and information technology, (b) assess Extension professionals' perceived performance of these competency themes, and (c) assign priority levels to competency items related to educational tools and information technology.

Methods

This IRB exempt study followed a descriptive design and attempted to collect data from a census of Extension faculty at USU Extension. The population was Extension faculty directly involved in planning, implementing, or evaluating Extension programs. The population size was 134 faculty ($N = 134$), and with a response rate of 65%, the final sample size consisted of 87 faculty ($n = 87$). Data collection occurred in April 2019 using Qualtrics. Related competency items were identified from a literature review. The response options followed the Borich (1980) model. On a 5-point Likert-type scale, respondents were asked to rate (a) their perception towards the importance of each competency i.e. perceived importance (I), and (b) their perception of their ability to perform the competency i.e. perceived ability (A). The Tailored Design approach informed questionnaire design (Dillman, Smith, & Christian, 2014), and the instrument was reviewed by a panel of experts for validity. The construct for Educational Tools and Information Technology included 18 competencies. Cronbach's alpha indicated the core competency area had acceptable internal consistency (Cronbach's $\alpha = 0.93$). The analysis further employed a Principal Component Analysis (PCA) and the Wilcoxon Signed-Rank (WSR) test to meet objectives.

The PCA with an orthogonal rotation was used to reveal latent components within the core competency area of Educational Tools and Information Technology to address objective (a). Latent components were referred to as Professional Development Themes. Individual competencies were discussed based on their corresponding theme. Objective (b) was addressed through an assessment of the negative, positive, and tied ranks of the WSR. Negative ranks (NR) are the number of observations where perceived ability (A) was less than perceived importance (I), that is ($A < I$). Negative ranks indicate the number of times respondents' ability to perform a competency item was less than adequate given the item's importance to job success. Positive ranks (PR) are the number of observations where perceived ability was more than perceived importance ($A > I$). Positive ranks indicate the number of times respondents' ability to perform a competency item was more than adequate given the item's importance to job success. Tied ranks (TR) refer to the number of times perceived ability was equal to perceived importance ($A = I$). This suggests respondents had adequate ability to perform the competency given the item's importance. Objective (c) was addressed by calculating a standardized score based on the three ranks of the WSR. While a Borich design was used to gather data, the corresponding Borich analytical framework (i.e. Mean Weighted Discrepancy Score) was not used to avoid any statistical discrepancies arising from comparing means for single-item ordinal variables. A weighted rank-sum score was derived for each item based on the frequency distribution of ranks as follows: % NR (3) + % TR (2) + % PR (1). The weighted rank-sum score was standardized between 0 and 1, and referred to as the Standardized Priority Index (SPI) which was interpreted as follows: Not a Priority = 0 – 0.20, Below Average Priority = 0.21 – 0.40, Normal Priority = 0.41 – 0.60, Above Average Priority = 0.61 – 0.80, and Essential Priority = 0.81 – 1.00

Findings

For objective (a), the PCA revealed three latent components of Educational Tools and Information Technology referred to as Professional Development Themes. Based on the factor loadings, the Professional Development Themes were referred to as Curriculum Design and Learning (CDL), Traditional Teaching Methods (TTM), and Tech-Ed Tools (TET). The themes accounted for 66% of the variation in the original items, and the model was valid given a Kaiser-Meyer-Olkin Measure of Sampling Adequacy of 0.911 and a significant Chi square value ($X^2 = 874.52$, $p < 0.001$) for the Bartlett's Test of Sphericity. From Table 1, Curriculum Design and Learning related to the competencies needed to create and adapt curriculum to facilitate diverse learning experiences aimed at meeting the needs of learners. Traditional Teaching Methods related to the competencies to use common teaching methods and techniques to disseminate information to learners. Tech-Ed Tools referred to competencies needed to use the Internet and Web technology to engage with learners and facilitate online learning experiences.

Table 1
Principal Component Analysis of Educational Tools and Information Technology Competencies

Competency Items	Factor Loading		
	CDL	TTM	TET
<i>Curriculum Design and Learning (CDL)</i>			
Develop measurable teaching objectives	0.73	0.04	0.30
Facilitate group discussions to ensure full participation	0.68	0.34	0.29
Find instructional materials to support teaching activities	0.77	0.19	0.28
Design an educational curriculum	0.77	0.19	0.24
Apply teaching and learning principles to ensure participants understand the topic	0.72	0.30	0.23
Select appropriate teaching methods based on participants' familiarity with the topic	0.80	0.33	0.07
Develop instructional materials	0.81	0.16	0.06
Modify a curriculum to meet participants' needs	0.77	0.35	0.05
<i>Traditional Teaching Methods (TTM)</i>			
Explain technical terms in simple language	0.30	0.68	0.38
Conduct a lecture	0.31	0.58	0.36
Use presentation tools such as PowerPoint	0.13	0.67	0.27
Conduct individual visits (one-on-one)	0.30	0.72	0.15
Conduct a workshop	0.47	0.67	0.14
Conduct field tours	0.12	0.76	0.09
<i>Tech-Ed Tools (TET)</i>			
Engage with participants through online video conferencing (e.g. Zoom)	0.03	0.33	0.78
Adapt a curriculum for delivery online	0.35	0.20	0.76
Engage with participants through social media	0.18	0.16	0.72
Create an online course for clients that can lead to certificates, badges, or Continuing Education Units (CEUs)	0.41	0.18	0.67

Table 2 provides the results related to objectives (b) and (c). With respect to objective (a), for the Professional Development Theme of Curriculum Design and Learning, most Extension professionals did not possess the adequate level of competency to develop measurable teaching objectives (63%), apply teaching and learning principles to ensure participants understand the topic (58%), and design an educational curriculum (53%). Yet, most Extension professionals had at least adequate ability to perform all competency items in Traditional Teaching Methods. For Tech-Ed Tools, most professionals did not have adequate competencies to engage with participants through social media (57%) and create an online course for clients that can lead to certificates, badges, or Continuing Education Units (52%).

For objective (c), results from Table 2 indicated there was an above average priority to equip Extension faculty with Curriculum Design and Learning competencies (SPI = 0.70). The highest rated competency item within this theme was to develop measurable teaching objectives (SPI = 0.80). In contrast, there was an overall normal level priority to provide faculty with Traditional Teaching Methods competencies (SPI = 0.50). All competency items within Traditional Teaching Methods were assigned a normal priority for professional development. Overall, there was an above average priority to provide Extension faculty with the competencies related to Tech-Ed Tools (SPI = 0.69). The highest rated competency item within this theme was to engage with participants through social media (SPI = 0.75).

Table 2
Descriptives and Priorities of Educational Tools and Information Technology Competencies

Competency Items	Wilcoxon Signed-Ranks (%)			SPI	Priority
	Negative (A < I)	Positive (A > I)	Tied (A = I)		
<i>Curriculum Design and Learning</i>					
Develop measurable teaching objectives	63	3	35	0.70	AA
Apply teaching and learning principles to ensure participants understand the topic	58	5	38	0.76	AA
Design an educational curriculum	53	13	35	0.70	AA
Find instructional materials to support teaching activities	45	10	45	0.68	AA
Select appropriate teaching methods based on participants' familiarity with the topic	44	8	49	0.68	AA
Develop instructional materials	46	10	44	0.68	AA
Modify a curriculum to meet participants' needs	40	6	54	0.67	AA
<i>Traditional Teaching Methods</i>					
Facilitate group discussions to ensure full participation	33	12	54	0.50	N
Explain technical terms in simple language	25	5	71	0.60	N
Conduct a workshop	28	11	60	0.59	N
Conduct field tours	27	16	57	0.55	N
Conduct individual visits (one-on-one)	14	20	67	0.47	N
Conduct a lecture	19	38	44	0.41	N
Use presentation tools such as PowerPoint	15	33	53	0.41	N
<i>Tech-Ed Tools</i>					
Engage with participants through social media	57	7	36	0.69	AA

Create an online course for clients that can lead to certificates, badges, or Continuing Education Unit (CEUs)	52	6	42	0.73	AA
Adapt a curriculum for delivery online	48	8	45	0.70	AA
Engage with participants through online video conferencing (e.g. Zoom)	34	18	49	0.58	AA

Note. SPI = Standardized Priority Index, AA = Above Average Priority, and N = Normal Priority

Conclusions/Recommendations/Implications

This study provides a description of USU Extension faculty's perceived ability to perform Extension-specific competencies related to Educational Tools and Information Technology using a novel methodology that does not rely on the observed means of ordinal variables. As most competency items were rated an above average priority based on the standard priority index, it is critical for USU Extension to provide faculty with opportunities for professional development especially in the area of curriculum design and educational technology. The only theme to receive a normal priority listing was Traditional Teaching Methods. Faculty appeared well versed in, and comfortable with, the traditional methods of outreach and education. Meanwhile, results indicated a need for additional competency development in the use of educational technology tools such as social media, online courses and online delivery. Addressing these competencies can aid in meeting the needs of diverse audiences.

Equipping USU Extension faculty with the knowledge and skills to improve in these pertinent competency areas can help improve current and future programming and ensure the success and longevity of their Extension programs. Recommendations for immediate action include providing professional development opportunities in those competencies listed as an above average priority. More so, training is needed to help Extension faculty develop measurable learning objectives and engage with audiences through social media. These should be delivered through face-to-face and online professional development trainings and supplemented with easily accessible resources tailored to faculty such as quick guides and how-to videos. Importantly, educational opportunities and resources should be accessible and applicable to all faculty, regardless of geographic location and/or subject area expertise.

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And the list goes on: A synthesis of Extension agent job competencies.

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Abstract: The historic Cooperative Extension Service has experienced many changes over the last 20 years. These changes have spurred scholars to redefine and reexamine the responsibilities and skills needed of effective agents. This study created an exhaustive list of agent competencies listed in literature from the last 20 years. Using a document analysis approach, we analyzed 16 reports from across the U.S. Through the analysis, we discovered 505 competencies needed to serve as a Cooperative Extension agent. We recommend future research conduct a systematic needs assessment of the competencies to set professional development priority. We call action to state staff to consider how these competencies affect retention and job efficiency of local agents.

Introduction

At the county level, an “Extension agent” is an educator with expertise in areas such as agriculture, family and consumer sciences, natural resources, and youth development (Seevers & Graham, 2012). The agent serves as the liaison between the land-grant institution and the community, covering a wide span of programs (Seevers & Graham, 2012). Over the past century, Cooperative Extension Service (CES) has experienced many changes. In the last 20 years alone, the delivery of the practical, research-based knowledge has been altered drastically (Braverman, Engle, Arnold, Rennekamp, 2008; Seevers & Graham, 2001). The county agent was once thought to be the expert who delivered programs through the technology transfer model (Fitzgerald, Burns, Sonka, Furco, and Swanson, 2012) and outreach approach (Boyle, 1981). Demonstration trains are one of the earliest examples of experts bringing knowledge to rural areas. The expert would present the newest information, research, or technology to local people to improve their livelihood (Moore, 2018). The expert model has shifted to the “transformative education” (Braverman et al., 2008, pg. 10-11) or engagement model (Fitzgerald, et al., 2012), which allows for open communication from local constituents to the agent, and from the agent to the land-grant universities. This engagement model creates an opportunity for local residents to share the issues they are facing and the county agent to adjust programming based on the needs within their specific county (Fitzgerald et al., 2012).

The modern-day Extension agent is tasked with the significant responsibility of implementing needs-assessments, creating and delivering programs, overseeing volunteers, managing funds, communicating with the public, staying informed on new research about their program area, completing reports, and fulfilling general office responsibilities (Cooper & Graham, 2001). Research reveals a plethora of responsibilities which can often leave agents feeling overwhelmed, unable to maintain work-life-balance, and regularly working over 40 hours a week (Enslie, 2005). This multifaceted role of Extension agents requires a sometimes-challenging

balance of “hard” and “soft” competencies to be considered “successful” (Cooper & Graham, 2001).

Present research has identified numerous competencies needed for a successful career as an Extension agent. One study identified over 300 competencies (National 4-H, 2017). Yet, in Oregon, a shortage of information is available on how agents are trained or how professional development meets the needs of identified agent competencies. This is important given the increasing job requirements, funding limits, and the looming potential of agents leaving the profession. Terry & Osborne (2015) concluded proper training of new agents is critical to the success of their career. If Oregon is expected to train and prepare agents to effectively fill their role, we need to know more information regarding the identified competencies. Therefore, the purpose of this investigation was to review the literature and explore Extension agent competencies in order to have a more thorough understanding of needed skills and make informed decisions about future agent training.

Review of Literature

Competencies are defined as “the basic knowledge, attitudes, skills, and behaviors that contribute to excellence in Extension education programs” (Maddy, Niemann, Lindquist, & Bateman, 2002, pg. 1). The vagueness of this definition has led researchers to compile a vast number of competencies required to serve as a successful 21st Century Extension Agent. Many states have identified the necessary competencies, including Arkansas (Cooper & Graham, 2001), Florida (Harder, Place, & Scheer, 2010), North Carolina (Lakai, Jayaratne, Moore, & Kistler, 2014), and Ohio (Cochran, 2009). Among the lists created through previous studies are “soft” and technical skills, broad and general competencies, and program-specific competencies. Stone and Bieber (1997) explained competencies as a link for individual and organizational performance and should be highly considered for the implementation of professional development.

There is no published information about the training of agents in Oregon. Each program area has its own goals and objectives resulting in program areas training their agents individually (Shirley, 2019). Moreover, Oregon 4-H has entirely cut their new agent training because of a budget deficit (Shirley, 2019). With the exception of an article from 2002, Oregon has never conducted research on the topic of agent competencies (Maddy et al., 2002). We did find one list of competencies produced by Oregon Extension personnel, although the list was adapted from a publication from another state and to our knowledge, never subjected to scrutiny by state Extension faculty or leaders.

Objectives

The literature reveals that increasing competencies and decreasing funds may be competing for the attention of state professionals. Professional development must be fiscally responsible while being selective, and intentional with the content. Multiple studies that examined competencies

are inconsistent in methodology, population, demographics, and conclusions. In this review, we are not interested in making comparisons among studies, rather evaluating and synthesizing relevant studies related to agent competencies to better inform training of agents in Oregon. This document analysis is the first phase of a larger inquiry towards Extension agent competencies. From this query, we reviewed and synthesized relevant literature to address the following research objective: to examine published works about Extension agent competencies and identify salient agent competencies.

Methodology

We employed a document analysis to investigate competencies identified in published and public works. The document analysis research method is applicable to qualitative work when the researcher is wanting to provide backgrounds on a subject, offer critical questions to be asked or trends that are occurring, and add value to the current body of literature (Bowen, 2009). There are many works that have addressed and tested agent competencies. A document analysis allows us to examine a wide scope of research over a period of time and allows us to select data that meet our set requirements (Bowen, 2009).

We broadly started our review of competency research by searching the phrase “competencies”, “training”, and “agent qualities” in the Journal of Extension (JOE). We expanded our study to include the Journal of Agricultural Education (JAE) and a search of state Extension websites. We first eliminated any studies conducted outside the U.S. After “skimming” (Bowen, 2009) the data by reviewing titles and abstracts, we collected 24 works that identified Extension agent competencies. To avoid selectivity bias (Bowen, 2009), we eliminated any studies that exclusively examined competencies needed for administration, directors, or supervisors. We only focused on agent competencies. It is important to note, however, that some of the studies we examined included agents, administrators or supervisors in their population, but the populations in the studies were identifying agent competencies. Moreover, we concentrated on studies written between 1999 to 2019, a 20-year timespan. The criteria for our literature review resulted in 16 articles. We recognize there may be other studies that identify Extension agent competencies, however, we reached a point of data saturation, or “data adequacy” (Morse, 1995) and proceeded with our analysis.

As a research team, we proceeded with reading and interpreting the selected documents (Bowen, 2009) and created a Microsoft Excel document to record and track the findings. We listed all the studies as well as methods, population, sample, demographics, results, and any competencies listed from each study. Eight studies identified broad themes of competencies, such as communication skills or educational processes. Fourteen studies identified specific competencies, such as the ability to delegate or critical thinking skills. However, there was a dissonance amongst themes and competencies within the 16 studies. For example, one study identified volunteerism as a theme, plus additional competencies related to volunteerism (e.g., engages with a diverse audience of volunteers) (National 4-H, 2017), but other studies identify

volunteerism as a singular competency, not as a broad, overarching theme. We made the decision to include both themes and individual skills in the collective list of competencies to ensure the perspective of past research was not lost. Additionally, to offer an objective and practical list, we did not eliminate program-specific competencies. Since we do not serve as Extension agents or Extension specialists, we admittedly do not have the program-specific experience to determine which specific competencies should be kept or omitted.

Our exhaustive list resulted in 587 competencies. We alphabetized the list of competencies and conducted three rounds of narrowing and combining like terms (Bowen, 2009). When conducting a document analysis, it is critical to be objective and sensitive to previous works (Bowen, 2009). Many competencies were so specific they could not be combined into similar areas without diminishing the thoroughness of other researchers' work. After three rounds of consolidating competencies, we were left with 503 competencies needed to serve as an Extension agent.

Results

Our research objective sought to examine published works written about agent competencies. The combination totaled 503 competencies needed to serve as a Cooperative Extension agent. Of the 16 studies chosen, three were nationwide studies and 13 were state-specific, including Arkansas, Florida, Michigan, North Carolina, Ohio, South Carolina, Tennessee, Texas, and Virginia. Only a portion of the studies reported information about the participants or how data were collected. Of the studies that identified participants, 732 were agents, administrators, directors, or specialists. Ninety percent (90%, $n = 665$) of the 732 participants were only agents. There was a variety of methods conducted by the authors of the 16 works. Nine implemented a survey or questionnaire, five had no methods identified and two studies operationalized a Delphi study.

Our document analysis revealed 11 competencies that were identified most frequently among the 16 selected works. Programming and subject matter expertise were mentioned in 11 studies. Communication was recognized in ten studies. Applied research skills was identified in eight studies. Leadership, teaching skills, and Extension knowledge were mentioned in seven works. Organizational effectiveness and evaluation were recognized in six studies. Lastly, interpersonal skills and professionalism and ethics were identified in five studies. Given the length of the list, we are not able to provide the full list of the 503 compiled competencies. However, we bring attention that 468 (93%) of the combined competencies were only mentioned in one study, such as the ability to say "I don't know" (Cooper & Graham, 2001), being a life-long, self-directed learner (Cochran, 2009), understand office know-hows, (Brodeur, Higgins, Galindo-Gonzalez, Craig, & Haile (2011), and understanding social systems (Brown, Gibson, & Stewart, 2008).

Discussion and Recommendations

As we sought to examine competencies to better inform training decisions, we uncovered discrepancies among the papers included in our review. This analysis revealed a wide range of competencies considered necessary for an agent to be considered successful. The fewest competencies listed within one study was four (Stone & Coppernoll, 2004) and the largest list included 383 (National 4-H, 2017). Second, many studies did not provide a thorough explanation of how the competencies were identified. Five studies did not include methodology, and four did not mention their population, which leaves the reliability of the study under question (Bhattacharjee, 2012). Over half of the works we reviewed sent surveys to agents and asked them to rank the importance of pre-set competencies, but were not clear in all cases how the original list or instrument was created. We hypothesize the discordance between the studies lies in the intention of the studies, methods, and rigor of the research.

Many professionals and researchers have spent a considerable amount of time and years focusing on the inquiry of agent competencies. From the 16 selected studies, we observed two studies which examined the competencies from a “needs” perspective, the most recent in 2002 (Cooper & Graham, 2001; Maddy et al., 2002). Additionally, no study in our search examined the difference between what agents are identifying as necessary competencies compared to what state professionals say are important skills. With that, we offer the following recommendations. Considering the condition of training for Oregon Extension Agents, we suggest conducting a needs assessment on the current, exhaustive, list of agent competencies for the improvement of training and professional development in our state. We also suggest the broader landscape of Extension critically reflect on the weight of the list of competencies as it pertains to training and professional development within individual states.

A needs assessment is a “systematic approach of procedures undertaken for the purpose of setting priorities and making decisions about program improvements,” (Witkin & Altschuld, 1995, p. 4). Needs assessments are designed for large groups of people with improvement as an intended outcome. As universities are struggling with budget cuts, it is critical agents are trained in highly efficient manners. Decisions about what professional development is offered to obtain these competencies should be intentionally made and empirically supported. In Oregon, state and regional professionals determine content, length of training, delivery and methodology of training (Shirley, 2019). With increasing responsibility (Cooper & Graham, 2001) and budget cuts (Brown, 2008; Harder et al. 2016; Lakai et al., 2012), it is unrealistic to train an agent in 503 skills, however, appropriate training is critical for agent success (Terry & Osborne, 2015). Therefore, an efficient training program should consider the perspective of current agents and be developed based competencies that exist, resulting in an expedited, effective, and efficient training program.

We also call attention to the growing responsibility of county agents and its relation to agent retention. Retention of Extension agents has been identified as a national challenge by the

Extension Committee on Organization and Policy (ECOP) (2005) with new employees having the highest turnover within the organization (Allen, 2006). Strong & Harder (2009) determined that almost 150% of a salary may be needed to replace individual turnovers. Failure to retain Extension agents has a negative ripple effect on the whole land-grant system (Brodeur, Higgins, Galindo-Gonzalez, Craig, Haile, 2011). Furthermore, CES programs across the states have been fighting budget cuts, and training programs often take a significant reduction (Brown, 2008; Harder, Zelaya, & Roberts, 2016; Lakai et al., 2012).

With nationwide Extension facing challenges with turnover, we should consider if agents are expected to be proficient in this exhaustive list, or, are they to have a basic understanding of the attitudes, skills, and behavior as Maddy et al. (2002) suggests? Do these high expectations add to existing pressures of being an agent, and is it sustainable to require agents to be experts across a wide range of competencies? State professionals should reflect on how competencies are communicated with agents, how they measure these competencies, how they can support growth in these areas.

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Extension Administrators' Perspectives on County-Based Professional Competencies

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U.S. Cooperative Extension clientele is changing, both in who they are and how they want to receive information. Extension administrators discussed the competencies of Extension professionals as they participated in a larger study focused on Extension system-level adaptation. These perspectives inform both the higher-education curriculum taught by departments of Agricultural Education and Extension (AEE) and for administrators who are seeking effective employees. Extension Education curriculum is not fully-preparing future Extension agents in all required competencies, falling short on use of technology, diversity and pluralism, volunteer development, marketing, and public relations, risk management, and the community development process. Additionally, the pipeline is not preparing a demographically representative population, leaving State Administrators struggling to hire prepared professionals, especially those with in-culture competency (e.g., racial and ethnic minority and urban).

Extension's mission remains focused on translating research-derived information from the land-grant university (LGU) system related to agriculture; family, health, and consumer sciences; 4-H youth development; and, community development (Conglose, 2000). U.S. Extension was initiated in 1914 with the passing of the Smith-Lever Act. Since then, society has significantly changed. Extension has adapted through many shifts over its century-long existence. Today, Extension is experiencing a significant environmental shift (Elliott-Engel, 2018) – changing funding requirements, significant population demographic shifts- e.g., racial and ethnic minority changes and urbanization, and, technology use patterns. To ensure organizational success, Extension professionals need requisite skills to continue to reach all citizens.

Extension Workforce Preparation

Our Extension Education core competencies are based on the research literature and the essential skills required for employment by state Extension organizations. Liles and Mustian (2004) presented seven core competencies for Extension professionals in the North Carolina system. Scheer, Ferrari, Earnest, and Connors (2006) reviewed the research literature to create an entry-level extension professional competency framework. Harder, Place, & Scheer (2015) conducted a Delphi study to inform a competency framework. Table 1. combines all three studies competency recommendations for Extension professionals for easier analysis.

Table 1. Research Informed Entry-Level Extension Professional Competencies

<i>Liles & Mustian (2004)</i>	<i>Scheer, Ferrari, Earnest, & Connors (2006)</i>	<i>Harder, Place, & Scheer (2015)</i>
	Technology	Able to use technology for program delivery IT Skills
Communications Human Relations	Communications	Communication skills including speaking and writing Interpersonal skills Relationship building
Knowledge of the organization Professionalism Leadership	Extension knowledge, leadership, and Management	Accountability Develop extramural funding Entrepreneurship development Fiscal Management Knowledge of land-grant university and extension system Organizational leadership development Personal leadership development Problem-solving Professionalism Self-management
Technical subject-matter expertise		Technical subject-matter expertise
Ability to plan, design, implement, evaluate, and account for significant education programs	Program planning, implementation, and evaluation	Educational methodology Integrate extension, research, and teaching Program implementation Program evaluation Program planning Teaching skills
	Applied research	Applied Research Skills
	Diversity and pluralism	Cultural sensitivity Volunteer Development
	Marketing and public relations	
	Theories of human development and learning	
	Risk management	

Community development
process and diffusion.

Preparing the Future Extension Professional

In a review of U.S. institutions, Sands and Retallick (2018) found 17 universities offered Extension Education graduate degree programs. The courses offered by these programs were universal. Course topics are: Foundations of agriculture and extension education; Research including methods, Statistics and analysis; Program planning; Program evaluation; Instructional methods; Leadership/administration; Communication/public relations/ public policy; and practicum. Extension professional competencies not specifically identified in courses taught include Technology, Technical-subject matter expertise, Diversity and pluralism, Volunteer development, management, and Community development process, and Diffusion.

Recruiting A Diverse Workforce

A discussion of core-competencies and training does not address who is receiving the training. Grogan and Eshelman (1998) discussed the need to attract and retain a diverse workforce. Three approaches were shared: a) Reviewing the job description for characteristics that would either attract or deter diverse candidates (Arnold & Place, 2010), b) Identifying and personally encouraging diverse candidates to apply, and c) Individuals with hiring authority can identify pathways for individuals to gain the credentials and experience needed for positions within the organization- e.g., creating an internship for a person to gain experience, and then promoting the successful candidate into the position. Angima and Carroll (2019) contribute to the recruitment conversation by emphasizing the need to deploy a systematic approach to ensure prospective candidates are supplied with accurate, appropriate, and comprehensive information. One way of recruiting potential new candidates is internships, which increase awareness and understanding of Extension careers (Grotta & McGrath, 2013).

Labor Market

The labor market is a complex system informed by social and economic influences (Prastacos, Söderquist, Spanos, & Van Wassenhove, 2002). Workforce development system is a theory of change for managing supply and demand. Education, suppliers, and community contribute to the supply-side. Sectors, firms, and occupations contribute to demand. Supply and demand are influenced by intermediary activities that include recruitment, assessment, training, placement, retention, and advancement (Workforce Innovation Networks, 2002).

Desired organizational outcomes are achieved when employee skill-building, performance metrics, and feedback are emphasized (Walker & Matarese, 2011). Future Extension professional preparation has been deduced into a consistent curriculum (Sands & Retallick, 2018). Yet, the literature remains inconsistent regarding required competencies. Extension Administrators (supervisors) perspectives can provide guidance on Extension professionals requisite skills.

Purpose & Objectives

Competencies of the Extension workforce is an emergent theme from a larger descriptive qualitative study exploring Extension and 4-H’s organizational environmental factors. The research question of the larger study was: What environmental factors do Extension administrators perceive as being challenges for their Extension organization and the 4-H program? The objective of this project is to share State Extension Directors, and 4-H Program Leaders perspectives on the competencies Extension professionals need to be effective.

Methodology

Twenty Extension administrators (State Extension Directors (n=7), State 4-H Program Leaders (n=13)) volunteered to be interviewed. Participants represent 15 states and all four APLU administrative regions. Participants completed a SWOT Analysis for both Extension and the 4-H program in their state. A SWOT Analysis is a management assessment tool (Pickton & Wright, 1998). Data were prepared and analyzed by transcribing audio recordings verbatim. During data collection and analysis, memoing occurred. Open-coding with Atlas.ti was conducted, and then themes were developed (Charmaz, 2014). Member checking was conducted to support transparency (Creswell & Poth, 2017). Triangulation was supported by using two separate populations to give perspective on the same phenomena (Corbin & Strauss, 2008).

Results

Table 2. connects this studies’ results relayed here as specific quotes and the Extension professional competencies identified in the literature. Administrator’s did not always speak in specific terms of a competency but rather often referred to the issues that Extension needs to address. The results of this study support the full matrix of extension professional competencies identified in the literature.

Table 2. Administrator Perspectives’ of County-Based Professional Competencies

<i>Literature Competency</i>	<i>State Administer Perspective’s on the Competency</i>
Knowledge of Organization, Professionalism,	<i>It's partnering with people, creating networks, and then seeing where we can take our expertise – William</i>

Leadership, and Management	<i>How do we integrate technology and Extension and make sure both remain relevant and . . . effective? – Ryan</i>
Technology	Costs and barriers to serving constituents make a compelling argument that adopting technology is necessary. <i>There are... weaknesses in our marketing. – Susan</i>
Communication	<i>The other threat is about... positive marketing and communication about the impacts, true impacts of the 4-H program, and [not] being able to communicate that well. – Curt</i>
Program planning, implementation, and evaluation	Excellent program planning and implementation was paramount. The need for evaluation competency is increasing as impact results are required to ensure both capacity and grant funding.
Applied Research	<i>[We must know the] impacts of our extension programs... I think that's going to be important so that the general public can actually appreciate and understand what we have to offer. – James</i>
Diversity and pluralism	<i>We . . . [have a] Caucasian staff who is comfortable with the audience we serve. And the people who get it are doing a great job with it. But they're a small minority so we are making advances in reaching new audiences; but it is not enough, and it is not fast enough. – Rhonda</i>
Volunteer Development	<i>In our club program, there is a small but mighty percent is a huge threat to our organization. [They take] so much time, up and down the organization. It's a huge huge investment of resources...trying to manage our volunteers who frankly are probably just not a good fit for the organization. – Susan</i>
Marketing and Public Relations	Administrator's emphasized a need to intentionally market the Cooperative Extension organization and the 4-H brand to reach new audiences.
Theories of Human Development and learning	Administrators did not speak directly to learning theory. Yet, their discourse was imbued with issues of efficacy and academic rigor, which is underpinned by a theory informed approach.
Risk Management	<i>stewardship, meaning that way hold the organization and its purpose, the above our own desires. And it means that we're going to deal with the difficult stuff because of the whole purpose around above our own comfort level. – Elizabeth</i>
Community Development process and diffusion	<i>The agents really need to step back, look at their advisory board structure, and they should have expertise within their community that know all of the, all the players in that community. – Sam</i>

Technical subject-matter
expertise

I study harder today than I ever have because every single day I'm confronted with the problem that oftentimes I know absolutely nothing about, you know, so in order for me to figure out what we need to do to address the white fly issue in [state], I got to figure out first what are white flies? – Carolyn

Diversity in the Current Pipeline

Administrators recognized their mission mandate to serve the representative populations in their state. Yet, a mismatch between the staff in the system and the populations they serve remains. Ryan succinctly stated: “We do not have a diverse staff at all. We only have two people of color . . . out of all of our 80 plus educators.” Many other administrators discussed their staffing limitations, including Rhonda who shared “we have by [and] large a predominantly Caucasian staff.” Only one administrator, Callie, talked positively about the diversity of their staff. The challenge to achieve the goal of having representative populations inside the organization is important to serving citizens outside of the organization, yet the human-resource development challenge remains. Especially for 4-H professionals, the pipeline has roots in traditional audiences – e.g. the club program- and thus individuals are predominantly white and rural.

Discussion & Implications

Administrator expectations of performance are out of line with our current preparation curriculums for Extension professionals. Agriculture and Extension Education department curriculums do not match the needs of the modern Extension professional as expected by state-level administrators. Departments offering Extension Education programs need to reflect-on and revise their curriculum.

The pipeline does not contain enough minority or urban-enculturated individuals. The Extension system may want to adopt a recruitment campaign, like Agriculture Education’s “Teach Ag!” to attract more potential and diverse candidates to the field. Recruitment efforts pre-university selection and during post-secondary study could contribute to a more diverse population of candidates applying for and being successful in county-based positions. In lieu of effective University degree preparation, state extension systems could develop recruitment and on-boarding professional training for new hires using the competencies determined in this study.

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A Case Study: Student Perceptions of a High-Impact Agricultural Learning Experience

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High-impact, authentic, and experiential learning offer educational opportunities that lead to desired learning outcomes such as leadership and professional development. While high-impact instruction has only reached a fraction of college students, a skills gap has existed between the abilities of college graduates and the expectations of industry professionals for leadership and professional skills. The College of Agricultural Sciences and Natural Resources at Texas Tech University established the Matador Institute of Leadership Engagement in 2017 as a leadership and professional development program that utilized high-impact, authentic, and experiential learning. Students engaged in classroom-based and field-based instruction delivered through coursework, workshops, agricultural tours, legislative trips, service projects, and internships. The purpose of this study was to examine students' perceptions of the program's instructional methods, as well as their perceived leadership and professional development that resulted from the program. Overall, students preferred actively engaging field-based instruction that involved industry professionals, while their perceived leadership and professional development included an increased understanding of themselves and others, their ability to network, a more comprehensive understanding of the agricultural industry, and a more developed concept of leadership. The findings of this study could offer valuable insight to future research and leadership programs looking to implement effective practices.

Introduction/Conceptual Framework

Instructional methods in higher education have begun to transition beyond the traditional format of lecturing in a classroom setting (Herrington, Reeves, & Oliver, 2010; Ornellas, Falkner, & Stalbrandt, 2019). High-impact, authentic, and experiential learning can provide undergraduate students with engaging educational opportunities that lead to desired learning outcomes including leadership and professional development (Bozalek, Ng'ambi, Wood, Herrington, Harman, & Amory, 2015; Kolb, 1984; Kuh, 2008; Soria & Johnson, 2017). While high-impact instruction has only reached a fraction of students in higher education in the past, a skills gap has been identified between the abilities of college graduates and the expectations of industry professionals for leadership and professional skills (Andelt, Barrett, & Bosshamer, 1997). Many college graduates have expressed the difficulties they face when entering the industry resulted from the design of curriculum that lacked practical application (Ornellas et al., 2019). As a result, the goal of leadership development has been incorporated into approximately one-third of institutional mission statements and the number of programs aimed at developing leadership

skills in college students through engaging instruction has increased (Meacham & Gaff, 2006; Spralls, Garver, Diving, & Trotz, 2010).

Leaders as individuals who are cognitively aware of their thinking and behavior, while being perceived as someone who is aware of the knowledge and values of those around them (Avolio, Luthans, & Walumbwa, 2004). Agricultural leadership students have indicated an improvement in their comprehension of theoretical knowledge about leadership, as well as their willingness to enhance others' leadership abilities (Zimmerman-Oster & Burkhardt, 1999). However, leadership education and training among college students is too often limited to the classroom instruction (Allen & Hartman, 2009; Connors, Velez, & Swan, 2006). Consequently, universities have expressed commitment to pursuing relational models of hands-on leadership development programming beyond the traditional classroom setting to prepare future generations of leaders (Brown & Fritz, 1994). Alexander, Rucker, Graham, Miller, and Apple (2017) identified the overarching goal of leadership programs is to prepare students across a variety of areas to develop a well-rounded set of leadership skills and industry knowledge that enables the agricultural discipline to grow. High-impact, authentic, and experiential learning experiences can serve as a way for higher education institutions to meet the challenge of engaging students and equipping them with the learning outcomes that will set them up for success (Kuh, 2008; Odom, Shehane, Moore, & McKim, 2014). Agricultural leadership programs can strengthen their value and relevance through collaboration with agricultural professionals (Alexander et al., 2017).

A minimum of two high-impact instructional activities with an experiential design have been recommended to improve student engagement and success in undergraduate programs (Kuh, 2008). Texas Tech University has developed an initiative for every undergraduate student to engage in a transformational learning experience through high-impact practices (Texas Tech University, 2018a). The most recent high-impact learning initiative at Texas Tech that has focused on the development of leadership and professional skills among students is the Matador Institute of Leadership Engagement (MILE) Program. The College of Agricultural Sciences and Natural Resources established the MILE Program in 2017 to provide leadership and professional development for undergraduate students. Throughout the three-semester program, students participated in leadership courses and multi-day sessions that incorporated classroom-based and field-based instruction. Students engaged in leadership and professional development through workshops, service projects, internships, agricultural tours, team-building, networking opportunities, and legislative trips to Washington, D.C. and Austin, Texas (Texas Tech University, 2018b). The MILE Program used a model with high-impact, authentic, and experiential instruction that reflected certain components of well-known leadership programs including the Purdue Leadership Development Certificate Program, Texas Agricultural Lifetime Leadership Program, Kansas Agricultural and Rural Leadership, and more. However, there has been a lack of consistency across agricultural leadership programs regarding instructional methods, creating a need to identify effective instructional methods and define key elements that contribute to the success of an agricultural leadership program (Alexander et al., 2017).

The conceptual framework that guided this study was composed of engaging instructional concepts, including high-impact learning, authentic learning, and experiential learning that apply real-world contexts. High-impact learning has strengthened intellectual and practical skills, deepened personal and social responsibility, and practiced integrative and applied learning (Kuh, 2008). Kolb's Experiential Learning Theory was derived from the work of John Dewey, Jean Piaget, and Kurt Lewin, which encompasses learning as "the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). Effective learning can occur through the engagement of four stages in Kolb's (1984) experiential learning cycle, including concrete experiences, reflective observation, abstract conceptualization, and active experimentation. Similar to high-impact and experiential learning, authentic learning uses real-world contexts to offer an effective, practical model for the facilitation of learning through hands-on experiences and engaging learning opportunities that link knowledge to action (Bangs, 2011; Bozalek et al., 2015; Brundiers, Wiek, & Redman, 2009; Roach, Tilley, & Mitchell, 2018). High-impact, authentic, and experiential practices that were implemented in the MILE Program included workshops, seminars, industry tours, written reflections, self-assessment, collaborative projects, portfolios, service and community-based learning, and internships (Kuh, 2008; Mazurkewicz, Harder, & Roberts, 2012). Although they might require more time and effort, these instruction methods allow an actively engaged learner to behaviorally and cognitively process skills, knowledge, and attitudes that can produce richer and more enduring learning (Baker, Robinson, & Kolb, 2012; Barab, Squire, & Dueber, 2000; Brinkerhoff & Apking, 2001; Gentry, 1990). Students' level of cognitive development and knowledge acquisition can increase due to their increase level of engagement in the academic process (Smith, Sheppard, Johnson, & Johnson, 2005).

Purpose/Objectives

Research focused on leadership programs and how they impact student development through the use of high-impact, authentic, and experiential methods could potentially increase consistency among current and future agricultural leadership programs. The purpose of this study was to examine students' perceptions of an agricultural leadership and professional development certificate program taught with high-impact instructional methods. The following research objectives guided this study:

1. Examine students' perceptions toward instructional methods in an agricultural leadership and professional development certificate program.
2. Examine students' perceived leadership and professional development as a result of their experiences in an agricultural leadership and professional development certificate program.

Methods

Qualitative research methods with a case study strategy guided the study through powerful and compelling data collection, analysis, and interpretation regarding human experiences to construct

understanding of the students' perceptions regarding these specific components of the leadership program (Anderson, 2010). The case that was explored in this single, descriptive case study was a leadership and professional development program for undergraduate agricultural students (Harling, 2012; Rossman & Rallis, 2003). The MILE Program implemented high-impact, authentic, and experiential learning through both field-based and classroom-based methods of instruction that were taken into consideration as part of the case being studied (Lewis & Williams, 1994). The 14 student members in the first cohort of the MILE Program from fall 2017 to spring 2019 were selected as participants for this study. Each member was a student in the College of Agricultural Sciences and Natural Resources at Texas Tech University. Out of the 14 participants, 8 were female and 6 were male with ages ranging from 18- to 20-years-old at the time of application. Members varied in their academic majors including animal and food science, agricultural communications, agricultural and applied economics, and natural resources management.

Data was collected through semi-structured interviews and written reflections to provide further insight into participants' experiences in the program (Polkinghorne, 2005; Rossman & Rallis). After students participated in sessions throughout the MILE Program, they wrote reflections encompassing their perceptions of their experiences, which were then used as supporting data in this study. Open coding of the data was followed by axial coding using NVivo 12.0 analysis software. Interrater reliability was established through two independent coders who participated in coder training until a reliable level of 0.76 was reached (Lombard, Snyder-Duch, & Bracken, 2002). After reliability was established, the remaining data set were divided equally between each of the two independent coders to complete the remainder of the coding process. Thematic analysis was used to develop meaning from the coded sections of data. The researcher examined the code analysis results to construct themes according to participants' experiences, combining them into statements that communicated the essence of experiences in the program through descriptions (Creswell, Hanson, Clark, & Morales, 2007).

Trustworthiness was established through four aspects of qualitative case study research that establish rigor, including credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985; Houghton, Casey, Shaw, & Murphy, 2013). To ensure credibility, prolonged engagement and peer examination were implemented. Further, transferability, dependability, and confirmability were ensured in the analysis and reporting of data through thick, rich descriptions, an audit trail, triangulation, member checking, and researcher reflexivity (Anderson, 2010; Creswell & Miller, 2000; Dooley, 2007; Krefting, 1990; Polkinghorne, 2005). The primary researcher also served as the graduate assistant for the MILE Program, meaning the researcher regularly interacted with the students in the program.

Findings

Analysis of students' responses regarding instructional methods revealed three themes including active engagement, preference for field-based learning, and learning from industry leaders and

professionals. Students indicated effective learning resulted from actively engaging instruction that provided interactive firsthand experiences through doing, applying, or implementing what they learned from instruction. Students also indicated a positive perception of field-based instruction or experiences in comparison to instruction that occurred in a classroom setting. Students discussed how opportunities to go somewhere other than a classroom by getting outside and off campus, traveling on tours or other program trips, or going out in the industry field or community benefitted their learning. Finally, students discussed the impact of learning from the knowledge and experience of industry leaders and professionals, particularly when the professionals were in their own environment.

Analysis of students' responses regarding their perceived leadership and professional development that resulted from the program revealed four themes including understanding of self and others, knowledge of the agricultural industry, networking, and concept of leadership. Students discussed gaining a better understanding of various personalities, strengths, weaknesses, leadership styles, and communication that equipped them to effectively approach, interact, and communicate with others. Students also indicated a more comprehensive understanding of the agricultural industry through new or eye-opening knowledge or opportunities they had not previously experienced. Additionally, they identified the value of networks and the experiences they had to build confidence in their networking skills and establish relationships for current or future professional opportunities. Finally, students discussed how they learned to define or exemplify leadership as a result of their experiences, interactions, and observations of current industry leaders and professionals during their time in the program.

Conclusions/Recommendations/Implications

Smith et al. (2005) supported students' preference for actively engaging instruction with the understanding that students' level of cognitive development and knowledge acquisition increased as their involvement or engagement in their academic experience increased. Further, effective learning can occur when an actively engaged learner behaviorally and cognitively processes skills, knowledge, and attitudes in a learning opportunity that employs a high level of involvement by the participant (Gentry, 1990). The agricultural students in the program preferred field-based experiential learning and felt their level of knowledge retention was higher compared to classroom-based learning. Research has supported high-impact, authentic, and experiential learning may require more time and effort, but the learning that results is richer and more enduring (Baker et al., 2012; Kuh, 2008). Students believed instruction that incorporated industry leaders and professionals enhanced their learning experiences. Further, students discussed the value of networking for their leadership and professional development. Alexander et al. (2017) supports agricultural leadership programs can strengthen their value and relevance through sustainability that results from collaboration and connectedness among agricultural professionals.

Students discussed how an increased understanding of themselves as well as others provided a foundation they were able to build upon in the development of their leadership and professional

skills. Avolio et al. (2004) supported this finding by defining leaders as individuals who are cognitively aware of their thinking and behavior, while being perceived by others as someone who is aware of the knowledge and values of those around them. Students acknowledged a more comprehensive understanding of the agricultural industry as a result of their experiences in the MILE Program, which Alexander et al. (2017) suggests is the overarching goal of agricultural leadership programs. Students in the MILE Program acknowledged a new perspective on their concept of leadership, which is supported by Zimmerman-Oster and Burkhardt (1999) who suggest agricultural leadership students are likely to show a significant improvement in their comprehension of theoretical knowledge about leadership, as well as their willingness to enhance others' leadership abilities.

Leadership programs in higher education, particularly in the agricultural field, should incorporate actively engaging, field-based instruction using educational concepts in real-world settings with industry professionals to improve student comprehension (Bangs, 2011; Brundiens et al., 2009; Gentry, 1990). Programs should also incorporate a diverse, interdisciplinary approach to the agricultural industry. Leadership programs in higher education can enhance the leadership and professional development of participants through assessments that provide a better understanding of themselves and others in addition opportunities that allow participants to establish relationships for professional opportunities. Future research should evaluate multiple leadership programs from various institutions. Further, a more comprehensive program evaluation is recommended for future research regarding agricultural leadership programs in higher education.

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An Examination of Student Perceptions Toward University Recruitment Photographs

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With a new generation entering college and the growing demand for professionals in the agricultural industry, recruiting students with an agricultural and non-agricultural background to college agriculture programs is important. This study examined students' perceptions and preference of university recruitment photographs to determine if there was a difference between students with agricultural and non-agricultural backgrounds. The research design was quantitative, and data was collected using an online survey consisting of semantic differential scale questions to measure perception and a rank order question to measure preference on eight different recruitment photographs (four agricultural photos and four university photos) in four categories (Building/Campus, Socializing, Teacher with Student, and Student Profile). Results revealed statistically significant differences in perception among students with agricultural backgrounds on an agricultural Building/Campus photograph and an agricultural Socializing photograph. Results on preference showed a statistically significant difference among students with an agricultural background on the agricultural Socializing photograph. It was found the university Building/Campus photograph had the most positive perception and highest rank, regardless of student background. These differences between student backgrounds are important when creating recruitment materials. Photographs including iconic university buildings and landmarks should be utilized regardless of student background.

Introduction/Conceptual Framework

The number of college-level undergraduate students enrolled in agriculture programs has increased to almost 30%. However, the demand for students to enroll in agriculture programs remains because the number of graduates cannot keep up with the demand for agriculture professionals as current agriculturists reach retirement age (Goecker, Smith, Fernandez, Ali, & Theller, 2015; STEM, 2014; Roser, 2013). It is projected that students with little to no connection to agriculture will contribute to the future population of agricultural professionals in the workforce (STEM, 2014). This new generation of students entering college differs from past generations in that they grew up with social media, are more apt to use images in their communication processes, and have shorter attention spans (Russmann & Svensson, 2017; Seemiller & Grace, 2016).

Images increasingly serve as a means of communication in contemporary society (Bradea, 2015). Visual elements have the ability to impact human psychology and physiology, affecting ideas, perception, feelings and behaviors, making it a powerful tool in changing the state of mind and body (Branthwaite, 2002). The use of photographs within institutional recruitment materials is

just as important as it is in traditional marketing and advertising strategies because colleges and universities are marketing their programs to prospective students (Hartley & Morpew, 2008; Pippert, Essenburg, & Matchett, 2013). Setterbo et al. (2017) found campus visits and recruitment events are effective ways to influence students with no agricultural background to enroll in an agriculture program. Ruffalo (2017) reported 82.1% of four-year colleges and universities rely on print media advertisements and recruitment materials to recruit prospective students. Additionally, Ashburn (2007) reported 64% of high school juniors and seniors utilized college viewbooks and print materials to gain more information about institutions.

A conceptual framework was developed based on various concepts derived from literature on visual communication and perception including Chapman's (1981) Model of Student College Choice, which includes the value of recruitment materials; Gregory's (1970) Top-Down Processing Theory of visual perception that suggests individuals are more likely to pull from past experiences to form a perception; and Petty and Cacioppo's (1986) Elaboration Likelihood Model (ELM) of persuasion, which explains different ways in how individuals process stimuli, why they are used, and their effect on attitude change (Petty, Cacioppo, & Shumann, 1983).

Purpose/Research Questions

The growing demand for diverse professionals in the agriculture industry presents a need to recruit students with both agricultural and non-agricultural backgrounds to college agriculture programs. Likewise, as a new, visually-driven generation is recruited to college agriculture programs, a better understanding of how students perceive photographs in recruitment materials is needed. The purpose of this study was to identify students' perceptions of university recruitment photographs as well as photograph preferences to more effectively prepare visual elements in recruitment materials. The following research questions guided this study:

RQ1: Is there a statistically significant difference between student perceptions toward various recruitment photographs based on if they have an agricultural or non-agricultural background?

RQ2: Is there a difference in photograph preference between students with agricultural and non-agricultural backgrounds?

Methods and Procedures

This study was quantitative in design. There was one independent variable, student background, with two groups: students with a non-agricultural backgrounds and students with an agricultural background. The dependent variables were the student perceptions and preference of the photographs. Participants voluntarily signed up to take the 69-item online Qualtrics survey through Texas Tech University's SONA participant pool in exchange for extra credit for undergraduate courses in communications, agricultural communications, and human sciences. After the survey was open for two weeks, a snowball sampling method was adopted due to low response rates. The population consisted of 117 first-year students who enrolled during the fall

2018 semester. Of the participants, 57 had an agricultural background and 60 had a non-agricultural background. Thirty students were enrolled in the College of Agricultural Sciences and Natural Resources (CASNR), and 87 were enrolled in a different college on the Texas Tech campus. Only first-year student participants who enrolled during the fall 2018 semester were able to take the survey.

The survey consisted of three sections in order to understand student perceptions toward eight university recruitment photos and photograph preferences that would most likely encourage them to enroll in an agricultural program at the university. The six-item, seven-point semantic differential scale questions were adopted from past research and was designed by using polar adjectives to measure perception (Lutz, MacKenzie & Belch, 1983; Michell & Olsen, 1981; Gardner, 1985; MacKenzie, Lutz & Belch, 1986; Phelps & Thorson, 1991). The six items were scaled (positive adjective = 7 and the negative adjective = 1) and included unfavorable – favorable, boring – interesting, dislike very much – like very much, irritating – not irritating, does not hold attention – holds attention, not important – important. Validity for the entire instrument was established by a panel of experts. Reliability was established for each item. For the semantic differential scale, reliability was established through a pilot test showing an acceptable reliability of $\alpha = .958$ for this item. The rank order question was developed by the researchers, and participants ranked each image in the order of what would most likely to encourage them to enroll to an agricultural program (1 = most likely, 8 = least likely). It can be expected to have a reasonable reliability for the first three ranks and last three ranks (Vannette, 2015). Demographic and background questions helped to determine participant background in agriculture through a series of questions: “Did you grow up on a farm or ranch?,” “Do your parents or grandparents depend on, or have been dependent on, an income from production agriculture and/or natural resources?,” “Did you ever take an agricultural or natural resources class in high school?,” and “Were you ever a member and/or participant in 4-H or FFA in high school?” If any of the questions were answered as “yes,” they were labelled as having an agricultural background. If they answered “no” to all questions, they were labelled as having a non-agricultural background. Using SPSS statistics software, an independent samples t-test was run for the semantic differential scaled section to compare differences in students’ perceptions based on their background. A nonparametric Mann-Whitney U test was run for the rank order question to determine if there were differences in photograph preference between students with an agricultural and non-agricultural background.

Previously captured marketing images were selected with permission from both Texas Tech University and CASNR. Categories were selected based on findings from Klassen (2000) and included Building/Campus, Socializing, Teacher with Student, and Student Profile. Four university images and four agricultural images were selected, two in each category. The university images depicted generic scenes around campus, and the agricultural images depicted scenes related to CASNR. For Building/Campus, the university image showcased the university seal at night and the agricultural image showed CASNR’s animal science building. For Socializing, the university image showed students talking outside the chemistry building, and the

agricultural image showed students playing cornhole in the livestock arena. For Teacher with Student, the university image showed a professor helping students in the lab, and the agricultural image showed a CASNR landscape architecture professor helping a student with a project. For Student Profile, the university image showed a group of business students, and the agricultural image showed a CASNR natural resource management student with a drone in the field.

Results

For research question one, statistically significant differences in perception were only found in two of the eight photographs for students with agricultural backgrounds (Table 1). The agriculture Building/Campus photograph had significant differences in student perception for the Favorability and Interest scales, and the agriculture Socializing photograph had significant differences in all six perception scales. There were no statistically significant differences found for the other six images, and none were negatively perceived.

Table 1
Comparisons of First Year Student Perceptions Toward University Recruitment Photographs Significant Findings (N = 117)

Variable	Ag Background (n = 57)		Non-Ag Background (n = 60)		t	df	p	Cohen's d
	M	SD	M	SD				
Ag Socializing								
Favorability	5.98	1.21	4.96	1.55	3.96	115	<.01*	.73
Interest	5.82	1.37	4.92	1.68	3.18	115	<.01*	.59
Likeability	5.76	1.28	4.72	1.57	3.93	115	<.01*	.73
Irritation	6.00	1.31	5.25	1.56	2.80	114	.01*	.52
Attention	5.62	1.39	4.79	1.82	2.78	114	.01*	.51
Importance	5.43	1.41	4.46	1.71	3.35	114	<.00*	.62
Ag Building/Campus								
Favorability	5.85	1.19	5.13	1.71	2.60	114	.01*	.49
Interest	5.15	1.42	4.57	1.68	2.01	114	.05*	.37

Note: *Significance at the $p \leq .05$ level; Scale: Semantic Differential Scale from 1 to 7, with 1 being negatively associated, and 7 being positively associated

For research question two, a statistically significant difference among median rank scores was only found for the agriculture Socializing photograph and was preferred by students with an agricultural background (Mdn = 3.00) over students with non-agricultural backgrounds (Mdn = 5.00), $U = 1154$, $z = -3.07$, $p = .002$. There were no statistically significant differences for the other seven photographs. The university Building/Campus photograph was found to have the

most positive perception and highest preference among students of both backgrounds (Mdn = 1.00) out of all eight photographs viewed.

Conclusion/Recommendations

Results suggest students with an agricultural background have a higher preference and more positive perception toward certain agricultural photographs in the specified categories. This could reflect agricultural students' ability to pull from past experiences and previous knowledge from their involvement in agricultural endeavors (Barry, 2002; Damasio, 1999; McLeod, 2008). Students with non-agricultural backgrounds did not have negative perceptions or preferences toward the agricultural photographs. When considering the ELM, prospective students with a non-agricultural background are more likely to process an agriculturally-related photograph peripherally due to low involvement with the image and will pull from positive or negative heuristic cues to make a perception or preference (Petty & Cacioppo, 1986; Petty, Cacioppo, & Shumann, 1983). Students of both background types had the most positive perception and highest preference for the university Building/Campus photograph.

When creating recruitment materials, college marketers should be aware students with a non-agricultural background significantly differ in how they perceive images in the categories of CASNR Building/Campus and Socializing. A mixture of agricultural and university photos should be used when creating recruitment materials. If budget allows, creating a set of recruitment materials with agriculture-focused photographs to recruit students with agricultural backgrounds would be effective. Based on the findings of this study, university Building/Campus photographs should be included when creating recruitment materials to appeal to students of both background types. This image of a highly recognizable campus icon was the most preferred image and ranked as most likely to encourage students to enroll in an agriculture program. While choosing images that reflect a college of agriculture is important, these findings suggest it would be effective to also include university images to show a connectedness with the overall campus.

Future research should focus on prospective students who are still in high school and should incorporate more photographs and photograph categories for a better understanding of prospective student perceptions and preferences. Gathering data from different geographic locations and demographic backgrounds would also be beneficial. Incorporating qualitative methods would be valuable to gain verbal insight from the participants on how they emotionally connect to each photograph as well as their thoughts when actively viewing the photos. Eye-tracking data collection would also be advantageous to gain information on visual attention by assessing fixation duration and eye movement of participants as they view each photograph. This would allow researchers to gain a deeper understanding of what components in each image are viewed, how long they are viewed for, and if there is a difference between students with agricultural and non-agricultural backgrounds. Lastly, creating recruitment material prototypes that include all the photographic components would increase reliability.

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Divergence in Generational Support of Social Progress: An Exploration of Purchasing Intentions for Agriculturists

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Purchasing intentions in the United States show support for progressive social views. Yet, little is known about the purchasing intentions of agriculturists, who simultaneously produce and consume commodities in a dialectic process. As a part of an ongoing project of the Agriculture Research Initiative, made up of industry representatives and varying institutions of higher education, this study focuses on a section of pilot data detailing generational differences relative to purchasing intentions when brands advocate for social progress. The areas of racial, gender, and LGBT (lesbian, gay, bisexual, and transgender) equality are explored and divergent trends for gender and LGBT equality are discussed with respect to generational nuance. Implications for a continuation of this study and addition to the larger body of data are discussed.

Introduction

Ninety-six percent of the nation's farms are operated by white producers, while 3.2% of farms are operated by farmers (i.e. those who are directly involved in the toil of agricultural commodities) of Hispanic origin (USDA, 2012). Hispanic farmers, who are considered an underserved population, along with other racially and socially disadvantaged groups, face more challenges in terms of access to land, and financial resources, among other resources, resulting in intensified inequity in the agricultural industry (Walla, 2019). Even so, the industry has made strides to help mitigate inequality of underserved minorities in agriculture. For example, Farm to Grow Inc. is a nonprofit committed to working with Black farmers in finding ways to be more sustainable in their operations through promoting innovative practices that preserve cultural and biological diversity (Farms to Grow Inc., n.d.). Relative to a more ambiguous form of diversity, the Cultivating Change Foundation aims to elevate the value and competence of LGBT agriculturists and their allies through advocacy, education, and community support (Cultivating Change Foundation, n.d.). Although the industry has made efforts to enhance diversity and inclusion, farming culture has not historically been at the forefront of acceptance of racial groups and other minorities (Braden, LaScola, Berejnoi, Cloutier, & MacFadyen, 2018).

For this study, the USDA (2014) definition of diversity and inclusion (including, but not limited to characteristics such as: national origin, language, race, color, disability, ethnicity, gender, age, religion, sexual orientation, gender identity, socioeconomic status, veteran status, and family structures) was utilized. Diversity and inclusion in agriculture has also been highlighted in the mainstream media recently. For example, History Channel's 2019 farm documentary, "The American Farm" (History Channel, n.d.) features the struggles a black farming family has faced as a minority in agriculture. In addition, Tyson Foods, the world's second largest processor and marketer of chicken, beef, and pork (Tyson Foods, n.d.), focused on gender diversity as they

conducted a marketing campaign for International Women’s Day that featured children depicting women in the roles of a farmer, a doctor, and a truck driver. Each vignette then highlighted women who are “shaping what it means to feed the world” in various sectors of Tyson Foods (Tyson Foods, 2019). Although efforts have been made when it comes to highlighting diversity and inclusion in agriculture, industry advocates have posited that if the U.S. agriculture industry expects to meet future demands and consumers’ needs and expectations, American farmers and agriculturalists need to be as “diverse as the crops they grow” (Berg, 2019, pg. 2). This concept relates to an understanding of producing and marketing agricultural goods and services to consumers from an informed and sympathetic perspective. To inform this perspective agriculturists should be familiar with national purchasing intention data. Indeed, the data indicates 59% of reporting U.S. adults support boycotting brands over their stances on social issues (Bame, 2017), and shows the support of growth in consumer interest of social issues. They go further to describe that in a digital age, movements, strikes, and issues are spread via social media and initiated with hashtags that consumers can track, which allows for consumers to easily determine which companies are supporting social issues and which lack corporate social responsibility (CSR). Issues that ranked the highest in this study were immigration, women’s rights, and diversity and inclusion (Bame, 2017). These issues transcend the consumer market as there are clear and present implications for producers, marketers, packagers, and distributors alike. Yet there is little known about how the interests of this consumer market align, or not, with that of agriculturists to produce and support the production of commodities that enter the market. In alignment with the National Research Agenda (Roberts, Harder, & Brashears, 2016), this project explores the methods, models, and programs effective in communicating with diverse audiences (Research Priority 5) as they relate to different generations of agriculturists.

Theoretical Framework

Since the 1990s, corporations have been practicing CSR, which is implemented when corporations adopt practices that benefit society beyond what is legally required (Vogel, 2006). Research indicates that most successful business leaders believe it is necessary to be socially responsible to not only maintain and/or increase profitability but also to retain and attract employees/consumers (Perrini, 2006). While CSR is corporate-driven and motivates corporations to do more for society, it also opens the door for activists and consumers to demand and expect more. This shift from corporate-driven “do good for the good” has recently transitioned into a societal-driven brand activism (Strach, 2016). Brand activism consists of consumers’ efforts to promote political, economic, social, and/or environmental reform. According to Kotler and Sarkar (2017), there are six domains of brand activism: business, political, environmental, economic, legal, and social. In our context, we focus on social activism, which centers around issues of gender equality, sexual orientation, race, and age. Social activism has picked up speed in recent years. In fact, millennials have high expectations for companies and want companies to show concern not just for their own profits but for both the local communities they serve and the greater world (Kotler & Sarkar, 2017). This societal-driven social activism has led to a market-driven effort called cause marketing, which includes marketing the efforts a company is making

toward improving an area of society. Sprout Social (2017) recently captured how important cause marketing is to consumers with results indicating that consumers are more receptive to brands communicating social or political messages on social media compared to other platforms. This was also supported by Cone Communications (2013) who found 92% consumers reported they would buy a product or service that socially benefited society. This is associated with the notion of “voting with your dollar”, where consumers will act to support brands that align with their social views and conversely decrease support for brands that act the other way. “The most effective way to be political today is not to cast your vote at the ballot box but to do so at the supermarket” (Hertz, 2001, p. 190). Just as a citizen can influence their environment through ballot votes, a consumer can influence society and create societal expectations through their purchases. CSR (or lack thereof) in agriculture is important to examine, as minimal attention is given to the social structural roots of agriculture “that create inequities or any possibility of deleterious, if unintended, social or political effects” (Hallet IV, 2017, p. 1064). Therefore, CSR, via social activism and cause-marketing becomes the frame for understanding agriculturists as a population.

Purpose/Research Questions

The intention of this study was to gather demographic data of agriculturists & assess their perceptions and predispositions surrounding underrepresented populations in the agriculture industry. Moreover, we sought to explore the nuance behind how social issues and advocacy related to brand loyalty and purchasing intentions on the consumer end of the market, as it relates to generations of consumer-producers--agriculturists. Therefore, we ask the following questions to guide our work:

1. What are the generational differences between purchasing intentions when a company advocates for racial equality?
2. What are the generational differences between purchasing intentions when a company advocates for women’s equality?
3. What are the generational differences between purchasing intentions when a company advocates for LGBT equality?

Methodology

A survey was constructed to gather data on how individuals within the agriculture industry perceived issues of social activism and how their purchasing intentions might change when companies/brands they purchase from actively supported one of three forms of social activism (e.g. publicly supporting racial equality, gender equality, or equality based on sexual orientation). This question was part of a larger set of questions that explored professional interactions with underrepresented minorities and how respondents perceived the attitude of the industry toward diversity and inclusion of underrepresented minorities. Focusing on purchasing intentions and brand loyalty, the instrument asked participants to respond to Likert-type statements in scenarios like, “If a company I purchase products/services from supported [racial

equality] publicly, I would...”. Potential responses were on a 4-point scale and included “Boycott/Stop Purchasing”, “Decrease Purchasing”, “Continue Purchasing/No Change”, and “Increase Purchasing”. The instrument was disseminated at three agricultural conferences and meetings over the course of two months. All conferences were held in the southeastern region of the United States. Researchers solicited respondents through a combination of display booths and social events, offering confectionary incentives in display booth settings only. Surveys were either administered via paper hard copy or on a digital tablet with a link to the Qualtrics™ questionnaire. In the meeting spaces, researchers approached individuals intentionally to gather information from participants through the survey. All data was collected and coded by the Qualtrics™ platform and analyzed with SPSS (v25). We focus a majority of our data analysis on descriptive statistics to better understand the sample characteristics. To examine the differences between generational subgroups a chi-square test was conducted in cross tabulations.

Findings

Out of 317 people who took the pilot survey there were 259 individuals who responded with their gender identity. They consisted of 135 men (52%), 122 women (47%), and 2 transgender (<1%) individuals. An overwhelming majority of respondents also identified as heterosexual (N = 285; 95%) with the remaining participants aligning their sexual orientation with homosexual, bisexual, or ‘no response’. Of the respondents who provided a response to their race (N = 308) a majority identified as Caucasian and made up 88% of the sample. Black (N = 11) and Latino (N = 11) respondents made up 7% of the sample while Asian, Middle Eastern, Native American, and Self-identified races made up less than 5% of the sample. To understand our data in generational relationships, we compiled respondents into categories according to birth year that align with the Silent (prior to 1944), Baby Boomer (1944-1964), X (1965-1979), Y (1980-1994), and Z (1995-2015) generations (N = 300). The Baby Boomer generation made up the largest contingency (N = 119; 40%) of the sample. Generations X (N = 66; 22%), Y (N = 54; 18%), and Z (N = 46; 15%) were similarly represented and made up a significant portion of the sample, while the Silent Generation (N = 15; 5%), expectedly, made up a small portion of the sample. Additionally, most of the sample identified the main facet of their occupation as that of a Farmer Rancher, or Grower (FRG) (50%). Thirty-two respondents aligned part of their occupation with an education role and a large portion of respondents (N = 72; 21%) did not identify part of their occupation with the additional categories provided (Animal Science/Nutrition, Chemical, Education, Equipment, Insurance, Legal, Policy, Real Estate).

Table 1
Overall Purchasing Intentions for Generations of Agriculturists (N = 291)

	Boycott/Stop Purchasing		Decrease Purchasing		Continue Purchasing/No Change		Increase Purchasing		Total
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	
Racial Equality	27	9.3	51	17.5	184	63.4	29	10	291
Equality for Women	31	10.7	49	17	180	62.3	29	10	289
LGBT Equality	46	16.3	58	20.5	149	52.7	30	10.6	283

Research question one through three were intended to explore how are agriculturists’ purchasing intentions were impacted when organizations/brands advocated for a social issue equality. For comparison, compiled frequencies for purchasing intentions relative to the three social equality issues are featured in Table 1. Our first research question was intended to explore the generational differences between purchasing intentions when a company advocates for racial equality. The data generally show that a majority of the generational members would continue their purchasing habits if a company advocated on behalf of racial equality. While only a slim majority (51.9%) of Generation Y would continue purchasing at the same rates, they also had a higher rate of increasing their purchasing habits (23.1%) when compared to other generations. Interestingly, the Silent Generation seemed less likely to change their purchasing habits, but when they did change habits due to racial advocacy, they were more likely to decrease their purchasing habits or stop purchasing all together. The data suggests that some of these differences are significant ($p < .05$, $LR = 22.47$), but there is a minimal effect size for association ($V = .16$) (Vaske, 2008). To account for counts less than 5 in 30% of the cases the Likelihood ratio is used.

Research question two explored the generational differences between purchasing intentions when a company advocates for women’s equality. These results start to disperse a little more in comparison to those found for advocacy of racial equality. While the majority of respondents center around continuing their purchasing habits (62%), again there is a notion that Generations X and Y individuals would increase their purchasing habits at a higher rate than individuals who align with other generations. Individuals in Generation Z would be more likely to decrease their purchasing intentions if a company supported equality for women. Silent Generation respondents were more likely to boycott or stop their purchasing (21.4%, $N = 3$) of brands within a company that advocate more strongly for women. Despite the novel descriptive disparities between generations, none of the differences between the groups were significant ($p = .07$, $LR = 19.72$). Research question three explored the generational differences between purchasing intentions when a company advocates for LGBT equality. The data express more disparate findings than that of advocacy for women’s equality. While Generation Y, the Baby Boomers, and the Silent Generation respondents center most around continuing to purchase, Generation X and Z deviate

from this trend. Generation X actually has a large contingency of respondents in comparison to other generations who say they would decrease or stop purchasing (46.2 %) if a company were to advocate for LGBT equality. Generation Z follows a similar trend, but more than a quarter (25.6%) of respondents note they would boycott or stop purchasing all together compared to one in five respondents (N = 13) of Generation X. Gen Y respondents are more likely to increase purchasing than peers in other generations. These findings represent a significant difference between the generations ($p < .05$, $LR = 22.98$), but only a minimal effect ($V = .17$) (Vaske, 2008).

Conclusions & Recommendations

Participants least supported LGBT equality with 104 (36.8%) participants indicating they would either decrease or stop their purchasing from a company that supported equality for LGBT individuals. With a little over one third of the participants stipulating they would not purchase products from a company that shows support for LGBT equality, it is important to consider today's social landscape in agriculture. A report from the Movement Advancement Project (MAP) estimates somewhere between 2.9 million and 3.8 million LGBT people live in rural America (Scher, 2019). Logan Casey, MAP policy research, stated, "We so often overlook that LGBT people live in rural communities" (Scher, 2019, para. 3). This could likely be due to the more difficult nature of differentiating LGBT individuals from cisgender heterosexual individuals. Although some of the participants indicated they would decrease or stop purchasing from companies that supported equality for women, racial equality, and LGBT equality, consumer research has indicated there is a need and demand for companies to support more popular social issues. While there is a general consensus in our sample around the support for LGBT (63%) equality, there are far more people who act adversely in response to this area than for social issues of race and gender equality. There is an obvious divergence in agriculturists' purchasing intentions compared to national findings. This is concerning purely because those whose livelihood is bent on the production of agricultural commodities, who are closest to its roots, are not as likely to support the evolving marketplace. More work needs to be done to understand this divide and how a bridge can be made and understood from a qualitative lens. Additionally, data should continue to be collected at major meetings within the agricultural industry to generate a broader understanding of how social responsibility is shouldered.

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Addressing the Gender Gap: Women's Perceived Barriers to Pursuing STEM Careers

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This national study used the Delphi method to identify perceived barriers women face in the pursuit of STEM careers. The study used a series of three web-based questionnaires. The first round of the study used a questionnaire with an open-ended question to facilitate the generation of a wide array of response categories. In round two, respondents were asked to rate the 24 perceived barriers in round one on a Likert-type scale and to make changes as necessary. In round three, respondents were asked to provide a dichotomous indication of whether they agreed or disagreed with each of the items. Consensus on 20 perceived barriers was reached after three rounds. The major barriers identified by the respondents were: male domination of STEM careers, lack of awareness of educational and career opportunities, STEM education and toys directed at boys, a lack of female mentors/role models, minimization of barriers, personal expectations, the time required to become proficient in a STEM field, lack of encouragement from men, and the perceived glass ceiling of women in STEM careers.

Introduction

As America is fully engaged in the 21st century, its ability to maintain global competitiveness within science, technology, engineering, and mathematics (STEM) hinges on a fully developed economy (Carnevale, Smith, & Melton, 2011). Yet, the number of students pursuing STEM careers still lags behind demand both in the United States and internationally (Rothwell, 2014; U. S. Department of Labor, 2009). Although federal policies and initiatives have yielded increased numbers of qualified workers, men continue to outnumber women in these careers (Hill, Corbett, & St. Rose, 2010), which has resulted in calls to increase the proportion of women in STEM education and careers (Roberts, Harder & Brashears, 2016).

The foundation of the gender discrepancy among STEM workers can be identified as early as middle school. Although boys and girls are earning math and science credits at an equal rate with girls earning slightly higher grades (NCES, 2007), a small gender gap persists on the mathematics sections of the SAT and ACT examinations (Corbett, Hill & St. Rose, 2008). The gap continues to increase when students reach post-secondary education as the percentage of men pursuing STEM degrees outpaced women 29% to 15% (NSF, 2009). Approximately one-half of the bachelor's degrees in chemistry, math, and agriculture are awarded to women (NCES, 2015). However, among degrees awarded in physics, engineering, and computer science, this proportion decreases to approximately 20% (National Science Board, 2014).

Academic self-confidence and achievement and socio-cultural factors have been examined as factors attempting to explain the gender gap. (Andreescu, Gallian, Kane, & Mertz, 2008; Hill et

al., 2010). Pajares (2005) found the gender differences in academic self-confidence begin in middle school and increase throughout high school and college, with girls reporting less confidence in their math and science abilities. In a majority of countries, more boys than girls scored above the 99th percentile in mathematics on the 2003 Program for International Student Assessment yet, in Iceland and Thailand, girls more often scored above the same threshold (Guiso, Monte, Sapienza, & Zingales, 2008). These differences between countries illustrate the cultural importance of mathematical skill development (Hill et al., 2010). However, as Dweck (2006) noted, when girls believe that they can become smarter and learn what they need to know in STEM subjects, they are more likely to succeed in these fields. Finally, culturally prescribed gender roles influence career interest, especially in girls, by suggesting certain career options are not possible because they are inappropriate for their gender (Hartung, Porfeli, & Vondracek, 2005; Low et al., 2005).

Theoretical Framework

Guiding this study was the Theory of Vocational Personalities and Work Environments (Holland, 1997). Holland posited that individuals tend to seek and create work environments that allow them to manifest their work personalities (Su, Murdock, & Rounds, 2015). Holland (1997) identified six work personality types, also known as vocational interests (Su, Murdock, & Rounds, 2015), which influence one's career decisions: *realistic*, *investigative*, *artistic*, *social*, *enterprising*, and *conventional*. Holland illustrated these personality types around a hexagonal model to visually reflect the degree of similarity between them (e.g., artistic and social are similar to each other, where investigative and enterprising, being directly across from each other on the hexagon, are maximally different). Holland (1997) also categorized work environments into the six personality types. Holland argued that the degree of congruence between a person's personality and interest type and their work environment affects work attitudes and behaviors. Thus, higher levels of congruence lead to greater satisfaction, success, and persistence (Su, Murdock, & Rounds, 2015).



Figure 1. Holland's six work personality types. Adapted from *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed.). Odessa, FL: Psychological Assessment Resources.

The literature base is replete with calls to diversify the STEM workforce. Exposing students to careers within the STEM paradigm has been identified as a method to generate interest, among females, in STEM careers. The current 3-circle model of agricultural education serves, not only, as an effective context to expose female students to career options but, aids in the development of necessary STEM employability skills (Swafford, 2018). Through the use of Supervised Agricultural Experiences and Career Development Events, agricultural education is uniquely positioned to address the gender gap in STEM fields by, according to Holland (1997), guiding career exploration and decision making.

Objective

The gender gap in STEM careers continues to be an important and complex issue facing the United States workforce. Therefore, the objective of this study was to identify current barriers women perceive as obstacles to successful employment in STEM careers.

Methodology

This national study used the Delphi method to identify perceived barriers women face in pursuing STEM careers as determined by a panel of experts. Delp, Thesen, Motiwalla, and Seshadri (1977) described the Delphi method as a group process by which a panel of experts is assembled to provide informed judgment toward consensus on a specific topic. The purpose of a Delphi panel is to collect responses from a group of experts and combine the responses into a useful statement (Stitt-Gohdes & Crews, 2004).

The purposefully selected panel of experts for this study consisted of women, ranging in age from 20-56, with academic and career experiences related and unrelated to STEM, including finance, elementary and higher education, computer science, engineering, agriculture, mathematics, law, art, business, and medicine.. To ensure a representative sample, eight women were selected from each AAAE region (North Central, Southern, & Western) for a total of 24 panelists. Dalkey (1969) reported that the reliability was greater than .80 when Delphi group size was larger than 13.

Upon agreement of the panelists to participate, this study employed three rounds and was initiated through an email detailing the process and anticipated timeline. The study was conducted electronically via an online data collection instrument. Each round was closed after 21 days, and data collection was closed after 63 days. The first round of the study used a questionnaire with the open-ended question: “What are the major obstacles confronting women in the pursuit of careers in STEM?” An open-ended question was used to facilitate the generation of a wide array of response categories. The researchers then categorized responses to produce items for a second-round questionnaire. Questionnaires were validated using an expert panel of university social science researchers.

In the second questionnaire, panelists were asked to rate the perceived barriers identified in round one on a five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree). Consensus was determined, *a priori*, as those barriers earning mean Likert scores of 3.5/5 and above. From second-round responses, the list of perceived barriers was reduced from 25 to 23. The third questionnaire sought to determine consensus. Panel members were asked to indicate whether they agreed or disagreed with each of the 23 perceived barriers, and to provide comments if they could not agree with the summary findings. Consensus was reached on 22 barriers, with no suggested revisions, and thus, data collection ceased. Data were analyzed using descriptive statistics. Data collected using Likert-type scales were treated as interval data and reported as means and standard deviations. Nominal data were reported using frequencies and percentages. The response rate for round 1 was 88% ($n=21$) and 75% ($n=18$) for rounds 2 and 3.

Results

As shown in Table 1, 100% of the panel members agreed that perceived male domination of STEM careers was an obstacle women face when pursuing STEM careers. Over 90% of the panel members agreed that a lack of awareness of educational and career opportunities was a perceived barrier. Furthermore, over 75% of the panelists agreed that STEM education and toys were directed at boys, a lack of female mentors/role models, minimization of barriers, personal expectations, the time required to become proficient in a STEM field, lack of encouragement from men, and the perceived glass ceiling of women in STEM careers were perceived barriers which may prevent women from pursuing STEM careers. However, less than one-half of the

panelists agreed that lack of encouragement by family members and perceived lack of intelligence were barriers facing women in STEM.

Table 1

Delphi Round Three: Level of Agreement with Perceived Barriers to STEM Careers (n=18)

Perceived Barrier	Agree (%)	Disagree (%)
Male domination in STEM careers	100.0	0.0
Lack of awareness of educational opportunities in STEM fields	94.4	5.6
Lack of awareness of career opportunities in STEM fields	94.4	5.6
STEM toys directed at boys	88.9	11.1
Lack of female mentors/role models	88.9	11.1
STEM education directed at boys	83.3	16.7
Minimization of barriers	83.3	16.7
Personal expectations	77.8	22.2
Time required to become proficient in a STEM field	77.8	22.2
Lack of encouragement from men	77.8	22.2
Perceived glass ceiling of women in STEM careers	77.8	22.2
Intimidation by men	72.2	27.8
Societal gender roles	72.2	27.8
Lack of respect for women in STEM careers	66.7	33.3
Lack of encouragement from women	66.7	33.3
Career wage gap	66.7	33.3
Sexism	61.1	38.9
Energy required to become proficient in a STEM field	61.1	38.9
STEM-related educational expenses	61.1	38.9
Work/life balance	55.6	44.4
Lack of encouragement from family members	44.4	55.6
Females perceived level of intelligence	44.4	55.6

Conclusions/Discussion/Recommendations

In one form or another, half of the perceived barriers identified in this study deal with male domination or influence in STEM and societal beliefs and expectations for women (Hill et al., 2010). Perceived outright male domination and intimidation to sexism, lack of support from other women, and perceived lack of respect for women, comprise major threats to women who desire to pursue careers in STEM. The perceived lack of awareness of educational and career opportunities for women create additional challenges which must be overcome if the gender gap in STEM is to moderate. Interestingly, while still considered barriers, the time and energy as well as the educational expenses associated with pursuing STEM careers did not rank as high, collectively, as those obstacles associated with men or society.

Several obstacles were identified which were consistent with the literature, yet over 80% of the panelists in this study identified the minimization of barriers as a perceived challenge. Some may perceive the minimization of barriers as a decrease in barriers but, according to social psychology theory, this may not be the case. Minimization of barriers refers to a lack of awareness of discrimination (Kaiser & Major, 2006) and is grounded in the cultural belief that individuals largely control their own destiny (Fiske et al., 1998). This meritocratic worldview creates the perception that successful people are responsible for and deserve their success through hard work, and individuals who simply do not work hard enough experience failure (Kaiser & Major, 2006). However, while a distinct cultural belief in our society, this finding seems incongruous with the societal barriers also identified in this study. Why did the panelists recognize several social or cultural barriers, but then claim minimization of barriers? Has society created an atmosphere in which women can identify certain social or cultural barriers, but influenced them into believing that if these discriminatory behaviors are identified as foundational to their perceived failures that they are not worthy of pursuing careers outside of social norms?

The agricultural education profession is well-prepared to make a significant impact on the gender gap in STEM, as our profession is grounded in promoting career success among secondary and post-secondary students. As over 90% of the panelists in this study identified a lack of awareness of educational and career opportunities in STEM, it is recommended that agricultural education teacher educators continue to prepare preservice teachers to enter the classroom with the tools to promote the educational and career opportunities that exist in agriculture/STEM. Furthermore, as STEM career readiness concepts are naturally inherent within the 3-circle model of agricultural education (Swafford, 2018), it is imperative that school-based agricultural education (SBAE) teachers incorporate all components of the model in their programs to ensure students are exposed to the opportunities which exist and, more importantly, are educated about social and cultural issues surrounding STEM, in an effort to make this career field more inclusive of women.

The responsibility of educating girls and young women about the educational and career options in STEM does not rest solely with formal agricultural educators, however. Agricultural communications and extension professionals have the unique opportunity to use their informal and non-formal educational platforms to promote STEM to this underrepresented population. It is recommended that agricultural communications professionals utilize print, video, audio, and social media platforms as tools to educate girls and young women about the educational and career opportunities in STEM. It is further recommended that these platforms are used to target boys and young men in an attempt to dispel misconceptions about females and their roles in society and the modern workforce. Youth extension professionals are encouraged to use their positions as mentors and role-models to support and embolden girls and young women to pursue STEM careers and further educate boys and young men about the negative impact of gender bias and discrimination.

It is recommended that future research focus on the efficacy of formal, informal, and non-formal education models toward increasing awareness of educational and career opportunities in STEM. Researching effective methods to recruit and retain females in STEM degree programs is also suggested. Finally, it is further recommended that research be conducted to determine the most effective mentoring programs to support young women as they pursue STEM education and careers.

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The Spouse's Perspective of Agricultural Education as a Career

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The national shortage of qualified agriculture teachers can intensify the existing deficit of skilled workers in agriculture and those trained and motivated to tackle the world's complex challenges. Because a spouse can influence an agriculture teachers' career decision-making, this national study sought to explore the attitudes, work-family interface, and satisfaction of a spouse towards SBAE as a career. Our findings show households of SBAE teachers spend over 90 hours at work each week, with spouses reporting high work-interference with family (WIF) but relatively high satisfaction with SBAE as a career. Over one third of the spouses reported having "a lot" or a "great deal" of influence on the career-decisions of their spouse. Total household weekly hours, WIF, and family-supportive work culture were significant predictors of a spouse's satisfaction. Future research exploring other predictors of spouse's satisfaction with SBAE is warranted.

Introduction/Need for the Study/Theoretical Framework

The nation is facing a shortage of qualified school-based agricultural education (SBAE) teachers, spurring program closures and an onslaught of hiring emergency or alternatively licensed teachers to keep programs alive (Smith, Lawver, & Foster, 2018). A primary goal of SBAE is to prepare students for careers in agriculture, food, and natural resources (AFNR) areas. This lack of SBAE teachers and programs may result in fewer students who are prepared to seek careers in AFNR areas, and could widen the agricultural literacy gap in society. To exacerbate the problem, there already exists a shortage of skilled workers in the agricultural field (Goecker, Smith, Fernandez, Ali, & Theller, 2015). With global population growth placing greater demands on a skilled agricultural workforce tasked with addressing the world's complex challenges (e.g., food security, protecting natural resources), the shortage of trained SBAE teachers is of great concern.

One approach to maintaining the pipeline of SBAE teachers is a concerted effort to retain those currently in the classroom by removing factors that contribute to their turnover decision. Hall (1987) concluded that employees do not make career decisions independently but are influenced by a variety of factors. For example, factors related to the family domain have been shown to influence SBAE teachers' job satisfaction and turnover intentions (Sorensen, McKim, & Velez, 2017; Tippens, Ricketts, Morgan, Navarro, & Flanders, 2013). A spouse or partner (henceforth referred to as spouse) is one of the major influential family domain factors that may influence a teacher's career decision-making. Further, Lawver, Torres and Husmann (2008) found the number one strategy utilized by SBAE teachers to balance work and family was to have an understanding and committed spouse. Yet, there is a dearth of literature examining perceptions

and influence of the spouse on SBAE teachers' decision making. This study seeks to examine the attitudes and satisfaction of SBAE teachers' spouse regarding SBAE teaching as a career.

Two interconnected theories were used as the framework for this study. First, the family-relatedness of work decisions (FRWD) framework (Greenhaus & Powell, 2012) suggests that people often consider the home situation and the most positive outcomes for a couple or family when making career decisions. Furthermore, the spouse is one of the major influential factors that shape one's career decision-making. A spouse often holds strong views about the employee's working life and wishes him or her to change, continue, or pursue certain careers. The spouse's views, and consequently work-related decisions, are often shaped by role conflict, the conflict that arises as a result of trying to manage work and family roles (Greenhaus & Beutell, 1985). The role conflict theory suggests spillover from one domain to the next. For example, characteristics of the family domain (e.g., spouse's attitude towards agricultural education) can influence decisions and characteristics in the work domain (e.g., decision to quit).

Research examining individual's work and family roles has yielded a construct known as work-family conflict (WFC). The negative consequences of WFC include reduced job and overall life satisfaction as well as turnover intentions (Allen et al., 2000; Carlson, Kacmar, & Williams, 2000). In the same way WFC and job satisfaction among SBAE teachers are significantly correlated (Sorensen, McKim, & Velez, 2016a), we suggest the same relationship would be true for the spouse of SBAE teachers. However, no literature currently exists exploring this question, specifically on a national scale. Agricultural education is a unique and arduous profession, with teachers on average devoting more than 60 hours per week to their jobs (Sorensen et al., 2017). The surfeit of weekly work hours is generally attributed to the extra responsibilities of advising the local FFA chapter or fostering school and community partnerships for example (Torres, Ulmer, & Aschenbrenner, 2008). These additional responsibilities increase the amount of time SBAE teachers engage in the work domain, thus reducing the time available in other life roles, contributing to work-family conflict and turnover intentions (Greenhaus & Beutell, 1985; Sorensen, McKim, & Velez, 2016b; Sorensen et al., 2017). Since WFC usually affects other individuals sharing work and family domains (e.g., spouse), we postulate that the spouse of SBAE teachers' experiences WFC as a result of the SBAE teacher's excessive work hours.

Other factors, such as gender, culture, and experience with SBAE may influence a spouse's satisfaction with agricultural education as a career. For example, because of traditional gender roles that still persist, women are more likely to sacrifice their own career opportunities for their husband despite dissatisfaction with the career (Ullrich, Pluut, & Büttgen, 2015). Additionally, spouses who participated in an SBAE program in high school might have different attitudes towards SBAE teaching as a career than those who did not participate, and would likely have a better understanding when SBAE teachers spend long hours away from home for FFA activities.

Purpose/Objectives

The purpose of this national descriptive study was to explore the spouse's satisfaction with SBAE teaching as a career. This research aligns with the National Research Agenda Priority three which calls for research into a "sufficient scientific and professional workforce" (Roberts, Harder, & Brashears, 2016, p. 9). The following research objectives guided the study: 1) describe the demographic characteristics of participants; 2) describe work-family conflict and perceived family-supportive work culture of participants; 3) describe satisfaction of the spouse regarding SBAE as a career; and 4) explain the relationship between the spouse's satisfaction with the career and key demographics, work-family conflict, and family-supportive work culture.

Methods/Procedures

The population for this study consisted of spouses of school-based agriculture teachers in the United States during the 2018-2019 school year. This study first targeted a simple random sample ($n = 739$) from the entire population of secondary agriculture teachers in the United States, which was obtained from the National FFA Organization and consisted only of names and email addresses. A Qualtrics survey was distributed to the agriculture teachers with one item asking them to provide an email for their spouse. A total of 175 agriculture teachers (23.68% response) responded to the original survey distribution, providing us with the new target frame we desired ($n = 168$). The instrument was then sent to all of the emails provided by the agriculture teachers using the tailored design method (Dillman, 2007). A total of 110 usable surveys were collected. We considered the potential for non-response bias using the guidelines outlined by Lindner, Murphy, and Briers (2001) and found that no bias existed (p -values $> .05$).

Demographic characteristics (objective 1) were measured by asking participants their gender, number of weekly work hours, number of weekly work hours of their spouse, if they participated in SBAE while in school, and level of knowledge about SBAE before meeting their spouse. These results were analyzed and reported using frequencies, percentages, means and standard deviations where appropriate. For objective two, three different constructs were utilized, (i.e., work-interference with family, family-interference with work, and perceived family-supportive work culture). For objective three, the construct satisfaction with SBAE as a career was utilized. Table 1 shows information about the constructs of interest in this study. Construct reliability estimates (Cronbach's alpha coefficients) for each construct were estimated using a pilot test of SBAE teachers and were found to be reliable (Nunnally & Bernstein, 1994). Face and content validity were also considered as a panel of experts evaluated the instrument. Results for objectives two and three were analyzed and reported using means and standard deviations. Research objective four was analyzed using an OLS multiple linear regression with a spouse's satisfaction as the dependent variable. According to Green (1991), a minimum acceptable sample size with six predictor variables is 110.

Table 1.
Construct information used in the current study

Construct (derived from)	No. of Items	Pilot α	Study α
Satisfaction with SBAE as a career (Judge, Bono, & Locke, 2000)	4	.87	.89
Work-interference with family (Carlson et al., 2000)	3	.94	.93
Family-interference with work (Carlson et al., 2000)	3	.87	.78
Family-supportive work culture (Harrington, Deusen, & Humberd, 2011)	5	.71	.78

Results/Findings

Research objective one sought to describe the demographic characteristics of the spouse of the SBAE teacher. The majority of the spouses were female (59%) and worked outside of the home (89%) with weekly total household work hours of 91.54 (SD = 23.45). Thirty-five percent (35%) of the participants believed they had “a lot” or a “great deal” of influence regarding the career-decisions of their spouse. Of the participants, 72% had never participated in SBAE, and more than half knew nothing at all or only a little bit about SBAE prior to meeting their spouse.

Research objective two sought to describe perceptions of the work-family interface of the spouse of agriculture teachers. Constructs of interest were work-interference with family (WIF), family-interference with work (FIW), and perceived family-supportive work culture. Participants in this study agreed that their agriculture teacher spouses experienced work-family conflict but disagreed that they experienced family-interference with work (see Table 2). Participants only slightly agreed that the culture of SBAE was a family-supportive one. Objective three of this study sought to describe the satisfaction of the spouse regarding agricultural education as a career. Overall, participants somewhat agreed with being satisfied with their spouse’s career as an SBAE teacher (see Table 2).

Table 2.
Spouse’s Perception of the Work-Family Interface and Satisfaction with SBAE

Constructs	Mean	SD
Satisfaction with SBAE as a career	4.46	1.14
Work interference with family (WIF)	4.24	1.19
Family-supportive work culture	3.87	0.88
Family interference with work (FIW)	2.04	0.70

Note. WIF, FIW, family-supportive work culture, and satisfaction with SBAE as a career were measured on a 6-point scale from 1 (*strongly disagree*) to 6 (*strongly agree*).

For research objective four an OLS regression was conducted. The dependent variable was the spouse’s satisfaction with SBAE as a career while the independent variables were total

household weekly work hours, previous participation in SBAE, WIF, FIW, and family-supportive work culture. The independent variables comprised a significant model ($F = 9.03$; p -value $< .001$) and predicted 33% ($R^2 = .33$) of the variance in spouse's satisfaction with SBAE as a career (see Table 3). Three variables were found to be significant ($p < .05$) predictors in the model, which included family-supportive work culture ($\beta = .42$; p -value $= < .001$), WIF ($\beta = -.32$; p -value $= .003$), and total household weekly work hours ($\beta = .26$; p -value $= .005$). Gender, previous participation in SBAE, and FIW were statistically insignificant predictors in the model.

Table 3.
Predictive Model of Spouse's Satisfaction with SBAE as a Career

Variable	Dependent Variable: Spouse's Satisfaction with SBAE			
	<i>B</i>	<i>SEB</i>	β	<i>p</i> -value
Gender	.19	.22	.08	.390
Total household weekly work hours	.01	.01	.26	.005
Participation in SBAE	.08	.25	.03	.754
WIF	-.31	.10	-.32	.003
FIW	-.12	.14	-.07	.426
Family-supportive work culture	.54	.13	.42	.000

Note. $R = .61$, Adjusted $R^2 = .33$, $F = 9.03$, p -value $< .001$. WIF, FIW, and family-supportive work culture were measured on a 6-point scale from 1 (*strongly disagree*) to 6 (*strongly agree*). Gender coded 0 = female, 1 = male. Participation in SBAE coded 0 = yes, 1 = no.

Conclusions/Recommendations/Implications

The purpose of this research was to provide a nationwide analysis of the attitudes of the spouse of the SBAE teacher towards teaching agriculture as a career. The first research objective provided insight into the demographic characteristics, specifically family domain characteristics, of the spouse of the SBAE teacher. With over one-third of spouses reporting they have “a lot” or a “great deal” of influence regarding the career decisions of their spouse, this finding supports the theory of family-relatedness of work decisions (FRWD, Greenhaus & Powell, 2012). It is encouraging to note that with 35% of the spouses indicating a substantial influence on the career decision-making of the SBAE teacher, the spouses on average indicated being moderately satisfied with SBAE as a career.

In today's economic environment, a dual-earner income is a commonplace, and nearly 90% of spouses in this study indicated working outside the home with average total household work hours of 91 hours per week. This suggests an excessive amount of work hours for a standard work week. According to the role conflict theory (Greenhaus & Beutell, 1985), excessive work hours will contribute to work-interference with family (WIF), which, is a significant predictor of the spouse's satisfaction with SBAE as a career. This study supports the role conflict theory in relation to agriculture teachers and their spouse.

Spouses perceive relatively high WIF but low FIW from the SBAE teacher which are consistent with research outside agricultural education (Cinamon & Rich, 2005) as well as within (Sorensen et al., 2016b), suggesting that conflict originates more as a result of workplace characteristics than family characteristics. This is likely the product of the extensive work responsibilities placed on agriculture teachers (Torres et al., 2009). Most concerning is WIF is a negative but statistically significant predictor of spouse's satisfaction with SBAE as a career. As WIF rises, spouse's satisfaction with SBAE will diminish. With the spouse's influence on career decision-making, WIF can therefore lead to SBAE teacher turnover (Sorensen et al., 2016b), and supports previous recommendations to reduce the time burden of SBAE teachers.

While total household weekly hours, WIF, and school culture were significant predictors of spouse's satisfaction with SBAE, gender, participation in SBAE, and FIW were not. These predictor variables, however, explained a substantial, 33% of the variance in spouse's satisfaction with SBAE. The largest of these predictors was school culture, supporting the findings of Sorensen, et al. (2017) and highlighting the importance of a family-supportive work culture. Similar to other studies in agricultural education, gender does not seem to be significant predictor of satisfaction with SBAE (Sorensen et al., 2016a; Sorensen & McKim, 2014). Recommendations for future research to determine additional factors related to a spouse's satisfaction with SBAE, work-family interface variables related to SBAE, and career decisions related to SBAE is warranted. One limitation and unaddressed question of this study is the likelihood of teachers with very unsupportive spouses to provide an email to participate in such a study. More precise sampling methods in future research with spouses would be recommended. This national analysis was a critical step forward in understanding agriculture teacher retention from the perspective of someone who does in fact influence career decisions – the spouse.

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Profiles of Youth Citizenship: A Cluster Analysis of Ethical factors, Demographics, and Problem-solving Dispositions

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Youth have the capacity to drive positive change in their communities through active and engaged citizenship (AEC). Teen-leadership programs aim to provide youth with opportunities to develop the skills necessary to participate as partners in community problem-solving efforts. Situated in relational developmental systems metatheory, this study aimed to examine how cluster membership based upon demographic characteristics, ethical factors, and problem-solving (PS) disposition impacted AEC. The findings indicated significant differences between clusters for AEC. These differences were predominately observed through membership in long-term or short-term leadership programs, gender, enrollment in honors/AP courses, and ethical views. Youth leadership practitioners should consider avenues for infusing character development in gender inclusive program curriculum to increase likelihood for AEC.

Introduction/Theoretical Framework

From an interactional lens, community is a dynamic, changing environment built on the actions of its members rather than a stagnant, geographically bound area (Barnett & Brennan, 2006). From this perspective, individuals are impacted by their community and context. Conversely, individuals influence their communities, whether intentionally or unintentionally (Lerner, Almerigi, Theokas, & Lerner, 2005). Community development initiatives rarely build on the strengths of youth or allow youth to contribute to community viability. However, youth have the capacity to develop healthier communities with longevity (Checkoway & Gutierrez, 2006). Society, their community, and the individual are all positively impacted when youth are actively engaged within their communities (Zaff, Boyd, Li, Lerner, & Lerner, 2010). Increasing youth capacity for AEC benefits youth participants, their communities, and greater society.

From a relational developmental systems (RDS) viewpoint, youth are regarded from a strength-based perspective as resources to be developed (Geldhof, Bower, & Lerner, 2013). Examining trajectories toward AEC enables a greater understanding of the mutually influential person-context relations involved in RDS (Zaff, Kawashima-Ginsberg, Lin, Lamb, Balsano, & Lerner, 2011). In developmental science, understanding how humans thrive through mutually-influential relations between individual contributions, positive community engagement, and community organizations is a focal area of work (Lerner, Wang, Champine, Warren, & Erickson, 2014). RDS metatheory provides a basis for examining these phenomena from “a life-span approach to the scientific study of systematic intraindividual changes—from conception to the end of life—of

an organism's behavior, and of the systems and processes involved in those changes and that behavior" (Overton, 2015, p. 47). In RDS, a reciprocal bi-directional relationship exists between the individual and their context, which incorporates both inter- and intra-individual change (Overton, 2013). Plasticity is a hallmark of this metatheory and encompasses the capacity for development to be systematic and continuous rather than random (Lerner & Overton, 2008). The organism is inherently active, self-creating, self-organizing, and self-regulating in nature in a plastic, nonlinear complex adaptive system (Overton, 2015). The organism's actions function coactively with the physical and sociocultural environment it inhabits.

At the basis of RDS metatheory are the mutually influential relationships between biology, person, and culture (Overton, 2015). Sociocultural theory provides a basis for understanding the impact that culture and environment have on human development. Vygotsky's (1978) sociocultural theory posits individuals derive meaning of their experiences through social mediation, which is situated in culture and history. As active and engaged citizens, personal culture and history of social experiences impact on developmental trajectories. Therefore, youth are not homogeneous citizens; they all have different lived experiences of citizenship (Bell, 2005). Parental and community views of civic participation and one's self-efficacy relating to participation in problem-solving opportunities impact youth in different ways and should be taken into consideration. This is important to consider when envisioning an optimized developmental process to contribute to active and engaged young citizens.

Demographics, ethical factors, and PS disposition from RDS metatheory can be utilized to develop youth profiles for AEC. AEC is often operationalized as "someone who has a sense of civic duty, feeling of social connection to their community, confidence in their abilities to effect change, as well as someone who engages in civic behaviors" (Zaff et al., 2010, p. 737). This perspective views active and engaged citizens as more than just "dutiful" citizens who partake in activities such as voting, obeying laws, paying taxes, etc. (Mihailidis & Thevenin, 2013). Rather, active and engaged citizens meaningfully contribute to their communities.

AEC provides a model for examining behavioral, cognitive, and socioemotional constructs associated with youth citizenship development (Zaff et al., 2010). Lerner et al. (2014) emphasizes ecological assets, strengths of adolescents, PYD, and risk/problem behaviors all impact AEC. PS disposition is not specifically examined through this model. Positive PS disposition may provide insight on youth's preparedness to engage in AEC based on the relationship between perceptions of competence and self-determination. When youth accomplish tasks, they experience heightened enjoyment, competence, and self-determination (Wiess, 2011). Therefore, to establish a model for developing AEC and youth change agents, we must explore youth profiles of AEC to understand the makeup of young active and engaged citizens.

Purpose & Objectives

Are there youth profiles of active and engaged citizenship based on ethical factors, demographics, and PS disposition for youth participating in a teen-leadership program? The purpose of this study was to develop youth profiles of citizenship. We used the following objectives to examine this question:

1. Identify clusters of participants based on ethical factors, demographic characteristics, and problem-solving disposition.
2. Examine relationships between active and engaged citizenship and clusters based on ethical factors, demographic variable, and problem-solving disposition.

Methods

The research design for this study was a non-experimental, ex post facto survey design (Ary, Jacobs, Irvine, & Walker, 2018). We chose the ex post facto design because participants had already received a leadership programming treatment and the design allowed for the surveying of participants in a realistic setting. The Virginia 4-H extension specialist identified 14 counties with strong, year-round leadership programs. Eleven of the 14 counties participated. From the 11 counties there were 275 potential participants with 199 completing the survey for a response rate of 72.36%. We also contacted 14 additional extension agents to recruit counties with upcoming camp-counselor trainings which incorporated leadership training. From the 14 additional counties, nine counties participated with 95 potential participants and 60 responding for a response rate of 63.16%. The overall response rate was 70%. We directly administered the instruments face-to-face and the survey took approximately 30 minutes to complete.

To measure AEC, we utilized a previously established instrument by Bobek, Zaff, Li, and Lerner (2009). We adapted the 32-item AEC scale to incorporate social media as a means for outreach and advocacy. Participants responded to 28 items on a 5-point Likert scale and 3 questions regarding amount of participation on a 6-point Likert scale (from 1 = "Never" to 6 = "Every day"). Scores on the scale could range from 32 to 163. The overall AEC instrument yielded a Cronbach alpha of .834. We utilized an adapted version of the Report Card on the Ethics of American Youth (Josephson Institute of Ethics, 2012) to examine ethical factors. This question asks opinions on nine ethical and unethical statements on a 4-point Likert scale (1 = "Strongly disagree" to 4 = "Strongly agree", and 0 = "No opinion"). Participants also answered 14 items on the important of material and character values on a 4-point Likert scale (1 = "Unimportant" to 4 = "Essential", and 0 = "No opinion") and 14 items on partaking in unethical behaviors in the last year on a 3-point Likert scale (1 = "Two or more times", 2 = "Only once", and 3 = "Never"). Scores had a potential range of 37 to 134 with a Cronbach alpha of .824.

We applied Dillman's Tailored Design Method (DTDM) to create demographic questions: age, race, enrollment in honors/AP courses, and questions regarding activity participation (Dillman, Smyth, & Christian, 2014). Activity involvement included eight items regarding amount of

participation in different activities on a 6-point Likert scale (from 1 = “Never” to 6 = “Every day”). Scores on the activity scale could range from 9 to 54. To collect data on PS disposition, we adapted the EMI, Critical Thinking Disposition Assessment (Irani, Rudd, Gallo, Ricketts, Friedel, & Rhoades, 2007). We employed a pilot study to select questions related to PS disposition. Following the pilot study, we selected 11 items to represent PS disposition. The 11-item PS disposition scale yielded a Cronbach’s alpha of .871.

We employed a two-step cluster analysis to determine the existence of clusters or subgroups of participants and mean variables by cluster in regard to their responses to demographic questions, ethical factors, and PS disposition. The cluster analysis utilized eight clustering variables, which was appropriate based on recommendations for a sample size of at least 2^m (m = number of clustering variables) (Mooi & Sarstedt, 2011). A two-step cluster analysis was appropriate because the variables were both categorical and continuous (Şchiopu, 2010). In the first step, an algorithm similar to k-means algorithm is conducted and followed by a modified hierarchical agglomerative clustering procedure to form homogeneous clusters (Mooi & Sarstedt, 2011). We then applied a one-way analysis of variance (ANOVA) to compare clusters on AEC to report F statistics for significant differences between clusters. An alpha level of 0.05 was set a priori.

Results

We conducted a two-step cluster analysis to determine profiles of youth participants based on gender, race, age, enrollment honors/AP courses, ethical views, PS disposition, activity involvement, and whether the individual participated in a long-term or short-term 4-H teen leadership club. The results generated five clusters (Table 1). Cluster one ($n = 82$) consisted of white females from long-term leadership programs who take honors/AP courses. Cluster one had the highest ethical views, a slightly higher age mean, and were involved in more activities when compared with the other clusters. Cluster two ($n = 55$) was the youngest group and included a mixture of genders and individuals enrolled in honors/AP courses from short-term leadership programs. This cluster was predominately white ($n = 43$, 83.6%) with 16.4% being black ($n = 9$). Cluster two had one of the higher PS dispositions, but lower ethical views. Cluster three ($n = 45$) contained white youth from long-term teen-leadership programs not enrolled in honors/AP courses. This cluster had the lowest levels of ethical views, PS disposition, and activity involvement. Cluster four ($n = 40$) consisted of a mixture of races, including black ($n = 20$, 50%), multiracial ($n = 9$, 22.5%), Asian ($n = 5$, 12.5%), Native American ($n = 2$, 5%), and those who preferred not to state ($n = 4$, 10%). This cluster had a mixture of genders and those taking honors/AP courses and the majority were from long-term ($n = 35$, 87.5%) teen-leadership programs. Cluster four had higher ethical views when compared with clusters two and three. Cluster five included white males from long-term leadership programs who take honors/AP courses and had higher ethical views and PS disposition.

Table 1

Descriptive Statistics of Variables from Two-step Cluster Analysis by Cluster (n =259)

	Cluster 1 (n = 82)	Cluster 2 (n = 55)	Cluster 3 (n = 45)	Cluster 4 (n = 40)	Cluster 5 (n = 37)
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Total AEC	111.9(9.3)	105.9(12.4)	107.0(12.5)	106.6(12.9)	105.0(11.6)
Ethical Views	119.3(17.1)	109.3(12.5)	108.0(21.9)	116.1(12.9)	117.1(14.6)
PS Disposition	43.7 (7.1)	43.9 (6.2)	42.0 (9.6)	43.3 (5.8)	43.9 (6.6)
Activities	23.0 (6.8)	22.5 (6.4)	20.7 (6.5)	21.3 (6.5)	21.9 (6.7)

Note. PS = Problem solving, Activities = Activity Involvement

Table 2

One-Way Analysis of Variance (ANOVA) of Clusters by AEC (N =259)

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
<i>Total AEC</i>					
Between Groups	4	1951.51	487.88	3.76	.005**
Within Groups	254	32991.18	129.89		
Total	258	35942.69			

Note. *p < .05, **p < .01, 2-Tailed.

We conducted a one-way ANOVA to compare the effect of cluster membership on total AEC and subscales (Table 2). There was a significant effect of cluster membership on total AEC at the $p < .01$ level for the five clusters [$F(4, 254) = 3.76, p = .005$]. Post hoc comparisons using the Tukey HSD test indicated the mean score for cluster one ($M = 111.9, SD = 9.3$) was significantly different from the other clusters.

Conclusions, Implications, & Recommendations

In community-development efforts, youth are rarely regarded as community resources (Jones, 2009); however, youth's mere presence influences society (Lerner et al., 2005). When equipped with skills and positive attitudes toward citizenship, youth are capable of meaningfully contributing to their communities which benefits both the individual and community (Christens & Dolan, 2011). By examining the impact of different variables on youth's AEC, insights can be provided to build youth-development and youth-leadership programs aimed at preparing youth for community engagement. In this study, there were differences in overall AEC scores between different clusters of youth in Virginia 4-H teen-leadership programs. Notable findings related to program treatment, gender, enrollment in honors/AP courses, and ethical views. Further exploring this phenomenon and infusing teen-leadership programs with opportunities for character development could heighten AEC for youth participants.

Based on the findings, there are several recommendations for practice and research moving forward. Findings indicated that participation in a long-term 4-H teen-leadership program alone did not indicate higher levels of AEC when compared with the cluster of youth who participate in short-term programs. Therefore, we recommend that Extension professionals and youth practitioners consider inclusion of more character education in their programs to influence ethical views. It is also recommended that they consider the role that gender may play in the development of AEC. Hall and Coffey (2007) discussed gender differentiation in citizenship, saying that “much of the current negative and anxious commentary about young people and the ‘don’t care’ culture is implicitly, and sometimes explicitly, directed at young men in particular” (p. 294). They go on to note that women are expected to contribute, but males are often viewed as noncontributors. Based on this notion, sociocultural development of views toward citizenship may differ based upon gender, which would explain the variations between similar clusters differing predominately on gender alone. Teen-leadership professionals should aim for programs to promote gender inclusion in citizenship-focused curriculum and think intentionally about the engagement of males as contributors to their communities.

With citizenship as a priority in 4-H (National 4-H Headquarters, 2011), professional development is needed for Extension agents to fully understand the innerworkings of these clusters and how program improvements and adjustments may aid to increased levels of AEC. These clusters allow us to examine how indicators combine to impact independent variables. Therefore, social science researchers should also consider how results may differ from traditional variable-centered analyses and consider a variety of statistical methods to ensure participants are treated as heterogeneous in nature. It is essential to keep in mind how individual development is a result of the bidirectional relationship between an individual and their context over time.

Program goals of 4-H indicate high priorities for the development of self and of abilities to be meaningful contributors to their communities (4-H National Headquarters, 2011). Therefore, it is recommended that future research and replication include a wider range of teens not participating in 4-H or teen-leadership programs in order to derive comparison from the impact of the 4-H program on AEC, PS disposition, and ethical views. Further, the relationship between enrollment in honors/AP courses and ethical views and/or PS disposition should be further explored.

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Changes in Attitude Towards Science when AFNR and Medicine are Used as the Context in a General Life Science Course

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Abstract

The future of our planet and society depend on a citizenry that has a positive attitude toward science and understands the complexity of issues related to agriculture, food, natural resources, and medicine. However, students often have negative attitudes toward science. Faculty have an opportunity to influence non-science majors' attitudes about science through teaching and highlighting the relevant science issues that impact the everyday lives of their students. The purpose of this descriptive research was to describe changes in science attitudes among college students when using AFNR and medicine issues as the context for teaching life science concepts. Students completed the Student Attitude Toward Science instrument before and after the course as well as open-ended questions. Student motivation increased ($p < .05$) and students indicated teaching of societal issues contributed to their overall change in perception towards science. The findings from this research can inform science course development to include contextualized curriculum to improve student motivation and attitudes toward science. Additional research should be conducted with larger populations of students for more generalizable results.

Introduction/Theoretical Framework

The future of our planet and society depend on a future workforce and citizens that have a positive attitude toward science and understand the complexity of these issues, specifically issues related to agriculture, food, natural resources, and medicine. Furthermore, society has developed, and the population has dramatically increased over recent decades, creating complex challenges which now threaten global sustainability and human well-being (Adenoro, Baker, Stedman, & Weeks, 2016). The American Association for Agricultural Education (AAAE) has indicated a need for research addressing the complex, societal issues, specifically research determining formal and non-formal curriculum (Adenoro et al., 2016), and methods which are effective in “preparing people to solve complex, interdisciplinary problems” (p. 10) as well as methods which inform “public opinions about agriculture and natural resource issues” (Roberts, Harder & Brashears, 2016, p. 10). Non-science majors will make up the vast majority of individuals in careers that will make decisions about science research and funding as well as how technology and scientific advancements are presented in society (Movahedzadeh, 2011; Rogers & Ford, 1997). General education science courses are often required in higher education in fulfillment of a general science requirement for a degree program. However, students often have negative attitudes toward science that are influenced by many factors such as past experiences, self-efficacy, motivation, beliefs and perceptions (Rogers & Ford, 1997). Negative attitudes may also arise if students do not perceive a connection with the required science course and their degree,

career goals, or their everyday life. Students' negative attitudes toward learning science can decrease their desire to further their science knowledge (Gogolin & Swartz, 1992). Including societal issues as part of science content provides opportunities for rich discussions within the classroom environment and engenders interest and motivation among college students (Leonard, 2010). Education researchers, specifically in science have found many student attitudes and beliefs are influenced by class experiences (Adams, Perkins, Dubson, Finkelstein & Wieman, 2005). Goodstein (1992) shared that nearly 95% of society was "illiterate in science" (p. 150) and in order to maintain a functioning society, the general public must be educated and literate in societal issues, especially those related to science. Since a basic understanding of science is vital to function and make informed decisions in society, it is imperative that we recognize ways to improve students' experiences in science courses and their attitudes toward science. Science faculty have a unique opportunity to influence non-science majors' attitudes about science through their teaching techniques and highlighting the relevant science issues that impact the everyday lives of their students. This attention to teaching and learning will improve student motivation (Movahedzadeh, 2011). This study is therefore focused on the attitudes and educational delivery of topics related to these complex issues.

The theoretical framework used for this study was the Cognitive Dissonance Theory (Festinger, 1957). This theory suggests individuals sometimes encounter situations in which their current attitudes, beliefs, or behaviors conflict with their own, thus producing mental anxiety. This mental distress ultimately leads to a change in their attitudes, beliefs or behaviors in order to reduce the discomfort and restore balance. Conceptually for this study, individuals enrolled in a science course who have preconceived notions, attitudes, or beliefs about science, may experience dissonance when exposed to new science concepts or ideas, or familiar concepts presented or applied in different contexts. Science teachers who are attentive to their students and innovative in their instruction, may capitalize on the dissonance experienced during learning (Misiti & Shrigley, 1994). The discomfort created by the misalignment of the individual's attitudes and ideas can cause a shift in attitude to reduce dissonance. This study sought to describe possible changes in attitude towards science among college students when issues related to agriculture, food, natural resources (AFNR) and medicine are used as the context.

Research in this area is mixed, however, Curry, Wilson, Flowers & Farin (2012), found that using curriculum that was contextual in nature, was comparable to science-based curriculum and may show promise in teaching students to think in a contextual manner while learning science concepts. Additionally, Chiasson & Burnett's (2001) research showed that agriscience students were better prepared for standardized science assessments. Despite this research, little is known about college students' attitudes towards science when AFNR and medicine is used as a context for science instruction.

Purpose/Objectives

The purpose of this research was to describe non-science major students' attitudes toward science and determine how class content and structure (i.e., using AFNR and medicine issues as the context for teaching life science principles) affects those attitudes. Objectives guiding this study were: 1) describe attitudes towards science among non-science majors enrolled in a life science course before and after the course; and 2) describe specific characteristics of the life science course influencing a change in attitude towards science among non-science majors.

Methods/Procedures

This descriptive study used survey methodology to assess attitudes toward science of students enrolled in a general education integrated life science course, before and after the course. Students enrolled in the life science class received the Students Attitude Toward Science (SATS) instrument (Aydeniz & Kotowski, 2014), in an online format (i.e., Qualtrics). The instrument utilized in this study consisted of statements to explore students' attitude toward science. The instrument consisted of six constructs: attitudes towards science, motivation towards learning science, utility of science, self-efficacy of science learning, normative beliefs about science involvement, and intentions to pursue science-related activities. Each construct consisted of five items and were measured using a 6-point scale from 1 (strongly disagree) to 6 (strongly agree), with higher scores indicating greater agreement with the statements. Sample items from the attitude construct included "I like watching science related TV or media" and "Science is my favorite subject in school." Sample items from the motivation construct included "I will ask others for an explanation if I do not understand the science topic" and "I will look for an explanation, online or in the textbook, if I do not understand the science topic." Sample items for the utility construct included "I use the science that I learn in school in my life" and "What I learn in my science class helps me understand how things work in life." Sample items from the self-efficacy construct included "I am not the type who can do well in science" and "I believe science is too difficult for me to learn." Sample items from the normative beliefs construct included "I try to do well in science because my friends or family expect it of me" and "My friends or family have a lot of respect for scientists." The Students Attitude Toward Science instrument has been used in previous research and been found to be reliable and valid (Aydeniz & Kotowski, 2014). Reliability estimates for each of the six constructs of the instrument were calculated and found to be acceptable with alphas exceeding .70 (Nunnally & Bernstein, 1994).

At the beginning of the semester-long life science course, an attempted census of students (n = 182) participated in the pre-test SATS instrument, and at the end of the course, students (n = 148) were surveyed again using the same instrument as a post-test. Additionally, students (n = 126) responded to seven open-ended questions designed to support student responses on the pre- and post-test instruments. The open-ended questions related to specific components of the course (e.g., course content) that influenced students' attitudes towards science. The open ended questions were analyzed using frequency counts of key words and phrases. Data were analyzed

using Statistical Package for Social Science (SPSS) and descriptive statistics were used to analyze data and report findings.

Results/Findings

The majority of the participants in this study were White (83.2%) with slightly more males than females (52.3% male) and nearly 70% of all respondents were freshman in college. Six constructs were measured in the areas of attitudes towards science, motivation towards learning science, utility of science, self-efficacy of science learning, normative beliefs about science involvement, and intentions to pursue science-related activities. In both the pre-test and post-test, the mean of self-efficacy was highest among the participants (see Table 1) and the construct of motivation had the lowest overall mean in the both the pre and post-test. While all of the construct means changed between the pre- and post-test, only motivation towards learning science showed a statistically significant increase ($p < .05$). Overall, four of the construct means increased (attitude, motivation, utility & intent) and while not statistically significant, two of the construct means decreased (self-efficacy & beliefs) (see Table 1).

Table 1.
Results of Student Attitude Toward Science Pre and Post-Test

	Construct Pre-Test (n=182)		Construct Post-Test (n=148)		Change	p-value
	M	SD	M	SD		
Self-Efficacy	4.61	1.00	4.52	1.20	-0.09 = Δ	.485
Intent	4.14	1.21	4.23	1.35	+0.09 = Δ	.551
Beliefs	3.53	0.97	3.38	1.13	-0.15 = Δ	.186
Attitude	3.24	0.93	3.43	1.06	+0.19 = Δ	.079
Utility	2.55	0.75	2.57	0.91	+0.02 = Δ	.847
Motivation	1.75	0.59	2.09	0.69	+0.34 = Δ	.000

Note. All constructs were measured on a 6-point scale from 1 (*strongly disagree*) to 6 (*strongly agree*).

Participants were asked whether incorporating topics about issues related to AFNR and medicine into the life science course content contributed to their overall change in perceptions towards science, and 83.6% indicated it did in fact contribute to their perception change. Specific topics which respondents indicated most changed their perceptions towards science included GMO's (45.7%), World Hunger (32.8%), Cancer (25.9%) and Climate Change (19.8%). Respondents reported that connecting these societal issues to science concepts, helped them recognize the relatability of science to their everyday lives, regardless of their college major. Additionally, nearly 80% of respondents indicated the teaching of societal issues influenced how they thought

about other science topics. The specific components of the course, outside of the content itself, that most influenced respondents' attitude change were lectures (43.5%) and the instructor (40%), while assignments (18%) and readings (3%) were least influential.

Conclusions/Recommendations/ Implications

Cognitive dissonance theory suggests that students will experience an imbalance in their beliefs and attitudes when presented with new knowledge that may contradict those beliefs and attitudes. Our findings suggest that incorporating issues related to AFNR and medicine, can create some cognitive dissonance for students, which might increase student's positive perceptions towards science as they work to restore balance within their beliefs and attitudes. Although only the construct motivation towards learning science showed statistically significant positive change, the majority of the other constructs also showed an increase (non-statistical). The two constructs that decreased (non-statistical), self-efficacy of science learning and normative beliefs about science involvement, may indicate that students' perceptions of what they thought they knew about science prior to the course changed only slightly in light of new information. The slight decrease in these two constructs may be explained as students work through their new science understanding and reconcile the misconceptions they may have had. When students perceive new information as useful, they readjust their beliefs when comparing the new information to what they previously believed to be true (Kang, Scharmann, Noh & Koh, 2011). The discomfort caused by cognitive dissonance will motivate the individual to change their behavior or beliefs in order to restore cognitive balance (Festinger, 1957). In the process of restoring balance students may become more motivated towards learning science. There is some evidence that our findings support this theory. However, more research should be conducted to examine the specific factors influencing each dimension of students' attitudes towards science. How can a general education life science course positively and significantly change the specific dimensions of students' attitudes towards science (e.g., utility of science, self-efficacy of science learning, intentions to pursue science-related activities).

The topics most influential in students' science attitude change, which included GMO's, World Hunger, Cancer and Climate Change indicate that students have interest in these complex interdisciplinary issues and can be important in changing students' attitudes towards science. Infusing these topics into classes using methods students indicated were most significant in the course (i.e., lectures, discussions, and good instructors), provides opportunities for students to engage with content they recognize as important for their everyday lives, in a manner which resonates with them. While students indicated the readings and assignments were least influential, the instructor's knowledge seems to be instrumental to provide relevant, engaging lectures that lead to exciting discussions among students. Related to our findings, Senko, Pickett & Pelz (2012) found that instructor qualities most valued by students included passion and expert knowledge about the topic. Additionally, Trammell & Aldrich (2016) found that college students, both online and face-to-face, expect instructors to have "strong teaching skills and content knowledge" (p. 24). As instructors were found to be a major influence in students'

science attitude change, we recommend further research to explore the degree to which instructors influence attitude change as well as the methods and equipment used by exemplary college teachers who integrate complex interdisciplinary issues into their courses.

The results from this study inform practice as well as research. The AAAE research agenda is very clear in its recommendations to determine methods for addressing the complex, social issues that are facing society and informing public opinion in order to solve these pressing issues (Roberts, et al., 2016). Our study suggest that instructors who teach life science concepts (e.g., AFNR) should consider including complex, interdisciplinary issues such as climate change, food security, GMOs and Cancer as context. Contextualizing the science instruction within relevant social issues, can enhance lectures leading to rich, meaningful discussions among students that relate to these complex, interdisciplinary issues. These issues seem to resonate with today's students, helping them recognize the relationships between science and their everyday lives, thus becoming informed decision makers, which is important for the future of the planet and society.

This study was conducted with students enrolled in one course at a specific university. Therefore, we recognize the limitations of generalizability to only this population of students. We recommend further research be conducted with other populations of students to increase generalizability and determine how students' attitudes towards science and society's complex scientific problems can be positively changed. This research should include secondary as well as post-secondary science and science-type courses. Additionally, future research should focus on the impact of teaching about AFNR complex issues on students' career interests in contributing to solving some of society's complex issues.

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Predicting U.S. Consumers' Intention to Purchase Grass-Fed Beef

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This study stemmed from a larger study that described what factors influenced regional purchases of grass-fed beef in the United States. This study's research objective was to predict respondents' intentions to purchase grass-fed beef. A conceptual model was created by combining components of the theory of planned behavior and total food quality model with demographics, knowledge, and meat and beef consumption habits. The researchers created an online survey through Qualtrics, and a marketing research company administered it to a nonprobability opt-in panel of 484 household primary grocery shoppers who were 18 years and older. The binomial logistic regression model was statistically significant ($X^2(27) = 256.07, p < .001$). The model explained 55.1% of the variance in intent to purchase grassfed beef. Of the 27 predictor variables, six variables were statistically significant: subjective norms, perceived behavioral control, past experience consuming grass-fed beef, weekly household beef consumption, knowing how beef was raised, and importance of locally raised beef. Further research should learn about consumers' current knowledge of the quality cues and to better understand why they are important. Future research should determine whether environmental attitudes would influence their intention to purchase grass-fed beef.

Introduction/Theoretical Framework

A growing demand amongst consumers for grass-fed beef is primarily due to the environmental benefits and nutritional content of beef from grass-fed cattle (Sitienei, Gillespie, & Scaglia, 2016). Cardiovascular disease is a leading cause of mortality in Americans. Health professionals suggested that individuals lower their consumption of saturated fatty acids, transfatty acids, and cholesterol, while increasing their intake of conjugated linoleic acids and omega-3 fatty acids (Daley, Abbott, Doyle, Nader, & Larson, 2010; McNeill, Harris, Field, & Van Elswyk, 2012). Certain forms of dietary fats are an important part of a well-balanced diet, which helps to prevent cardiovascular disease (National Cattlemen's Beef Association, 2014). The media and research have increased consumers' awareness of the effects that their beef choices have on their health (Sitienei, Gillespie, & Scaglia, 2017). Beef producers are changing their cattle breeding, genetics, and feed programs to meet this demand for leaner beef (Van Elswyk & McNeill, 2014). Beef from cattle that have been fed grass-based diets have fewer saturated fatty acids, transfatty acids, and cholesterol. The significantly higher levels of conjugated linoleic acids and omega-3 fatty acids in grass-fed beef make it a leaner red meat choice (Cheung, McMahan, Norell, Kissel, & Benz, 2017; Duckett, Neel, Lewis, Fondenot, & Clapham, 2014). However, certain qualities make grass-fed beef less desirable to some shoppers (Daley et al., 2010).

Grass-fed beef producers consider the concerns of their customers and market their product to consumers through direct sales and retail sales. Producers' marketing techniques need to precisely target their desired consumers who are faced with information overload in today's competitive market (Curtis, Cowee, Havercamp, Morris, & Gatzke, 2008). These producers often reach out to Extension specialists for guidance on knowing what consumers are seeking. Extension specialists are often unprepared to answer some of these marketing inquiries (Chase, 2006). Research has identified tactics that can target U.S. grass-fed beef consumers (Cheung et al., 2017; Dahlen, Hadrich, & Lardy, 2014; Gillespie, Sitienei, Bhandari, & Scaglia, 2016; Gwin, Durham, Miller, & Colonna, 2012; Gwin & Lev, 2011) and marketing tactics for producers (Curtis et al., 2008; Gwin & Lev, 2011). This study expands this research by developing a conceptual model that predicts U.S. consumers' intention to purchase grass-fed beef. This model was developed by reviewing literature related to the theory of planned behavior (TPB), total food quality model (TFQM), meat consumption, grass-fed beef consumption, knowledge, and demographic characteristics of individuals who consume beef or grass-fed beef.

The TPB comprised of three components that a person considers before performing a behavior: attitude, subjective norms, and perceived behavioral control (Ajzen, 1998). Attitude toward grass-fed beef consumption in the United States has not been deeply studied. However, attitude toward beef consumption has been studied using TPB. A person's attitude toward the behavior is formed by the favorable or unfavorable consequences that can occur from carrying out that action. Health, taste, and the safety of beef heavily influenced the attitudes of consumers (McCarthy, de Boer, O'Reilly, & Cotter, 2003). A study by Hoeksma, Gerritzen, Lokhorst, and Poortvliet (2017) concluded that higher quality beef produced with better animal welfare led to more beef consumption. Attitude was the most important factor that determined if an individual would consume beef (Hoeksma et al., 2017). Subjective norms determine how influential others are on an individual's decision to perform a specific behavior (Ajzen, 1998). Spouses, family members, and friends have influenced individuals during purchasing decisions (Simpson, Griskevicious, & Rothman, 2012). The views of doctors and dieticians played an integral role in determining how consumers feel about their beef consumption (McCarthy et al., 2003). Subjective norms influenced consumers' intention to consume beef, but it was not as important as their attitude and perceived behavioral control (Hoeksma et al., 2017; McCarthy et al., 2003). Consumers consider perceived behavioral control, or what factors might prevent or help them from performing a specific behavior. Consumers' perceived behavioral control was a significant factor influencing their intention to purchase meat from mobile slaughter units (Hoeksma et al., 2017) and buying meat in Pakistan (Khattak & Khattak, 2017; Khattak & Naqvi, 2016).

The TFQM explains consumer quality perception and decision-making (Grunert, Larsen, Madsen, & Baadsgaard, 1996). Prior to purchasing a food item, consumers focus on a search quality, such as the appearance of the item. After the item has been purchased, consumers evaluate an experience quality, like taste (Grunert et al., 1996). Credence qualities, such as the health benefits of an item, cannot readily be evaluated by consumers; therefore, they must trust the information that has been provided to them (Grunert, Bredhal, & Brunso, 2004). Quality cues

are broken into two categories: intrinsic and extrinsic (Grunert, 1997). Grunert (1997, 2005) surveyed consumers to determine which quality cues were most important to them when purchasing meat. From the results gathered, intrinsic quality cues included visual, physical characteristics, such as the cut, marbling, color, and the presence or absence of fat. Extrinsic quality cues focused on the price, brand, origin, packaging, animal welfare, and animal production information. The extrinsic quality of health concerns has become a priority for consumers because it affects the type of beef they purchase from grocery stores, farmers' markets, restaurants, and private vendors (Cheung et al., 2017; Gwin & Lev, 2011; Ziehl, Thilmany, & Umberger, 2005). Consumers want transparency from the producer on issues such as animal welfare and environmental practices (Birt, 2017). Millennials are not just concerned with the type of food they eat, they want to know everything that is happening to produce that food. This leads to an increased demand for food that is not only healthier but also better for the planet (Birt, 2017). These quality cues can help to fulfill shoppers' purchase motives when they are seeking a specific product, which create positive consequences. If the positive consequences outweigh the negative consequences, consumers usually purchase the product (Grunert et al., 2004).

A study with 750 participants found that 36.0% of consumers eat beef more than once a week (McCarty & Neuman, 2013). McCarty and Neuman also found that 86.0% of respondents eat ground beef for weeknight dinners. Eight percent of consumers stated that they intended to increase consumption of beef in the next six months (McCarty & Neuman, 2013).

Purpose and Research Objective

This study stemmed from a larger study that developed U.S. regional consumer profiles that described what factors influence their intention to purchase grass-fed beef. This study's research objective was to predict respondents' intentions to purchase grass-fed beef based on beef consumption, knowledge, quality cues, attitude, subjective norms, perceived behavioral control, and demographics. This research aligns with the National Research Agenda priority area one by providing beef producers with information to make an informed decision on how to best market grass-fed beef to consumers.

Methods

The target population was household primary grocery shoppers who were 18 years and older. The U.S. population as of December 1, 2017, and the number of variables in the instrument determined the sample size of 484 (Ary, Jacobs, & Sorenson, 2010; U.S. Census, 2017). Centiment, a marketing research company, used a nonprobability opt-in sampling technique. Representative balancing ensured opt-in panel respondents reflected the U.S. census on age, ethnicity, gender, and region. This addressed exclusion, selection, and non-participation bias, all limitations of nonprobability sampling (Baker et al., 2013). A quantitative, descriptive survey was created online through Qualtrics. The questionnaire contained items about household

consumption of meat, knowledge of grass-fed beef production, beef quality cues, attitude toward consuming grass-fed beef in everyday diet, subjective norms, perceived behavioral control to purchase grass-fed beef, intention to purchase grass-fed beef, and demographic characteristics. A panel of experts comprised of faculty in agricultural education, meat science, agricultural communications, and agribusiness established face and content validity. The researchers established validity by running an exploratory factor analysis using Principal Component extraction and Varimax rotation to determine whether the items for each component of the TPB and TFQM had a factor loading of more than 0.5 with the five dimensions extracted (extrinsic quality cues, intrinsic quality cues, attitudes, subjective norms, and perceived behavioral control). A pilot test with 68 respondents representing the target population established reliability. Using Cronbach's alpha, reliability scores for the pilot test were acceptable with .83 for attitude, .83 for subjective norms, and .77 for perceived behavioral control. After the university's Institutional Review Board approved the survey, Centiment sent the finalized questionnaire to the opt-in panelists.

Results

A binomial logistic regression model predicted consumers' intention to purchase grass-fed beef using the components of the TPB (attitude, subjective norms, and perceived behavioral control), TFQM (intrinsic quality cues, extrinsic quality cues, cost cues, and meal preparation), knowledge, beef consumption habits, and demographics. Linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box Tidwell (1962) procedure. A Bonferroni correction was applied using all 27 terms in the model, resulting in a statistical significance being accepted when $p < .00016$ (Tabachnick & Fidell, 2014). Based on this assessment, all continuous independent variables were linearly related to the logit of the dependent variable. The area under the ROC curve was .89, 95% CI [.86 to .92], which was an excellent level of discrimination (Hosmer, Lemeshow, & Sturdivant, 2013).

The binomial logistic regression model was statistically significant ($X^2(27) = 256.07, p < .001$). The model explained 55.1% (Nagelkerke R^2) of the variance in intent to purchase grassfed beef, and correctly classified 84.0% of cases. Sensitivity was 84.0%, specificity was 78.0%, positive predictive value was 82.8%, and negative predictive value was 79.5%. Of the 27 predictor variables, six variables were statistically significant: subjective norms, perceived behavioral control, past experience consuming grass-fed beef, weekly household beef consumption, knowing how beef was raised, and importance of locally raised beef (Table 1). Households that primarily consumed beef on a weekly basis significantly predicted whether U.S. consumers intend to purchase grass-fed beef (Wald $X^2(1) = 4.09, p = .04$). The odds ratio indicated that households eating beef less than a weekly basis were less likely to purchase grass-fed beef. Those who have previously consumed grass-fed beef significantly predicted their intent to purchase grass-fed beef (Wald $X^2(1) = 17.89, p < .00$). The odds ratio showed that not consuming grass-fed beef was associated with a reduction in the likelihood of purchasing grass-

fed beef. Subjective norms influenced respondents’ decision making, significantly predicting whether they purchased grass-fed beef (Wald $X^2(1) = 27.15, p < .00$).

Conclusions/Recommendations/Implications

The model explained 55.1% of the variance; the variables identified in the conceptual model influenced the intent to purchase grass-fed beef to some extent. Subjective norms and perceived behavioral control were statistically significant predictor variables for the TPB. The fact that attitude was not a significant predictor variable contrasted from Hoeksma et al.’s (2017) study. Perceived behavioral control was a statistically significant predictor variable for this study and other studies for consumers’ intention to purchase meat (Hoeksma et al., 2017; Khattak & Khattak, 2017; Khattak & Naqvi, 2016). It was surprising that some of the demographic characteristics and quality cues were insignificant in the logistic regression, such as annual household income, marital status, leanness, and price. The conceptual framework encompassed many factors that influence meat consumption behavior. However, to include more factors would require a larger sample size so that individual variance is less important and allows the behavioral patterns to be observable.

Several studies predicting consumers’ intention to purchase meat have incorporated the New Ecological Paradigm to measure consumers’ pro-environmental attitudes (Hoeksma et al., 2017). Future research should consider how this paradigm influences U.S. consumers’ intention to purchase grass-fed beef. This study measured if they had the intention to purchase grass-fed beef and past grass-fed beef consumption and did not measure how much grass-fed beef was purchased by respondents. Knowing this would allow grass-fed beef producers to have a better understanding of the market and demand. Further research should learn about consumers’ current knowledge of the quality cues that were statistically significant and to better understand why they are important. Additional research should examine producers’ and agricultural businesses’ marketing efforts to determine their effectiveness in identifying and retaining direct-to-consumer and retail outlets for selling their grass-fed beef products.

Table 1

Logistic Regression Predicting the Purchase of Grassfed Beef

<i>Predictor</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>Odds Ratio</i>	<i>95% CI for Odds Ratio</i>	
						Lower	Upper
Attitude	.09	.09	0.87	.35	0.95	.91	1.31
Subjective Norm	1.13	.22	27.15	.00	3.08	2.02	4.71
Perceived Behavioral Control	3.01	1.25	5.79	.02	20.23	1.75	234.44
Knowledge	-.14	.12	1.33	.25	.87	.69	1.10
Past Consumption of Grassfed Beef	-1.18	.28	17.89	.00	.31	.18	.53

Weekly Household Consumption of Beef	-.77	.38	4.09	.04	.47	.22	.98
Weekly Consumption of Meat 1-5 Times	.05	.28	.03	.87	1.05	.61	1.81
Purchased Ground Beef	.24	.33	.52	.47	1.27	.67	2.42
Tenderness	-.52	.40	1.68	.20	.59	.27	1.31
Marbling	.39	.30	1.70	.19	1.48	.82	2.68
Taste	.14	.53	.07	.79	1.15	.41	3.27
Leanness	-.37	.35	1.07	.30	.69	.35	1.39
Price	-.18	.43	.17	.68	.84	.36	1.94
Health Benefits	-.43	.36	1.44	.23	.65	.33	1.31
Living Healthy Lifestyle	-.19	.36	.28	.60	.83	.40	1.68
Ease of Preparation	.27	.31	.75	.39	1.31	.71	2.42
Food Safety	.64	.38	2.91	.09	1.90	.91	3.98
Naturally Raised Beef	-.47	.33	2.01	.16	.63	.33	1.20
Humane Treatment	.09	.36	.07	.79	1.10	.55	2.22
Supporting Local Economy	-.39	.36	1.19	.28	.68	.33	1.37
Know How Beef Was Raised	-.81	.33	6.23	.01	.44	.23	.84
Farm Preservation	-.54	.36	2.25	.13	.59	.29	1.18
Environmental Impacts	-.32	.37	.74	.39	.73	.35	1.50
Locally Raised Beef	.69	.36	3.76	.05	1.99	.99	3.99
Households of 1-2 Individuals	.31	.41	.55	.46	1.36	.61	3.03
Married or Domestic Partnership	-.30	.27	1.20	.27	.74	.43	1.27
Household with Children Under Age 18	-.13	.43	.09	.76	.88	.38	2.02
Constant	-5.58	1.02	29.75	.00	.00		

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The Influence of Restorative Learning Environments in Agriscience on Stress Level and Attention Capacity of High School Students

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Student performance and health has been negatively impacted by high levels of stress and directed attention fatigue. The Stress Reduction Theory and Attention Restoration Theory suggest exposure to natural environments with restorative characteristics can reduce stress and increase attention. A quasi-experimental design aimed to determine if a difference in stress and attention levels existed between horticulture students taught in agriscience classrooms and natural agricultural laboratories. While a significant difference in the stress levels of students was not detected, a statistically significant and practical difference existed in attention levels. Students taught in the natural laboratory setting had increased attention levels while those taught in the classroom had a decrease in attention levels. Agriscience teachers should utilize natural settings often in their instruction. Additional research is needed to make generalizable conclusions and investigate how student stress is impacted in these environments.

Introduction/Theoretical Framework

High school students experience chronic stress, which leads to decreased physical health, mental health, and directed attention, negatively impacting their academic achievement (APA, 2014; Jayson, 2014; Novotney, 2014). Environments with elements of nature have provided restorative benefits (Kaplan, 1995), and have the potential to address extreme stress (APA, 2014) and directed attention fatigue (Alkahtani et al., 2016; Shows, Albinsson, Ruseva, & Waryold, 2016) experienced by students today. While many agricultural laboratory settings contain natural and restorative elements, a gap in the literature exists about the impact of these natural agricultural laboratory settings on the stress and directed attention of high school students.

Stress Reduction Theory (Ulrich, 1983) and Attention Restoration Theory (Kaplan & Kaplan, 1989) address the restorative impact of nature (Ulrich et al., 1991). After experiencing stress, exposure to a natural environment initiates an immediate and unconscious response of the nervous system, which reduces heart rates, decreases stress hormones, and returns body function to normal (Ulrich, 1983; Ulrich et al., 1991). This response sparks increases in positive emotion and positive changes in physiological responses to stress. Attention Restoration Theory focuses on how natural environments influence the cognitive and psychological resources of individuals (Kaplan, 1995). Directed attention is required when a stimulus requires attention but does not naturally attract it (Kaplan, 1995). When directed attention becomes fatigued, individuals struggle to concentrate and complete mental work (Kaplan & Talbot, 1983). Restorative

environments containing the four characteristics of being away, fascination, extent, and compatibility restore directed attention. The conceptual model in Figure 1 outlines the three causal linkages (in gray) between stress and attention that lead to impaired performance as proposed by Kaplan (1995). Acting as a barrier to the impaired performance is a restorative environment distinguished by the four characteristics, as described by Kaplan and Talbot (1983). The impact of the restorative environment is reflected in affective and cognitive responses, which provide restoration in the form of increased attentional capacity and reduced stress arousal, which can lead to increased academic performance.

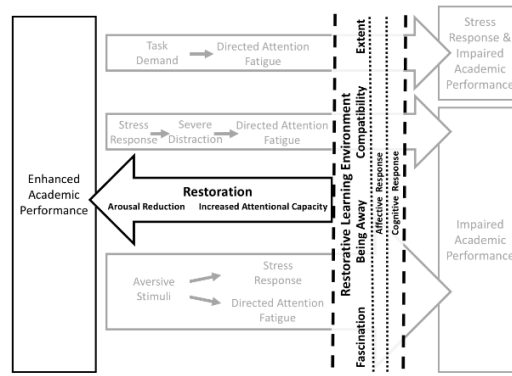


Figure 1. Conceptual Model for the Study of Restorative Learning Environments on Academic Performance (Adapted from Kaplan, 1995)

Purpose(s)/Objective(s)

The purpose of this study was to determine the influence of natural agricultural laboratory settings on stress and attention levels of high school students. The study's objectives were:

1. Determine if a difference in the change of student stress levels exists between students instructed in the classroom setting and those instructed in a natural agricultural laboratory setting.
2. Determine if a difference in the change of student attention capacity exists between students instructed in the classroom setting and those instructed in a natural agricultural laboratory setting.

The following research hypotheses were developed based on the research objectives.

H1: Students receiving instruction in a natural agricultural laboratory setting will have a greater decrease in stress levels compared to students receiving instruction in the classroom setting.

H2: Students receiving instruction in a natural agricultural laboratory setting will have a greater increase in attention scores than students receiving instruction in the classroom setting.

Methods/Procedures

A counterbalanced, randomized subjects, pretest-posttest control group quasi-experimental design was used to expose all groups to all treatments in different orders (Ary, Jacobs, Sorensen, & Walker, 2010; Campbell & Stanley, 1963). The research design employed in this study controlled for threats to internal validity including: history, maturation, pretesting, differential selection, instrumentation, statistical regression, experimental mortality, interaction of selection with other threats, and subject effects (Ary et al., 2010). Limitations of this research include possible carry-over effect, inequivalent complexity, testing fatigue, experimenter effects, interaction of testing and selection with treatment. Efforts were made to reduce these limitations, but the limitations should be considered when interpreting the results.

Secondary agriscience students enrolled in horticulture coursework was the population for this study. Two schools were selected using purposive sampling based upon their horticulture program, natural agricultural laboratory resources, and community profile. The use of non-probability sampling limits the ability to generalize the findings beyond the population (Ary et al., 2010). Both schools offered a Horticulture Science and Services pathway in which students in the first three courses were used for this study. School A was a more rural school surrounded by farmland with a majority white (61.9%) population. A 57 by 62-foot classroom and a 30 by 60-foot greenhouse were used for data collection. School B was in an urbanized area surrounded by apartments and housing. A majority of students were minorities (54%). A 27 by 26-foot classroom and a 30 by 50-foot shade house were used.

Eighty-six of 183 possible horticulture students submitted IRB parental consent and student assent forms and were present for the entire study, resulting in a 47% participation rate. Forty-four students were assigned to Group 1 and 42 were assigned to Group 2 treatment groups. Participants completed pretest assessments for stress and attention and were randomly assigned to one of the experimental groups on day 1. Master's degree students certified to teach high school agriculture were trained and delivered researcher-designed lesson plans on semi-hardwood propagation. Group 1 received the experimental treatment, greenhouse instruction. Group 2 received the comparison treatment, agriscience classroom instruction. At the end of class, all students completed posttest measurements for attention and stress. On day 2, students remained in their initial groups and followed the same protocol except they were assigned the opposite treatment setting (greenhouse or classroom) and completed a nutrient deficiency lesson.

The Perceived Stress Scale (PSS) 10 (Cohen & Williams, 1988) measured stress. Cronbach's alpha scores ranging from 0.871 to 0.916 determined a strong internal consistency (Field, 2013). A Pearson's Product-Moment Correlations of $r = 0.80$ determined acceptable test-retest reliability for the pre-posttest design (Litwin, 2003). The Necker Cube Pattern Control Test measured directed attention (Cimprich, 1990; Kaplan, 1995; Tennessen & Cimprich, 1995).

Extreme outliers $\pm 3 SD$ from the mean Necker Cube scores were removed (Jaggard, 2014). PSS and attention difference scores were calculated by subtracting posttest from pretest. To test the hypotheses, a univariate general linear mixed model was completed for stress and attention separately. The dependent variable was the PSS difference score and attention difference score. The fixed variables were day, treatment order, and day-treatment order interaction. Student ID was the random factor. Although violations to normality were detected for posttest PSS scores for greenhouse first instruction and for some attention difference scores, the linear model is robust to violations of normality, and analysis continued (Field, 2013; Keith, 2006). All other assumptions were met. The analysis was split by treatment group to determine the changes associated with the PSS and attention difference scores and a change in stress and change in attention designation was determined (no change, increase, decrease).

Results/Findings

A general linear mixed model of day 1 and day 2 PSS difference scores and attention difference scores by treatment order was constructed to test the hypotheses. The PSS model was not significant (Adj. $R^2 = 0.02$, $F(3,159) = 0.14$, $p = 0.93$) and there was not a significant interaction effect ($F(1,159) = 0.37$, $p = 0.54$). This resulted in failure to reject the null hypothesis that no significant difference in stress level existed between instructional environments. Figure 2 shows the profile plot of estimated marginal means of the PSS difference scores for each day by treatment order, which shows an interaction. Each group had higher difference scores on the day they received their treatment. For attention, a significant model accounted for 13.8% of the variance (Adj. $R^2 = 0.138$, $F(3,147) = 9.01$, $p < 0.01$, $\eta^2 = 0.16$). A significant interaction between day and treatment order existed ($F(1,147) = 24.64$, $p < 0.01$, $\eta^2 = 0.14$). The significant model and interaction effect led to a rejection of the null hypothesis that there was no significant difference in change in attention level between student instructed in the natural agricultural laboratory and the agriscience classroom. Additionally, the effect sizes exceeded the minimum for practical significance (Ferguson, 2009). Figure 2 presents the profile plot for the estimated marginal means of attention difference scores by day and treatment order. Both groups had larger changes in their attention level on the day they received instruction in the natural agricultural laboratory setting.

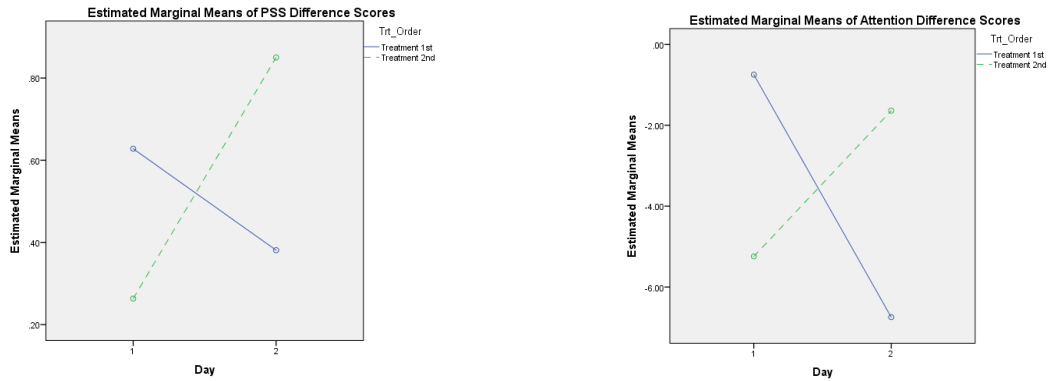


Figure 2. GLM profile plot for the estimated marginal means of stress and attention scores by day and treatment order

The percentage of students who experienced a change in their PSS and attention scores in each environment was calculated (Table 1). A greater percentage of students experienced a decrease in their perceived stress level from the beginning of class to the end of class in both the treatment (41%) and comparison (50%), with 9% more of the students experiencing a decrease in the agriscience classroom than in the greenhouse environment. Conversely, 38.6% of students in the greenhouse environment experienced an increase in stressed compared to 35% in the classroom. A larger percentage (59%) of students in the treatment group saw no change or an increase in their attention than those in the comparison group (15.1%). At the same time, a larger percentage of students in the comparison group saw a decrease in attention (84.9%) than those in the treatment group (48.1%).

Table 1

Percentage of students with no change, decrease, or increase in stress and attention by treatment

Treatment	No Change N (%)	Decrease N (%)	Increase N (%)
Lesson & Environment			
Stress			
Treatment Total (N = 83)	17 (20.5)	34 (41.0)	32 (38.6)
Day1 Propagation Greenhouse	9 (20.0)	15 (34.9)	19 (44.2)
Day 2 Nutrients Greenhouse	8 (20.0)	19 (47.5)	13 (32.5)
Comparison Total (N = 80)	12(15.0)	40 (50.0)	28 (35.0)
Day 1 Propagation Classroom	3 (7.9)	20 (52.6)	15 (39.5)
Day 2 Nutrients Classroom	9 (21.4)	20 (47.6)	13 (31.0)
Attention			
Treatment Total (N = 79)	15 (19.0)	38 (48.1)	26 (32.9)
Day 1 Propagation Greenhouse	8 (20.9)	18 (45.0)	14 (35.0)
Day 2 Nutrients Greenhouse	7 (17.9)	20 (51.3)	12 (30.8)
Comparison Total (N = 73)	3(4.1)	62 (84.9)	8 (11.0)
Day 1 Propagation Classroom	2 (5.9)	30 (88.2)	2 (5.9)
Day 2 Nutrients Classroom	1 (2.6)	32 (82.1)	6 (15.4)

Conclusions/ Recommendations/Implications

The finding that a significant difference in the stress levels of students after instruction in the natural agricultural laboratory environment did not exist contradicted findings that individuals experienced faster and more complete restorative effects from stress in natural environments (Hartig, Evans, Jamner, Davis, & Garling, 2003; Hartig, Mang, & Evans, 1991; Ulrich et al., 1991). These unexpected results may be contributed to several factors including: initial response to the environment (Ulrich, 1983; Ulrich et al., 1991), negative anticipation of leaving the restorative environment (Hartig et al., 1991; Hartig et al., 2003), difficulty detecting decreases in negative affect (McMahan & Estes, 2015), the characteristics of the restorative environment (Hartig et al., 1991; Kaplan & Talbot, 1983) and the appropriateness of the measurement instrument. The statistically significant and practical difference between the increase in attention for students taught in the natural agricultural laboratory setting and decrease in attention for students taught in the agriscience classroom supports the Attention Restoration Theory (Kaplan & Kaplan, 1989). Natural views have also been shown to increase directed attention capacity (Tennessen & Cimprich, 1995).

Since the results from this study are not generalizable, additional research should investigate these findings in a larger, generalizable sample of agriscience students. Researchers need to develop a reliable instrument for measuring current stress levels, sensitive to short-term changes and integrate physiological measurements of stress. In addition to looking at the short-term impacts to directed attention, researchers should attempt to measure the long-term impact of time spent in restorative learning environments. Although the greenhouse/shade house setting was

investigated in this study because of their wide-spread usage (Franklin, 2008; Shoulders & Myers, 2012), teachers have a variety of laboratory areas available to them (Shoulders & Myers, 2012), many of which could be categorized as natural agricultural laboratories and provide restorative effects to students. Future research should investigate these other laboratory environments to test for similar results.

Schools should provide natural environments conducive to learning and encourage teachers to utilize these areas for instruction. Agriscience teachers should purposefully use natural laboratory environments, despite the additional preparation some of them require, to allow their students to benefit by recovering from directed attention fatigue. Teachers should explore new and different ways to utilize these natural laboratory settings to increase their use and the opportunities for students to benefit from the increased directed attention capacity.

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A Qualitative Exploration of Southwestern Agriculture Teachers' Implementation of Supervised Agricultural Experience Programs

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Abstract

Agriculture teachers have continued to underutilize supervised agricultural experience (SAE) for the last 40 years. However, SAE remains a central component to the total school based agricultural education program. Therefore, the central research question was: how do southwestern agriculture teachers develop and implement SAE programs at the local program level? This research was conducted using a multi-case study design. Seven current agriculture teachers representing five programs were interviewed and observed. Three primary themes emerged from the data: 1) change is good, but sometimes difficult, 2) community support makes SAE work, and 3) requirements for SAE are necessary. Recommendations for practice include: enhanced coursework for preservice teachers on developing and implementing SAE programs, professional development for practicing teachers, and aligning current student needs with SAE instruction and the SAE for All initiative. Recommendations for research include: examination of current students' motivation to complete SAE programs and further investigation into the impact of the SAE for All initiative on SAE success and teacher implementation.

Introduction

In addition to leadership development and classroom/laboratory instruction, supervised agricultural experience (SAE) programs are an essential part of the three-component model that guides school based agricultural education (SBAE) programs nationwide (Talbert, Vaughn, Croom, & Lee, 2007). SAE's are designed to provide experiential learning opportunities to students, increase in difficulty and scope over the students' four years in an agricultural program, and provide students with opportunities to capitalize on career exploration and experiences (Stimson, 1919; Talbert et al., 2007). Today SAE's are commonly described as work-based learning and align with national education reforms that focus on college and career readiness at the secondary level (National Council for Agricultural Education, 2017).

Throughout the literature, SAE's have been identified as a powerful tool for student growth and development (Barrick et al., 2011; Rubenstein & Thoron, 2015). Despite the documented importance of SAE, there have been many challenges related to SAE development and implementation for agriculture teachers across the United States. The changing landscape of local SBAE programs from primarily rural schools and communities to more urban and suburban settings has been identified as a potential barrier for effective SAE implementation due to its unique challenges (Rubenstein, Thoron, Colclasure, & Gordon, 2016). Teacher time, funding sources, administrative support, and lack of student motivation to engage have all been identified

as potential hurdles that agriculture teachers must overcome when implementing SAE's in their SBAE programs (Dyer & Osborne, 1995; Robinson & Haynes, 2011; Retallick, 2010). As more and more SBAE programs are seeing a decrease in the number of students with active SAEs (Dyer & Osborne, 1995; Retallick 2010), it becomes important to examine the development and implementation of these programs at the local level. This study builds on previous work by Rubenstein and Thoron (2015) to identify areas that facilitate and impede development of SAE programs in a variety of local contexts. Our study specifically focuses on teachers as they are the primary influencer on effective SAE implementation (Dyer & Osborne, 1995).

Theoretical Framework

Rubenstein and Thoron (2015) identified various components that are integral to the development of exemplary SAE programs. We choose this framework to guide our study because of its comprehensiveness surrounding the various facets that impact SAE development and implementation and its congruency with our central research question. The nature of SAE's necessitates the involvement of a variety of individuals including school personnel, students, parents, community members, and of course the agriculture teacher. While the primary focus of our study is on teachers, who have been documented in the literature to have the most direct impact on SAE development and implementation (Dyer & Osborne, 1995), we acknowledge that a variety of individuals play integral roles in the overall SAE experience for students. Within their framework, Rubenstein and Thoron (2015) described five components that are vital to the development of quality SAE programs. These include student centered SAE programs, committed teachers, supportive surrounding community, shared expectations, and joint supervision. For the purposes of our study, we primarily focused on the committed teachers section of the framework which identifies early instruction of SAE, requiring of SAE, utilizing a team approach to SAE development, utilizing concrete examples, actively involved teachers, and attaching a grade to SAE as critical components that the teacher should attend to when developing and implementing SAE in their local programs.

Purpose and Central Research Question

The purpose of this study was to explore southwestern agriculture teachers' development and implementation of SAEs at the local level in both suburban and rural settings. Findings from this project can provide information on how SAE program development and implementation can be improved and assist agricultural education teacher preparation programs in enhancing their preservice teacher education curriculum. This study aligns with the American Association for Agricultural Education National Research Agenda (2016-2020) that calls for meaningful learning within SBAE programs to engage students in the learning process and motivated teachers to facilitate engagement (Edgar, Retallick, & Jones, 2016). Our central research question was: how do southwestern agriculture teachers develop and implement supervised agricultural experiences programs at the local program level?

Methods

We employed a multi-case study design for investigation of our central research question (Yin, 2014). We used pragmatism as our epistemological lens and acknowledge our positionality as former SBAE teachers and current teacher educators. Each of the researchers were certified agricultural education teachers, taught middle and high school agriculture, and believe in the benefits of utilizing SAE programs in a total SBAE program. All participants recruited for the study had to meet the following selection criteria: currently teaching agriculture at the secondary level, a minimum of 80% of students with an active SAE program, and a minimum of 50% of students logging hours in AET. State staff were utilized to help identify teachers who met these criteria and were eligible for the study. Participants were contacted via phone during the fall of 2018 to determine interest in participating in the study. In total seven teachers participated representing five agriculture programs. See figure 1. for further information on each participant, including all pseudonyms used to protect participant identities.

Name	Years Teaching	Gender	Description of School	Type of Certification
Jane	11	F	Suburban	Traditional
Sam	33	M	Suburban	Traditional
James	1	M	Suburban	Traditional
Rose	16	F	Suburban	Traditional
Beth	4	F	Suburban	Alternative
Phillip	26	M	Rural	Traditional
John	2	M	Rural	Traditional

Figure 1. Participant description including gender, school, years teaching, and certification route

Two forms of data were collected in December 2018 including in-person observations of program with field notes and in-depth semi structured interviews lasting between 60-90 minutes in length. All interviews were audio recorded and later transcribed verbatim. Data were analyzed using constant comparative analysis (Lincoln & Guba, 1985). Trustworthiness for our study was ensured by disclosing our positionality as it pertains to this research, member checking, audit trails, and rich, thick description through participant quotes (Tracy, 2010). This study was approved by the university Institutional Review Board.

Findings

As the data were analyzed, three themes emerged from the interviews. The three themes were: change is good, but sometimes difficult; community support makes SAE work; and requirements for SAE are necessary.

Change is Good, but Sometimes Difficult

Inevitably in every agriculture teacher's career, the content will change and evolve to meet the necessary needs of the students and changing agricultural industry. Each of the teachers has experienced change in SAE from what they were taught in their teacher preparation programs or learned through ongoing professional development. Some have had to learn how to engage millennials and Spanish speaking students in their programs or how to conduct supervisory visits in a foreign country. These necessary evolutions have not been taught in teacher education programs and these teachers have had to find a way to actively engage students in all environments to ensure they have the opportunity to engage in the complete three-component model. Beth shared that what she learned in courses didn't work in the classroom,

Some of them, like just don't, they just don't do it. And that's where I changed the way I started doing SAE's ... I just don't know how to get them to buy in that this is actually part of your program.

John explained,

Teaching in a school where students cross the border to get to school presents a new level of challenges. One student travels over an hour and a half just to get to the border. How am I supposed to visit his program? I still need to figure that out.

Rose stated that it isn't just the students who are changing, but the process and record keeping systems continually receive updating. She stated, "AET is constantly changing, too. So you gotta stay up with it cause it's changing a lot. Cause I got on there the other day and I was like 'Whoa this is brand new.'"

Community Support Makes SAE Work

Agriculture teachers always work hard to engage their communities both inside and outside of the classroom. Throughout the interviews, the teachers discussed how local community members were essential for providing the necessary resources for students to conduct their SAE experiences. This was through the donation of land, time, money, animals, machinery, and the list continues. Community members were essential for each of these teachers to effectively implement SAE programs in their classrooms. Rose shared that her former co-teacher worked hard to engage the community and that because of his hard work they were able to secure funds to improve their program.

We have a good partnership with the Farm Bureau, so they provide a lot of funding for us. We've gotten maybe \$10,000 from them and that helps us with our school garden areas. And it's awesome for our kids but it's also recruitment, ag literacy, so we just try to double dip in all these areas.

When discussing potential funding sources, Jane shared that there are various grants available to her students. She stated that one of her students was struggling financially to engage in their

planned SAE, “so early on she was just lost, and I was like “You shouldn't have to pay for resources like this.” I just sent it [scholarship application] to her.”

Requirements for SAE are Necessary

While a common practice is to set expectations for student success in the classroom, these agriculture teachers shared that one of the essential components of their SAE programs was that students clearly understood that each expectation set by their teacher must be met. The expectations discussed by teachers were: the number of hours engaged in their SAE program, the fact that they program must be agriculturally based, that they had to have a project developed by the end of their SAE unit within the first two weeks of school, and that they had to have documentation (written and photographic) of their participation and engagement in the program. Beth eagerly shared, “students have a SAE report that they have to do, and it’s got some specifics in it- like it has to have 3 pictures with it.” Rose believed that her major expectation was that the students started small and built upon their SAE as they were in the program. She stated,

I try to put a lot more impact on it and I spend more time on it up front and with my freshmen. I used to kind of have the same expectation from a freshman and a senior, you know, so I changed what we did the first nine weeks, was we just did a, they interview people about careers that interested them and that was their first SAE along the whole exploratory foundation type thing. And then they’re supposed to build one from there, I just- I don’t know how to get them to implement them.

James further added,

One thing I hit on in my class is doing it for the grade and doing it for the experience. So yeah, you can take care of your dog for 25 hours and meet my requirement and you’ll get the same A as everyone else. But then when you go to apply for your job, what are you going to say? Are you going to say dog care?

Discussion, Recommendations, and Implications

Throughout the interviews the agriculture teachers in this study discussed the importance of adapting SAE instruction to meet the needs of the students in their program. This has led each of these teachers to needing additional resources that have been provided graciously by community members and organizations like the FFA Alumni and Farm Bureau. Furthermore, as the teachers spent more time in a program, they found that their expectations for SAE continued to grow and increase, similar to the work of Rubenstein and Thoron (2016). This strengthens the resolve that SAE is a vital component of agricultural education; however, teachers still need additional help to ensure that all students in their programs have the opportunity to engage.

Therefore, the researchers suggest the following recommendations for teacher education:

- Course assignments that require preservice teachers to work with current middle and high school students to develop SAE programs during their coursework prior to student teaching;

- Professional development workshop development for inservice teachers on assisting teachers with adapting their SAE instruction to align with current student needs and the SAE for All initiative; and
- Ensuring that SAE instruction has a central role in the teacher education program and is not just an added piece of instructional content.

The following research recommendations are provided:

- Examine current agriculture student's motivation to complete SAE programs;
- Conduct an experimental student to examine the impact of the SAE for All initiative to determine if it influences teachers use of SAE in their classroom; and
- Examine the influence of achievement motivation on student and teacher engagement in SAE programs.

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An Examination of Montana Young and Beginning Producer Experiences as a Guide for Post-Secondary Education

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Abstract

The U.S. agricultural industry continues to see increases in the average age of the existing labor force and fewer young and beginning farmers and ranchers (YBFR) entering production agriculture. One reason for these trends is the ability for YBFR to identify and overcome the challenges they face when entering the industry. The purpose of this study was to identify those barriers and explore effective strategies for overcoming them by examining the business and professional experiences of Montana YBFR. This phenomenological research study examined the ‘what and how’ of eight Montana YBFR who recently established their agricultural businesses. Seven themes were revealed: (1) Access to land, capital, and equipment are significant barriers to entry; (2) A network of peers and mentors is critical to success; (3) Governmental programs positively impact business practices; (4) Risk mitigation strategies instill security and protection of investments; (5) Family and peers influence business decisions; (6) Education on new technologies and practices increases business competitiveness; and (7) Financial competence enables objective, profitable decisions. These findings serve as key points for agricultural educators charged with cultivating this generation and building a skilled workforce. Further research to examine the impact of networking, education, and influences on decisions is needed.

Introduction/Theoretical Framework

If one word could summarize the future of the U.S. agricultural workforce, it very well might be uncertainty. Among the principal farmers in the United States, 33.0% of the population is 65 and older (USDA, 2012). The average age of Montana farmers and ranchers is 57.8, and continued to trend upward over the past several decades (USDA, 2007). Reasons for the aging of the farming and ranching population include lower interest of the younger generation to return to smaller, more rural communities, higher income opportunities in professions other than agricultural production, and social and economic barriers to entering the industry (Ahearn & Newton, 2009; Mishra, Wilson, & Williams, 2009). Overcoming these challenges is crucial to achieving the 2050 goal of feeding and clothing the growing world population (United Nations, 2017; Northoff, 2009). The return of young and beginning farmers and ranchers (YBFR) to rural communities plays a significant role in the sustainability of the agricultural industry as well as community development. Many rural communities depend on the return of young professionals for job creation, to decrease population loss, improve economic prosperity, and add to human and social capital (Cromartie, Reichert, & Arthun, 2015). The industry also provides a viable platform for family businesses.

Family farms are crucial to the success of rural communities across the nation as they make up 97.0% of the agricultural industry's farming operations (USDA, 2015). The industry is in a transition period that will witness a large portion of its current operators moving towards retirement with a shortage of producers interested in taking over the operation. This shortfall could be overcome with younger generations returning to the farm, expanding their operations, and absorbing acreage that does not have an heir interested in farming or ranching.

The structure and sustainability of the agricultural workforce will depend on the successful transition of the next generation into ownership of today's family farms. In fact, overcoming barriers to transition has become so important, that numerous government programs and policies continue to be developed to assist those entering production agriculture (Ahearn, 2013). Many of these policies attempt to address three of the major barriers identified in the literature: the aging population of our nation's producers; significant capital and land resource acquisition issues; and operational practices that correlate with financial performance (Ahearn & Newton, 2009; Mishra, Wilson, & Williams, 2009). The majority of the studies identifying these barriers used quantitative methods and data from the USDA Agriculture Resource Management System (2015) to draw conclusions on crucial traits of YBFR. While the challenges identified in existing literature and legislation are important, little research-based effort has been made to assess the issue directly from the perspective of the YBFR who face these barriers. Such information could help identify whether there are gaps in current knowledge about existing challenges. Moreover, this information would help complement existing research that seeks to develop strategies for education that helps overcome these challenges and "strengthen farms, agricultural workers, and communities" as outlined in the AAAE National Research Agenda Priority 3: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Roberts, Harder, & Brashears, 2016). At all levels, our educational system can play a large role in helping overcome these critical challenges by working together to produce knowledgeable, skilled individuals to enter agricultural careers with emphasis on both technical and soft skills (Crawford, Lang, Fink, Dalton, & Fielitz, 2011). In 2009, the National Research Council called for higher education to increase youth exposure and interest in agricultural careers in partnership with related organizations and affiliates. "Forming partnerships... may increase awareness of the multidisciplinary and challenging nature of agriculture and could increase the diversity of students seeking postsecondary degrees and careers in the agricultural sciences" (Roberts, Harder, & Brashears, 2016, p. 30).

An important avenue for success is helping individuals develop a career identity and an understanding of who they are and how their work is meaningful to them (Andreas, 2012). Career identity resources focus on an individual's career goals, occupational interest, values, and the overall importance of the individual's work regarding their feeling of self-importance (Ibarra & Barbulescu, 2010; Meijers, 1998). The critical career resources framework focuses on four main variables for career success and development: human capital resources, social resources, psychological resources, and career identity resources (Andreas, 2012). Human capital resources are typically skills that allow individuals to be proficient in their job performance, including but not limited to "education, experience, and training and cognitive ability" (Andreas, 2012, p. 374).

Social resources can be defined as the network of resources that individuals are able to construct as well as their ability to use that network to generate information, guidance, support, and influence (Adler & Kwon, 2002). The psychological resources relate to the outlook or resolve of the individual, consisting of optimism, hope, self-efficacy, and resilience. The final career identity resource revolves around an individual's mental state and outlook on an individual's career and job at that present time. It is important that all four resources are present and allocated equally; a deficiency in one area cannot be compensated by a strong resource in another category (Andreas, 2012). Research that focuses on the perspective of YBFR producers will enable educators to be more successful in aiding individuals to develop their career identity. That is, not only can such research help prepare and inform future YBFR producers about operational and financial practices that have been successful, but it can also serve as a guide for the educational system to build programs, models, and strategies effective in preparing people to work in a global agriculture workforce (Roberts, Harder, & Brashears, 2016).

Purpose/Objectives and Methods

The purpose of this phenomenological research study was to examine the business and professional practices of established YBFR agricultural operations in Montana. The objectives were to: (1) Describe what Montana YBFR experience from entry to establishment of their agricultural operations; (2) Describe how Montana YBFR experienced entry into and establishment of their agricultural operation; and (3) Describe the essence of common experiences of being a Montana YBFR entering into and establishing an agricultural operation. Phenomenology is the study of the lived experiences of individuals regarding a specific phenomenon or environment (Creswell, 2013; Groenewald, 2004; Merriam & Tisdell, 2016). For this study, the phenomenon was being an established YBFR. The two main objectives of phenomenology research are to describe what the individuals experienced and how they experienced the phenomenon (Creswell, 2013). This approach allowed for an in-depth understanding of the decision-making process that YBFR face.

In phenomenology research, it is recommended that five to twenty-five individuals are interviewed for the best results (Creswell, 2013). Research also indicates that in order to produce practical results, participants should be selected according to specific criteria relevant to the purpose and objectives of the research (Guest, Bunck & Johnson, 2006). For these reasons, the sample included eight Montana YBFR that depend on agriculture as their primary source of income; had at least three years of management experience; fit the USDA definition of a YBFR; had similar farming practices, commodities, and location; and were recommended by their primary financial lender as "established and successful." This produced a criterion sample representative of established and successful YBFR that could reflect on their experiences and give insight useful for educators who prepare future agriculturalists (Ahearn & Newton, 2009). The use of semi-structured interviews, independent reviewers, and debriefing sessions allowed sufficient inquiry and provided ample data to reach study objectives and data saturation (Creswell, 2013; Eddles-Hirsch, 2015). Following Moustakas (1994) analysis, a panel of reviewers highlighted significant statements relating to what and how the participants experienced the phenomenon, or horizontalization. Clusters of meaning

were then developed into themes. Next, a textural description of what the participants experienced and a structural description of how they experienced the phenomenon were constructed. Finally, descriptions were combined to write a composite description of the “essence” of the phenomenon, including common experiences written as descriptive passages (Moustakas, 1994, p. 61).

Results

Based on textural and structural descriptions, seven themes revealed the business and professional practices as well as working challenges of YBFR from entry to establishment of operations. Themes and distinguishing quotes related to objectives one and two are outlined in Table 1.

Table 1: *Emergent themes and distinguishing participant quotes*

Themes	Quotes from Textural and Structural Descriptions
Access to land, capital, and equipment are significant barriers to entry into agriculture.	“Access to capital and funds is a big one. I mean, you’ve got high climbing land prices versus diminishing returns...you start with little to zero assets.”
A network of peers and mentors is critical to success.	I feel in this world, it’s all about connection to who you know” and “The network you build is very valuable.”
Governmental programs positively impact business practices.	“I was able to participate in a TIP program which allowed me to get into some acres on a lease that otherwise I probably wouldn’t have been able to come into, so the programs and the availability has been impactful”
Risk mitigation strategies instill security and protection of investments.	“The impact of crop insurance for myself as young beginning producer has been very high, without the multi-peril crop insurance and the subsidies that we get for it, it’d be too much risk for me to probably even do what I do.”
Family and peers influence business decisions.	“Be willing to take advice from people that are successful” and “The biggest impact on me has been working with my dad since I was a kid, learning from him.”
Education on new technologies and practices increases business competitiveness	“Having flexibility and the confidence to try new crops and stay technologically advanced enough that you’re comfortable to try new things. Monetarily, I think that is one thing that’s really led to my success” and “The biggest impact would have been studying business at [college].”
Financial competence enables objective, profitable decisions.	“Know your numbers, know them well, and make decisions based on those numbers.”

The Essence: The collected data make clear that a YBFR faces significant challenges when starting an agricultural operation. Regardless of whether a young producer comes from a family farming background, access to land, machinery, and capital were the most common identified challenges to starting an operation. Participants felt that established producers had a significant advantage in

financial resources as well as risk taking ability, putting YBFR at a competitive disadvantage. Finding land and securing financing for capital needed to start an operation was reportedly overwhelming. YFBR also indicated deficiencies in experience and knowledge about effectively managing finances and resources. However, the most successful individuals all indicated that these deficiencies can be overcome with consistent work and perseverance. Continued education and inquiry about availability of government programs enabled YFBR to take advantage of resources designed for them by agencies such as the NRCS and USDA. Programs most identified by YFBR were those that offered risk protection for their investments. They highly value the sense of security that risk mitigation programs, such as crop insurance, bring to their business. YFBR also noted that there are important non-farm program risk management strategies. Because every experience transitioning into a business, leasing, or taking over family or community lands is unique, educational experiences that help understand production costs for all commodities within the operation are imperative. Preparing students for life-long learning and continuing to provide these resources throughout their careers is essential to meeting the AAAE priority to “strengthen farms, agricultural workers, and communities.” Additionally, YBFR valued networking with peers and mentors to shape their experience and guide their success. These relationships allowed them to share ideas, seek knowledge, and have a sounding board for decisions. Similarly, they valued relationships with lenders who shared their vision, and many cited having a community, industry, or family mentor as the primary reason for their ability to build their agricultural operation. Such relationships provide important insights about the complementarity of formal and non-formal education. While most individuals were aware of their desire to enter the industry and made specific decisions to prepare in college, there was a consensus among the group that access to continuing education and the determination to acquire that knowledge were critical in their success. Because YFBR producers already face higher barriers to viability and sustainability than established operators, being a front-runner to acquire knowledge about emergent research, diversification, cropping practices and new technologies allow adaption and evolution of operations can help level the playing field. This mindset of embracing education and new technologies has allowed YBFR to build their operation in innovative, profitable ways.

Conclusions, Recommendations, and Implications

The testimony of eight different participants provides evidence that there are common professional practices and experiences that can help overcome barriers outlined in previous research (Ahearn & Newton, 2009; Mishra, Wilson, & Williams, 2009). Participants consistently referred to seven themes and reinforced career resources for success (Andreas, 2012). Inclusion of all four resources provides a strong foundation for successful careers across industries useful for post-secondary education. These considerations must be acknowledged with change to improve strategies effective in preparing students to enter the workforce. To do so, educators must design a revitalized undergraduate program approach to build career skills in the areas of technical content, business practices, soft skill development, and networking. To reinforce human capital resources, inclusion of real-life agricultural case studies into courses will enable students to practice skill development using field-based data and programs. Teaching strategies should incorporate business concepts and

higher order thinking to build confidence in financial management and decision-making skills. Student networking experiences inside and outside of classroom, such as career fairs, can build social capital resources prior to graduation. Having a network of mentors during college can offer the support needed to motivate the younger generation to return to agricultural production. Workshops on how to identify a mentor and expert speakers from the community can provide valuable insight into careers. Engaging students in agriculture in formal and non-formal ways can build their resource knowledge, skill development and understanding of the importance of life-long learning. Post-secondary education should explore creative ways to build psychological and career identity resources into the curriculum to instill self-efficacy, resilience, and career outlook. Structured internships, service learning, research, academic conferences, study-abroad trips, and professional development can positively influence career decisions. Findings serve as a key point for agricultural and extension educators charged with cultivating this generation and advocating for the investment in future leaders. Future research must be conducted to better understand the impact of networking, education, and influences on YBFR career decisions. In addition, research on post-secondary skill development models and strategies to better prepare the younger generation to enter into agricultural careers is needed (Roberts, Harder, & Brashears, 2016).

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