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Storying Outdoor Youth Education: A Historical Narrative of the Louisiana 4-H Camping Movement

Adam M. O'Malley, *Louisiana State University*
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Abstract

Perhaps one of the most formalized ways that 4-H has fostered agricultural innovation and practical education has been through their outdoor youth education program, more commonly known as 4-H Camp. Although 4-H Camps were first created for local clubs, camping events soon expanded to the state and national levels. In fact, three years after establishing the first 4-H Camp, more than 1,700 had emerged across the U.S., with attendance surpassing 100,000 youth. Because of its positive outcomes, the 4-H Camping movement has become celebrated as a novel technique to motivate youth to engage in agrarian concepts. Despite this, little work has been done to document the historical origins and evolution of the camping movement. Therefore, a need emerged to describe the actors, forces, and events that led to the prevalence of 4-H Camping in Louisiana. Through our analysis of the data, four themes emerged: (1) early foundations, (2) facility infrastructure development, (3) impact and organizational changes, and (4) the evolution of programmatic delivery. When considered together, the themes knit together the story of the Louisiana 4-H Camp. A key implication from this investigation was the need for greater advocacy efforts among 4-H leaders and agents. For example, the Louisiana 4-H Camp had to navigate multiple barriers throughout history, such as a lack of funding and staff. However, through individual and collective advocacy efforts, the 4-H camp secured vital resources to support 4-H members' needs. Going forward, researchers should examine how fundraising and donors for 4-H camps could be better leveraged and sustained over time. This should include exploring strategies to inform legislators, policymakers, and citizens about the impacts that 4-H camp can have on youth and the state of Louisiana.

Introduction and Review of Literature

During the 1700s, nearly 85% of the U.S. employed population was engaged in the agricultural industry (SeEVERS & GRAHAM, 2012). Therefore, issues such as land disposition, international trade, slave labor, and the demand for improved products were acute for the majority of U.S. citizens. The unique circumstances during this period led to the need for increased youth leadership and the development of greater agricultural literacy (HILLISON & BRYANT, 2001). In response to this need, agricultural societies emerged on the coattails of a growing scientific community and began to target agricultural-based issues and problems (STIMSON & LATHROP, 1942). For example, in 1785, Benjamin Franklin founded the first U.S. agricultural society in Philadelphia to promote agrarian knowledge and address the concerns of rural populations (ELLSWORTH, 1968). The same year, the South Carolina Agricultural Society in Charleston became established an experimental farm that explored practical solutions to common crop pests and diseases (STIMSON & LATHROP, 1942).

By 1861, more than 900 distinct agricultural societies existed in the U.S. (CARRIER, 1937). Many agricultural societies invested in publishing and promoting scientific knowledge to the public through publications, newspapers, and formal presentations (CROOM, 2008). These early agricultural professionals assembled at centrally located farmer institutes to share knowledge and

innovations, often through informal outdoor education (see Figure 1). The conferences allowed low-income farmers to socialize and exchange ideas by offering a low-cost alternative to formal education in the agricultural sciences (Seevers & Graham, 2012).

Figure 1

An Outdoor Farmer's Institute in 1916



Note. Reprinted from *Education Through Cooperative Extension*, by B. Seevers & D. Graham, 2012, p. 27, Copyright by University of Arkansas Press.

After the reconstruction era, the foundations of the Cooperative Extension Service (CES) began to take root (Gordon & Schulz, 2020). Although agricultural societies had established a network to promote agriculture, change was slow among farmers who often saw little value in evolving their knowledge and practices that had been inherited over generations. This issue, coupled with problems feeding a growing population, resulted in a need to develop a network of colleges for the practical instruction of agriculture (Ramussen, 1989). In 1855, Michigan became the first to establish a state college of agriculture, following years of pressure from the Michigan Agricultural Society (Friedel, 2011). Many other states quickly followed suit, including Maryland and Pennsylvania. However, the CES experienced many struggles in its formative years, such as a lack of effective curriculum, qualified professionals, and adequate financial support (Warner & Christenson, 2019). In 1857, Vermont Representative Thomas Morrill presented the first version of a bill to Congress that would later lead to the creation of the land-grant university system (Friedel, 2011). Thereafter, many states sought to improve further their citizens' knowledge and skills about agricultural practices. As a result, the U.S. Congress passed the Smith-Lever Act (1914), which formalized the CES and provided funding to diffuse knowledge about agriculture, home economics, and related subjects (Ramussen, 1989; Warner & Christenson, 2019).

Before the passage of the Smith-Lever Act (1914), many agricultural boys' and girls' clubs had been closely associated with the CES. In 1902, for example, A. B. Graham created a youth program in Clark County, Ohio, which is considered the official birth of the 4-H club movement in the United States (McCormick & McCormick, 1984). In their early formation, the clubs engaged members in experiential learning to test the soil pH for farmers in their local community (Graham, 1941). The youth also collected data from corn and flower test plots from seeds provided by Congressman Samuel Cox (Graham, 1941). This movement eventually became known as 4-H. Thereafter, the passage of the Smith-Lever Act "effectively nationalized 4-H" (National 4-H History Presentation Program, 2017, para. 6). The existing clubs were officially recognized as affiliate 4-H clubs by O.H. Benson, the Director of the Office of Farm Management at the U.S. Department of Agriculture (McCormick & McCormick, 1984, National 4-H Council, 2021). Benson had previously worked closely with Dr. Seaman Knapp in the southern U.S. in the early founding of the CES. Now the largest youth organization in the nation, with over 6.5 million active members, 4-H has grown tremendously since its early foundations in Clark County, Ohio (National 4-H Council, 2021; McCormick & McCormick, 1984).

Origins of Camping in 4-H

Perhaps one of the most formalized ways that 4-H has fostered agricultural innovation and practical education has been through their outdoor youth education program, more commonly known as 4-H Camp (McCormick & McCormick, 1984). The origins of 4-H camping have been traced to 1915, "when the first county camp for both boys and girls was conducted in Virginia" (Carter, 2006, p. 21). However, West Virginia created the first permanent campsite for youth in 1921. As such, camping has been central to the mission and operations of 4-H since its early beginnings. Each year, approximately 14 million youth and adults across the U.S. attend a summer camp program to explore new experiences, build confidence, and socialize with peers and supportive adults (American Camp Association, 2018). The majority of these youth attend overnight, residential summer camping programs, many away from home for the very first time.

Although 4-H Camps were first established for local clubs, camping events soon expanded to the state and national levels (Hoover et al., 2007). In fact, three years after the establishment of the first 4-H Camp, more than 1,700 had emerged across the U.S., with attendance surpassing 100,000 youth (Meadows, 1997). It is also critical to note that the National 4-H Conference, where youth 4-H officers from each state assembled at the nation's capital to discuss the organization's direction, first began as a camping program (National 4-H Conference History, 2012). Originally named the *National 4-H Club Camp*, youth officers camped in U.S. Army tents across the Washington Mall at the base of the Washington Monument at the inaugural camp in 1927 (Coreil & Tassin, 2008; National 4-H Conference History, 2012). At this event, 142 youth officers from 38 states attended, including five youth officers and two female sponsors from Louisiana (see Figure 2).

Figure 2

Louisiana 4-H Youth officers posed in front of the Washington Memorial at the first National 4-H Club Camp in 1927.



Note. Photograph used with permission from the Louisiana 4-H Camp Archives.

The American Camp Association (ACA) (2018) reported that more than 10 million youth attend camp yearly. These camps usually occur in outdoor spaces during the summer months by trained professional staff (Henderson et al., 2007). Camping usually evokes images of fun, enjoyable outdoor excursions that offer individuals the opportunity to form relationships and engage in other experiential learning opportunities (Henderson et al., 2007). Nevertheless, camping can also provide a powerful context that can elicit transformative learning for youth in which they mature regarding their decision-making, problem-solving, and ability to demonstrate respect for others (Thurber et al., 2007). Consequently, it is critical to situate the outcomes that youth have been reported to experience from participating in camping.

Outcomes of Youth Camping

Although leaders historically designed camps to promote leadership and relationship-building skills among students, some evidence has suggested that camps can also improve their content knowledge (Brown et al., 2013, 2014). For example, Brown et al. (2013) reported that the content knowledge of youth who attended a residential summer camp increased twofold when comparing their scores on a pre-test and post-test assessment. However, it should be noted that a six-month deferred post-test revealed that students' long-term knowledge retention was negligible. Despite this, other research has demonstrated that participating in a residential

summer camp program can increase youth leadership competency, positive character development, independent living skills, and citizenship (Garst et al., 2011; Garton et al., 2007; Hedrick et al., 2009). Additional evidence has also suggested that youth who have served as counselors at 4-H camps can also develop an increased interest in leadership and citizenship, a sense of teamwork, and positive feelings associated with contributing to a larger purpose (Brandt & Arnold, 2006; Carter, 2006; Garst & Johnson, 2005).

Meanwhile, other empirical evidence has focused on the outcomes of camping more broadly. For example, the ACA (2018) conducted a five-year study investigating the impacts of a summer camp experience. The results indicated that the camp environment provided a critical context for youth to develop relationship skills and improve students' content knowledge (ACA, 2018). Meanwhile, Wahle et al. (2019) found statistically significant and positive relationships regarding youth's participation in camping and their growth in communication, career, and personal dimensions. Because of its positive outcomes, the 4-H Camping movement has become celebrated as a novel technique to motivate youth to engage in agrarian concepts (Carter, 2006). According to the National 4-H History Preservation Program (2017), camping has remained one of the most powerful educational opportunities youth have engaged in over the past 100 years. Despite this, little work has been done to document the historical origins and evolution of the camping movement. Therefore, a need emerged to describe the actors, forces, and events that led to the prevalence of 4-H Camping in Louisiana.

Purpose

This historical narrative sought to describe the origins and evolution of the 4-H camping movement in Louisiana since its establishment in 1922. Because this investigation coincided with the 100th anniversary of the first permanent 4-H campsite (Carter, 2006), we intended to narrate how the organization used recreation and outdoor education to foster positive youth development. Through this investigation, we also hoped to create discourse about strategies that 4-H could use to ensure the program remains accessible and available to the youth in the future. As a result, this investigation aligned with *Priority 4: Meaningful, Engaged Learning in All Environments* of the American Association for Agricultural Education's National Research Agenda (Edgar et al., 2016).

Methods

We used a historical narrative approach to achieve the study's purpose (Salevouris & Furay, 2015). Investigators analyze the actors, events, and occurrences that shape a phenomenon when engaging in historical research. Therefore, a central assumption is that the historical record can be reconstructed through the collection of primary and secondary sources (Salevouris & Furay, 2015). In this investigation, we used the following sources of data to story the 4-H camping movement: (a) artifacts, (b) documents, (c) interviews with four leaders of the Louisiana 4-H camping program, and (d) photographs. We used internal and external criticism to ensure the sources were quality before including them in our analysis (McDowell, 2002).

Interview participants were purposefully selected based on their in-depth knowledge of the history of camping in Louisiana. Semi-structured and open-ended interview sessions were conducted via Microsoft Teams, recorded, and transcribed for analysis. Each interview lasted approximately 30 minutes. Further, we conducted follow-up sessions to ensure the participants'

perspectives were accurately captured. For example, each individual interviewed had previously held a leadership position associated with the Louisiana 4-H Camping program. It should also be noted that the Louisiana State University (LSU) Institutional Review Board (IRB) approved this study with the intent of using participants' real names to preserve the historical record accurately. However, this manuscript used pseudonyms to facilitate a blind review. Table 1 provides an overview of the pseudonym of each participant and their corresponding professional characteristics.

Table 1

Professional Characteristics of the Interview Participants

Pseudonym	Years Served	Professional Role	Connection to Camp
Mrs. Christine Bergeron	10 years	Camp Director	Current Louisiana Camp Director who has heavily advocated for the expansion of the Louisiana 4-H Camp and the diversification of its programming efforts.
Dr. Paul Coreil	20 years	Former Louisiana CES Director	Working with Mr. York and Dr. Lane, Burke was responsible for much of the growth and development at Louisiana 4-H Camp from 2001-2013.
Mr. Dwight Landreneau	26 years	Former Louisiana CES Associate Vice-Chancellor	Former Louisiana CES Associate Vice Chancellor who, together with Dr. Burke, facilitated many changes to the Louisiana 4-H Camping Program.
Dr. Mark Tassin	37 years	Louisiana 4-H Department Head	A former Louisiana 4-H Department Head, Dr. Lane, conducted the field research informing much of the significant changes to the Louisiana 4-H Camp in 2006-2007.

Reflexivity

The lead investigator was a doctoral student at LSU. He also serves as the program coordinator for the Louisiana 4-H Camp. In this role, he has oversaw the curriculum development and educational delivery of programs for the residential 4-H camp during the summer months, in addition to facilitating field trips and specialty programs. He has also been responsible for hiring and evaluating camp instructors and staff. As a result, he was uniquely positioned to have access to historical artifacts and contacts that have shaped the programmatic delivery of the camping program over time. The second researcher was a faculty member at LSU and had experience as a historical researcher. Therefore, the second research was able to assist with data analysis. These

experiences uniquely influenced how we approached the investigation, collected primary and secondary sources, and the procedures used to analyze the data.

Data Analysis

We used Corbin and Strauss' (2015) constant comparative method to analyze each data source. Using this approach, we analyzed the data through three distinct cycles of coding that resulted in the findings being "rooted in the original data themselves" (Corbin & Strauss, 2015, p. 51). To begin this process, we organized the data chronologically and then engaged in open coding by which we coded the data line-by-line. Then, we used axial coding to scrutinize relationships among the open codes to reduce the data. This process resulted in the development of categories. In our final stage of analysis, we used selective coding to consider our categories in concert with the historical context (Corbin & Strauss, 2015). As a result of this process, four themes emerged that tell the story of the 4-H camping movement in Louisiana.

Rigor and Trustworthiness

To uphold quality in this investigation, we used Lincoln's and Guba's (1985) standards for rigor and trustworthiness: (1) confirmability, (2) dependability, (3) credibility, and (4) transferability. Confirmability, the first standard, requires researchers to be explicit about the influences that could have affected the study. Therefore, researchers should explain the methods in full, be open about biases, honest about their inferences, and connect their findings to existing literature. Therefore, we were descriptive about our research procedures, interview participants were chosen within the bounds of the study, biases were made known, and literature was linked to our findings. The second standard, dependability, refers to whether consistency was maintained throughout the research study. To achieve *dependability*, we performed an audit of our procedures to ensure our data collection and analysis were consistent and accurate. The third standard, credibility, represents whether the findings make sense within the context of the study. To achieve this, we triangulated our data sources and fully described our participant selection procedures. The final standard, transferability, speaks to whether the study's findings might be transferable to similar circumstances in different contexts. To achieve such, we were transparent about our procedures and the biases that influenced our interpretations.

Findings

Through our analysis of the data, four themes emerged: (1) early foundations, (2) facility infrastructure development, (3) impact and organizational changes, and (4) the evolution of programmatic delivery. When considered together, the themes knit together the story of the Louisiana 4-H Camp. It should be noted that approval was provided by LSU IRB and participants to use their real names to preserve an accurate historical record.

Theme 1: Early Foundations

Louisiana State Representative James B. Aswell convened an educational conference in 1904, during which the committee heavily discussed the concept of an improved agricultural education curriculum in the Louisiana public school system (Stimson & Lathrop, 1942). That same year, the state mandated that all Louisiana elementary schools provide agricultural education. Therefore, the Louisiana Normal School, which would later become known as LSU, began offering an agriculture course designed specifically for high school teachers and principals.

Accordingly, in 1905, LSU President Colonel T. D. Boyd announced that a two-year agriculture course would be offered (Stimson & Lathrop, 1942).

Then, Avoyelle's Parish Superintendent of Public Schools Victor Leander Roy established Louisiana's very first corn club in Moreauville, Louisiana in 1908 (Mitchell, 1959; Stimson & Lathrop, 1942). Over 250 boys attended the first meeting of the corn club (Benedict & Gautreaux, 2014). Only three years later, youth corn clubs could be found across the state, and other project clubs began to gain popularity prior to becoming affiliate 4-H Clubs.

By 1922, a wealthy landowner, Rufus Walker donated his land in Pollock for use for the annual Louisiana 4-H Summer Camp (Cantrelle, 1986; Fiser & Coolman, 2004). Six years later, Walker then deeded this land for the use of 4-H Clubs in the area. By 1936, the campgrounds were officially designated as *state lands* after the Louisiana State Government presented a formal petition to LSU – home to the CES system that oversaw the state 4-H program (Camp Grant Walker, 1941). This change was primarily strategic to make needed improvements to the 4-H Campgrounds to expand opportunities to youth throughout the state. For example, with government funding, construction of permanent structures began at the campgrounds, which had been prohibited previously. The Federal Works Progress Administration (WPA), created under President Franklin Roosevelt's New Deal, was primarily responsible for the construction of Camp Grant Walker (Works Progress Administration of Louisiana, 1941). Figure 2 depicts the capital improvements that occurred at the Louisiana 4-H Camp as a result of the WPA.

Figure 2

Improvements to the Louisiana 4-H Camp the WPA after being Designated as State Lands



Note. Photographs used with permission from the Louisiana 4-H Camp Archives. ¹Leveed banks of Big Creek (Bottom-Left), ²Residential cabins (Top-Left), ³An open-air, stone amphitheater (Bottom-Right), ⁴A graveled roadway (Top-Right).

Theme 2: Facility Infrastructure Development

Following the initial improvements by the WPA, little documented evidence existed of additional capital improvements until the 1970s, except for the construction of “a new cinderblock dining hall” (Dr. Mark Tassin). According to former LSU Associate Vice-Chancellor Mr. Dwight Landreneau, in the 1970s, a pool and several new, larger bunkhouses were added to the grounds to replace the original cabins. By 1981, Dr. Lane reported they had “construct[ed] 11 new bunkhouses.” For several decades, Dr. Mark Tassin served as the Louisiana 4-H Department Head and oversaw camp operations. He reported that in 1986 construction had been completed for a new, larger multipurpose building that also provided a cafeteria and dining facility for youth. At this time, a large, open-air pavilion was also constructed on the west side of the camp.

Camp Director Christine Bergeron also reported that in 1997, the Louisiana Sheriff’s Association “donated and installed a new air conditioning unit” for the bunkhouses. Then, in 2007, Louisiana 4-H purchased the neighboring Girl Scouts Camp Site, Camp Windywood, after it had declared bankruptcy. Several small buildings were demolished and a new environmental education building, shooting sports facility, shotgun and rifle ranges, and pond were all completed by 2012. Then, later that year, Roy O. Martin donated \$500,000 to construct a multipurpose building for the camp to have a centralized location for its nearly 600 temporary residents each week during 4-H Summer Camp. The multipurpose building has been the latest capital improvement to the facility.

Theme 3: Impact and Organizational Changes

Over its nearly 100-year history, the Louisiana 4-H Camp has experienced many changes. However, the individuals interviewed reported that the camp had an overwhelmingly positive impact on Louisiana youth. For example, when reflecting on his experiences, Dr. Paul Coreil, who served as the LSU Vice-Chancellor and Director of the CES from 2001 to 2013, recalled his time as a camper in the 1960s. He explained: “everybody wanted to be in 4-H; the camp was highly attractive to us.” He added: “being independent of your parents and learning about things that you could do with hands-on, experiential learning, [it] helped build confidence, responsibility, and practical life skills....” Mrs. Holstein affirmed that this perspective remained, explaining that “It is often that when individuals I meet around the state, and they find out that I am the Camp Director at Louisiana 4-H Camp, they cannot wait to tell me their stories about their time spent at camp during their youth.” After the campgrounds sustained significant storm damage in 2020, Holstein added, “we had several individuals and organizations reach out to donate resources towards our recovery simply because of the impact camp has made on their lives or their children.” Meanwhile, Mr. York explained that the camp “provided a forum for youth to develop communication and interpersonal skills.” He expanded: “...”[you] saw other kids their same age, their peers, and experienced leadership skills. And I think that’s contagious. I think that is what camp was all about.”

The camping program evolved considerably regarding its staffing and organizational structure. For example, before 2001, Dr. Lane explained: “there was no permanent camp director.” Therefore, during this period, the camp largely stood idle in the off-season, with Louisiana 4-H personnel managing the summer camp operations. “The programming was all on agents... we had almost 100 kids in a class, so you weren’t doing anything but talking at them,” explained Dr. Lane. Similarly, Dr. Burke agreed that at that point, it was time to make changes at camp, noting

its unique context for education. He explained: “They went to school for nine months in the classroom, and now they’re ready to cut loose, but you can also teach them a lot there.” Therefore, a semi-permanent camp director was hired in the late 1990s to reside on-site during the summer months to provide a more consistent managerial presence before the position was made permanent in 2001. Dr. Lane recounted: “I went to four or five states and looked at their camping programs, and we made a major revamp.” These changes in 2007, according to Dr. Lane, included employing seasonal summer staff, subject-matter specialists, pedagogical specialists, reducing the 4-H member to educator ratios, and establishing a revolving account to consistently facilitate capital improvements.

As a result, Dr. Lane reported that the “Louisiana 4-H Camp started to be able to build some funds, and some foundation to be able to do some things at camp, not only in hiring, but in facilities and management...expanding staff, and then utilizing camp for other types of activities outside of extension.” For example, the camp employed a more robust maintenance department, an on-site housekeeper, an administrative coordinator, and a full-time 4-H program coordinator to continue programming into what was traditionally the off-season. The Louisiana 4-H Camp also began hiring approximately 20 camp staff members, six educational instructors, a full cafeteria staff, and an on-site nurse during the summer session. The Louisiana 4-H Camp was then able to begin hosting professional development sessions for extension agents and agricultural education teachers. It also began serving as a venue for weddings, reunions, and other community events. Dr. Burke concluded: “It’s a much more structured and more focused experience now...it’s a more high-quality camp, with qualified instructors that better align with the overall goal and mission of 4-H.”

Theme 4: The Evolution of Programmatic Delivery

The Louisiana 4-H Camp primarily focused on recreational opportunities coupled with outdoor education that featured basic agricultural and environmental concepts in its early days. However, because of limited funds and time, the effectiveness of the curriculum and educational approach varied considerably. Despite this, all four participants in this investigation articulated that the educational and recreational programming of the Louisiana 4-H Camp improved considerably after hiring a permanent camp director. According to Dr. Burke, its impact expanded after the camp’s curriculum became more focused. On this point, Mr. York maintained: “We have such low [educational] achievement, and illiteracy is high [in State], poverty is high...I think that made camp even more important to be part of the solution.” He continued: “We just became a professional education organization that was much more structured because of the needs of Louisiana” (Mr. York).

Meanwhile, Mr. York suggested that the staff at the Louisiana 4-H Camp have continued to make positive improvements: “Now, the [4-H Camp Staff] are structured; they have a good curriculum. I think they do a good job of getting instructors, training the instructors, and utilizing the junior leaders in the whole process. Dr. Lane added that the growing popularity of the Louisiana 4-H Shooting Sports Program, and the ability to offer hunter education training at the camp, had also increased the visibility and awareness of the camp in recent years. Now, Louisiana 4-H boasts one of the nation’s largest state camping programs, serving nearly 5,000 youth and adults every summer (LSU AgCenter, 2019). However, according to current Louisiana 4-H Camp Director Christine Bergeron, “We are completely at capacity. Each summer, there are approximately 2,000 children placed on a waiting list.” As a result, the need for more capital

improvements and staff has continued to persist. The Louisiana 4-H Youth Development Program has been providing hands-on, high-quality residential summer camping programs for the state's youth for nearly 100 years (LSU AgCenter, 2020). Focusing on experiential learning, leadership development, and positive character development, the Louisiana 4-H Camp hosts over 3,500 youth each summer (Osbourne, 2019).

Conclusions, Discussion, Implications, and Recommendations

This investigation described the origins and evolution of the 4-H camping movement in Louisiana. The primary and secondary data used in this study demonstrated how the Louisiana 4-H Camp evolved regarding facility infrastructure, impact, and programmatic delivery. For example, the Louisiana 4-H Camp had many capital improvements over time (Cantrelle, 1986; Fiser & Coolman, 2004). We conclude that by designating the camp as *state lands*, this move opened up opportunities to seek state and federal assistance (Louisiana 4-H Camp, 1941). We recommend that 4-H camps in other states that have struggled to have the funding needed to make capital improvements explore whether a similar approach might be appropriate in their context. During this process, we also recommend that as campground sites and additions are constructed, leaders should carefully consider the required space, technology, and equipment to facilitate quality learning in response to 21st century needs regarding fiber, food, and other natural resources. All 4-H program leaders responsible for camp oversight should also profoundly consider the facility's historical uses. For example, with the rise of nutrition issues and food deserts in the U.S., perhaps 4-H camps could better teach affected communities and students about how to produce safe and nutritious food effectively.

Participants in this historical narrative articulated an overwhelmingly positive portrayal of the Louisiana 4-H Camping movement. Case in point, multiple participants, articulated how the camp helped advance 4-H members' agricultural knowledge, leadership, and interpersonal skills. Despite this, we recommend that future research examine the outcomes that the 4-H camp has had on members more systematically. A limitation of this study was that the participants were leaders of the Louisiana 4-H Camp at different points in time. As a result, they may have had a biased perspective of the outcomes that 4-H members experienced. If one of the primary goals of 4-H camp has been to influence students' personal development, then outcomes and factors influencing such should be evaluated every year at the conclusion of each camp session. This longitudinal data could provide a more detailed and accurate analysis of the impacts of a residential summer camp experience on youth.

Future research should also explore campers' content knowledge acquisition during camp and through a deferred post-test assessment (Brown et al., 2013, 2014). Previous research has evaluated the educational value of camp (Brandt & Arnold, 2006; Carter, 2006; Garst & Johnson, 2005), but greater attention should be placed on describing the affective and psychomotor outcomes that 4-H camp may have on students. Because 4-H camping has remained a fixture over the past 100 years across the U.S., we also recommend that a national study be conducted to identify the most common outcomes experienced by 4-H members. These results could further inform 4-H camps regarding how to tailor their programming to better meet the needs of students' varying learning styles, motivations, attitudes, and other factors. Future research should also explore how these factors influence campers' perceptions of camp. For example, researchers should compare if the outcomes reported in this investigation could be transferrable to 4-H camps in other states. Camp planners and organizations like the American

Camping Association should also create learning standards and establish benchmarks to measure students' successful learning more purposefully moving forward.

Although robust evidence (Garst et al., 2011; Garton et al., 2007; Hedrick et al., 2009) has been advanced on the impacts of the camp experience on youth counselors after serving, there is a dearth of research evaluating the impacts of counselors on campers' outcomes. Therefore, future research should examine the ways in which camp counselors influence camper outcomes. Practitioners should also carefully consider implementing additional training with an increased emphasis on supporting campers during camp, the benefits experienced by campers, and how counselors can support these experiences.

A key implication from this investigation was the need for advocacy among 4-H leaders and agents. For example, the Louisiana 4-H Camp had to navigate multiple barriers throughout history, such as a lack of funding and staff. However, through individual and collective advocacy efforts, the 4-H camp secured vital resources to support 4-H members' needs better. Additionally, the impact of the 4-H camp on the citizens of Louisiana has continued to expand as evidenced by the growth in private and corporate donors whose families have experienced the benefits of the Louisiana 4-H Camp. Despite this progress, researchers should continue to explore how fundraising and donors to 4-H camps could be better leveraged and sustained over time. This should include exploring strategies to inform legislators, policymakers, and citizens about the impacts that 4-H camp can have on youth and the state of Louisiana.

Moving forward, we recommend that Louisiana 4-H agents and camp staff receive professional development to learn better how to advocate for the camp with key decision-makers. These opportunities should allow participants to explore ways to feature and communicate the impacts that 4-H camp can have on youth and the general public, including strategies involving social media, newspapers, media releases, and other proven communication strategies. We also recommend that future research examine effective advocacy efforts that other state 4-H camps have successfully used to secure funding to advance their programming. By gaining more visibility for 4-H camps through advocacy, perhaps this youth development program can be sustained for future generations. Accordingly, we recommend that a national task force be created to develop national learning standards for 4-H camps. This task force could also create 4-H campground and facility guidelines to ensure quality facilities can be created and maintained throughout the U.S.

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Exploring How Relational Motivations of Extension Educators Influence Mentoring Relationships

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The purpose of this grounded theory qualitative research study was to explore how relational motivations influenced mentoring relationships for Extension educators at a Midwestern land-grant university. This study was part of a larger research study that focused on the construction of a theoretical framework that described the mentoring processes experienced by Extension educators. The findings revealed the relational motivations of mentees and mentors that influenced mentorship in Extension, providing new insight about positive work relationships in a specific organizational context. This research study has implications for new employee trainings, mentoring program designs, and professional development opportunities, and it supports further assessment of mentoring and positive work relationships in Extension and, more broadly, agricultural education.

Introduction

Background

Mentoring is a phenomenon that is likely happening in Extension organizations. Mentoring, formal and informal, is one of many methods that Extension may use to prepare new employees for their work. Through mentoring, new professionals can gain important insight about the Extension organization as they develop relationships with key stakeholders and clientele, create their plans of work, and report annual accomplishments and impact (Place & Bailey, 2010). Despite its promising implications for Extension organizations, mentoring in this context has been understudied. Additionally, informal, relational mentoring has been an area in mentoring research that has been given little attention (Janssen et al, 2016; Haddock-Millar, 2017). Understudied areas of mentoring research include examining the underlying development mechanisms of mentoring and relational motivations of mentors and mentees (Janssen et al., 2016); “defining the mentoring concept as a theoretical basis for research” and “understanding context and the connectedness between multiple factors” (Haddock-Millar, 2017, p. 54); and exploring the antecedents, processes, and outcomes of high quality mentorships which is also known as relational mentoring (Ragins, 2012).

Positive workplace relationships are a cornerstone of mentoring research. The role that work plays in employees’ lives is evident more than ever before (Colbert et al., 2016), and organizations must acknowledge the relational aspects of their work environments and actively support positive relationships within them (Inzer & Crawford, 2005). Positive workplace relationships play a role in employee flourishing (Colbert et al., 2016) and facilitate employee attachment to the workplace and improve the organization life quality (Ehrhardt & Ragins, 2019). Mentoring relationships are examples of positive relationships in the workplace.

One of the primary purposes of mentoring is to support the development and growth of an employee's skills and career (Humberd & Rouse, 2016), and it is defined by its primary feature of being embedded within a workplace environment (Ragins & Kram, 2007). Mentoring episodes are single, developmental interactions between individuals in a career setting, and they can—but not always—lead to a sustained mentorship (Ragins, 2012). Mentoring research has changed over time, and the phenomenon has been assessed and studied across various professional settings that include education and business and for careers in science, technology, engineering, and math.

Relational mentoring explains the close bonds that members in a mentorship develop and nurture over time (Ragins, 2012; Ragins & Verbos, 2007), and there is no expectation from individuals to repay debts (Ragins, 2012). Research on relational mentoring has shown that it affected identity transformation (Gammel & Rutstein-Riley, 2016); facilitated commitment of mentors and mentees (Jones et al., 2014; Hernandez et al., 2017), and led to psychological empowerment in mentees (Fullick-Jagiela et al., 2015). Researchers and practitioners should broaden the theoretical lens of mentoring which would permit relational mentoring and its functions, characteristics, and outcomes to be better understood (Ragins, 2012).

Extension organizations may rely on formal mentoring programs and promote informal mentoring to stimulate transformational learning in new professionals. The goals of these efforts are to grow employees' competencies and increase their socialization within the organization. Regarding positive workplace relationships in the Extension context, coworker and constituent relationships factored into employee success (Smith et al., 2011) and work relationships influenced employees' perceptions of their experiences (Harder et al., 2021). Research on mentoring in Extension showed that mentoring factors into employees' professional development experiences (Benge et al., 2011), their fit in the organization, and long-term retention (Vines et al., 2018). Keys to successful mentoring relationships were found to be trust, clarity for mentee and mentor roles, setting goals, and collaboration (Byington, 2010). Facilitative factors that contributed to mentorship success in Extension were similar programmatic responsibilities, geographic proximity, frequency and type of information shared, initiation of the relationship, and ability to establish mentee-mentor friendship (Mincemoyer & Thomson, 1998).

Conceptual Framework

Kram's (1985) theoretical work, which is focused on what mentees receive from mentoring relationships, was an initial guiding concept for our study. Mentees receive guidance and support from mentors through career and psychosocial functions (Kram, 1985). For the career function, mentors help mentees increase competence in their roles through coaching, exposure to opportunities, and providing challenging assignment while for the psychosocial function, mentors support mentees through counseling and friendship (Kram, 1985).

In addition to the career and psychosocial functions of mentoring that were presented by Kram (1985), there is a relational function which is an approach to mentoring that focuses on close bonds and mutual learning and growth for mentees and mentors alike (Ragins, 2012; Ragins & Verbos, 2007). Relational mentoring relies on communal norms instead of exchange norms which are typical in traditional mentorship (Ragins & Verbos, 2007). With communal

norms, there is no obligation for repayment of debts in the mentoring relationship. Benefits are given in response to the needs of another person instead. Although both exchange and communal norms can be present in mentoring relationships, communal norms are the foundation for relational mentoring and fostering close mentoring bonds (Ragins & Verbos, 2007).

Relational mentoring was the focal point and core conceptual framework for our study. Ragins (2012, p. 527) emphasized that relational functions include both members of a mentorship, and they can be observed through “personal learning and growth, inspiration, affirmation of selves, reliance on communal norms, shared influence and mutual respect, and relational trust and commitment.”

Purpose

This grounded theory qualitative study was part of a larger research study that focused on the construction of a theoretical framework that described the mentoring processes experienced by Extension educators at a Midwestern land-grant university. The purpose of this study was to explore how relational motivations influenced mentoring relationships for Extension educators. By exploring the factors that influence mentoring processes for Extension employees, social science researchers and Extension practitioners may gain a deeper understanding of the mentoring phenomenon that occurs in their organizations.

This study supports AAAE Research Priority 3: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century. Specifically, this study addresses Question 2: What methods, models, and practices are effective in recruiting agricultural leadership, education, and communication practitioners (teachers, extension agents, etc.) and supporting their success at all stages of their careers?

Methods

Mentoring is a social phenomenon, and the processes of mentoring require human involvement and interaction. We used grounded theory methodology to gain understanding about the relational motivations of Extension educators. Our study aligned with the emergent design of grounded theory because of the exploratory nature of the research purpose. We viewed this study with ontological and philosophical assumptions and with a social constructivist interpretative framework (Creswell & Poth, 2018).

The population for our study was all Extension educators at a Midwestern land-grant university, and the sample was Extension educators who experienced mentoring and who were willing to share their experiences. We recruited participants directly through email. We selected participants through initial sampling, using organizational data and participants' self-identification of specific attributes. Participants had at least one year of employment with the Extension organization under study, and they had experience with mentoring in their organization. As the study progressed, we selected additional participants based on emergent categories and themes in the collected data. We used theoretical sampling (Charmaz, 2014) until our data was saturated and there were no new properties of categories that emerged. Past

research on high-quality relationships in the workplace have focused on the experiences of most employees (Ragins, 2012) which captured the range of experiences. In this study, the participants' focused and similar experiences provided clarity on how specific mentoring processes occurred.

We applied several qualitative research validation strategies in this study. We used rigorous procedures to collect data that included multiple sources, and we collected rich, descriptive data from participants by applying focus group and individual interview techniques using Zoom, the video web conference platform. We generated transcripts and research memos (Charmaz, 2014) from the focus groups and interviews. Participants chose their pseudonyms and their preferred pronouns.

For grounded theory studies, the coding and analysis processes are emergent and not linear. Throughout data analysis, we used the constant comparative method (Creswell & Poth, 2018), and we engaged in theoretical sorting, diagramming, and integrating practices to find clarity in the data (Charmaz, 2014). We used process coding as an initial coding method because it is open-ended and builds a foundation for future coding cycles (Saldaña, 2016), and we used focused coding to concentrate on initial codes that appeared more frequently or had more significance. Throughout the coding process, we used "-ing" words to convey the action-orientation of mentoring.

Twenty-one Extension educators participated in our study, and the range of their Extension experiences was one year to over 30 years. Participants represented the general program areas of youth, family, and community; food, nutrition, and health; and agriculture and natural resources. We conducted seven focus groups and 13 individual interviews from March 2021 through July 2021, during the global coronavirus pandemic. The public health crisis may have impacted the sample population's ability to participate in our study. Furthermore, we recognize that the ongoing pandemic may have impacted participants' reflections on their mentorship experiences in Extension.

The primary author conducted this study as a PhD student. When she collected and analyzed data, she was an Extension educator. As a researcher, she was obligated to be reflexive about what she brought to the study, what she observed throughout the research process, and how she interpreted her observations (Charmaz, 2014). This required her to examine her beliefs, attitudes, interests, and decisions. Her Extension experiences were enriched by mentors. Over the years, she received important guidance, feedback, and friendship from her Extension mentors. In recent years, she served as an informal mentor to new Extension employees. It was through these experiences that she realized her interest in learning more about the mentoring processes within an Extension context.

Findings and Discussion

Through mentee and mentor lenses, participants reflected on certain contributions that explained how mentorship in Extension occurred. Mentees and mentors uniquely contributed to

mentorship, and we identified these contributions as relational motivations that influenced mentoring in this organization. These contributions are included in the theoretical model that we constructed as part of a larger grounded theory research study. To provide context for this particular study, we presented the model (Figure 1) after the findings about mentee and mentor contributions.

Mentee Contributions

The relational contributions of mentees to mentorship in Extension included *Feeling included and supported* and *Being open to experiences and feedback*. Participants described *Feeling included and supported* which was characterized by reflections as mentees about feeling connected to their colleagues, particularly to people in mentor roles, and about being included or getting involved in professional activities like working groups, teams, and grant projects. Some participants, like Hermione, a food, nutrition, and health educator, reflected on the ways that they felt immediate support from their office colleagues, and they expressed gratitude for those experiences.

Participants like Jonathan, a family, youth, and community educator, and Martha, a food, nutrition, and health educator, shared about times when colleagues reached out to invite them to join a team or a project, and in some cases the invitations led to mentorships. Lindsey, an agriculture and natural resources educator, described how she met two experienced educators in a farmer's field on her first day. She explained that their meeting helped her learn the relational aspect of Extension education and that it underscored the importance of having collaborative relationships with her colleagues.

Participants also described *Being open to experiences and feedback* which was characterized by their reflections about mentees being open to new experiences and receiving counsel from experienced educators. Participants like Missy and Evan, both agriculture and natural resources educators, and Betsy, a food, nutrition, and health educator, shared about the value in mentees hearing about lessons learned from mentors. When Alexis, a youth, family, and community educator, started her position, she had many questions about the expectations placed on her. Through an intentional conversation with her mentor, she received important feedback that helped her build programmatic partners.

Mentor Contributions

The relational contributions of mentors to mentorship in Extension included *Prioritizing inclusion*, *Focusing on the mentee*, *Showing support and encouragement*, and *Giving guidance and advice*. Ty and Courtney, youth, family, and community educators, and other participants recalled experiences where *Prioritizing inclusion* was evident. They felt like they were being dragged along by their mentors, but they viewed those experiences as "success journeys." They reflected on those experiences as being valuable to their Extension careers. Ty shared that "I feel like almost every success I've ever been given has been, ever had, it, has been a gift from somebody and just lots of opportunities." Courtney described that her mentor "...dragged me

into everything. She'd be like, 'Yeah, I'm writing a grant. And I want you to be a part of it,' or, you know, 'I'm doing this program, come join me.'"

In their reflections, participants described *Focusing on the mentee* which was characterized by their specific examples when experienced educators showed selflessness towards new or less experienced educators. They recalled scenarios in which mentors would make themselves available to mentees who were in need. In the mentor role, Gracie, an agriculture and natural resources educator, shared "...that if [my mentee] is under stress, like I'm immediately like, well, 'How can I help you?' And then I'm there." Participants described the personality characteristics of mentors with words like kind, caring, unselfish, and self-aware.

Participants like Valerie, a youth, family, and community educator, shared about the ways in which mentors were *Showing support and encouragement* through narratives that centered on when mentors shared positive sentiments, praise, affirmations with mentees, and by descriptions of "being there" for mentees. Valerie shared that "...[mentors] walk the talk, right? [They are] the person that's advising you, supporting you, there for you." Chad, an agriculture and natural resources educator, talked about self-efficacy, a person's belief in themselves and that they can succeed in a particular situation. He aligned his thoughts with the roles mentors played in fostering self-efficacy in mentees, even sometimes in situations that mentors created for mentees.

As they recalled their experiences, participants talked about mentors *Giving guidance and advice* through lessons learned, sharing wisdom, and when mentors made themselves available to mentees for counsel. When they discussed the support provided by mentors, participants noted the complexity of both their organization and university. Participants like Bruce, an agriculture and natural resources educator, reflected on the commonalities that educators in his program area shared and how that led to more experienced educators offering advice to new or less experienced educators through storytelling techniques.

Shared Contributions to Mentorship

The relational contributions of both mentees and mentors to mentorship in Extension included *Taking initiative in the position, Using opportunities to connect, Spending time with each other, Building trust, Nurturing a relationship that supports growth, and Sharing an understanding of mentorship.*

In their reflections, participants described *Taking initiative in the position* which was characterized by mentees' and mentors' willingness to seek out the other person in the mentorships. They recalled scenarios when mentees or mentors were self-starters or showed dedication to take action regarding a particular situation. Lindsey explained that, "...somebody has to take initiative. So somebody has to contact [the other] person and show an interest and take the time." Participants like Ty described initiative as "showing up," and they reflected on the intentionality that led to their mentorships.

Participants discussed how *Using opportunities to connect* led to mentorships. Participants described the ways in which mentees or mentors met other people, the mentorship structure itself (formal or informal), and the opportunities that were available to grow a mentorship. Evan, an agriculture and natural resources educator, described that "...I just kind of put myself in positions where I had opportunity to interact with [people I wanted to learn from]." Several participants discussed that organization-wide events were opportunities that educators used to get to know each other better. They talked about the informal hallway discussions that took place and shared how mealtimes provided valuable opportunities for educators to build connections.

As they recalled their experiences, participants discussed *Spending time with each other* which focused on the ways in which mentees and mentors were present for each other, both in person and at a distance. Alexis scheduled a visit with her mentor and referred to that time, which she used to learn about her role and all the nuances of it, as a "total game changer," while Chloe, a youth, family, and community educator, described how the time she spent with her formal mentor gave her clarity and confidence in her role.

Participants described *Building trust* in mentorships. Participants talked about the ways in which mentees and mentors got to know each other on deeper levels; their truthfulness with, openness with, and beliefs in each other; and the quality time they spent together over an extended period. As Norah, a youth, family, and community educator, explained, "...it takes time to connect and build trust and getting to know that person's character and understand them." As a mentee, Missy shared that getting to know her mentor's character was a key component of the trust that was built in her mentorship.

In their reflections, participants described examples in mentorships where mentees and mentors were *Nurturing a relationship that supports growth*. They discussed how mentees and mentors grew and developed in mentorships; how they built a strong future together; and the ways in which individual roles in the mentorship were transformed. Participants described the decrease in dependence of mentees as an indicator of growth and development. Courtney equated it to "...you start with the training wheels, and then you start like taking the training wheels off, and you're just like, let them go." Participants also indirectly described the concept of relational mentoring when they discussed the mutual growth aspect of their mentorships. They used words like "transform" and "evolve."

Sharing an understanding of mentorship was evident in participants' explanations about mentees' and mentors' common interests and similar preferences towards mentorship approaches and their shared values for and compatibility in mentorship. Participants discussed the value of mentorship, and they conveyed the importance that both mentees and mentors placed on mentorship. As they reflected on why mentorship was important, some participants talked about the jumpstart that mentorship provided new educators. Chad said, "First off, it sort of gives I think, a more rapid start to new employees. You know, giving them information skills, feedback to help them sort of get up and moving faster." Some participants, like Jonathan, described the necessity of mentorship in an Extension organization because it provided a solid foundation for

new educators. He stated, “For me, mentoring in Extension is necessary. It just, you just have to because there's no other way to learn this stuff, and I worked for the university before.”

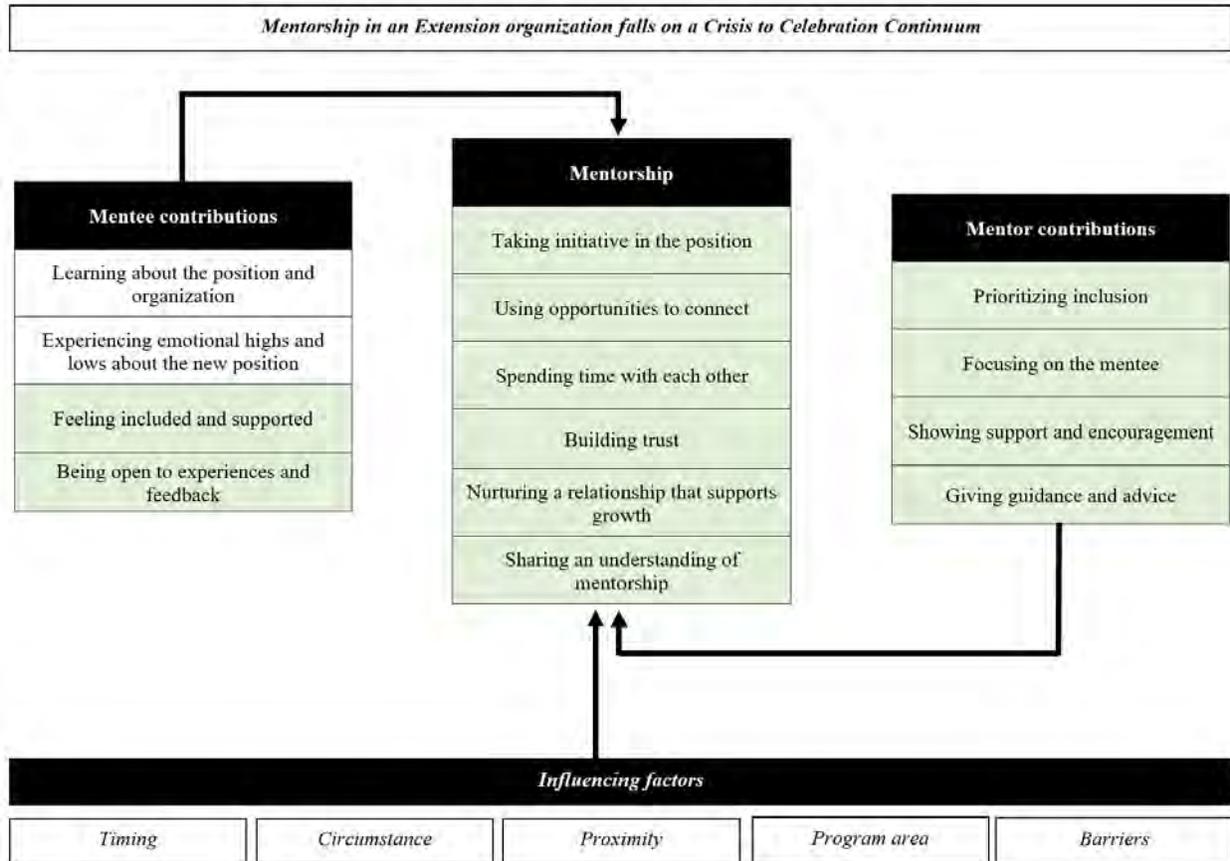
Theoretical Model

As part of a larger research study, we constructed the *Mentorship in Extension: An organization model*, and it explained how mentorship occurred in the Extension organization we studied. The model is presented in Figure 1.

In the lateral center of the model, the three people-centered theoretical codes were placed, from left to right: *Mentee Contributions*, *Mentorship* (shared contributions), and *Mentor Contributions*. Arrows were used from the *Mentee Contributions* and *Mentor Contributions* theoretical codes that went towards *Mentorship* to describe how the inputs of both mentees and mentors led to and impacted mentorship. On the theoretical model, we highlighted in green the contributions of mentees and mentors to mentorship which were relationally motivated.

Figure 1

Mentorship in Extension: An organization model with relational motivations highlighted



Discussion

As mentees, the participants shared experiences in their mentorships where they desired to feel included and supported in their roles. Hermione talked about her office environment, the welcoming colleagues who were ready to assist, and how these elements contributed to feelings of comfort and empowerment. These findings supported Fullick-Jagiela et al.’s (2015) conclusion that relational mentoring episodes empowered mentees to establish high-quality relationships in the workplace. Participants like Jonathan and Martha shared about what it felt like to be included in team projects and how they were able to contribute to the organization early in their tenures. They reflected on the reciprocity of interactions with more experienced colleagues, including those who were willing to learn from them, too. These findings aligned with Ragins’ (2012) emphasis that relational mentoring functions included but were not limited to both members engaging in personal learning and growth and relying on communal norms.

Extension mentor contributions were exclusively relationally motivated. Although their organization’s administrators encouraged them to mentor others, participants expressed that they

were not required to be mentors. Therefore, the participants who served as mentors fulfilled the role out of their own care and concern for their new colleagues. Participants' recollections centered on their engagement in mentoring episodes (Ragins, 2012) and on established mentorships to share knowledge, guidance, and insights with mentees as ways to support their developing skills and careers (Humberd & Rouse, 2016).

As mentors, participants discussed experiences in their mentorships where they prioritized including new employees and focused on mentees' unique, specific needs. Gracie offered her practical philosophy by reflecting on how she reached out to new employees very soon after their start dates, but she noted that it was difficult as a new Extension educator to know who to reach out to for introductions. Ty, Courtney, and other participants discussed the power of an invitation and how it reinforced to new Extension educators that they were welcome, belonged, and added value to the organization. These findings supported Joshi and Sikdar's (2015) evidence that characteristics of an effective informal mentor included organizational ascendancy and impact, a concept that pertained to inclusivity and giving visibility and exposure to the mentee.

Participants also described the ways in which they showed support and encouragement to mentees and how they gave them guidance and advice. Chad conveyed that Extension mentors played a role in fostering mentees' confidence and self-efficacy, and he noted that mentors' support and encouragement can help mentees realize that they are capable of fulfilling the obligations of their positions. These findings supported Byington's (2010) conclusion that open and supportive communication was an important facilitator of an effective mentorship, and they also illuminated Vines et al.'s (2018) argument that Extension organizations must provide a work environment where employees can envision themselves achieving success and being valued.

Several participants noted specific instances when their mentors provided them concrete and clear advice on how to navigate situations they faced. Betsy and Jonathan recalled in detail the practicality of their suggestions and noted that their mentors had experiences that they drew upon and learned from. Bruce discussed the commonalities of mentees and mentors in his Extension program area, and he shared that storytelling was an effective technique for mentors to use to offer guidance and advice to mentees. These findings aligned with Mincemoyer and Thomson's (1998) determination that frequency and type of information shared between mentees and mentors contributed to the success of Extension mentorships.

Implications and Recommendations

As part of a larger research study, we constructed the *Mentorship in Extension* model that clarified how Extension educators in one organization experienced mentoring processes. This theoretical model provided new understanding about the relational motivations of Extension educators that influenced mentoring. With regards to the transferability of the implications of the findings and recommendations, we encourage scholars and practitioners to consider the context of our study. Our findings can generate conversation within, reflection by, and action from the Cooperative Extension System.

Mentoring is a method that Extension organizations use to train, orient, and develop new professionals (Benge et al., 2011; Benge et al., 2015; Place & Baily, 2010). Research on mentoring in Extension has been primarily focused on assessing perceived mentoring efficacy and there has been distinct lack of research on the relationships between mentees and mentors (Denny, 2016). Our study addressed Janssen et al.'s (2016) calls for further study of the underlying development mechanisms of mentoring and relational motivations of mentors and mentees, and it also responded to Haddock-Millar's (2017) recommendation for additional research on the definition of mentorship as a theoretical basis for research and on the connectedness between multiple factors in specific mentorship contexts. The findings from our study illuminated how relational motivations of Extension educators influenced mentorship in one organization; however, the findings also underscored the need that remains to further understand the mentoring phenomenon in this specific context.

Participants in our study experienced relational mentoring. Relational mentoring supports the growth and development of mentees and mentors, and it results in close bonds between the mentorship pairs (Ragins, 2012). We found that the relational approach to mentorship was effective and was preferred by participants. We challenge Extension leaders and organization decision makers to expand their knowledge and understanding of relational mentoring. By having a deeper appreciation of the concept, Extension practitioners can better shape their own philosophies on mentorship and facilitate mentoring relationships in their organizations.

Relational mentoring provided the theoretical foundation for this research study. Extension is a relational organization, and the storied history of the Cooperative Extension System shows that its professionals are committed to building relationships with the people they serve and with the people they work. Developing and nurturing relationships requires time, trust, shared understanding, inclusion, and selflessness. To promote a mentoring culture, we advise Extension leaders and human resources directors to build time into organization events for educators to build or maintain relationships with their colleagues.

To effectively design programs or adopt practices that address mentorship, Extension leaders and human resources directors should first explore how mentoring processes occur in their organizations. Additionally, we encourage Extension practitioners to welcome research opportunities and to collaborate with social science and Extension scholars to study professional development approaches in their organizations. Mentoring is one tool—in a toolbelt of many tools—that can be used to prepare Extension professionals for their highly complex, evolving, demanding, and impactful roles. Future evaluation and research in an Extension context may include the examination of mentorship as a complementary approach to other professional development methods.

Ragins (2012) acknowledged that past research on high-quality relationships in the workplace focused on the experiences of most employees. We urge social science and Extension scholars to investigate the range of mentorship quality that Extension educators have experienced. Additional research on how mentoring occurs in Extension organizations, or more broadly the agricultural education field, would further highlight an area of mentoring knowledge that has been given less attention over the years. To date, much of the mentoring literature has

focused exclusively on the outcomes and impacts of mentorship. The findings we presented are a starting point for future research studies on the mentoring phenomenon.

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Farmers' Motivation for Learning and Developing New Skills

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This quantitative study aimed to explore the extent to which self-leadership competencies and job motivation can explain farmers' motivation for learning and developing new skills. This study used an online survey methodology to collect data. We used unrestricted, self-selecting, and chain-referral sampling approaches. Fifty-nine self-identified farmers participated in this study. The overall mean score for farmers' motivation for learning and developing new skills was 4.33 (SD = .54), self-leadership competency 3.93 (SD = .48), and job motivation 4.72 (SD = .42). A significant positive association was found between motivation for learning and developing new skills and job motivation ($r = .59, p < .001$), and self-leadership competencies ($r = .39, p = .001$). Self-leadership competencies and job motivation explained 40% of the variance in overall motivation for learning and developing new skills among farmers. Human resources practitioners and Extension professionals should develop educational programs to strengthen the farmers' self-leadership competencies and job motivation because those are relevant factors on farmers' motivation to learn and develop skills that help them succeed in agriculture.

Introduction and Problem Statement

Farmers' motivation and willingness to learn and develop new skills are crucial in adopting research, technology, and innovation in their production systems. Prior studies report that farmers are highly motivated to keep learning and integrating new skills and competencies into their work (Franz et al., 2009; Bhatta, Itagaki & Ohe, 2019). It responds to the desire to be successful, increases their profit, solves their problems, and remain competitive (Zhou et al., 2020; Franz et al., 2009; Bhatta et al., 2019), in addition to the desire to live better (Zhou et al., 2020). Farmers are motivated to participate in diverse educational programs regarding various topics, with different formats and duration (Franz et al., 2010). The methodology used by outreach programs and training plays a relevant role in farmers' motivation and willingness to learn and develop new skills. Franz et al. (2009), in an interstate study, pointed out that most of the farmers prefer learning using the following methodologies: hands-on (99%), demonstration (96%), farm visit (94%) followed by field day, discussions, and one-on-one. Contrarily, the less motivational methods are games, comics, role-playing, and radio, according to Franz et al. (2009). Motivation is a key to farmers' willingness to learn.

Motivation is the leading force for initiating or maintaining an act or behavior in a particular situation (Dornyei & Ottó, 1998). It depends on internal and external driving forces that lead one to engage in certain activities and move in one specific direction (Porter et al., 2003). Internal driving forces, known as intrinsic motivation, are driven by an innate interest in or enjoyment of the task itself. It originates within the person, from inner feelings such as curiosity or the desire to reach self-realization (Gagné & Deci, 2005). On the other hand, external driving forces that engage individuals to act in a certain way are extrinsic motivation. It is based on rewards such as increasing profit and punishment such as being fired from the job (Eke, 2018). Some examples of external motivators for learning are the possibility to increase their profits, the immediate response of a need, and the usefulness of the content (Franz et al., 2009; Eke, 2018). McCombs (1991) indicated that a motivated person is a lifelong learner, and a lifelong learner is a

motivated person. Hence, farmers' motivation to learn and develop considerably depends on the specific factors. Prior studies have highlighted motivation as a facilitator of people's participation in lifelong learning activities or training (Herzberg, 1959; McCombs, 1991; Pinder, 2008; Vithessonthi & Schwaninger, 2008; Franz et al. 2009;). However, minimal studies have explored the relationship between self-leadership competencies and motivation to learn and develop new skills; even less has been focused on the farmer population.

This study aimed to explore the extent to which their self-leadership competencies and job motivation can explain farmers' motivation for learning and developing new skills. Job motivation is a set of driving forces that originated within and beyond an individual to initiate any work-related behavior and shape its form, direction, intensity, and duration (Pinder, 2008). Self-leadership is defined as "the influence we exert on ourselves to achieve self-motivation and self-direction we need to perform" (Manz & Sims, 1991, p.23). In other words, it is a process by which one manages own behaviors, influences act, and leads themselves applying specific behavioral and cognitive strategies to enhance individuals' effectiveness (Manz, 1986; Manz & Sims, 1991; Manz & Sims, 2001; Manz & Neck, 2004; Neck & Houghton, 2006).

Theoretical Framework

This study hypothesizes that self-leadership competencies and job motivation contribute to the farmers' motivation for learning and developing new skills. Recent self-leadership theories explain one's ability to lead thinking intentionally, feeling, and actions toward an individual's goals. Likewise, approaches such as Herzberg's two-factor theory of work motivation (1959), Vroom's valence-instrumentality-expectancy theory (VIE) (1964), and Alderfer's existence, relatedness, and growth theory (ERG) (1969) emphasize the role of motivation in the job performance. Lastly, motivation to learn and develop overlays under three main theoretical currents; motivation theories, lifelong learning theories, and Vroom's valence-instrumentality-expectancy theory (VIE). Through these theoretical frameworks, this study draws its analysis.

Self-leadership

Self-leadership has been defined as a lifelong process of self-discovery and self-satisfaction, a system of self-influencing, a technique for self-efficacy, a source of behavioral control, and even a manner of self-fulfillment (Manz, 1986) In other words, a process by which an individual manages their behaviors, influences act, and leads themselves applying specific behavioral and cognitive strategies (Manz, 1986; Manz & Neck, 2004; Manz & Sims, 2001). Self-leadership competencies can help individuals to a) learn more about themselves, b) maximize their personal and professional strengths and minimize those weaknesses, c) reach their personal and professional goals through self-efficacy, and d) live a purposeful life (Neck & Manz 2010).

Manz published the first self-leadership theory in 1986. This theory was based on theoretical models deployed from psychological theories; some of the most relevant are social learning (Bandura, 1977), self-regulation (Bandura,1991), and self-determination and motivation (Deci & Ryan, 1985; Bandura, 1986). Later, self-leadership was linked to cognitive therapy theory. Manz & Neck (1991) argues that an essential part of self-leadership involves: challenging dysfunctional thinking through rational thoughts, beliefs, and self-statements.

Self-leadership is a broader concept than self-influence; it incorporates self-management strategies and strategies for managing the natural motivational value of the task and the pattern of individual thinking (Manz, 1983; 1986). Self-leadership focuses on behaviors, cognition, and reducing standards and appropriateness discrepancies (Godwin et al., 1999). Drawing from the literature, the *self-leadership theory* explains how individuals think and behave according to three main strategies; behavioral, motivational, and cognitive (Prussia et al., 1998; Yun et al., 2006), which have been categorized in the three dimensions described below:

- a) Constructive thought pattern strategies help build creative and positive thinking about oneself and the job task, incorporating self-assessment of thoughts and assumptions, positive self-talk, and visualization of successful performance (Manz, 1986; Neck & Houghton, 2006).
- b) Natural reward strategies refer to both behavioral (e.g., following a positive job routine to make the work task more enjoyable) and cognitive processes (e.g., decide to focus on positive aspects of a job rather than on negatives) to increase ones' performance-enhancing task behavior and intensify inner motivation (Neck & Houghton, 2006; Manz, 2015; Deci & Ryan, 1985). If a duty is pleasurable in itself, then it is considered a natural reward (Ryan & Deci, 2017).
- c) Behavior-focused strategies allow individuals to enhance self-observation, self-goal setting, self-reward, self-punishment, and self-cueing. Self-observation enables an individual to recognize one's functioning (Neck & Houghton, 2006), a requirement for a behavior change. Goal setting helps establish personal goals (Latham & Locke, 1991), the key to action. Self-cueing alludes to concert strategies/activities that an individual uses to focus on important issues and goals (Houghton & Neck, 2002).

Bryant and Kazan (2012) propose the following four pillars of self-leadership. 1) recognizing who you are through your values, defining what is meaningful for you, and establishing your goals, 2) knowing what you do through reflecting on your behaviors and motivations, 3) knowing what you need to learn by identifying learning points and developing a learning plan, and 4) using what you know to building successful habits to maintain the pillars and creating an environment of success. These pillars are coupled with the ability to influence an individual's communication, emotions, and behavior on the way to getting there.

Self-leadership theories (Bryant and Kazan, 2012) propose that individuals are more than the simple result of their social context and personality traits; they are active agents of their motivation. In this context, self-leadership and motivation have been related broadly. Self-leadership provides the needed self-control and self-determination to influence oneself intrinsic and extrinsic motivation (Porter et al., 2003)

Bandura (1977), through his *social learning theory*, explains how people influence their cognition, motivation, and behavior through observing and learning from role models and their own experience of reward and punishment. The social cognitive theory (Bandura 1986) explains the continuum interaction between human thoughts, behaviors, and their social and political environment, highlighting the value of behavioral consequences as sources of information and motivation (Bandura, 1986; Schunk, 2001).

In 1991, through his *social cognitive of self-regulation theory*, Bandura explained the motivation and regulation of humans' behaviors through the ongoing exercise of self-influence. The primary self-regulative mechanism involves three subfunctions: 1) self-observation, which provides needed information that helps us to set realistic goals and assess our progress toward them. 2) self-judgment, which refers to observing, reflecting, judging, and guiding our actions and reactions, plays a significant role in the self-directness process. 3) self-reaction is the mechanism by which specific standards regulate the course of action; this mechanism is created and reinforced by meaningful incentives by each person carrying an affective reaction. This last subfunction is related to the self-rewards and self-punishment that make the person maintain or eliminate a performance.

In 1985, Deci and Ryan postulated the *self-determination theory* (SDT). It highlights the reciprocity between human motivation and good life, pointing up the importance of evolved personal inner resources for personality development and behavioral self-regulation (Ryan, Kuhl, & Deci, 1997). Likewise, SDT emphasizes the role of internal regulation and motivation as a driver behind self-leadership behaviors. This theory concerns motivation as the energy, direction, and persistence that move individuals toward their goals, a highly valued aspect of human performance and development (Deci & Ryan, 1985). Pinder (2008) defines motivation as "a set of energetic forces that originate both within as well as beyond an individual's being" (Pinder, 2008, p. 11). This definition alludes to intrinsic and extrinsic types of motivation. Intrinsic motivation is driven by an innate interest in or enjoyment of the task itself, and it is originated within the person, rather than from external pressures or rewards (Gagné & Deci, 2005); the source of intrinsic motivation may come from individuals' feelings such as curiosity, the desire to learn and to surpass oneself. Contrary to inner motivation, extrinsic motivation alludes to external forces that stimulate an individual to act in a certain way based on reward and punishment. For example, individuals work upon their goals, such as to get a merit-based promotion or being better ranked in the job because reaching those goals would bring several rewards associated with them, such as a better salary, social and public recognition, and a better lifestyle, to name a few.

More recent self-leadership theories rooted in self-awareness and self-management (Goleman, 2005) distinguish these two concepts, which were used as interchangeable terms early. Bryant and Kazan (2012) state that self-awareness and self-management concepts are related but have different meanings. Self-awareness is the ability to acknowledge, understand and be conscious of one's values, perspectives, strengths, weaknesses, leadership propensity, and emotional needs (Ng, 2018), paying attention to our actions, performance, and reactions in a reflective manner. On the other side, self-management is "the ability to nurture and harness one's passion, abilities, emotions, and leadership capacity in decision-making." (Ng, 2018, p.221). Hence, both concepts are critical components of self-leadership. Bryant and Kazan (2012) understand self-leadership as intentionally leading their thinking, feeling, and actions toward the goals. Thus, self-leadership is an ongoing purposefulness, mindfulness, reflection, and practice.

Job Motivation

Job motivation has been explained through a variety of theories such as *Herzberg's two-factor theory of work motivation* (1959), (1964), and *Alderfer's existence, relatedness, and growth theory* (ERG) (1969), an adaptation of Maslow's hierarchy of needs (Maslow, 1943). The *two-*

factor theory of work motivation (Herzberg, 1959) describes the factors that affect the employee's job motivation through the identification of factors that cause satisfaction, such as achievement, recognition, and advancement - higher-order psychological needs-, and factors that cause dissatisfaction in the employee such as salary, interpersonal relationships, and work conditions - basic needs. This theory states that these two factors are independent, and thus, to increase employees' job motivation, the employer needs to address these factors separately.

The *existence, relatedness, and growth theory* (ERG) (Alderfer, 1969) propose three categories of work motivation; 1) current needs -refers to the physical and essential aspects that need to be covered by any individual at the moment (food, clothing, shelter). 2) relatedness needs- refers to the need for socialization and relationships that an individual has on and off the job. 3) growth needs -this alludes to the need for self-development and self-actualization. These three stages are explained as a continuum of satisfaction, progression or regression, and frustration.

Regarding the relationship between job motivation and self-leadership competencies, Manz (2015) and Stewart et al. (2019) indicated that those who continually apply behavior-focused strategies are more likely to act based on self-determination. It helps them keep themselves intrinsically motivated and work more independently in their job, requiring fewer external directions or control systems for desirable performance.

Motivation for Learning and Developing

Motives are why a person has to engage in certain activities or experiences and move in specific directions (Morsella et al., 2009). Authors empathized those motives usually end on human behavior and may evidence one's values. Motives often affect a person's perception, cognition, emotion, and behavior. Motivation usually doesn't change but increase or decrease. Farmers' motivation has been one of the main influences to adopt a change such as technology, innovation, or attending an educational program to learn new production techniques (Bagozzi & Dholakia, 1999). Previous studies (Franz et al., 2009; Bhatta et al., 2019) reported that farmers have high motivation and interest to learn and incorporate new skills and competencies into their practice. In this context, both intrinsic and extrinsic driving forces are responsible for the farmers' motivation to learn, which theoretically has been informed by motivational theories and adult learning theory.

Types of motivation

The literature describes two types of motivation. First, *intrinsic motivation* is an internal driving force that leads the person to act or behave in a specific determined way. Intrinsic motivation is driven by an innate interest in or enjoyment of the task itself independent of extrinsic rewards or subsequent consequences (Gorges et al., 2016). This motivation is intimately related to aspects of interest, giving emotional and personal positive value to activities or aspects of interest (Renninger et al. 1992). It originates within the person, from individuals' feelings such as curiosity, the desire to learn, and self-realization (Gagné & Deci, 2005). A farm-related example can be the grace to see the production healthier or the feeling of escalating in ones' self-realization.

Ryan & Deci (2020) wrote, “often contrasted with intrinsic motivation is the heterogeneous category of *extrinsic motivation*, which concerns behaviors done for reasons other than their inherent satisfactions.” (p.2). Extrinsic motivation is an external driving force that engages individuals to act in a certain way based on rewards such as increasing profit and punishment such as being fired from the job (Eke, 2018). Farmers' external motives to learn and develop are the possibility to increase their profits, the immediate response of a need, and the usefulness of the content (Franz et al., 2009; Rabin, 2013). Additionally, to save time, learn about cutting-edge research, and engage in social aspects of agriculture (Franz et al., 2010). Farmers have reported that their interest in saving money and making a profit motivates them to learn and make decisions about how to maintain or even improve their lifestyle and quality and persevere their heritage and legacy to their families (Franz et al., 2010). The central farmer's motives to participate in an extension educational workshop in China were increasing their profits (31.54%) and having a better life (27.37%) (Zhou, 2020). Additionally, to some other motives such as improving academic qualifications (6%) one's qualities and social status (18.52%)

Adult Learning Theory

Andragogy is defined as the art and science of helping adults to learn (Knowles, 1980). The andragogical model has six assumptions for why adults learn: 1) the need to know why what, and how 2) self-concept of autonomous and self-directing that learners have 3) the role of the learner's experiences as resources and mental models, 4) the willingness to learn that is related to individuals' interests and their lives, 5) an orientation that is problem-centered and person-centered 6) the learner's intrinsic and extrinsic motivation (Knowles, Holton, and Swanson, 1998). The andragogical model is not a one-size-fits-all method to adult education; thus, it integrates flexibility in planning and implementing educational programs (Knowles 1984). McCombs (1991) highlights the relationship between learning across life and motivation, stating that a motivated person is a lifelong learner, and a lifelong learner is a motivated person. Prior agricultural research reports that educational programs for farmers need to consider critical elements such as teaching methodology, the concept relevance, and the farmers' needs (Franz et al., 2010).

Finally, regarding the relationships between self-leadership competencies and motivation by itself, Lovelace et al. (2007) argue that as higher self-leadership competencies a person has, less extrinsic motivators need because they are better self-managed and have more personal resources to activate and influence themselves. Self-management approaches are more related to extrinsic driving forces such as rewards, recognition, praise, and reinforcement; while, self-leadership competencies are more connected to intrinsic motivation (Manz, 1986; Neck and Houghton, 2006). Practical self-leadership competencies allow one to identify and apply one's signature strengths to start, maintain, or encourage self-influencing behaviors. It facilitates the mind and body willing to motivate oneself to reach established goals, highlighting natural rewards that result from the performance of the task or activity itself. Manz (1986) suggests that an A “comprehensive self-influence perspective concerns leading oneself toward the performance of naturally motivating tasks as well as managing oneself to do work that must be done but is not naturally motivating” (Manz, 1986, p. 589)

Purpose of the study

The purpose of this study was to assess Pennsylvania farmers' self-leadership, job motivation, and motivation for learning and developing new skills. Two research objectives guided this study: (1) Describe the Pennsylvania farmers' self-leadership, job motivation, and motivation for learning and developing new skills. (2) Describe to what extent self-leadership competencies and job motivation can explain farmers' motivation for learning and developing new skills.

Method

This descriptive and correlational study used a survey method approach. This study targeted a self-identified Pennsylvania farmers population. The sample (n=59) was selected using an available, self-selected, and chain-referral sampling approach, a form of convenience sampling (Fricker, 2008). We used an open web page survey to collect data from Pennsylvania farmers. Additionally, agriculture-related organizations in Pennsylvania provided referrals to recruit participants for this study. Respondents were recruited through the following: the Penn State Extension website, a one-page press release was posted in an Pennsylvania online Daily Farming Newspaper, webpages of counties Farm Bureau, and the Penn State Extension Leadership Facebook page. We collected data from September 13 to November 17, 2019. After removing responses with missing data, the final data set included 59 out of 91 answered surveys. The instrumentation used in this study is summarized in the following table.

Table 1

Summary of the Instruments that Used in this Research

The instrument, Cronbach Alpha, Scale	Example of Scale Items	Adopted items from the literature
<i>Self-Leadership Competencies Scale</i> (11-items) Five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach Alpha (.74)	An example of the items asked in this scale was "I easily prioritize tasks during my busy season on the farm," "I handle stress effectively," and "I would say I am self-confident."	Benge et al., 2011; 2001; Day, 2000; Day & Dragoni, 2015; Goleman, 2004; Haynes, 2000; Stedman & Rudd, 2006.
<i>Motivation for Learning and Developing New Skills Scale</i> (2-items). Five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach Alpha (.64.)	The items included in this scale were: "I like to learn new things about my work even if it's about small details." and "I view changes as an opportunity to learn, and not as a difficulty."	Llinares-Insa, González-Navarro, Zacarés-González & Córdoba-Iñesta (2018).
<i>Job Motivation Scale</i> (3-items). Five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach Alpha (.82)	The items included were: "I take pride in doing my job as well as I can," "I try to think of ways of doing my job effectively," and "I feel a sense of personal satisfaction when I do my job well."	Vithessonthi, & Schwaninger (2008).

A panel of experts composed of seven people -Extension educators and administrators, academic faculty members with expertise in survey methodology and farmers issues, and a graduate student in Extension education assessed the instrument for face and content validity. The instrument resulted in being sufficiently valid to use it. Additionally, we conducted a pilot study in a three-day event in August 2019 to determine the reliability of the developed scale.

Early and late responses were compared to evaluate non-response errors (Miller & Smith, 1983). The first 25 respondents were assigned as an early phase respondent group and the last 25

respondents to the late phase respondent group. The phases of responders were determined based on the day and time they submitted their responses. The results obtained from a T-test showed that there was no non-response bias (Lindner et al., 2001; Miller & Smith, 1983), and it meant that data collected from the sample were representative of the study population (see table 2)

Caution is advised in interpreting the study findings since the study participants were not randomly selected. The results of this study will only be representative of those who participated and, thus, cannot be generalized to the entire population of Pennsylvania farmers.

Table 2

Independent Samples T-test for Equality of Means on Scale Scores of Constructs between Early and Late Respondents.

Scale	Respondents				T	P
	Early (n = 25)		Late (n = 25)			
	M	SD	M	SD		
Self-leadership competencies	3.89	.43	3.95	.54	-.456	.651
Job motivation	4.69	.48	4.75	.38	-.432	.668
Motivation for learning and developing new skills	4.34	.55	4.36	.57	-.126	.900

For data analysis, we used SPSS® version 26. Independent variables and the dependent variables were treated as interval data. A descriptive statistic was conducted to describe the Pennsylvania farmers' self-leadership competencies, job motivation, motivation for learning and developing new skills. A regression analysis was used to relate to the extent to which self-leadership competencies and job motivation can explain farmers' motivation to learn and develop new skills. We used Davis (1971) conventions to report the magnitude of the relationship between independent and dependent variables.

Findings

The first research objective was to describe the Pennsylvania farmers' self-leadership competencies, job motivation, and motivation for learning and developing new skills. The overall mean score for self-leadership competency was 3.93 ($SD = .48, n = 59$). Results are shown in Table 3. Lower scores are interpreted as greater needs of self-leadership competencies, and higher scores are interpreted as greater proficiency in this content area. Participants reported greater needs in the following: balancing personal and professional life during the busy farming season, handling stress, quickly making decisions, and easily prioritizing tasks during my busy season on the farm. Farmers reported high proficiency in applying their set values in the workplace, working independently, feeling self-confident, and achieving their business goals.

Table 3

Farmers' Self-Leadership Scale

Items	N	M	SD
I balance my personal and professional life.	58	3.19	1.017
I handle stress effectively.	57	3.39	.881

I quickly make decisions.	57	3.72	.978
I easily prioritize tasks during my busy season	57	3.82	.826
I achieve my business goals.	57	4.02	.641
I would say I am self-confident.	58	4.17	.881
I easily work independently.	57	4.60	.623
I have a clear set of values that I apply in the workplace.	58	4.60	.591

The overall mean score for farmers' job motivation was 4.72 ($SD = .42$, $n = 59$). Results are shown in Table 4. Higher levels indicate greater job motivation. Farmers reported being highly motivated by their jobs.

Table 4

Farmers' Job Motivation

Items	<i>N</i>	<i>M</i>	<i>SD</i>
I try to think of ways of doing my job effectively.	59	4.59	.561
I take pride in doing my job as well as I can.	59	4.78	.457
I feel a sense of personal satisfaction when I do my job well.	59	4.78	.457

The overall mean score for farmers' motivation for learning and developing new skills was 4.33 ($SD = .538$, $n = 59$). Results are shown in Table 5. Higher levels indicate a greater motivation for learning and developing new skills. Farmers reported a high motivation for developing and learning.

Table 5

Farmers' Motivation for Learning and Developing New Skills

Items	<i>N</i>	<i>M</i>	<i>SD</i>
I view changes as an opportunity to learn and not as a difficulty.	59	4.10	.736
I like to learn new things about my work, even minor details.	59	4.56	.534

The second research objective was to describe to what extent self-leadership competencies can explain farmers' motivation for learning and developing and job motivation. An application of Pearson correlation analysis showed a significant positive association between self-leadership competencies and job motivation ($r = .30$, $p = .010$), self-leadership competencies and motivation for learning and developing new skills ($r = .39$, $p < .001$), and job motivation and self-confidence for learning and developing new skills ($r = .59$, $p < .001$). Multiple linear regression was used to determine to what extent self-leadership competencies can explain farmers' motivation for learning and developing new skills and job motivation. The results showed that a significant proportion of the total variance (40%) in overall farmers' motivation for learning and developing new skills is explained by the overall farmers' self-leadership competencies and the overall farmers' job motivation ($F_{2,56} = 18.7$, $p < .001$, $R^2 = .400$). (see table 6).

Table 6

Multiple Regression Analysis Between Farmers' Motivation for Learning and Developing New Skills, Self-leadership Competencies, and Job Motivation.

Model Fit		Change Statistics					
	<i>R</i>	<i>R</i> ²	<i>SE.</i>	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>P</i>
1	.63	.40	.42	18.66	2	56	.000

Note: $p < .05$

Analysis of variance in overall farmers' motivation for learning and developing new skills is presented in Table 7.

Table 7

Analysis of Variance in Farmers' Motivation for Learning and Developing New Skills.

Model	Sum of Squared	<i>Df</i>	Mean Square	<i>F</i>	<i>p</i>
Regression	6.72	2	3.36	18.66	.000
Residual	10.08	56	.18		
Total	16.80	58			

Note: $p < .05$

Within the final model, both factors were significant predictors of farmers' motivation for learning and developing new skills namely, farmers' self-leadership competencies ($\beta = .26, p = .038$) and job motivation ($\beta = .67, p < .001$). Multiple relations' coefficients are presented in table 8.

Table 8

Multiple Relations Coefficients

Model	<i>B</i>	<i>SER</i>	<i>B</i>	<i>p</i>
Constant	.18	.68		.795
Self-leadership competencies	.26	.12	.49	.038
Job motivation	.67	.14	.25	.000

Conclusions, Discussion, and Recommendations

This study explored the Pennsylvania farmers' motivation for learning and developing new skills, self-leadership competencies, and job motivation. This research adds to the existing literature on the role of farmers' motivation for learning and developing new skills, self-leadership competencies, and job motivation. The results of our study are consistent with other studies and showed that Pennsylvania farmers have a high proficiency in the following self-leadership skills: achieving business goals, feeling self-confident, applying their set values in the workplace, working independently, and feeling self-confident. However, more significant needs were balancing personal and professional life during the busy farming season, handling stress,

quickly making decisions, and prioritizing tasks on the farm. Human resource practitioners, faculty focusing on leadership studies, and Extension leadership educators must include the topics like stress, balancing personal and professional life, and prioritization tasks on the farm in their Extension programs. Incorporating self-leadership competencies in leadership programs may help farmers lead themselves, maximize their personal and professional strengths and minimize those weaknesses, reach personal and professional goals through self-efficacy (Neck & Manz, 2010), and live a purposeful life. Vik & McElwee (2011) wrote that strategic planning is a significant requirement for farmers because it helps farmers find ways and strategies to create a profitable business and balance their lives.

Our study found that Pennsylvania farmers are highly motivated by their jobs; they feel a sense of personal satisfaction when they do their job well and feel proud by doing what they do and thinking in ways to do their job effectively. The results of this study aligned with previous studies. Muri et al. (2020) studied Norwegian sheep farmers and found that participants were highly motivated by the performance of the farm-related activities and the associated lifestyle rather than instrumental rewards. The authors indicated that motivation affects job satisfaction, and a high level of job satisfaction may strengthen these motivations.

The results of our research demonstrated high motivation for learning and developing new skills among farmers. We found that farmers enjoy learning new work-related things, and they view any changes as an opportunity to grow and learn rather than a barrier. Also, our study showed that farmers' self-leadership competencies were significantly associated with motivation for learning and developing new skills. McCombs' (1991) research indicated significant relationships between continuous learning and motivation. The authors wrote that a motivated person is a lifelong learner, and a lifelong learner is a motivated person. Bryant and Kazan's (2012) four-pillars model of self-leadership supports our research findings because self-leadership competencies can help farmers to recognize and set values and goals, know their own needs, create a plan, and use the gained knowledge to maintain positive thought, attitudes, and behaviors in response to their personal and professional needs, conduct themselves to their personal and professional self-realization through a lifelong learning process that untimely improve their lives. Manz (1986) also showed evidence of a significant relationship between self-leadership and intrinsic and extrinsic motivation mentioning that "comprehensive self-influence perspective concerns leading oneself toward the performance of naturally motivating tasks as well as managing oneself to do work that must be done but is not naturally motivating" (Manz, 1986, p. 589). Extension leadership educators should consider our findings and teach self-leadership competencies as a part of leadership programs because it can impact farmers' motivation to continue learning and developing new skills that benefit farmers' business and their lives.

This study confirms that farmers' motivation to learn and develop new skills is associated with farmers' self-leadership competencies and job motivation. This evidence shows human resource practitioners, extension professionals, and outreach educators that increasing farmers' participation and engagement in extension programs that help them develop new knowledge or learn new skills can foster job motivation. DiLiello and Houghton (2006) stated that individuals with higher self-leadership competencies see more innovation and creativity potential than individuals who have lower self-leadership competencies. This indicated that self-leadership

competencies and job motivation are necessary aspects to be considered and addressed to get more self-confident farmers willing to learn, develop and effectively solve problems.

Limitations related to this study are mainly based on the survey method and the possibility to generalize results. This study utilized an open survey link with an anonymous response method regarding the survey method. Thus, it does not allow researchers to track participants and discuss the variables included in this study more in detail. An open survey method doesn't allow to verify the nature of respondents; thus, it makes it almost impossible to confirm that respondents were only farmers; however, as it was posted on the agriculture-related website, we can assume but not ensure that respondents are only farmers. Another general limitation is that the results cannot be generalized to the entire Pennsylvania farmers wither outside of the state; they are only representatives of the participants in the present research.

Overall, our study supports the importance of farmers' self-leadership and job motivation as predictors of their motivation to learn and develop new skills. For further research, we suggest exploring the effect of demographic variables on farmers' motivation for learning and developing new skills. Additionally, it would be interesting to examine other factors that might influence farmers' motivations for learning and development.

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Describing Ingroup Prejudices Exhibited by School-Based Agricultural Education Teachers and Prejudice Predictive Demographics

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Many organizations have built capacity toward fostering diversity and inclusion within agricultural education in recent years. While many working efforts focus on programming, no research was found focusing on root issues such as prejudices held by teachers. Thus, the purpose of this study was to investigate levels of prejudice, as defined by integrated threat theory, held by secondary agriculture teachers toward other secondary agriculture teachers. A survey addressing social desirability, sexism, racism, and homophobia was distributed to a random sample of NAAE Region IV teachers. After controlling for nonresponse error, an accepting sample of 37.5% (n = 135) indicated through descriptive statistics that 1) Social desirability in the population did not correlate with any prejudice variables, indicating results weren't biased this way, and 2) the population holds moderate prejudice toward women and lesbians as well as slight prejudice toward gay men and racial minorities. A Multivariate Analysis of Variance indicated that male participants had higher levels of sexism as well as homophobia toward both lesbians and gay men. Additionally, participants from rural areas showed higher levels of both forms of homophobia in addition to racism. SBAE supervisors should consider implementing directed tolerance and multicultural training for SBAE teachers and teacher candidates.

Introduction

Over the previous decades, our society has worked toward an increased view of diversity, equity, and inclusion (DEI). Working with diverse students is nothing new to teachers, as classroom demographics have changed dramatically in the previous years, prompting a need for teacher educators to ensure teachers can be aware of and influence structural inequities in their schools (Banks et al., 2005). School-based agricultural education (SBAE) teachers must be prepared to work with disenfranchised students while recognizing personal biases, providing additional support, and speaking against disparaging remarks (Cano & Moore, 2010; Newcomb et al., 1993; Phipps et al., 2008). While no research could be found documenting the *actions* of SBAE teachers related to increasing DEI, previous studies have indicated that the *attitude* of SBAE teachers toward increasing DEI in agricultural education programs is overwhelmingly positive (LaVergne et al., 2011; 2012). While much discussion focuses on the views of DEI by teachers and some documentation of the experiences of students and teachers who belong to disenfranchised groups, there has been little focus on documenting prejudices held by teachers.

In exploring sexism in agricultural education, Oklahoma female SBAE teachers noted that they were not readily accepted in the profession, with 64% having endured gender bias (Kelsey, 2007). Baxter et al. (2011) found that this gender bias has occurred over four different generations of teachers and while the severity of this bias decreased over time, all participants faced notable bias. Additionally, Ohio male agriculture teachers only 'slightly agreed' that women teachers made strong leaders or were competent enough to teach ag mechanics (Cano, 1990). These biased ideas have perpetuated since, even to the point of pushing feelings of guilt

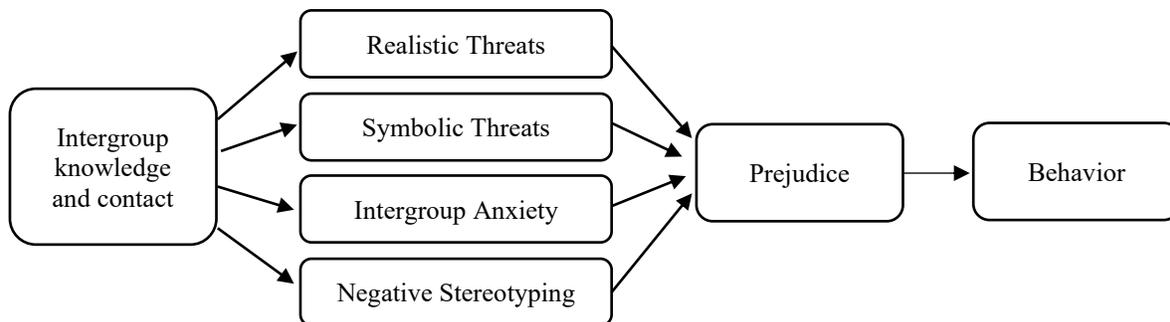
on female agriculture teachers (Foster, 2001; Kelsey, 2006a, 2006b). Homophobia has not been examined within SBAE but has been studied within rural communities and schools. In Australia, gay and lesbian participants consistently experienced homophobia within all sectors of their lives in rural areas (Gottschalk & Newton, 2009). In the U.S., gay men within the agricultural sector have experienced significantly more workplace homophobia than those in other sectors (Parent & Steede, 2020). When considering homophobia within schools, queer teachers often must navigate carefully, taking on mental distress by living ‘double lives’ and separating their public and private selves as a form of self-preservation (Bower-Phipps, 2017; Ferfolja & Hopkins, 2013; Gray, 2013; Griffin, 1992; Jackson, 2006; Mayo, Jr., 2008; Olson, 1987). Finally, racism has not been examined within the agriculture classroom. However, FFA members of color reflected that they received weird looks and felt racially isolated at the National FFA Convention career show (Martin & Kitchel, 2015). Conversely, collegiate white agriculture students are not only aware of their whiteness, but most recognize the power of whiteness in their upbringing (Martin & Hartmann, 2020). As DEI continues to advance within agricultural education, an understanding of prejudice and how it manifests needs to be established to better assess interventions geared toward increasing equity and the well-being of disenfranchised students and teachers.

Theoretical Framework

Most examples of prejudice can be viewed through the integrated threat theory of prejudice, where four different threats interact to cause prejudice (see Figure 1) (Stephan & Stephan, 2000). It’s important to note that Stephan & Stephan (1993) define prejudice as negative affect, which includes evaluations and emotions toward outgroups. This can give way to prejudiced behavior, but it’s important to reiterate that prejudice does *not* equate to behavior. This study sought to evaluate prejudice in SBAE teachers while using the lens of cross categorizations, meaning that while a group of people may have a common categorization (i.e. SBAE teacher), individuals’ other identities create complex contexts, creating further ingroups and outgroups within common categories (Crisp et al., 2006).

Figure 1

Integrated Threat Theory of Prejudice, adapted from Stephan and Stephan (2000).



Very few studies exist that measure teacher prejudices or attitudes toward diversity and multiculturalism, however one study in the Czech Republic found that there was a prominent level of congruency between teacher beliefs and societal beliefs, which was described by the

researcher as widespread (Leix, 2015). Leix also points out that teachers can influence their pupils' attitudes toward cultural diversity, which can be problematic if teachers hold prejudice toward disenfranchised groups. In a review of anti-prejudice education practices, it has been noted that there is no single 'best' strategy, but approaches can and should include cognitive, emotional, and behavioral interventions (Peucker, 2011). These three types of interventions also work to address the additional aspects of the integrated threat theory of prejudice: intergroup knowledge and contact, perceived threats, and the person's behavior, respectively. This study seeks to describe levels of prejudice in our population to best assess what types of interventions are needed.

Purpose and Objectives

The purpose of this study was to investigate the levels of prejudice held by SBAE teachers in the National Association of Agricultural Education (NAAE) Region IV. Additionally, this study seeks to determine if demographic variables can be used to identify differences in prejudice levels within the population. This research aligns with AAAE research priority 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century (Stripling & Ricketts, 2016), and was guided by the following objectives:

1. Describe the levels of Social Desirability in Region IV SBAE teachers.
2. Describe levels of prejudice (sexism, racism, and homophobia toward both lesbians and gay men) exhibited by Region IV SBAE teachers towards other SBAE teachers.
3. Examine if prejudice levels differ based on participant sex and the population of where they were raised.

Methods

This study utilized a quantitative cross-sectional survey design and was distributed according to the tailored design method (Dillman et al., 2014).

Population and Sample

The target population for this study consists of SBAE teachers from Region IV of the National Association of Agricultural Educators, which includes the states of IL, IN, KY, MI, MO, and OH ($n = 2273$). For this population size, Krejcie and Morgan (1970) recommend a sample of 331. In order to pull a representative sample, state NAAE member directories were obtained for the above states through either publicly available information online, or through state agricultural education staff. A stratified random sample was drawn from these directories by calculating the proportions of state populations to the overall region population, rounding up, and randomly selecting that number of participants' emails from each individual state. Ultimately, the proportion of the accepted sample for each state was within 6% of that state's proportion of the population, with Illinois being the most overrepresented (+ 4%) and Kentucky being the most underrepresented (- 6%). These state populations, proportions of population, and proportions of the accepted sample can be found summarized in Table 1.

Demographics collected for this study include age, number of years teaching, state, race, sexual orientation, size of the community teaching in, size of the community the participant was

raised, and the type of certification that the participant holds. For the size of community variables, it was decided to use an ordinal scale with the options of Rural (< 2,500), Suburban (2,500 – 50,000), and Urban (> 50,000) because this is the scale utilized by *The AET* in their collection of demographics. Full participant demographics can be found summarized in Table 2.

Table 1
Summary of study population and stratified sample sizes

State	Population Size	Proportion of Pop.	Stratified Sample	Rounded Sample	Accepted Sample	Proportion of Sample
IL	460	.2	66.99	67	30	.24
IN	319	.14	46.45	47	20	.16
KY	286	.13	41.65	42	9	.07
MI	163	.07	23.74	24	12	.1
MO	546	.24	79.5	80	29	.23
OH	499	.22	72.67	73	25	.2
Total	2273	1		333	125	1

The average participant in this study was a 38-year-old ($M = 38.02$, $SD = 11.93$), white (97.5%), straight (96.7%), female (56.1%) who was raised in a rural area (68.9%), taught in a rural area (61.9%), and had taught for an average of 12 years ($M = 12.4$, $SD = 9.46$).

Instrumentation

The instrument for this study was established by modifying summated rating scales from previously published studies measuring social desirability ($\alpha = .88$) (Crowne & Marlowe, 1960; Strahan & Gerbasi, 1972; Fischer & Fick, 1993), Neosexism ($\alpha = .76$) (Tougas et al., 1995), Modern Homophobia toward Lesbians ($\alpha = .95$) and Gay Men ($\alpha = .95$) (Raja & Stokes, 1998), and Attitudes Toward Diversity in Coworkers ($\alpha = .78$) (Montei et al., 1996). These scales were measured as Likert-type scales with five points with anchors ranging from *strongly disagree* to *strongly agree* except for social desirability which was measured dichotomously using the anchors *true* and *false*.

Validity for the instrument was established by assembling a panel of experts ($n = 6$) in Agricultural Education, Women's and Gender Studies, and Community Leadership. All but one member of the panel belonged to at least one disenfranchised group that faces the prejudices measured in this study. Reliability was then estimated by conducting a pilot study with a population similar to the population of interest: third- and fourth-year agricultural education students at a large midwestern university ($n = 41$). Results from this pilot study indicated that all but one construct was found to have desirable Cronbach's alphas above .80 (Carmines & Zeller, 1979; Nunnally & Bernstein, 1994). Falling below this threshold, social desirability calculated an alpha of .67. While not desirable, no alternative scale could be found within the literature to potentially replace it in the study instrument, so it was decided to continue to the primary study with the same scale. Full psychometric results from the pilot study can be found summarized in Table 3.

Table 2*Demographic Information for Study Participants (n = 125)*

	Female (n = 69)		Male (n = 53)	
	n	%	n	%
State				
Illinois	18	26.1	12	22.6
Indiana	11	15.9	6	11.3
Kentucky	3	4.3	6	11.3
Michigan	8	11.6	4	7.5
Missouri	13	18.8	15	28.3
Ohio	14	20.3	10	18.9
Missing Data	2	2.9	-	-
Race				
White	66	95.7	50	94.3
Black or African American	1	1.4	1	1.9
American Descendants of Slavery	1	1.4	-	-
Missing Data	-	-	2	3.8
Sexual Orientation				
Straight/Heterosexual	66	95.7	50	94.3
Bisexual	3	4.3	-	-
Gay or Lesbian	-	-	1	1.9
Missing Data	-	-	2	3.8
Community Teaching In				
Rural (< 2,500)	39	56.5	34	64.2
Suburban (2,500 – 50,000)	20	29	13	24.5
Urban (> 50,000)	7	10.1	4	7.5
Missing Data	3	4.3	2	3.8
Community Grew Up In				
Rural (< 2,500)	41	59.4	39	73.6
Suburban (2,500 – 50,000)	22	31.9	12	22.6
Urban (> 50,000)	3	4.3	-	-
Missing Data	3	4.3	2	3.8
Certification				
Traditionally certified	55	79.7	41	77.4
Working toward traditional certification	1	1.4	-	-
Alternatively certified	9	13	10	18.9
Working toward alternative certification	1	1.4	-	-
Missing Data	3	4.3	2	3.8

Summated scales from the present study followed the same pattern of Cronbach values, with all but one scale calculating an alpha above .8, and social desirability calculating an alpha of .61. This indicates that caution should be used in interpreting statistical findings using the variable of social desirability. To categorize the levels of innate prejudice exhibited by the sample we needed to set boundary values to separate the approximate values, thus real limits were established (Fife-Schaw, 2006). The real limits set for this study were: 1.01 to 1.99 was considered “low prejudice,” 2.00 to 2.99 were considered “slightly prejudiced,” 3.00 to 3.99

were considered “moderately prejudiced,” 4.00 to 4.99 was considered “extremely prejudiced.” It should be noted that these scales were designed to measure unconscious biases, so the results described here do not necessarily reflect the conscious thoughts, words, and/or actions carried out by the sample.

Table 3
Psychometric Properties for Pilot Study Scales (n = 41)

	<i>n</i>	<i>M</i>	<i>SD</i>	Range	Cronbach’s α
Social Desirability ^a	6	1.46	.29	1 – 2	.67
Neosexism	4	2.74	.75	1.25 – 4.5	.81
Modern Homophobia					
Toward Lesbians	5	1.95	.76	1 – 4.6	.90
Toward Gay Men	3	1.65	.67	1 – 3.33	.82
Racism	10	2.18	.55	1 – 3.1	.82

Data Collection and Analysis

Surveys were distributed via Qualtrics with six reminders (Dillman et al., 2014) from December 2020 to January 2021, and resulted in a response rate of 21.6% ($n = 72$). Non-response error was addressed by distributing a second, identical survey to a random sample of 20% of nonrespondents ($n = 53$) (Dooley & Lindner, 2003; Lindner et al., 2001; Miller & Smith, 1983). Independent-samples *t*-tests were conducted to compare nonrespondents to respondents and only one difference was found, indicating a medium nonrespondent bias in the variable of homophobia toward lesbians, $t(121) = -2.06, p = .04, d = .37$. All other variables were thus considered generalizable to the sample and population, and caution should be used when interpreting statistical tests that analyze variable relationships with homophobia against lesbians. After controlling for nonresponse bias, the data from the nonrespondents were combined with the sample data, resulting in an overall response rate of 37.5% ($n = 125$). These data were analyzed using descriptive statistics, Pearson correlations, and a two-way multivariate analysis of variance (MANOVA) to compare prejudice variable differences among participants based on gender and the population of the community they were raised, removing cases listwise for a total analyzed sample of 108. While it was also desired to compare prejudice values based on race and sexual orientation, this was not possible with the current sample as the participants were overwhelmingly (> 95%) white and heterosexual. All MANOVA assumptions were met except for multivariate and univariate outliers. One multivariate outlier was discovered where an individual selected “prefer not to respond” for gender. This case was removed and the MANOVA was conducted, with Wilks’ Lambda being used to evaluate results. After comparing MANOVA results with and without the three univariate outliers in the data, it was identified that these cases did not influence the significance status of any of the results, thus results reported here include these three cases.

Results

Objective one sought to determine how socially desirable the population was to determine if further analyses needed to be controlled for this variable. Results showed that teachers show moderate socially desirable behaviors, with the group average falling slightly above the midpoint of the scale ($M = 3.34, SD = 1.65$). Pearson product-moment correlations

between social desirability and prejudice variables indicated no significant relationships. Since no prejudice variables significantly correlated with social desirability, it was determined that the data were not influenced by this bias and there was no need for further analysis with this variable (Nederhof, 1985). It should be noted that analyses did indicate that social desirability was significantly related to Age, with a positive, moderate correlation according to Davis' (1971) descriptors, $r = .31, p = .004$. All correlations can be found summarized in Table 4.

Table 4
Pearson Product-Moment Correlations for Scale Study Variables

Variable	1	2	3	4	5
1 – Social Desirability	-				
2 – Sexism	.08	-			
3 – Homophobia - Lesbians	.14	.50***	-		
4 – Homophobia - Gay Men	.14	.47***	.83***	-	
5 – Racism	.003	.43***	.43***	.47***	-
6 – Age	.31**	.12	.17	.14	.11

* $p < .05$, ** $p < .01$, *** $p < .001$

Objective two sought to describe the levels of prejudice within the population. All prejudice scales were scored from 1 to 5, with higher scores indicating higher prejudiced feelings. Scores from the sample can be found summarized in Table 5 and per our real limits, indicate *slight* prejudice toward women ($M = 2.31, SD = .61$) and lesbians ($M = 2.15, SD = .89$); and *low* prejudice toward gay men ($M = 1.93, SD = .88$) and racial minorities ($M = 1.94, SD = .53$). While all scales had a minimum score of 1, no participant scored 1 for all scales, indicating that all participants exhibited *some* form of prejudice. Additionally, Pearson product-moment correlations between prejudice variables indicate moderate (racism vs. sexism and both forms of homophobia, in addition to sexism vs. homophobia against gay men), substantial (Sexism vs. homophobia against lesbians), and very high relationships (homophobia against gay men vs. homophobia against lesbians), $p < .001$ for all correlations. All correlations can be found summarized above in Table 4.

Table 5
Psychometric Properties for Study Scales (n = 125)

	<i>M</i>	<i>SD</i>	Range
Social Desirability Scale ^a	3.34	1.65	0 - 6
Neosexism Scale	2.31	.61	1 – 4.33
Modern Homophobia Scale			
Toward Lesbians	2.15	.89	1 – 5
Toward Gay Men	1.93	.88	1 – 5
Racism Scale	1.94	.53	1 – 3

Note^a Summed scale (individual values can only be whole numbers).

Objective three was to examine prejudice differences based on demographics. Due to the overall demographic distribution of our respondents, only gender and population of participant hometown participant hometown met the MANOVA assumption of group sizes, exhibiting at

least a 3:1 ratio between compared groups. For population of hometown, participants who were from suburban and urban areas were recoded and combined into a group considered “not rural” in order to meet this assumption. To examine these variables’ effects on prejudice and to determine if there was an interaction between the factors, a two-way between-subjects MANOVA was conducted (Huberty & Petoskey, 2000). Multivariate results, summarized in Table 6, indicate differences in prejudice when comparing gender, $F(4, 101) = 3.506, p = .01$, and population of hometown $F(4, 101) = 3.201, p = .016$. However, there was no significant interaction between these two variables, $F(4, 101) = 0.611, p = .656$.

Table 6

Multivariate Test Results Examining the Effect of Gender and Community Raised on Prejudice

Effect	Wilks' Λ	F	df_1	df_2	p	η_p^2
Gender	.878	3.506	4	101	.01*	.122
Community Raised	.887	3.201	4	101	.016*	.113
Gender*Community Raised	.976	.611	4	101	.656	.024

Note. * $p < .05$

Univariate test results, summarized in Table 7, indicate that both demographic variables had significant differences in homophobia. Male participants showed higher levels of homophobia toward lesbians [$F(1, 104) = 7.91, p = .006$] and gay men [$F(1, 104) = 8.921, p = .004$] than those who were female. Similarly, participants from rural areas showed higher levels of homophobia toward lesbians and gay men than those who were not [$F(1, 104) = 6.457, p = .013$; $F(1, 104) = 12.052, p = .001$, respectively]. When examining sexism, only gender showed a significant effect, $F(1, 104) = 7.896, p = .006$, and when examining racism, only community raised showed a significant effect, $F(1, 104) = 4.817, p = .03$.

Table 7

Univariate Test Results Examining the Effect of Gender and Community Raised on Prejudice

Source	Scale	F	p	η_p^2
Gender	Sexism	9.922	.002**	.087
	Homophobia → Lesbians	7.91	.006**	.071
	Homophobia → Gay Men	8.921	.004**	.079
	Racism	.934	.336	.009
Community Raised	Sexism	3.132	.08	.029
	Homophobia → Lesbians	6.457	.013*	.058
	Homophobia → Gay Men	12.052	.001**	.104
	Racism	4.817	.03*	.044

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

Conclusions, Implications, and Recommendations

From the findings, it can be concluded that the participants’ responses were not biased by social desirability as no significant correlations were found between social desirability and the prejudice variables. A significant, positive correlation was found with age and social desirability which aligns with previous research (Kozma & Stones, 1988; Stöber, 2001). For objective two, we concluded that slight prejudice toward women and lesbians and low prejudice toward gay

men and racial minorities existed within the population. With participants exhibiting some degree of prejudice and exhibited multiple forms prejudice as moderate to very high correlations existed between prejudice variables. These relationships are also expected due to previous research providing evidence that those who exhibit one form of prejudice also exhibit other prejudices (Aosved & Long, 2006).

While no participants were without prejudice, within objective 3 we concluded that prejudices could be found in higher levels in teachers who were male or those who grew up in rural communities, but without any interaction between these two variables. This corresponds with other work that has reported men exhibiting higher levels of sexism and homophobia, but interestingly our population does not follow this trend with racism where there were no significant differences found (Aosved & Long, 2006).

This study provides evidence that the studied population exhibited prejudices against other SBAE teachers who were women, belong to racial minorities, or identify as gay or lesbian. It's been supported that SBAE teacher connectivity with other SBAE teachers can be a predictor of career commitment (Moser & McKim, 2020). Thus, these prejudices, if outwardly shown have the potential to exclude, and potentially lessen teacher commitment in those SBAE teachers who belong to one or more of these minority groups. One limitation to this study is that the prejudices measured are in reference to *other SBAE teachers*. Because the current instrument emphasized this shared ingroup identity between the participants and minority teachers, the values reported here are likely lower than true teacher prejudices (Hornsey & Hogg, 2000). It is possible that existing prejudices could impact career commitment in minority teachers, but more research is needed in this area, particularly as we evaluate efforts toward recruitment and retention of SBAE teachers who belong to these groups.

For practice, it's recommended that SBAE state staff and teacher educators consider implementing tolerance and diversity programs within their curriculum and professional development offerings for all teachers, but particularly for pre- and in-service teachers who are male or from rural settings as those are the two groups who were identified in this study as having higher levels of prejudice. This programming could be any that addresses one (or more) specific threat of the four threats that can feed into prejudice as defined by the Integrated Threat Theory (Stephan & Stephan, 2000). Examples of this could include implicit bias training to counter negative stereotyping threat, cultural experiences that could help counteract intergroup anxiety, or intercultural experiences that may counter against symbolic threats. Teachers are also encouraged to participate in opportunities to learn about and mitigate their own implicit biases. Such opportunities could include self-reflection, reading books from anti-racist, anti-homophobic, or anti-sexist authors, or seeking out firsthand experiences to help learn how to best support students from all backgrounds. However, it should be noted that longitudinal studies are needed to examine the effect of these training types on long-term attitude change as it pertains to bias, as some studies have indicated no significant differences in biases between students who have taken a multicultural competency course and those who have not (Boysen & Vogel, 2008).

The first recommendation for research from this study is for researchers to consider include the question "population of community raised" to demographic sections of future studies that relate to prejudice or DEI attitudes, as none of the studies reviewed by the authors was found

to have reported this information. Additionally, we recommend continuing research within this area of DEI in education, particularly in exploring how teacher prejudices could have a direct impact on their coworkers, fellow SBAE teachers, or the learning, motivation, or engagement of their students and FFA members. As we move forward, more research is needed to determine how open SBAE stakeholders are to working towards cultural proficiency, especially since our field has many opportunities to work with not only pre-service teachers, but in-service teachers, administrators, community members, and students to learn more about how, where, and why mechanisms of prejudice and exclusion appear in the diverse settings where SBAE programs exist. Within this research, it's important to hear from not only those who belong to the majority in SBAE in their openness to diversity and inclusion but also from those who are often kept from these spaces due to their membership in one or more disenfranchised groups. Finally, to accomplish this research, SBAE faculty should seek to provide resources to empower future scholars who identify with these disenfranchised groups to gain the knowledge and ability to conduct this research themselves within their own communities.

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Teacher Expectancy: A Quasi-Experimental Evaluation of Secondary Student Performances in Single Sex Classrooms

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Abstract

Teacher beliefs and environmental conditions influence student performance outcomes. In this non-equivalent comparison quasi-experimental design study, students enrolled in ten secondary Principles of Agriculture courses assigned to a control or treatment group based upon their sexual identity. Teachers were asked periodically about their expectations of student performances. Over the course of the academic semester, students within the treatment group maintained higher grade point averages and better attendance. Boys from the treatment group maintained a higher percent of non-discipline referrals than boys from the control group. In addition, correlations are made between the teachers' expectations, and student performance and career aspirations. The researchers recommend that secondary schools consider single-sex classrooms for entry-level agricultural courses and for additional research to be considered to further strengthen the preliminary findings.

Introduction

In 2001, the No Child Left Behind (NCLB) Act began to allow public schools to offer same-sex classes, which led to the 2006 amendment to the Title XI regulation that removed the ban on single-sex public education. Title IX is the section of the Every Child Succeeds Act that prescribes gender equity in public education's in-school and extracurricular activities. Since NCLB, over 1,600 school districts across the United States have implemented some degree of single-sex education (Klein et al., 2014).

As more school districts across the United States implement same-sex schools and classrooms, the research that supports this learning environment remains widely disputed; especially, with a deficiency of same-sex education research in public schools. Pahlke et al. (2014) conducted a meta-analysis of 453 single-sex education studies that exposed an array of methodological issues: (a) mostly convenience samples; (b) typically conducted in private school settings with highly motivated students, exceptionally trained teachers, small class sizes, and high socioeconomic status; and (c) student participants did not represent the demographics of the community. This study mitigated the methodological issues, addressed in the 2014 study, by implementing the following research design: (a) a quasi-experimental design; (b) conducted in a public-school setting with traditionally trained teachers, larger class size, and more representative socioeconomic status; and (c) students represented the demographics of the community.

Although none of Pahlke et al. (2014) meta-analysis included studies within agricultural education classrooms, research regarding one particular sex is not uncommon. Although most of the recent literature that has emerged is regarding gender dynamics at the post-secondary level (Cline, et al., 2019; Murphey et al., 2016; Keilhauer et al., 2013), some studies have investigated

the effects of gender on the secondary level (i.e. Chumbley et al., 2015; Kagay et al., 2015; Velez et al., 2015; Ricketts et al., 2004). Newsom-Stewart and Sutphin (1994) found that girls and boys held differing perception about agricultural education and called for further investigations that “examine cultural and gender differences” in SBAE (p. 55). Their recommendation for future research spurred studies that investigated the effects of gender on student achievement (Johnson et al., 1998), students’ rationale for course selection (Sutphin & Newsom-Stewart, 1995), and the emergence of girls in leadership roles (Ricketts et al., 2004). Over 25 years after Newsom-Stewart and Sutphin’s introductory study on gender dynamic, literature in SBAE still remains scarce in gender studies and gender related issues (Enns & Martin, 2015).

Ricketts et al. (2004) found that male students participated in more technical skilled projects (i.e. mechanics, tractor operations) while female students participated in more soft skilled projects (i.e. agricultural communications, marketing, public speaking). The authors called for extensive research to uncover if this phenomenon continued to occur. Rosch et al. (2015) conducted a longitudinal study to measure leadership gains (skills, confidence, and engagement) in secondary agricultural students and found female students gain significantly in leadership while male students did not.

At present, no literature regarding the effectiveness of same-sex classrooms in school-based agricultural education (SBAE) courses is in existence. As such, this study sought to address the absence of literature by examining the effectiveness of same-sex classrooms and teacher effectiveness in SBAE programs in STATE This research aligned with priority four (meaningful, engaged learning in all environments) of the national research agenda for the American Association of Agricultural Educators by evaluating the learning environment of single-sex classrooms in agricultural education (Roberts et al., 2016).

Literature Review/Theoretical Framework

The Pygmalion effect posits that teachers’ beliefs influence student outcomes (Rosenthal, 2010). Such teacher beliefs are often called teacher expectations or teacher expectancy. These expectations can be based on a teacher’s knowledge of a student (Good, 1987), such as previous grades, behavior, or perceptions of in class performance, but are also based on one’s prejudices and biases (Reyna, 2008). Rosenthal and Jacobson (1968) hypothesized that a teacher’s expectations induce change in their own behavior towards specific students, which then may lead to differences in academic performance. For example, a teacher with a belief that a certain student will not perform well in mathematics because of their previous math grade (teacher expectation), may reduce the amount of effort they put into teaching the student (behavior), which may cause the student to actually perform poorly on a mathematic assessment (academic performance). In this way, the Pygmalion effect is a self-fulfilling prophecy (Merton, 1948); a teacher’s poor expectation results in poor student performance and a teacher’s high expectation induces greater student performance.

Over 50 years of empirical research has established the strong predictive power of teacher expectations (Jussim & Harber, 2005). Within an academic setting the Pygmalion effect can predict whether or not a student succeeds in their academic performance (Friedrich et al, 2015;

Hinnant et al., 2009; Good & Nichols, 2001; Rosenthal, 1972; Rosenthal & Jacobson, 1968), predict how students are placed in ability tracks (Anderson, 2018), and predict the development of self-concepts (Trouiloud et al., 2002). Mostly, academic outcomes are measured through course grades or end of course tests (Jussim & Harber, 2005). Although the predictive power of the Pygmalion effect is widely accepted, the sources of teacher expectations remain broad within academic settings (Friedrich et al., 2015).

Murdock-Perriera and Sedlacek (2018) posits that sources of teacher expectations may include preconceived biases and personal factors, such as empathy. Despite a broad view of what creates or considered a “teacher expectation,” the effects of teacher expectancy are argued to be an agent of educational inequality (Anderson, 2018); especially, in students who belong to a stigmatized group (Jussim & Harber, 2005). For example, the academic performance of minority students can be hindered by teacher expectations. Good and Nichols (2001) contended that teachers’ expectations of African American, elementary students hindered end of course test scores compared to European American students. Other scholars have suggested that teacher expectations may contribute to differences in achievement between boys and girls. Gentrup and Rjosk (2018) showed that students who were subject to strong teacher expectation biases showed high or low achievement gains, correspondingly. Specifically, Gentrup and Rjosk found that girls’ mathematic gains were unfavorably affected by negative teacher expectations.

Although teacher expectancy has been well cited in educational research (Rosenthal, 2002), SBAE scholars have yet to investigate teacher expectations in the contexts of SBAE. The researcher tested the merits of the Pygmalion effects within SBAE in this study. Specifically, the researcher investigated the expectations teachers formed based on the single-sex learning environments and the relationship between teacher expectancy and various student outcomes (academic performance, attendance, behavior, career interest, agricultural career interest, and interest in agricultural education).

Purpose/Objectives

The purpose of this nonequivalent comparison group quasi-experiment was to evaluate the effectiveness of secondary agriculture classrooms through the lens of the Pygmalion effect theory. The independent variable in this study was the manipulation of learning environments within *Principles to Agriculture* courses by mediating the composition of classrooms to either single-sex classrooms (treatment) or coeducational classrooms (control). Analyses between X+ and X- were separated into four groups: X₊₁ (boys in treatment group), X₊₂ (girls in treatment group), X₋₁ (boys in control group), and X₋₂ (girls in the control group). The following research objectives and hypotheses guided the scope of the study:

RO1: What are the student performance outcomes of X₊₁, X₊₂, X₋₁, and X₋₂ in terms of academic performance, attendance, behavioral instances, and FFA membership?

RO2: Does a relationship exist between teachers’ expectations for attendance, teachers’ expectations for academic performance, teachers’ expectations for behavior, teachers’ expectations for students’ interest in an agricultural career, teachers’ expectations for students’ interest in agricultural education, attendance, academic performance, behavior, and students’ interest in an agricultural career, and students’ interest in agricultural education.

Methodology

The untreated control group design with dependent pretest and posttest samples (Shadish et al., 2002), frequently called the nonequivalent comparison group design, was utilized in this study. This quasi-experimental design is recommended in educational field research for ethical, practical, and legal reasons (Steiner et al., 2009). Such reasons include 1) safeguarding the rights of minors, 2) the difficulty to enact randomized sampling in school systems, and 3) following legal boundaries for school records made the use of a quasi-experimental design justified. The use of a pretest is advantageous to facilitate causal inference from the quasi-experiment (Shadish et al., 2002). The pretest that measures the same outcome variable as the posttest also aids in statistical analysis. The pretest also provides how the treatment groups and control groups initially differ which is critical for indicating the possible operation of internal threats to validity (Bell et al., 1995).

Random assignment in higher order units (classrooms) were employed, which is appropriate for educational field research (Shadish et al., 2002). A unit describes whomever is assigned to experimental conditions. High order units (also known as aggregate units), such as classrooms, are collections of individual units, such as students. Simple random assignment was employed at the classroom level (higher order unit) rather than randomly assigning students to the treatment (individual unit). In this study, six classrooms at three school sites were randomly assigned treatment conditions and two classrooms at two school sites were randomly assigned to control conditions. Then students were placed in the class by the schools' guidance counselors. Both students and their parents were given the option to opt-out of same-sex classrooms within the first week of school. The researcher was unable to randomly assign students due to practical restrictions set by schools (e.g. last-minute scheduling, unable to communicate with the middle school, control over students' schedule request).

The intervention for this quasi-experiment was separating the *Principles of Agriculture* courses in homogenous, same-sex classrooms. The intervention was randomly assigned to three of the four selected schools to form the treatment group (Group A) following a selection protocol for participating schools. Group A had two subgroups that included Group A-boys and Group A-girls. Group A-boys ($X+1$) consisted of treatment classrooms where students were all boys and taught by a male teacher. Group A-girls ($X+2$) consisted of treatment classrooms where students were all girls and taught by a female teacher. The remaining school consisted of two heterogeneous, co-educational classes that formed the control group (Group B; $X-$). One control group class was taught by a female teacher while the other was taught by a male teacher. The intervention lasted one semester of the Fall 2019 school year, a total of 15-weeks. No other intervention was provided. All instructors taught the Principles of Agriculture course to state standards. The only manipulated difference between the treatment group and control group was the composition of sex in the classroom. Both groups were administered both a pretest and posttest.

The assessment of threats to internal validity, also known as ambiguous temporal precedence (Shadish et. al, 2002), is a critical methodological approach for a quasi-experimental design (Creswell & Creswell, 2018; Martin & Bridgmon, 2012; Cook & Steiner, 2010). Internal validity is assessing whether the dependent variables (outcomes) are indeed causal to the manipulated

independent variable (treatment) (Martin & Bridgmon, 2012). Actions were taken in to minimize potential threats to internal validity (see Table 1).

Table 1
Threats to Internal Validity and Actions Taken

Type of Threat to Internal Validity	In Response, Actions Taken
History	Both the treatment and control group were subjected to the same time frame and external events.
Maturation	All student participants were similar in age, mostly 9th grade students enrolled in Principles of Agriculture course.
Regression to the mean	Student participants were from public school and had similar ability levels.
Selection	Treatment groups were randomly assigned at higher order units.
Mortality (study attrition)	Schools provided letters of support from administration to prevent attrition during the study.
Diffusion of treatment	Control group was located at a different site and participants did not have contact with each other.
Compensatory/resentful demoralization	Both the control and treatment group received the same benefits for participating in the study. No compensation was offered to participants.
Compensatory rivalry	Steps were taken to ensure that teachers in both the control group and treatment do not amend their teaching out of competition to other groups.
Testing	The administration of pretest and posttest had a 15-week interval to prevent participant familiarity with instruments.
Instrumentation	The same instrument was used for pretest and posttests.

Note. Adapted from Creswell and Creswell (2018).

Inclusion criterion was implemented to recruit a sample that shared the following characteristics:

1. The school was located in STATE;
2. The secondary agriscience department had a minimum of two teachers;
3. The school had a minimum of one male instructor and one female instructor certified to teach secondary agriculture;
4. Both teachers were willing to teach a Principles to Agriculture course to the standards set by the STATE Department of Education;
5. The school provided a minimum of three sections of *Principles of Agriculture*.

Forty-three schools met the inclusion criterion and were contacted through an initial recruitment e-mail. Two follow-up e-mails and personal phone conversations occurred within a month of the initial correspondence from a faculty member who had a positive established reputation among the state's teachers. Various reasons for not participating consisted of a) not enough enrollment for two classes; b) lack of administrative support; c) lack of teacher interest; d) uncertainty of job placement the following year; and e) school scheduling restrictions. At the end of the recruitment, 10 schools expressed interest to participate in the study. Two of the 10 schools declined to participate in the study because of their uncertainty of enrollment and course offerings. In December, eight schools confirmed interest and ability to participate in the study. Each school was asked to supply a letter of support from their administration in order to

participate in the study. In January, six schools received written letters of support from their administration. Teachers ($n = 10$) from six schools attended a meeting to discuss the study procedures. Four schools were randomly assigned by to the treatment group and two schools to the control group. Over the summer one school in the control group had a change of teachers and failed to meet the criterion. As a result, five schools (eight classrooms) participated in the study. Of these, three schools (six classrooms) served as treatment and two schools (two classrooms) served as a control. Each school was considered to be located in a rural community, primarily Caucasian, and farming communities (STATE Department of Education, 2016).

A total of 191 freshman students enrolled in their first year of high school (14-16 years of age) participated in this study. Of this sample, 102 (53.4%) were female students and 89 (46.6%) were male students. A total of 144 (76 female students, 68 male students) students were placed into single-sex classrooms as the treatment group, with the remaining 47 students (26 female students, 21 male students) remained in coeducational classrooms as the control group. Participation in the study was granted by collection of parental permission and student assent within the first two weeks of school. Student participants in the treatment group (same-sex classrooms) had the option to opt-out into a traditional coeducation classroom. Parents also had the option to opt-out their child to a coeducation classroom. No students or parents requested to opt-out of same-sex classrooms.

The school districts reported that of the student participants, 21 (11.3%) had an identified Individualized Education Plan (IEP) or 504 plan and 10 (5.4%) students were considered gifted. A majority of the student participants qualified for free and/or reduced lunch ($f = 95$; 56.4%) and considered economically disadvantaged. A majority of the students were paid FFA members ($f = 111$; 66.1%). Students' ethnicity was not collected. Students reported the marital status of their biological parents. Respondents indicated that a majority of their biological parents were not married ($f = 89$; 54.6%). Most of the students ($f = 84$; 51.5%) were unsure about their father's level of education, while the majority of students reported their mother's level of education to be a Bachelor's degree ($f = 89$; 16.0). The study followed all protocols, confidentiality, and safety measures approved by the university's Institutional Review Board (IRB).

Measures

The instructor or the school district reported "student performance outcomes" in this study which was identified through each student's academic performance, FFA membership, attendance, and behavioral referrals. Academic performance was assessed through the student's *Principles of Agriculture* final semester grades as well as their overall cumulative high school Grade Point Average (GPA). The end of semester grade for the *Principles of Agriculture* course was reported by the instructors at the end of the semester in January 2020. The semester grade was reported in letter grade format (A-F). Each letter grade was coded for analysis (4.0 A, 3.0 B, 2.0 C, 1.0 D, and 0.0 F). GPA was reported by the school district at the end of the semester in January 2020. The GPA was report on a scale between 0.00 – 4.00. The GPA reflects only classes that were taken in the first semester as a Freshman student. If the student took classes for high school credit in middle school, those classes were not included in the reported GPA. The GPA only reflected the current semester courses and not cumulative.

Students' attendance was reported by the school district as full days missed throughout the 15-week fall semester. Days missed did not include partial days missed where students may have been late or left early. The reasoning behind the absence was not reported (e.g. doctors visit, school business, unexcused absence, suspension).

The school district reported behavioral incidents that occurred throughout the 15-week fall semester. Behavioral incidents defined by the STATE Department of Education (2020) are written discipline referrals. Reported behavioral incidents were school-wide rather than just in the *Principles of Agriculture* course.

The researcher developed a questionnaire that assists in describing teachers' expectancy. The instrument contained six items (academic performance, behavioral incidents, FFA membership, attendance, interest in an agricultural career, and interest in agricultural education). Each item was set to a five-point Likert-scale from 1 (strongly disagree) – 5 (strongly agree) whereas 3 served as neutral. Teachers completed the survey at three points in time: a) prior to the start of the class; b) at the start of the class; and c) at the end of the semester. A panel of experts reviewed the questionnaire for face and content validity (Ary et al., 2019). All three members were chosen based on their experience with teaching and educational research. To establish face and content validity, the panel experts received documents containing the research purpose, objectives, and copies of the questionnaires. The members were asked to examine clarity, verbiage, and visual appearance as recommended by Creswell and Creswell (2018). Modifications were made following the expert panel's reviews in order to meet face and content validity. The instrument was deemed acceptable.

Data collected from each student was inputted into IBM Statistical Package for Social Sciences® (SPSS) version 26 for data analysis. The data were organized and cleaned prior to analysis. As recommended by Field (2018), descriptive analyses (e.g., means, standard deviations, skew, kurtosis, histograms) of the data and examined items for normality (Shapiro-Wilk test and Levene's test) was conducted prior to fitting to any statistical model. A *strict* confidence level ($\alpha \leq 0.05$) was established for statistical test required in investigating the research objectives.

Findings

Research objective one sought to describe students' performance outcomes between the four subgroups of this quasi-experiment (X_{+1} , X_{+2} , X_{-1} , and X_{-2}) in terms of academic performance, attendance, behavioral instances, and FFA membership. Students' academic performance was measured by the end of semester grade and end of semester GPA (see Table 2). Girls in the treatment group (X_{+2}) reported the highest semester grade in the *Principles of Agriculture* course ($m = 3.53$, $SD = 0.79$), followed by boys in the treatment group (X_{+1} ; $m = 2.88$, $SD = 1.11$), girls in the control group (X_{-2} ; $m = 2.86$, $SD = 1.32$), and boys in the control group (X_{-1} ; $m = 1.90$, $SD = 1.55$). Semester GPA was reported on a 4.00 scale. Girls in the treatment group (X_{+2}) reported the highest semester GPA in the *Principles of Agriculture* course ($m = 3.14$, $SD = 0.71$), followed by girls in the control group (X_{-2} ; $m = 3.13$, $SD = 0.78$), boys in the treatment group (X_{+1} ; $m = 2.96$, $SD = 0.68$), and boys in the control group (X_{-1} ; $m = 2.20$, $SD = 1.05$).

Table 2

Students' Academic Performance of Treatment and Control Groups (n = 191)

Variable	Treatment (n = 144)						Control (n = 47)					
	Boys (n = 68)			Girls (n = 76)			Boys (n = 21)			Girls (n = 26)		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
LG	2.88	1.11	4.00	3.53	.79	4.00	1.90	1.55	4.00	2.86	1.32	4.00
GPA	2.96	.68	3.00	3.14	.71	2.80	2.20	1.05	3.70	3.13	.78	2.70

Note. LG = Principles to Agriculture Letter Grade; GPA = High School Grade Point Average. LGs were reported as letter grades from A to F. Each letter grade was coded using a numerical value (A = 4.00, B = 3.00, C = 2.00, D = 1.00, and F = 0.00). GPAs were reported on a 4.00 scale.

Student attendance was measured by the reported full days missed with one semester of each student (see Table 3). Girls in the treatment group (X₊₂) reported the highest percentage of students with perfect attendance or no days missed (n = 23), followed by boys in the treatment group (X₊₁; n = 6), girls in the control group (X₋₂; n = 2), and boys in the control group (X₋₁; n = 0). Girls in the treatment group (X₊₂) had the highest percentage of students who missed five days or less (n = 64; 78.3%), boys in the treatment group (X₊₁; n = 39; 67.3%), followed by boys in the control group (X₋₁; 65.0%; n = 13) and girls in the control group (X₋₂; .62.0%; n = 13).

Table 3

Students' Attendance and Behavioral Referrals (n = 168)

Characteristic	Treatment (n = 127)		Control (n = 41)	
	Boys (n = 58)	Girls (n = 69)	Boys (n = 20)	Girls (n = 21)
	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)
Days missed				
0	6(10.3)	22(31.9)	0(0.0)	2(9.5)
1 to 5	33(57.0)	32(46.4)	13(65.0)	11(52.5)
6 to 10	13(22.4)	9(13.0)	4(20.0)	8(38.0)
11 to 15	6(10.3)	1(1.5)	2(10.0)	0(0.0)
16 to 20	0(0.0)	4(5.7)	0(0.0)	0(0.0)
21 to 25	0(0.0)	0(0.0)	0(0.0)	0(0.0)
26 to 30	0(0.0)	1(1.5)	1(5.0)	0(0.0)
Behavioral referrals				
0	38(65.5)	58(84.1)	14(70.0)	19(90.5)
1 to 5	16(27.7)	11(15.9)	3(15.0)	2(9.5)
6 to 10	3(5.1)	0(0.0)	3(15.0)	0(0.0)
10 or more	1(1.7)	0(0.0)	0(0.0)	0(0.0)

Students' behavioral incidents were measured by the number of discipline referrals of each student within one semester. The minimum number of discipline referrals reported was zero and the maximum number of referrals reported by one student was thirteen. Of the student participants, 90.5% of the girls in the control group (X₋₂) reported the highest percentage of

students with no behavioral incidents ($n = 19$), followed by girls in the treatment group (X_{+2} ; $n = 58$), boys in the control group (X_{-1} ; $n = 14$), and boys in the treatment group (X_{+1} ; $n = 38$).

Research objective two sought to determine a relationship between teachers' expectations and students' interest in agricultural education, attendance, academic performance, behavior, and students' interest in an agricultural career. Table 4 displays the results from the Pearson correlation.

Table 4
Pearson's Correlation Matrix for Treatment Teachers' Expectations and Student Performance Outcomes

Variable	1	2	3	4	5	6	7	8	9
1. TEAP	-								
2. TEREf	-.163*	-							
3. TEATT	-.034	.595**	-						
4. TECC1	.278**	-.585**	-.102	-					
5. TEACP8	.796**	-.106	.197**	.149*	-				
6. ASG	.403**	-.198**	-.285**	.080	.300**	-			
7. SGPA	.223**	-.130	-.164*	-.004	.178*	.677**	-		
8. ACP8	.130	.012	.046	.064	.078	.100	.110	-	
9. CC1	.097	.119	-.052	-.026	-.001	.125	.172*	.366**	-

Note. TEAP = Teachers' Expectations for Academic Performance; TEREf = Teachers' Expectations for Discipline Referrals; TEATT = Teachers' expectations for Attendance; TECC1 = Teachers' Expectations' for Student Interest in the Agricultural, Food, and Natural Resources Career Pathway; TEACP8 = Teachers' Expectations for Students Interest in Agricultural Education Pathway; ASG = Agriculture Semester Grade; SGPA = Semester Grade Point Average; ACP8 = Student Interest in the Agricultural Education Pathway; CC1 = Student Interest in the Agriculture, Food, and Natural Resources Pathways. * $p < .05$. ** $p < .01$.

Teacher expectations for academic performance had a statistically significant ($p < .05$) relationship with teacher expectations for referrals ($r = -.163$), with teacher expectations for students' interest in an agricultural career ($r = .278$), with teacher expectations for students' interest in agricultural education ($r = .796$), and with students' semester grades ($r = .403$). Teacher expectations for academic performance had a statistically significant ($p < .01$) relationship with students' semester GPA. Students' semester GPA had a low magnitude, positive correlation ($r = .223$) with teacher expectations for academic performance. There was no significant relationship between teacher expectations for academic performance and teacher expectations for attendance, students' interest in agricultural education, or students' interest in an agricultural career.

Teacher expectations for behavior had a statistically significant ($p < .01$) relationship with teacher expectations for attendance ($r = .495$), with students' interest in an agricultural career ($r = -.585$), and with students' semester grade ($r = -.198$).

Teacher expectations for attendance had a statistically significant relationship with teacher expectations for students' interest in agricultural education ($r = .197$), student's semester grades. ($r = -.285$), and with student's semester GPA ($r = -.164$). with teacher expectations for attendance.

Teacher expectations for students' interest in agricultural education had a statistically significant relationship with students' semester grades ($r = .300$) and with students' semester GPA ($r = .178$) with teacher expectations for students' interest in an agricultural career. Students' semester GPA had a statistically significant ($p < .05$) relationship with students' interest in an agricultural career ($r = .172$).

Spearman's Rho correlations revealed a significant relationship between students' behavior and teacher expectations for academic performance. Student behavior had a statistically significant relationship with students' interest in an agricultural career ($r_s = .152$). Students' semester grades had a negative correlation with students' attendance ($r_s = -.328$). Students' attendance had a significant relationship with students' interest in an agricultural career ($r_s = -.203$).

Conclusions, Implications, and Recommendations

The treatment group had higher semester grades for their *Principles to Agriculture* course. Also, the girls (X_{+2}) and boys (X_{+1}) in the treatment group had a higher high school GPA when compared to their same sex colleagues in the control group (X_{-1} ; X_{-2}). The results imply that across the different school sites, the students in the treatment group had higher academic performance than students in the control group. These findings support the conclusions of Gurian et al., (2009) that single-sex classrooms increase students' academic performance.

The academic performance of boys and girls is a chief concern for educational researchers (Cheema & Gulluzzo, 2013; Legewie & DiPrete, 2012; Morris, 2008). After all, girls are disproportionately more likely than boys to make higher grades in high school, attend college, and aspire for higher status occupations in the workforce (Carter 2005; Lopez, 2003). Some scholars have even classified boys as at risk and disadvantaged (Cook, 2006; Gunzelmann & Connell, 2006; Van Duzer, 2006). The findings from indicate that girls indeed had higher academic performance compared to their male counterparts, regardless of treatment. However, the boys in the treatment group (X_{+1}) outperformed the boys in the control group (X_{-1}). Programs, strategies, and interventions are needed for secondary teachers to improve the academic performance of high school boys. Gurian et al. (2009) argues that single-sex classrooms can allow teachers to give specialized attention to boys which is recorded to improve academic performance; thus, teachers may consider this movement for early entry courses into secondary agriculture.

The scholars posit that girls have greater motivation to do well in school. Some scholars believe that interventions that increase boys' academic motivation is the best way to reduce the underperformance in academics. A study by Schipps et al. (2015) utilized a goal-setting intervention to successfully increase the academic performance of secondary boys. They argue that a written goal program in secondary classrooms allows students to increase internal awareness of their goals which as a result increases self-regulation. Students who have superior self-regulation are more likely to do well in school, graduate, and further their education through post-secondary learning (McClelland, 2018). Therefore, the academic performance of secondary boys may be enhanced with increased self-regulation. The implementation of goal setting programs in secondary classrooms is recommended and indeed needed to be empirically tested.

Interestingly, the treatment group also had the highest percentile of students with perfect attendance compared to the control group. Low school attendance is a powerful predictor of high school dropout (Rumberger, 2011). Kearney and Graczyk (2013) posit that reducing anxiety and disruptive behavior in classrooms are ways to increase attendance among secondary students. If this claim is true, then the increased attendance of students in the treatment group may be due to reduced social anxieties (Hart, 2016) and improved classroom management (Dijkstra & Berger, 2018) in same-sex classrooms. Further research that examines the effects of single-sex classrooms on secondary student attendance and the outcomes that bolster attendance is needed.

The control group had the most students with no discipline referrals compared to the treatment group. A study by Dijkstra and Berger (2018) found that single-sex classrooms reduced physical aggression of students, especially in boys. The reasoning of the discipline referrals was not collected in this investigation, whether the treatment or control group had discipline referrals related to physical aggression is unknown. Therefore, the researcher cannot support the claims of Dijkstra and Berger and further investigation is needed. Overall, boys in this study had a higher percentage of discipline referrals than girls which backs the findings of Downey & Vogt Yuan (2005).

Teacher expectations had seven statistically significant correlations with student outcomes. Teacher expectations for referrals had a low magnitude, negative correlation with teacher expectations for academic performance. In other words, teachers who expected more discipline referrals had lower expectations for a student's academic performance. While teacher expectations for academic performance had a substantial magnitude, positive correlation with students' semester grade and high school GPA. Interestingly, teachers who believed that their students would perform well academically also believed they would have interest in the agriculture, food and natural resources career pathways as well as the agricultural education pathway.

The findings helped to further support research conducted by Glock (2016) in which she discovered teachers' expectations influence academic performance. Performance expectations also coincided with research from Peterson et al. (2016) who reported that teachers with high expectations gained an increase in student performance and teachers with low expectations had a decrease in student performance.

Often, teachers are unaware of their expectations or how they influence their students. For example, a study by Kern and McCowan (2016) found that teachers were unaware of their tendency to call on White students disproportionately to minority students, even though minority students raised their hand proportionally to White students. These teachers would be unable to adapt their response rate without first being exposed to the bias. For teachers to make changes to their implicit behavior, they must first be made aware of their own expectations, biases, and prejudices towards students (King & Schellen, 2014; Vincent, et al., 2014; Whipp, 2013). Teachers may make necessary changes to their interactions with students once they become aware of their expectations and how their beliefs can influence student outcomes.

Therefore, the creation of an assessment for secondary teachers to become aware of their self-fulfilling expectations is warranted. Also, evaluations by administrators to examine teachers'

implicit behavior are recommended. Such observations may also be conducted by peer or mentor teachers. Without creating ways for teachers to understand their own biases and prejudices, teachers may unknowingly hinder students (Accavitti et al., 2016; Vincent et al., 2014; Thompson, 2014; Kumar & Hamer, 2013; Stenhouse & Jarrett, 2012). On the post-secondary level, preservice teachers also need to learn about the hefty influence of their teachers' expectations by student identities, and in the essence of this study, their sexual identification. By doing so, the agricultural education profession can pave a path to closing a present achievement gap among male and female students.

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What Motivates Agricultural Educators to Stay in the Profession? A Quantitative Analysis of Factors Influencing Teacher's Decision to Remain a Classroom Teacher.

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Today, agricultural education's most pressing issue is a lack of qualified classroom teachers. In 2019, twenty-eight states reported the loss of over 70 agricultural education positions with many school's closing the position due to inadequate staffing. Furthermore, in 2019, there were 1,420 agricultural education vacancies nationwide and only 904 graduates of license-eligible agricultural education teacher preparation programs. The teacher attrition rate is cited as one of the main contributors to the shortage of agricultural educators. While there have been many studies examining why teachers have left the profession, the purpose of this study was to ascertain the impacts of various personal, employment, and instructional factors on the decision of agricultural educators to remain in the profession. It was determined, using a series of means, construct scores, and a Multivariate Analysis of Variance (MANOVA), that participating agricultural educators valued all personal, employment, and instructional factors as "Somewhat Impactful" or "Moderately Impactful" in their decision to remain in the profession. Furthermore, it was determined that Florida and Georgia agricultural educators regarded the impact of personal factors and employment factors differently in their decision to remain in the profession.

Introduction

Over the last few decades, the most pressing issue surrounding School Based Agricultural Education (SBAE) has been the lack of qualified agricultural educators (Foster, Lawver, & Smith, 2019). The lack of agricultural educators and educators in other disciplines, has largely been contributed to teacher attrition (Solomonson & Retallick, 2018; Solomonson, Still, & Maxwell, 2021; Hainline, Ulmer, Ritz, Burris, & Gibson, 2015). In fact, 41% of teachers exit the profession within their first five years of employment (Solomonson, Thieman, Korte, & Retallick, 2019). This high attrition rate is contrasted with low teacher education enrollment. In 2019, there were 1,420 agricultural teacher vacancies and only 904 individuals completing a teacher licensure program in agricultural education (Solomonson, et al., 2019). If agricultural education is going to improve attrition rates and retain qualified teachers, it is imperative that education stakeholders understand why active agricultural educators are remaining in the profession.

Review of Literature

For decades, the issue of teacher attrition has plagued American public education (Shen, 1997). Annually, over 157,000 teachers leave the profession and another 232,000 transfer school districts (Mack, et al., 2019). This plight costs American education approximately \$7 billion annually and has been cited as the most pressing issue in public education (Mack, et al., 2019).

Unfortunately, Agricultural Education is not immune to this dilemma and the demand for qualified educators has increased while the supply has decreased (Foster, et al., 2019). This demand for qualified agricultural educators can be seen in the rising number of agricultural

programs in the U.S., the rising number of active agricultural teachers, and the total national enrollment of secondary agricultural students (Foster, et al., 2019). According to the National Association of Agricultural Educators (NAAE), over 605 SBAE teachers that were teaching in the 2018-2019 school year would not return for the 2019-2020 school year (Foster, et al., 2019).

Not only has there been a shortage of educators entering and continuing their careers in education, teacher education programs at the post-secondary universities have seen a dramatic decrease in enrollment. In fact, total teacher education program enrollment has decreased by 10% (Sawchuk, 2015). California teacher education enrollment declined by 53% from 2008-2009 to 2012-2013 (Sawchuk, 2015). This decrease in interest in becoming a career educator is startling and has placed a great stress on the educational system in the U.S. Unfortunately, Agricultural Education has not been immune to the teacher education enrollment decline or the teacher shortage (Foster, et al., 2019). In 2014-2015, the National Association of Agricultural Education identified that over 30 states had a deficit of agriculture teachers with over 400 teachers required to meet the demand nationally (Foster, Lawver, and Smith, 2014). In 2014, there were 10,874 SBAE teachers but in 2018 there were 13,827 (Smith, et al., 2018; Foster, et al., 2014). This 27% increase in teachers is contrasted by the decline in teacher education program enrollment. While there was a net increase in agriculture teachers, in 2019, twenty-eight states reported the loss of over 70 agricultural education positions with many school's closing the position due to inadequate staffing (Foster et al., 2019).

The demographics of teachers exiting the profession can shed some light on the causes of high attrition rates. Research shows that nearly 33% of teachers in all disciplines leave the profession in three years and approximately 50% in the first five years but that teachers with more than five years' experience are more likely to remain in teaching (Mack, et al., 2019; Shen, 1997; Billingsley, 2004). Some studies show that women are more likely to exit the profession earlier than men and that Caucasians are more likely to have higher rates of attrition than other races (Mack et al, 2019). Studies also show that younger and older teachers are more likely to exit the profession than middle aged teachers (Mack, et al., 2019). While there are numerous reasons for teachers leaving the profession, the most common reason cited is career dissatisfaction (Mack, et al., 2019).

While there are numerous reasons for teachers leaving the profession, the most common reason cited is career dissatisfaction (Mack, et al., 2019). This dissatisfaction stems from a multitude of sources including lower pay than other similarly educated careers, presumably better career options, student discipline, workplace conditions, and administrative interference (Mack, et al., 2019). The national average starting salary for teachers with a bachelor's degree is \$41,163 according to the National Education Association (NEA) (National Education Association, 2021). This compares to an average starting salary of \$50,944 for all recent graduates of a bachelor's degree reported by the National Association of Colleges and Employers (NACE) (2021). This below average salary has caused major dissatisfaction among teachers in some areas with salary related strikes becoming more prevalent.

Student discipline, school location and school demographics have also been determined to be a major factor in the decision for a teacher to leave the profession prematurely. Poor student behavior, poor attitude, and low motivation have been cited as reasons negatively

affecting the attrition rates (Mack, et al., 2019). While this is typically true, some research suggests that teachers who work with physical, mental, or learning deficits have greater job satisfaction and lower levels of attrition (Mack, et al., 2019; Shen, 1997).

Workplace conditions also play a major role in teacher's attrition rates. Teachers who are employed in urban schools and schools with limited resources or overcrowded classrooms have all indicated a higher intent to quit (Mack, et al., 2019). Some studies have also found that teachers have higher amounts of stress, more health issues caused by stress, and report an overall lower quality of life than people in other careers (Mack, et al., 2019).

Administrative influence has also been a major influencer in teacher's perception of their position. According to Igo and Perry (2019), Montana State students who graduated in their agricultural teacher education program, entered teaching, and decided to leave the profession cited "inadequate administrative leadership" and "Administrator's actions did not support teaching staff" as two of the most influential factors in their job dissatisfaction and their overall reason for leaving. Multiple other studies have shown similar results in that poor administrative actions cause a significant dissatisfaction among teachers (Moore & Camp, 1979; Mack, et al., 2019; Shen, 1997).

While there is a great deal of literature on why teachers are leaving the agricultural education classroom, there is a lack of literature on why active agricultural educators are remaining in the classroom. If agricultural education and the education profession as a whole is going to lower the attrition rate, retain teachers, and increase teacher education enrollment, it is imperative that education officials understand what factors impact teacher's decision to remain in the profession. Understanding these impactful factors will assist in advertising the benefits of being an educator, improving the working environment for teachers, and replicating those most impactful influences.

Theoretical Framework

The theoretical framework used in the study is the Social Cognitive Career Theory (SCCT) (Figure 1) which was developed from Albert Bandura's Social Cognitive Theory (Lent, Brown, Hackett, 1994; Bandura, 1986). The SCCT depicts the interactions between personal determinants, environmental determinants, and behavioral determinants and how they interact with each other to help individuals make career decisions (Lent, et al., 1994). One of the main concepts in the SCCT is self-efficacy (Lent et al.). Bandura details self-efficacy as "...[individuals'] judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (1986, p. 391). The determinants in the SCCT portrays how agricultural educators make the conscious decision to remain in the profession and how they view their ability to perform the required tasks as a teacher. Often times, there are external factors that can influence a teacher's confidence and/or desire to continue in a position (Moore & Camp, 1979; Mack, et al., 2019; Shen, 1997; Igo and Perry, 2019). If the agriculture teacher shortage and teacher attrition rates are going to improve, it is imperative that researchers study the decision-making process of active agricultural educators and what specific factors impact their decision to remain in the profession.

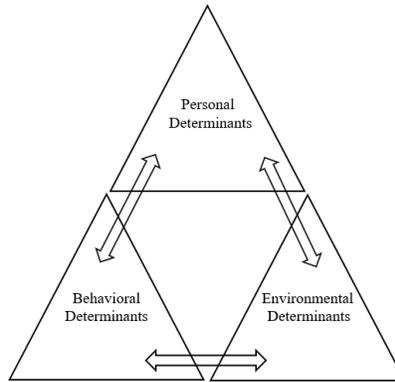


Figure 1. Social Cognitive Career Theory Triad.

Purpose and Objectives

The purpose of this study was to determine the impact of various personal, employment, and instructional factors on active agricultural educator's decision to remain in the profession. This study has the potential to provide insight into Alabama, Georgia, and Florida agricultural educator's reasoning for choosing to retain their career as an agricultural educator. The following research questions were assessed:

- 1.) What were the demographics of agricultural educators in Alabama, Georgia, and Florida?
- 2.) Did agricultural educators in Alabama, Georgia, and Florida value personal, instructional, and employment factors differently?

Methods

The researcher utilized a descriptive correlational research design. The research instrument consisted of two sections, section one measured the factors contributing to Alabama, Georgia, and Florida agriculture teacher's decision to remain in the profession and section two collected demographic data on the participants. The participants were asked to rate factors contributing to their decision to remain in the profession on a five-point Likert-type scale ranging from 1 = Does Not Impact to 5 = Strongly Impacts. The factors measured in the study included employment factors, personal factors, and instructional factors.

A pilot study was conducted with New Mexico agriculture teachers to determine face validity and reliability of the survey instrument. The sample selected for the pilot study consisted of 50 agricultural educators. The pilot study returned a 36.0% response rate ($n = 18$). According to Hill (1998), between 10-30 responses is necessary for pilot studies. The instrument was deemed suitable for the purpose of the study. Reliability coefficients (Cronbach's alphas) were utilized to measure the impact the factors have on the participant's decision to remain in the Profession. The Cronbach's Alpha scores ranged from .709 to .738 (Table 1). According to

Gliem and Gliem (2003), a coefficient greater than .7 is considered an acceptable level of reliability. This suggests the instrument used was extremely reliable.

Table 1

Instrument Reliability Test Results for Personal, Employment, and Instructional Factors

Factors Impacting Employment Decision	α	N Items
Personal Factors	.738	8
Employment Factors	.823	7
Instructional Factors	.709	7

A list of agriculture teachers was compiled using resources from the Alabama State Department of Education, Georgia State Department of Education, and the Florida State Department of Education. The researcher used systematic sampling to determine a random sample. From the list of agriculture teachers in each state, every third teacher was emailed and asked to participate in the study. The final sample contained 101 teachers from Alabama, 206 teachers from Georgia and 173 teachers from Florida (N = 480). A total response rate of 30.21% (n = 145) was achieved.

According to Lindner, Murphy, and Briers (2001), late responders and non-responders are very similar. To assess non-response bias and early/late response bias, a Multivariate Analysis of Variance (MANOVA) was used to compare differences among early responders and late responders. Overall, four emails were sent in weekly intervals to each teacher selected in the sampling to simulate responses. For the purposes of determining nonresponse bias, participants that responded to the first three emails were considered early respondents (n = 104) and participants that responded to the fourth email were considered late respondents (n = 41). After analyzing for non-response bias and early/late response bias, no statistical differences were found.

The analysis of all data occurred using SPSS Version 27. To analyze research question one and two a set of frequencies, percentages, means, standard deviations and construct scores were utilized. Research question three was analyzed using a Multivariate Analysis of Variance (MANOVA).

Results

Research Question One:

Demographic information from this study is presented in Table 2. Female agricultural educators comprised the largest gender group with 55.2% (f = 80) while 44.8% (f = 65) of participants were male. A total of 91.0% of participants were white (f = 132), 6.2% were African American (f = 9), 2.1% were Hispanic (f = 3), and 0.7% of participants were of another race. Of the participants, the average age was 38.71 (SD = 11.17). Furthermore, 13.1% of the participants were 25 years old or less (f = 19), 35.1% were 26-35 years old (f = 51),

34.5% were between 36-50 years old ($f=50$), 16.6% were 51-65 years old ($f=24$), and 0.7% were 65 or older ($f=1$). Approximately 37.2% ($f=54$) of participants highest degree earned was a bachelor's degree, 40.1% had a master's degree ($f=58$), 17.2% had a specialist degree ($f=25$), and 5.5% ($f=8$) had a doctoral degree. The average number years of experience as an agricultural educator was 12.03 years ($SD=9.06$). Furthermore, 2.8% had less than one year of experience ($f=4$), 26.9% had 1-5 years of experience ($f=39$), 26.9% had 6-10 years of experience ($f=39$), 23.4% had 11-20 years of experience ($f=34$), and 20.0% had 20 years of experience or more ($f=29$). The participants report that 79.3% were traditionally certified ($f=115$) and 20.7% were alternatively certified ($f=30$). In addition, 70.3% of participants reported that they were married ($f=102$), 3.4% reported they were divorced/widowed ($f=5$), 9.7% claimed there were dating/engaged ($f=14$), 13.8% are single ($f=20$), and 2.8% preferred to not disclose ($f=4$). Furthermore, 68.3% of the participants had children ($f=99$), 31.0% did not have children ($f=45$), and 0.7% preferred to not disclose this information ($f=1$). The length of employment contracts varied with 8.3% of participants claiming to be on a nine-month contract ($f=12$), 19.3% are on a ten-month contract ($f=28$), 26.3% are on a eleven-month contract ($f=38$), and 46.2% are on a twelve-month contract ($f=67$). The data on employment contracts includes state sponsored days such as extended day/year and RFP grants. Approximately 4.8% of participants claim to coach a sport ($f=7$) and 95.2% do not coach a sport ($f=138$). The size of agriculture programs varied with 52.4% of participants reports they teach in a one teacher department ($f=76$), 39.3% reported teaching in a 2-3 teacher department ($f=57$), and 8.3% reported teaching in a department with 4 or more agriculture teachers ($f=12$). Lastly, 9.7% of participants teach in a city school system ($f=14$) and 90.3% teach in a county school system ($f=131$).

Table 2

Personal Demographics of Participants in Alabama, Georgia, and Florida (n = 145)

		<i>f</i>	%
Gender	Male	65	44.8
	Female	80	55.2
Race	White	132	91.0
	African American	9	6.2
	Hispanic	3	2.1
	Other	1	0.7
Age	25 Years or Less	19	13.1
	26-35 Years	51	35.1
	36-50 Years	50	34.5
	51-65 Years	24	16.6
	65+ Years	1	0.7
Highest Degree Earned	Bachelors	54	37.2
	Masters	58	40.1
	Specialist	25	17.2
	Doctoral	8	5.5
Years of Experience Teaching Agriculture	Less Than One Year	4	2.8
	1-5 Years	39	26.9
	6-10 Years	39	26.9
	11-19 Years	34	23.4
	20 + Years	29	20.0
Teaching Certification	Traditional Certification	115	79.3
	Alternative Certification	30	20.7
Relationship Status	Married	102	70.3
	Divorced/Widowed	5	3.4
	Dating/Engaged	14	9.7
	Single	20	13.8
	Prefer to Not Disclose	4	2.8
Do you have Children?	Yes	99	68.3
	No	45	31.0
	Prefer to Not Disclose	1	0.7
Length of Teaching Contract with State Sponsored Days	9 Month	12	8.3
	10 Month	28	19.3
	11 Month	38	26.2
	12 Month	67	46.2
Do you Coach a Sport?	Yes	7	4.8
	No	138	95.2
# of Teachers in Agriculture Department	1	76	52.4
	2-3	57	39.3
	4+	12	8.3
Type of School System	City School System	14	9.7
	County School System	131	90.3

Research Question Two:

To evaluate research question two, a Multivariate Analysis of Variance (MANOVA) was used to compare construct scores for personal factors, employment factors, and instructional factors for Alabama ($f = 48$), Georgia ($f = 69$), and Florida ($f = 27$). The means, construct scores, and standard deviations for each factor by state is listed in table 4. To screen for multivariate outliers among variables, Mahalanobis distance scores were generated. In the current analyses, there are two degrees of freedom, which equated to a critical Chi-square value of 13.82 ($\alpha = .001$). The test revealed one case with a distance score exceeding this critical value. The response was retained for the analysis due to the limited nature of the outliers.

Table 4

Construct Scores for Factors Impacting Employment Decision (n = 145)

	<i>M</i>	<i>SD</i>	<i>N</i>
Total Instructional Factor's Construct Scores	4.13	.58	145
Alabama	4.05	.59	48
Georgia	4.13	.60	69
Florida	4.29	.49	28
Total Employment Factor's Construct Scores	3.98	.77	145
Alabama	3.86	.80	48
Georgia	4.19	.65	69
Florida	3.66	.88	28
Total Personal Factor's Construct Scores	3.64	.70	145
Alabama	3.58	.72	48
Georgia	3.84	.64	69
Florida	3.24	.64	28

According to Pituch and Stevens (2016), the threshold for tolerance levels when assessing multicollinearity is .10. A test linear regression was used to assess the condition of multicollinearity, and it was found that the condition was not violated (Personal Factor's Construct Scores, Tolerance = .75; Employment Factor's Construct Scores, Tolerance = .73; and Instructional Factor's Construct Scores, Tolerance = .96). Furthermore, Bartlett's Test of Sphericity was statistically significant ($p < .001$) suggesting that the data are sufficiently correlated. To assess multivariate normality, the Shapiro-Wilk's test was used which indicated that two of the three dependent variables violate the multivariate normality assumption.

According to Olson (1974), the MANOVA is robust against deviations from normality assuming limited multivariate outliers. In addition, the assumption of linearity was assessed using Q-Q plots and individual scatterplot matrices and the examination suggests that the condition of linearity is met.

The assumption of homogeneity of covariance matrices was assessed using box test:

Box's M = 10.47, $F(12, 33546) = .84, p = .61$. The nonsignificant result of Box's test suggests that the assumption is met.

A multivariate analysis of variance (MANOVA) was utilized to evaluate the differences in impact of various personal, employment, and instructional factors on agricultural educator's decision to remain in the profession by state of employment (Table 5), and it was found that there is a statistically significant effect: Wilks' Lambda = .845, $F(6, 278) = 4.07, p < .001$.

Table 5

MANOVA Results for Factors Impacting Employment Decisions by State of Employment

Wilks' Lambda	<i>F</i>	Hypothesis df	Error df	Sig.	Partial Eta Squared
.845	4.07	6	278	<.001	.141

To further investigate the statistically significant determination, three univariate Analysis of Variance (ANOVA) tests were used to assess any statistical differences. The test indicated that there are statistical differences within the Employment Factor's Construct Scores $F(2, 141) = 5.85, p = .004$ and the Personal Factor's Construct Scores $F(2,141) = 8.26, p < .001$. Furthermore, the univariate ANOVA's indicated that there were no statistical differences among the Instructional Factor's Construct Scores $F(2, 141) = 1.44, p = .241$. The results from the univariate ANOVA's are listed in Table 6.

Table 6

Univariate Results for Factors Impacting Employment Decisions by State of Employment

Dependent Variable	Type III Sum of Squares	<i>df</i>	<i>F</i>	Sig	Partial Eta Square	Observed Power
Instructional Factor's Construct Scores	.963	2	1.44	.241	.02	.30
Employment Factor's Construct Scores	6.52	2	5.85	.004	.077	.867
Personal Factor's Construct Scores	7.37	2	8.26	<.001	.105	.958

In the post hoc analysis, the Bonferroni criterion was used to discern any differences among Alabama, Georgia, and Florida construct scores. The results from the post hoc analysis is listed in table 7. The post hoc analysis indicated that there were statistical differences in how Florida and Georgia agricultural educators regarded the impact of personal factors ($p < .001$) and employment factors ($p = .006$) in their decision to remain in the profession.

Table 7

Post Hoc Analysis for Factors Impacting Employment Decisions by State of Employment

Dependent Variable	State of Employment	State of Employment	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Personal Factor's Construct Score	Alabama	Florida	.161	.110	-.05	.73
		Georgia	.126	.110	-.57	.04
	Florida	Alabama	.161	.110	-.73	.05
		Georgia	.152	<.001	-.97	-.24
	Georgia	Alabama	.126	.110	-.04	.57
		Florida	.152	<.001	.24	.97
Employment Factor's Construct Score	Alabama	Florida	.178	.772	-.23	.64
		Georgia	.140	.062	-.67	.01
	Florida	Alabama	.180	.772	-.64	.23
		Georgia	.169	.006	-.94	-.12
	Georgia	Alabama	.140	.062	-.01	.67
		Florida	.169	.006	.12	.94
Instructional Factor's Construct Score	Alabama	Florida	.139	.278	-.57	.10
		Georgia	.109	1.000	-.34	.19
	Florida	Alabama	.139	.278	-.10	.57
		Georgia	.131	.696	-.16	.48
	Georgia	Alabama	.109	1.000	-.19	.34
		Florida	.131	.696	-.48	.16

Conclusions, Implications, and Recommendations

The demographic data collected showed that the average participant was a 38.71 year-old white married female with 12.03 years of experience as an agricultural educator, a masters degree or higher, and is traditionally certified. Furthermore, the average participant has children, is employed on a 12-month contract, does not coach a sport, and teaches in a single teacher agriculture program within a county school system.

The MANOVA utilized to discern statistical differences among personal, employment, and instructional factors by state employment indicates that Florida and Georgia agricultural educators regarded the impact of personal factors and employment factors differently in their decision to remain in the profession. This suggests that Florida agricultural educators remain in the profession for more altruistic reasons than educators in Georgia.

Based on the finding in the study, it is recommended that education officials support and enable educators to impact students, improve funding for facilities and agricultural

education activities, and fulfill their personal expectations as a teacher. In addition, it is recommended that research be conducted on the following topics:

- 1.) Reasons agricultural educators left the profession in Alabama, Georgia, and Florida.
- 2.) Reasons for undergraduate students that were previously enrolled in an Agricultural Education program reasoning for changing their major.
- 3.) Determining best practices for recruiting secondary students to undergraduate agricultural education programs.

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Principals' Perceptions on Implementing Extended Contracts

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As the agricultural education profession works to recruit and retain school-based agricultural education teachers, extended contracts have been identified as a possible incentive. School administration plays a crucial role in implementing extended contracts as they are responsible for approving compensation for school staff and educators. The researchers of this study explore the perceptions of secondary principals with school-based agricultural education programs on implementing extended contracts. To do so, the researchers examine their perceptions of extended contracts and factors that impact the implementation of extended contracts. Results indicate that principals find extended contracts beneficial for teachers and programs. Principals perceive the source of funding, situational factors, and stakeholders as influential in their decision to implement extended contracts.

Introduction

Who will be filling the 40,200 additional positions projected to be open for secondary teachers throughout the United States by 2029 (Bureau of Labor Statistics, U.S. Department of Labor, 2020)? Specifically, who will fill the 63 positions left unfilled in agricultural education programs (Foster et al., 2020) with more programs being developed and teachers retiring? To address the teacher shortage (Eck & Craig, 2019; Murray et al., 2011; Lawver et al., 2018), recruitment and retention factors affecting agricultural education have been reviewed in the literature. When exploring why recruitment and retention issues are occurring in the profession, the lack of compensation, personal factors, teacher development, and working conditions came to the forefront (McIntosh et al., 2018; Solomonson et al., 2018; Tippens et al., 2013). Foster et al. (2020) found that the agricultural education profession competes with the agricultural industry for recruits when examining the salary competition occurring. Of the 2,361 teachers surveyed in 2018, 20.3% left to enter agriculture production or industry (Lawver et al., 2018). To address the lack of compensation, states have implemented or encouraged extended contracts (Idaho Agricultural Teachers Association, 2015; Illinois State Board of Education [ISBE], 2017; Schultz et al., 2019). Currently, the average amount of extended contract days nationwide is 33 days (National Association of Agricultural Educators [NAAE], 2020).

Furthermore, limited research has been conducted within the salary sector on how extended contracts (aka summer contracts) have impacted the financial strain on agriculture teachers or the salary competition among the two agriculture sectors. In addition, few studies have examined how administrators perceive extended contracts for agriculture teachers. Therefore, to first analyze how principals perceive the decision of compensation for SBAE teachers, the decision-making process of administrators must be analyzed. Throughout the years, different approaches to analyzing decision-making among principals and school administrators have surfaced. Earlier studies first explored management decision-making among businesses and school districts (Hammond et al., 1980; McFall, 2015; University of Minnesota, 2010). As research became more focused on educational settings, decision-making processes were researched by studying the factors that affect decisions before and after the decision is made (Hammond et al., 1980; University of Minnesota, 2010). However, a more recent study analyzed

the decision-making process as the process of decision-making occurred by examining which stakeholders influence administrators' decisions and how they do so (Brazer & Keller, 2006).

Furthermore, the level of state funding or support has been identified as a possible influence on decision-making concerning extended contracts as there is no national standard or mandate for the contracts. Therefore, some states have mandated extended contracts, while others have provided grants to support extended contracts for agriculture teachers (Flood & Curry, 2021). In states with no state mandate or grant, districts or community members must fund extended contracts for SBAE programs (Flood & Curry, 2021). It is essential to understand the decision-making process of a principal as it can alter the perceptions administrators have on extended contracts for agriculture teachers. Little research has been done on how administrators view extended contracts within the discipline.

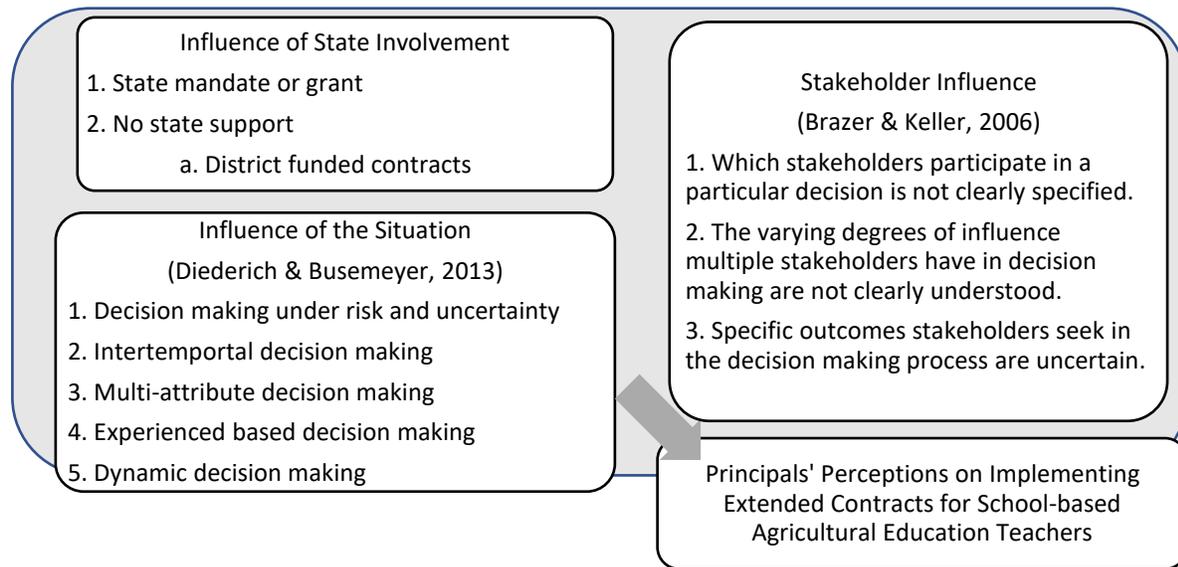
As a portion of a more extensive study that examines principals' decision-making process used when deciding whether to implement an extended contract, this study works first to broadly explore the perceptions principals have about extended contracts for agriculture teachers. Then, the researcher examines the effect of situational, stakeholder, and funding influences on implementing an extended contract. With compensation factors affecting recruitment and retention being identified, it is vital to develop ways for school district principals to help implement interventions. Individual secondary principals whose district has a present school-based agricultural education program will serve as the unit of analysis. The principals' attitudes, experiences, and opinions will determine administrators' perceptions toward extended contracts. Focusing on this unit of analysis is particularly appropriate for this study as social interaction and individual actions are crucial to community cohesion. As the units of analysis, individuals may be characterized in terms of their membership in social groupings (Babbie, 1998).

Conceptual Framework

As there is little research on principals' perceptions of extended contracts in SBAE, a conceptual framework was developed for this study, as seen in Figure 1.

Figure 1

Conceptual Framework



With no national mandate or grant for extended contracts for agriculture teachers, the conceptual framework of this study includes the influence of state support on principals' perceptions and implementation of extended contracts for SBAE programs. Diederich and Busemeyer (2013) identified six types of situations that influence the decision-making process: 1) decision making under risk and uncertainty, 2) intertemporal decision-making, 3) multi-attribute decision-making, 4) experienced-based decision making, 5) dynamic decision making, and 6) decision neuroscience. For this study, the conceptual framework focuses on the first five since the researcher cannot measure decision neuroscience. By measuring how the principals classify the decision to implement extended contracts for agriculture teachers based on how they perceive the situation or condition of the decision, the researcher can explore if uncertainty, risk levels, experiences, and outcomes play a role in implementation.

Three inquiries from Brazer & Keller's (2006) model of stakeholders in decision-making were incorporated into the conceptual framework for this study. The first inquiry, "Which stakeholders participate in a particular decision is not clearly specified," is included in the framework as the study works to identify which stakeholders are a part of implementing extended contracts for agriculture teachers. Their findings suggested that ten stakeholders impact school decisions: school boards, superintendents, parents, teachers, school staff, business leaders, community members, state government, local government, and national and regional associations (Brazer & Keller, 2006). The second inquiry, "The varying degrees of influence multiple stakeholders have in decision making are not clearly understood," allows for the exploration of how much influence each stakeholder has on the decision to implement extended contracts. Lastly, the third inquiry, "Specific outcomes stakeholders seek in the decision-making process are uncertain," studies what principals perceive are the outcomes each of the stakeholders is looking for during deciding whether to implement an extended contract. The last three inquiries not included in the conceptual framework are: 1) Stakeholder involvement is often presented as uniform, yet participation in decision making can vary substantially; 2) Implementation involves multiple stakeholder decision making, and 3) Thinking of decision making as more of a process than an event emphasizes how decisions are modified over time. The last three inquiries are not included in the conceptual framework as they require analysis of

all of the stakeholders involved rather than the perceptions and decisions of the secondary principals.

Purpose of the Study

The study aimed to examine the perceptions of secondary school principals who have a school-based agricultural education program on extended contracts. This investigation aligns with research priority five: Efficient and Effective Agricultural Education Programs under question five, “How can quality agricultural leadership, education, and communication educational programs be delivered in a cost-effective manner?” of the AAAE research agenda (Roberts et al., 2016). The research questions that guided the study were:

1. What perceptions do principals have towards the level of state support needed for extended contracts for agriculture teachers through:
 - a. grants?
 - b. mandates?
2. How is the decision-making process to implement extended contracts for secondary agriculture teachers perceived to be influenced by:
 - a. situational decision-making factors?
 - b. stakeholders?

Methods

The multi-state sample was drawn from secondary principals of the 8,739 SBAE programs throughout the United States. According to Krejcie & Morgan (1970), to generalize the results, 368 responses needed to be collected. To achieve this needed sample size for generalizability, 600 principals were contacted. To determine the sample of principals, two states were randomly selected from each region using the National Association of Agricultural Educators regional map of the United States (NAAE, 2021). States randomly selected were Idaho, Wyoming, Kansas, New Mexico, Minnesota, Wisconsin, Illinois, Missouri, Florida, North Carolina, Maine, and Virginia. States were divided by region to meet geographical diversity. A list of high school agriculture programs in each state chosen was retrieved from the National FFA Organization, as it has the most up-to-date list of agriculture programs. Then, the number of participants randomly selected from each state was determined based on the program's size to achieve a proportional sample. Finally, the researcher developed a list of the principals' contacts of each program selected. A total of 600 principals were selected based on the number of chapters in each state. For example, the sum of chapters of all twelve states is 2199. Since Idaho had 88 of those chapters, 24 chapters from Idaho were contacted since they make up 4% of the total number of chapters.

The survey questions were developed using the three constructs in the conceptual framework. The survey was constructed on Qualtrics®, an online survey creation tool. Using Dillman's (2014) recommended survey implementation steps to improve the response rate, the researcher's first contact was through pre-notification hard copy letters sent hardcopy through the mail asking participants to respond over the web using their personalized link. It included a description of the study, the need for the study, and a promotional license plate to serve as an incentive. On day one, the second contact occurred through an email linked to the survey. On

day six, a second email request was sent to non-respondents. Lastly, the fourth contact occurred on day 18 by sending an email follow-up. Due to the lack of responses, the researcher called each school to speak with or leave a message with each principal who did not complete the survey. Early respondents were compared to late respondent data to determine the generalizability of the results (Armstrong and Overton, 1977) and the limitation of the low response rate. Early respondents were defined as those who completed the survey before receiving a phone call. Late respondents were identified as those who completed the survey after receiving a phone call. Written informed consent was obtained from the study participants when completing the online questionnaire.

Data Analysis

Descriptive statistical analyses were performed on the sample groups to understand the population clearly. Measures of central tendency (means, medians, and other percentiles) and dispersion were computed. The influence of state support through grants was collected through a 5-point Likert scale question (1 = Strongly agree to 5 = Strongly disagree) on the survey. The influence of state support through mandates was collected through a 5-point Likert scale question (1 = Strongly agree to 5 = Strongly disagree). The influence of situational factors was collected by having participants rank the situational decision-making factors from 1 (Most Influential) to 5 (Least Influential) compared to each other. Principals were asked to rank the ten stakeholders (Brazer and Keller, 2006) from 1 being most influential to 4 being not influential.

Survey Validity and Reliability

A pilot test was conducted using a sample of Pennsylvania secondary principals derived from the National FFA online database and school district websites. The pilot test helped identify issues of the survey before sending it to the larger population. Pennsylvania was used for the pilot test for two reasons: 1) Fowler Jr. (1995) recommends 13-35 participants for a pilot test, and 2) Pennsylvania was not randomly selected to be in the sample. To further measure validity, a panel of experts was employed to create the survey instrument. Cronbach's alpha coefficient measured reliability to measure the degree of inter-item reliability of multiple items used to measure one concept within the survey ($\alpha = .918$).

Results

Of the 600 principals contacted, 93 (16% response rate) principals completed the questionnaire. Most participants were male ($n = 78$), female ($n = 14$). The majority described their school and community as rural ($n = 86$), with few describing a suburban school ($n = 7$) and none describing an urban school. When asked if their agriculture teacher is on an extended contract, 75% of participants said yes ($n = 69$), and 25% said no ($n = 23$). Participant's responses varied on the type of extended contract their teacher was on: flat-stipends ($n = 7$), extra allotment of days ($n = 29$), 12-month contract ($n = 18$), 11-month contract ($n = 11$), and 10-month contract ($n = 4$). For those who selected an extra allotment of days, the participants were asked if the allotment was based on the number of days ($n = 26$), the number of hours ($n = 0$), or if they were unsure ($n = 3$). The days allotted ranged from 10 to 40 days ($M = 20$). For those who had an extended contract, most principals fund the contract through the district ($n = 54$).

Principals' perceptions were measured through a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to see how much they agreed extended contracts were beneficial for the agricultural education program, agriculture teacher, and community. Overall, the majority of participants agreed extended contracts were beneficial for the program ($n = 78$, $M = 4.18$), the agriculture teacher ($n = 78$, $M = 4.23$), and the community ($n = 69$, $M = 3.90$).

RQ1a: *What perceptions do principals have towards the level of state support needed for extended contracts for agriculture teachers through grants?*

When asked to indicate how much the principals agree the state should implement a grant to help provide extended contracts on a scale from 1 = Strongly Disagree to 5 = Strongly Agree, the majority of participants strongly agreed or somewhat agreed ($n = 70$, $M = 3.88$). Table 1 illustrates how much principals perceive the state should be involved in implementing extended contracts.

Table 1

Principals' Perceptions on Level of Financial Support from the State

Please indicate how much you agree with the following statements regarding who should implement extended contracts.	<i>M</i>	<i>SD</i>
The state should implement		
a grant to help provide extended contracts to agriculture teachers.	3.88	1.22
a mandate for extended contracts for agriculture teachers.	2.40	1.21
Each school district should decide whether to implement an extended contract for their agriculture teacher(s).	4.57	.89

RQ1b: *What perceptions do principals have towards the level of state support needed for extended contracts for agriculture teachers through mandates?*

When using a scale of 1 = Strongly Disagree to 5 = Strongly Agree, many participants strongly disagreed ($n = 30$) or somewhat disagreed ($n = 22$) that the state should mandate extended contracts for agriculture teachers, as indicated in Table 1. However, instead of state mandates, an overwhelming majority of participants agree ($n = 82$, $M = 4.57$) that districts should decide whether to implement an extended contract for their agriculture teachers.

RQ2a: *How is the decision-making process to implement extended contracts for secondary agriculture teachers perceive to be influenced by situational decision-making factors?*

Participants ranked each situational decision-making factor from 1 being most influential to 5 being least influential. As illustrated in Table 2, the weight of advantages versus disadvantages factor was ranked first most often when compared to the other four factors.

Table 2

Principals' Perceptions on Level of Situational Influence on Implementing an Extended Contract

Situational Factors	<i>M</i>	<i>Mo</i>
Uncertain risk	3.05	3
Outcomes of consequences	2.45	2
Weight of advantages versus disadvantages	2.23	1
Experience they have when implementing contracts outside of school	3.55	5
Events or decisions that may follow the act of implementing contracts	3.72	5

RQ2b: *How is the decision-making process to implement extended contracts for secondary agriculture teachers perceived to be influenced by stakeholders?*

The stakeholders identified by Braver & Keller (2006) were found to be influential in the decision-making process when having to decide whether to implement an extended contract or not. To first answer how stakeholders impact the decision-making process, principals were asked to rank the ten stakeholders (Brazer and Keller, 2006) from 1 being most influential to 4 being not influential. Superintendents were perceived as the most influential ($n = 83$), with school boards closely behind ($n = 76$). Local government ($n = 68$) and state government ($n = 55$) were perceived to have the least amount of influence.

Conclusions and Recommendations

The first question opened the investigation by looking at principals' general perceptions of extended contracts. Most of the participants perceive extended contracts as beneficial for the SBAE program, SBAE teacher, and community. Due to the limitation of the low response rate, the researcher cautions against the generalizability of the findings. Nevertheless, this finding aligns with previous research as extended contracts are beneficial for the teacher, program involvement, and profession (Flood & Curry, 2021; Dryer & Williams, 1997; National Association of Agricultural Educators [NAAE] et al., 1998; Retallick, 2010).

Next, the level of state financial support principals perceived was needed to implement extended contracts was examined. Principals first agreed that state grants would be needed to fund an extended contract. However, most principals agree that the state should not mandate extended contracts as it should be left up to the district to decide whether to implement an extended contract for SBAE teachers. This aligns with what is being seen in various states such as Georgia, Illinois, Minnesota, and Alabama, where grants are provided to local school districts to provide extended contracts for agriculture teachers (Georgia Extended Day Grant Program, 2016; ISBE, 2017; Mackey, 2021; Minnesota Team AG Ed., 2020). In addition, there are states such as Louisiana where agriculture teachers are required to be employed for a twelve-month time period and be paid a twelve-month salary over a twelve-month time period (Landry, 2017). To better understand grant availability and mandate status for extended contracts, it is recommended to conduct a national study of how many states provide a grant or enforce a state

mandate for extended contracts. By doing so, the profession would be able to explore different grant or mandate options. Due to the low response rate, it is recommended to study further the perceptions of school administration on how to implement extended contracts best.

Four of the five situational factors were perceived as influential when implementing an extended contract. Previous research aligns with this finding, as situational factors have been found to impact their decision-making process (Sims, 2011; Tabrizi & Rideout, 2019). However, there is limited research on situational leadership in relation to educational leadership. Therefore, it is recommended to continue research on how situational factors affect principal decision-making. Additionally, as the study did identify how and why the situational factors are perceived to be impactful, it is recommended to examine further the effects of situational factors on implementing school policies such as extended contracts.

It was found that the superintendents and school boards are perceived to be the most influential in implementing an extended contract among the ten stakeholders developed by Brazer and Keller (2006). As superintendents are tasked to serve as the chief advisor to the school board on all matters relating to the school district, it is logical for the principals to perceive these two stakeholders to have the most influence (Association of Alaska School Boards [AASB], n.d.; Colorado Association of School Boards [CASB], 2022). Actions the school board is responsible for that impact extended contracts are governing financial transactions, hiring or firing of employees, and adopting district budgets. As an acting leader of the school board, the superintendent is expected to provide direction and guidance on these matters (AASB, n.d.; CASB, 2022). As a result of superintendents and school boards being perceived as influential in the decision-making process of implementing an extended contract, it is recommended to conduct a similar study on the perceptions of superintendents and school board members on extended contracts.

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How to Get to Implementation: Principals' Decision-making Process of Implementing Extended Contracts for Agriculture Teachers

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How do extended contracts for school-based agricultural education teachers go from the board room to the classroom? As a part of a more extensive study to understand principals' perceptions and decisions on extended contracts, the researchers specifically examine the decision-making process secondary principals go through when deciding whether to implement an extended contract or not for teachers in school-based agricultural education. To do so, the researchers developed a framework to examine how situational factors, stakeholders, and the sources of funding influence principals' decision to implement an extended contract when given a scenario of a teacher asking for an extended contract. Additionally, three principals were interviewed to explore the decision-making process in-depth. Data revealed superintendents and school boards are the most influential stakeholders in extended contract funding decisions. Additionally, district funding is the preferred source of funding for extended contracts.

Introduction

As times have changed from the traditional summer contracts for SAE visits and county livestock fairs (Dryer & Williams, 1970), extended contracts are needed for much more due to increased responsibility (Gross, 2019; Retallick, 2010). School-based agricultural education (SBAE) teachers reported working beyond the compensated time with an average of 55-57 hours of work a week (Cooper & Nelson, 1981; Murray et al., 2011; Sorensen et al., 2017). These hours are composed of work in career development events, FFA conferences, conventions, and SAE visits (Dryer & Williams, 1997; National Association of Agricultural Educators [NAAE] et al., 1998; Retallick, 2010). To address the heavy workload, organizations such as the National Association of Agricultural Educators, the National Council for Agricultural Education, and the American Association for Agricultural Education support extended contracts for agriculture teachers (NAAE et al., 1998). Extended contracts are vital for more than just the workload, as literature shows they are beneficial to educators and retention within the profession as they impact compensation, recognition, and job satisfaction (Flood & Curry, 2021; Gross, 2019; Retallick, 2010; Tippen et al., 2013).

If extended contracts are beneficial and encouraged, how do teachers receive an extended contract? With the absence of a national statute for extended contracts, the type and definition of extended contracts teachers may have are diverse nationwide (Flood & Curry, 2021). For example, the Georgia Department of Education (2016) provides an extended day grant program to agricultural and career and technical education programs where the programs qualify for an extended-day grant salary based on the minimum hourly rate on the state-approved 190-day base salary. However, in the state of North Carolina, all agriculture teachers at the secondary level are required to be employed for twelve months unless the teacher completes a waiver for a 10-month contract that must be approved by the North Carolina State Agricultural Education staff and the Department of Public Instruction CTE staff (North Carolina FFA Association, 2020). Unlike the states above, other states leave it up to the individual districts to determine if there will be an

extended contract and, if so, what type will be provided. Therefore, the administration plays a crucial role in implementing an extended contract as they approve and fund it.

The administration implementing the contract is impactful beyond the reason for additional funding. Involving staff in administrative decision-making has become more critical than ever as there has been an increase in the quality and motivation of academic staff when they are included in the decision-making process (Gürbüz et al., 2017 & Seniwoliba, 2013). According to Summak and Kalman (2020), decision-making in principals is defined as "the method employed by school principals in certain administrative tasks when faced with a situation that necessitates choosing between two or more possible choices or actions to arrive at a conclusion."

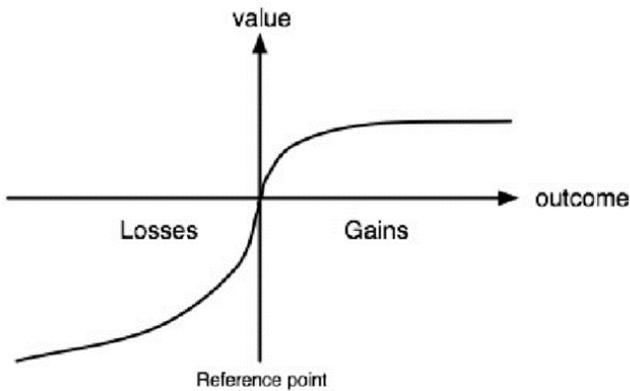
When applying the decision-making of principals to job satisfaction in teachers, Olcum and Titrek (2015) found when a principal had a rational, intuitive, dependent, or avoidant decision-making style, job satisfaction increased among the principal's teachers. However, principals who had a spontaneous decision-making style saw decreased teacher job satisfaction (Olcum & Titrek, 2015). Furthermore, decision-making among principals was found to affect teacher performance as well (Ayeni, 2018; Mailool et al., 2020), as the decisions made by the principals encourage performance in teachers that align with the vision and mission of the school (Murtingsih and Lian, 2017). Therefore, it is essential to study the decision-making processes principals go through when deciding whether to implement extended contracts, as their decision-making style can impact the teachers' job satisfaction and performance.

Theoretical Framework

To begin examining the decision-making process of principals in implementing extended contracts, it is necessary to provide a landscape of theories on decisions, decision-making, and the decision-making process. Hammond et al. (1980) reviewed the decision-making theory, identifying six approaches to encompass a framework for decision-making: decision theory (DT), behavioral decision theory (BDT), psychological decision theory (PDT), social judgment theory (SJT), information integration theory (IIT), and attribution theory (AT). The first three approaches stem from economics, while the latter three lie in psychology (Hammond et al., 1980). The six approaches identified decision-making as a rival between the types of knowledge one has from common sense and refined knowledge (Hammond et al., 1980). In more contemporary research, decision-making can be defined as selecting out of a list of options or alternatives (Fitzgerald, 2002; Ugurlu, 2013). Present decision-making theories tend to focus on the probability function approaches such as the utility theory, rationality model, and the heuristic approach (McFall, 2015). This study examines the decision-making process of secondary principals in a district with a SBAE program to identify the process and factors they consider when considering extended contracts for agriculture teachers using the prospect theory as the theoretical framework. The prospect theory is a decision theory that accounts for attitudes toward risks, probability, and uncertainty when decisions are made. Therefore, it is appropriate to frame the study using the prospect theory as it measures how a conclusion can be altered throughout the decision process. Additionally, the prospect theory is unique as it demonstrates how people's attitudes towards risk differ when concerning gains versus losses along the process, as shown in Figure 1 (McDermott, 2001).

Figure 1

Prospect Theory (Polic, 2009)

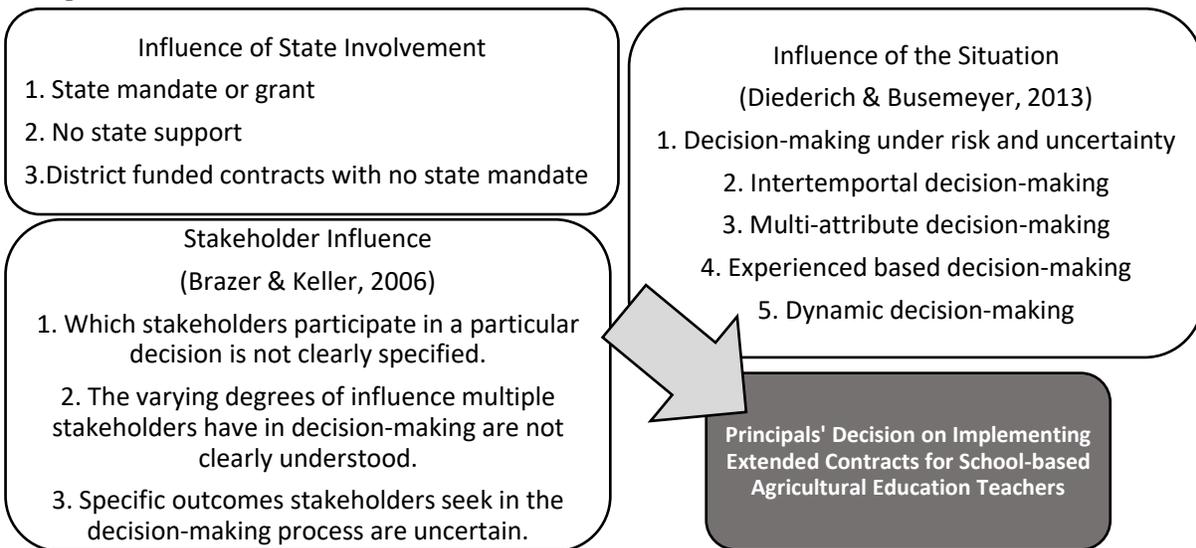


Conceptual Framework

Due to little research on principals' decisions to implement extended contracts, a conceptual framework was developed to examine the three factors that could influence principals' perceptions of extended contracts for SBAE teachers, leading to the ultimate decision of whether to implement extended contracts seen in Figure 2.

Figure 2

Conceptual Framework



As there is no national mandate or grant for extended contracts for agriculture teachers, the conceptual framework of this study includes the influence of state support on principals' perceptions and implementation of extended contracts for SBAE programs. Within the decision-making process, Diederich & Busemeyer (2013) identified six types of decision-making based on situations: 1) decision-making under risk and uncertainty, 2) intertemporal decision-making, 3) multi-attribute decision-making, 4) experienced-based decision-making, 5) dynamic decision-making, and 6) decision neuroscience. Decision-making under risk and uncertainty are the decisions made based on the amount of risk and uncertainty involved concerning the future consequences once the decision is made. Various theories explain risk and uncertainty by evaluating gambling, emotional factors, and simple heuristic models (Diederich & Busemeyer, 2013). Similarly, intertemporal decision-making considers the time of the impact or consequence (Diederich & Busemeyer, 2013). In this study, intertemporal decision-making would be the principal looking at the short-term versus long-term returns of the decision. For example, if the principal had the choice to invest in training for the school versus providing an extended contract to an agriculture teacher, would they see the return or rewards from the training or the extended contract first?

The theories above are missing one piece of the decision-making process: stakeholders. Previous theories explored the people involved in educational decisions throughout the process but only focused on the influence of stakeholders before and after the decision is made (Brazer & Keller, 2006, McFall, 2015). Brazer and Keller's conceptual framework for educational decision-making allows for data collection and analysis of decision-making while the decision is in progress (2006). By grounding the topic through the prospect theory, the three constructs of the influence of state support, situations, and stakeholders measured how different factors affected the frame, value, and weight of choosing to implement extended contracts for agriculture teachers. While using the theoretical framework to shape the approach, instruments, and data analysis, the conceptual framework identified the independent variables literature has found to be factored in principals' decision-making. Based on the literature, it was hypothesized all three factors would influence the decision to implement extended contracts.

Purpose and Objectives

The purpose of the study was to evaluate the process secondary principals of SBAE programs use when deciding whether to implement the compensation incentive. This investigation aligns with research priority five: Efficient and Effective Agricultural Education Programs under question five, "How can quality agricultural leadership, education, and communication educational programs be delivered in a cost-effective manner?" of the AAAE research agenda (Roberts et al., 2016). The research questions that guided the study were:

1. What is the decision-making process principals use to address implementing extended contracts for agriculture teachers?
2. How is the decision-making process to implement extended contracts for secondary agriculture teachers influenced by:
 - a. situational decision-making factors?
 - b. stakeholders?
 - c. the source of funding (state or district level)?

3. Is there a relationship between the decision to implement extended contracts and:
 - a. situational decision-making factors?
 - b. stakeholders?
 - c. the source of funding (state or district level)?

Methods

A concurrent mixed-methods design is appropriate to validate one form of data with the other form, complete a comparison of data, or address different types of questions (Creswell & Plano Clark, 2018; Teddlie & Tashakkori, 2009). Because this study aimed to examine the decisions of secondary principals with a SBAE program on extended contracts for agriculture teachers, a concurrent mix-methods design is the most appropriate choice. Quantitative data collected by the survey instrument was compared to the qualitative data collected from individual interviews conducted by the researchers.

The multi-state sample was drawn from secondary principals of the 8,739 SBAE programs throughout the United States. To generalize the results, a total of 368 responses were needed (Krejcie & Morgan, 1970). To achieve this required sample size, 600 principals were contacted. To determine the sample of principals, two states were randomly selected from each region using the National Association of Agricultural Educators regional map of the United States (NAAE, 2021). States randomly selected were Idaho, Wyoming, Kansas, New Mexico, Minnesota, Wisconsin, Illinois, Missouri, Florida, North Carolina, Maine, and Virginia. States were divided by region to meet geographical diversity. A list of high school SBAE programs in each state chosen was retrieved from the National FFA Organization. Then, the number of participants randomly selected from each state was determined based on the program's size to achieve a proportional sample. For example, the sum of chapters of all twelve states is 2199. Since Idaho had 88 chapters out of 2199, they make up 4% of the chapter total. Therefore, 24 chapters from Idaho were contacted. Then, participants self-selected to participate in a focus group once they completed the online questionnaire. Due to scheduling conflicts faced by the participants who agreed to participate, individual interviews were conducted instead of the planned focus group session.

The researchers developed a questionnaire using the three constructs in the conceptual framework. The survey was constructed on Qualtrics®, an online survey creation tool. Using Dillman's (2014) recommended survey implementation steps to improve the response rate, the researchers' first contact was with an incentive of a promotional license plate and pre-notification letter through the mail asking participants to respond over the web using their personalized link. On day one, the second contact occurred through an email linked to the survey. On day six, a second email request was sent to participants. The last contact occurred on day 18 by sending an email follow-up. Due to the lack of responses, the researchers called each school to speak with or leave a message with each principal who did not complete the survey. Early respondents were compared to late respondent data to determine the generalizability of the results (Armstrong and Overton, 1977) and the limitation of the low response rate. Early respondents were defined as those who completed the survey before receiving a phone call. Late respondents were identified as those who completed the questionnaire after receiving a phone

call. Written informed consent was obtained from the study participants when completing the online questionnaire and interview sessions.

Once all surveys were collected, on day 30, participants who opted to participate in the focus groups received an email with a Doodle poll to sign up for a session. Focus groups were intended to be conducted over Zoom. Each participant received a Zoom link for the time chosen with a passcode to enter the room. Unfortunately, only one principal could join the focus group session due to emergencies at the other schools. Therefore, individual interviews were conducted by sending a Doodle sign-up for individual time slots. The interviews were recorded via Zoom and transcribed by Rev. During the interview, participants completed a 'Choose an Alternative' exercise developed by Krueger (1998) to document the decision-making process derived from Hill et al. (1978). During the 'Choose an Alternative' exercise, the participants were given an hour to discuss whether they would implement an extended contract with a teacher based on the scenario and list alternatives. The 'Choose an Alternative' exercise approach was used as Krueger (1998) found this allows the participants to brainstorm alternatives without the researchers providing pre-selected options. The survey instrument and interview exercise were developed using three constructs: 1) influence of the situation, 2) influence of stakeholders, and 3) influence of state support. During the interviews, participants completed the exercise followed by questions structured around the exercise results.

Data Analysis

Quantitative data were analyzed using SPSS software. Descriptive statistical analyses were performed on the sample groups to understand the population clearly. Measures of central tendency (means, medians, and other percentiles) and dispersion were computed. Qualitative data collected from the interview were analyzed using the constant comparative method developed by Glaser and Strauss (1967). Using this method, the analysis began by constructing categories or themes through open coding. Open coding is defined as a form of coding when the researchers are open to noting anything possible at the early stages of analysis (Merriam & Tisdell, 2016). Once the transcripts were analyzed, the open codes were grouped through axial coding. Axial coding is developed through interpretation and reflection (Merriam & Tisdell, 2016). Categories were constructed and finalized by reviewing the axial coding and conducting a peer debrief. Nvivo software was used to organize and analyze the data to complete coding.

A pilot test was conducted using a sample of Pennsylvania secondary principals derived from the National FFA online database and school district websites. The pilot test helped identify issues of the survey before sending it to the larger population. Pennsylvania was used for the pilot test for two reasons: 1) Fowler Jr. (1995) recommends 13-35 participants for a pilot test, and 2) Pennsylvania was not randomly selected to be in the sample. To further measure validity, a panel of experts was employed to create the survey instrument. The Cronbach alpha for the survey was $\alpha = .708$. Triangulation has been identified as one of the best strategies for measuring qualitative research's credibility or internal validity (Merriam & Tisdell, 2016). It has been defined as a method to increase the credibility and validity of research through multiple methods that provide a balance of explanations to the readers (Noble & Heale, 2019). Dezin (1978) identified four points of triangulation: multiple methods, data sources, investigators, or theories. To address triangulation, three data collection methods were employed through the observation

and recording of the interviews, decision-making process instrument document used by interview participants, and manuscripts read relevant to principal decision-making.

Results

Of the 600 principals contacted, 93 principals submitted a completed questionnaire with a response rate of 16%. Most participants were male ($n = 78$) rather than female ($n = 14$). Most participants described their school and community as rural ($n = 86$), with few describing a suburban school ($n = 7$) and none describing an urban school. When asked if their agriculture teacher is on an extended contract, 75% of participants said yes ($n = 69$), and 25% said no ($n = 23$). Participant's responses varied on the type of extended contract their teacher was on: flat-stipends ($n = 7$), extra allotment of days ($n = 29$), 12-month contract ($n = 18$), 11-month contract ($n = 11$), and 10-month contract ($n = 4$). For those who selected an extra allotment of day, the participants were asked if the allotment was based on the number of days ($n = 26$), the number of hours ($n = 0$), or if they were unsure ($n = 3$). Days allotted ranged from 10 to 40 days ($M = 20$). For those who had an extended contract, most principals fund the contract through the district ($n = 54$). When asked whether to implement an extended contract for the teacher in a proposed scenario, 82 participants said yes, while eight said no.

Quantitative Results

RQ2a: How is the decision-making process to implement extended contracts for secondary agriculture teachers influenced by situational decision-making factors?

To better understand how situational decision-making factors, stakeholders, and funding impact implementing extended contracts, a scenario was posed to see how the factors would be applied. In the scenario, Mr. Martin is an agricultural education teacher at the local high school. The agriculture program has a greenhouse, woodshop, and aquatics program. Mr. Martin must maintain the facilities over the summer. Additionally, he attends Career Development Events, FFA conferences, and SAE visits to complete the three-circle model. To meet all model components, he puts in roughly 55 hours a week. He has kept a record of the hours outside of his 9-month contracted time. He has asked for extended contract time. Using the scenario, principals were asked how much they agree with statements related to the five situational decision-making factors on a 5-point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree). Responses varied on if uncertain risks would impact implementing an extended contract for Mr. Martin with 36.8% disagreed ($n = 35$), 31.6% were neutral ($n = 30$), and 29.5% agreed ($n = 28$) uncertain risks would impact their decision to implement an extended contract. A majority of principals agreed ($n = 62$) that outcomes that resulted from implementing an extended contract for Mr. Martin would impact a decision to implement an extended contract for a future teacher. The majority of principals also agreed ($n = 67$) that they would need to compare the advantages and disadvantages of implementing an extended contract for Mr. Martin before implementing an extended contract. A little over 50% of participants agreed ($n = 49$) that past experiences with

having teachers on extended contracts would influence their decision to implement an extended contract for Mr. Martin. Most of the participants agreed ($n = 62$) that their decision to implement an extended contract for Mr. Martin would be impacted by the events that would follow if they did implement the contract.

RQ2b: *How is the decision-making process to implement extended contracts for secondary agriculture teachers influenced by stakeholders?*

The stakeholders identified by Braver & Keller (2006) were found to be influential in the decision-making process when having to decide whether to implement an extended contract or not. To answer how stakeholders impact the decision-making process, principals were asked to rank the ten stakeholders (Brazer and Keller, 2006) from 1 being most influential to 3 being not influential based on the level of influence they would have on providing Mr. Martin an extended contract. Superintendents were perceived as the most influential ($n = 88$), with school boards closely behind ($n = 82$). Local government ($n = 58$) and national and regional associations ($n=56$) have the least influence.

RQ2c: *How is the decision-making process to implement extended contracts for secondary agriculture teachers influenced by the funding source (state or district level)?*

Principals were asked to identify the funding source they would most likely use to implement an extended contract if they were to provide one for Mr. Martin. The sources of funding they could choose from were state, district, or local funds. Eighty-two of the 93 participants indicated they would support an extended contract for Mr. Martin. Those who identified they would implement an extended contract were first asked to pick between state funds ($n = 33$) and district funds ($n = 48$). Next, most participants chose between district funds ($n = 70$) compared to local funds ($n = 11$). Lastly, many participants chose between state grants ($n = 61$) compared to local funds ($n = 20$).

RQ3a: *Is there a relationship between the decision to implement extended contracts and situational decision-making factors?*

Participants who said they would implement an extended contract for Mr. Martin perceived each situational factor as less influential than those who said they would not execute an extended contract for Mr. Martin; however, the difference was insignificant when conducting an independent sample t-test.

RQ3b: *Is there a relationship between the decision to implement extended contracts and stakeholders?*

An independent sample t-test found there was no significant difference between the level of influence for each stakeholder and the decision of whether to implement an extended contract or not for Mr. Martin except for superintendents. Table 1 illustrates the level of influence superintendents are perceived to have on the decision to implement an extended contract and the decision to implement the extended contract for Mr. Martin.

Table 1*Relationship of Superintendent Influence and Implementation Decision*

Stakeholder	Yes to Implement (<i>n</i> = 81)		No to Implement (<i>n</i> = 8)		<i>t</i> (87)	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Superintendent	1.012	.111	1.25	.463	-3.792	<.001	.169

RQ3c: *Is there a relationship between the decision to implement extended contracts and the source of funding (state or district level)?*

When asking participants to pick which funding source (state, district, and local) they would want to use to implement an extended contract, participants had to decide between two sources at a time: district versus state, state versus local, and local versus district. District and state funding were chosen more often than local funding. District funding (*n* = 48) was chosen more often than state grants (*n* = 33) when the two were compared. As district and state funding was more likely to be selected than local funding, the researchers compared what contract would be chosen between the district and state funding among participants who would implement an extended contract versus those who wouldn't implement an extended contract. When asked how they would fund a position if they had to implement an extended contract, more participants who would implement an extended contract selected district funding (*n* = 44) over state grants (*n* = 4). Conversely, more participants who wouldn't implement an extended contract selected district funding (*n* = 26) over a state grant (*n* = 7).

Qualitative Findings

Once principals completed the questionnaire, they were given the option to participate in a focus group session. The five participants who expressed interest were emailed a Doodle poll link to identify the availability of all participants. Once all participants provided availability, a date was scheduled for the Zoom focus group session. On the day of the scheduled session, one principal could participate. Therefore, the researchers conducted an interview using the decision-making exercise template and questions. The four participants who did not attend were emailed a link to sign-up for a one-on-one interview with the researchers. Of the four contacted, two participants completed a one-on-one interview. The three participants were males who had previously been a teacher before taking on being a principal. One participant had been an SBAE teacher.

RQ1: *What is the decision-making process principals use to address implementing extended contracts for agriculture teachers?*

Qualitative Research Themes:

After reviewing all level 1 codes and emergent level 2 codes in observations, interviews, and document analysis, three themes regarding principals' perceptions and decision-making related to extended contracts emerged. The three themes are:

1. Principals need a log of hours to implement an extended contract.

2. Principals perceive stakeholders involved in the decision to implement an extended contract as advocates or decision-makers.
3. Principals perceive extended contracts as a possible liability.

The Necessity of a Log of Hours

A keyword that appeared when asked what the first steps were in deciding whether to implement an extended contract was a log. All three interviewees said they would require the SBAE teacher to keep a log of hours in a Word document or in the Agricultural Experience Tracker (AET) to generate a PDF report as a form of data collection. In the log, interviewees identified the need for the total hours worked, a description of the work, and the total number of students involved. In addition, the log would tangibly show the superintendent and school board's justification for the extended contract. Kenny shared how the log would help justify the extended contract by showing that these hours are helping the school reach its' goals.

Jerome elaborated, "It says that they have the greenhouse, they have their career development events, but how much time are they spending with students? And what are they doing with their time to justify that need for that extended contract? So, is it that they're just going up and taking care of this greenhouse, or are they meeting students up there to take care of their greenhouse?"

Student Impact Hours

When comparing the three interviews, a key factor the researchers did not consider was the potential impact the extended contract had on students influencing the decision to implement an extended contract. Within the log, there is a difference between the SBAE teacher working in the greenhouse alone and working in the greenhouse with students. In other words, the hours SBAE teachers spend during extended contract time are expected to be spent working directly with students.

Dennis elaborates, "The ag program is a CTE-funded program because we get money when our kids take their certification test, so like vet assisting. It's a three-year program at Santa Fe that if a student goes through it and passes the certification test, our county is given money for that and helps our school grade because we get acceleration points for that. And I know it wouldn't shock you to know that we do very well on those tests because the kids are prepared by the teachers, and really it's the teacher's drive in the program."

Therefore, it has been found that the administrators and school board want to see the amount of time spent and how many students are directly impacted by the time spent and how they are impacted.

Accountability

Once an extended contract is approved, the log of hours is essential, as the principals shared they wanted to ensure the SBAE teachers were held accountable for the number of hours they were given. This would ensure there is tangible evidence of the services done by the teacher to meet the goals laid out by the school, as Kenny expressed. Further, Jerome shared how the log of hours increased transparency, "We want to make sure that they're accountable for what they're doing...And that way, we can be accountable to our stakeholders, our public, to the board, and

then be accountable to the public as well." Additionally, Dennis shared how an extended contract kept the school district accountable as a stipend is less reliable in his eyes, "...from a budgetary standpoint, it was much easier for me as a principal because with stipends you always have to worry about did the county transfer the money. So, when it became extended contract that alleviated that burden."

Stakeholders: Advocate versus Decision-Maker

The quantitative component of the study identified the level of influence the ten stakeholders had but did not identify where the impact occurred or what the influence looked like. By having the interviewees go through the six-step decision-making process using the scenario involving Mr. Martin, the influence of the stakeholders could be explored.

When discussing what type of data would be needed to begin, Jerome shared who the data was ultimately for first, "The principal and the teacher can be an advocate for that, but the decisions are ultimately made at the board level. And even the superintendent can be an advocate for it. Most of the time, if the principal is on board with the teacher and the superintendent, then the board will support that."

To provide more context, Jerome begins the data collection by asking how the teacher and himself will present this to the board. Dennis shared the same plan, "I'll build the plan, pitch it to the superintendent. I get the teachers and kids involved. Then it goes to the board for approval. And the superintendent and the principal's responsibility are to sell the idea to the board." Ultimately, the principals identified themselves and superintendents as the advocates for an extended contract and the school boards as the decision-makers. When asked why the school board is seen as the decision-maker, all participants explained the school boards have to approve all contracts. An unexpected finding was Jerome listed students, community members, and FFA alumni as possible advocates when it reached the board. Something to highlight is how Dennis and Jerome both shared how students are stakeholders who can be advocates when the extended contract is proposed to the board.

Liability

Another unexpected finding concerning liability was identified as both a reward and a risk that comes with an extended contract in the eyes of an administrator. A reward related to liability is identified by Dennis when sharing a motto he lives by because of the livestock on their school grounds, "I'm never going to be in the paper because a cow got loose and got hit by a car." By providing an extended contract, he and the school board feel the school is less likely to face liability issues in the future. Another reward identified by Jerome was the school district wouldn't have to worry about the facilities and program falling apart during the summer. Still, Jerome identified an extended contract as a risk in terms of liability because "you're not on school grounds when you're doing most of this stuff. So, what is the liability of you doing your work but not on school grounds?" To elaborate, the worry of what is happening during this time, as well as what if something happens during this time if the SBAE teacher is off-campus or no one is at the school to see, is shared among the interviewees.

Conclusions and Recommendations

This mixed-methods investigation of principals' decision-making on extended contracts for SBAE teachers yielded several findings. First, when asked to pick whether the district or the state should fund the extended contract implemented for Mr. Martin's scenario, more principals chose the district providing the funding. Furthermore, a majority of the principals agree the state should not mandate extended contracts as it should be left up to the district to decide whether to implement an extended contract for SBAE teachers. It was found the principals began the decision-making process by working with the SBAE teacher to keep a log of hours that includes how many hours they have worked outside of their contracted time as well as how many students were impacted and how the students were impacted during those hours. Once the hours have been collected, the principal works with the teacher to advocate for the extended contract. To do so, the principal first works to get the superintendent on board. Then, the principal and superintendent serve as advocates when the contract is presented to the school board. Finally, they work to identify additional advocates such as students, community members, and business leaders to promote the contract during the school board meeting. Data from the scenario question in the questionnaire revealed that the majority of participants agreed they would need to compare the advantages and disadvantages of implementing an extended contract for Mr. Martin. Most of the participants also agreed past experiences, future events that followed, and future outcomes impacted their decision to give Mr. Martin the extended contract. Uncertain risk was the only decision-making factor that did not affect most of the participants' decisions.

Among stakeholders, superintendents and school boards are perceived to have the most influence on the decision to implement an extended contract than the other eight stakeholders identified by Brazer and Keller (2006). When examining the reason why, the qualitative analysis found that superintendents are the advocators who influence the school board's decision-making. Since the school board makes contractual decisions, they were ranked as the second most influential stakeholder. Although they do not make the end decision, superintendents are perceived as most influential as it was shared that the school board usually follows the superintendent's lead. Further, it was found that the influence of the superintendent was significant when comparing those who would or would not implement an extended contract. This finding supports research by Bridges and Plancher (2019) that found superintendents and school boards perceive superintendents as the lead influencers of school board members. To understand why principals perceived the best funding source as district funding during the quantitative analysis, the qualitative analysis investigated the decision-making process. It was found that principals perceived that the districts needed to take ownership of paying their employees to ensure they were not working for free.

As principals identified themselves as advocators instead of decision-makers, conducting a similar study on superintendents and school board members is recommended. As the researchers identified superintendents specifically as the leaders of schools, it would be beneficial to compare the decision-making process of the principals and superintendents. Examining what superintendents are looking for when approving extended contracts is encouraged to help SBAE teachers advocate for an extended contract. One participant suggested as well that local industry partners could provide funds for extended contracts through the creation of summer programming the business leaders and SBAE teachers could collaborate on to improve student career opportunities and skills. Therefore, it is recommended to examine

further how often business leaders are providing funding for extended contracts and if that would influence superintendents' decision to implement an extended contract.

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We've Crossed a Line: A Philosophical Examination of Systemic Implications Surrounding SBAE Teachers' Attempts at Boundary Setting

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This philosophical paper situates the system of SBAE in light of teachers' attempts at boundary work. We define the system of SBAE through a Social Ecological Resilience approach, particularly by examining publications in JAE from 2021 to examine what SBAE demands of its teachers. Having worked with SBAE teachers over the last two years as they have struggled with attempts at boundary ownership, we question what this personal struggle indicates about a broader system. We argue for a bounded system by which respect for boundary ownership is reciprocated as an expected norm. We conclude by situating solutions oriented around the factors of Social Ecological Resilience theory. This work engages individuals across the system, rather than just the teachers, toward systemic accountability and transformation.

Introduction

Vignette: *I'm overworked when I arrive at school hours before my first class starts and stay late almost every day to fit all the tasks in. I feel unappreciated when colleagues get upset if I don't respond to an email they send after 5:00 PM. I resent when I give everything I have, but my administrator tells me to do more. I'm annoyed when I see other teachers on Instagram because it makes me feel like I'm not doing enough. I'm shameful when my husband feeds the baby a bottle instead of me nursing her. The guilt of taking a weekend off or saying no to a project feels as though I'm letting students down. I feel shameful when parents compare our program to more successful programs; to teachers who are always at school. I feel all of these things, but how can I say no to the growing list of expectations? How can I say no when I know I'll be judged by parents, community members, and my peers in the profession? How can I create boundaries in this job when the expectations are endless and the demands ever-growing? Boundaries and work-life balance sound nice, but they aren't realistic expectations for this profession. I know I need them, but I just don't see how to make them a reality.*

Purpose & Significance

The purpose of this philosophical paper is to expose characteristics of the broader system of Agricultural Education and its influence on School-Based Agricultural Education teachers. We used teachers' attempts at boundary work and their felt inability to reclaim boundaries as the basis for attaining this purpose. First, we offer a way of thinking about SBAE as a system using Social Ecological Resilience theory (SER) (Gunderson, 2000; Folke, 2006) as a guiding framework. Second, we explore the ways in which SBAE teachers are positioned as actors within the system of Agricultural Education, specifically how they interpret the demands of the system and how they are indoctrinated into the system. Finally, we offer discussion on how tenets of SER help address system breakdowns and challenges, making a call for accountability to all invested in the Agricultural Education system.

Assumptions & Limitations

Our work with teachers and subsequent approach to the system of Agricultural Education is underpinned by these key assumptions:

1. Teachers experience a felt need to engage in boundary work. This assumption has been reified by over 550 workshop participants across the United States and the continued engagement of over 600 SBAE teachers in a boundary-support Facebook group (Facebook Page, 2021).
2. Boundary work is intentional, agentic, and essential in all areas of life (Cloud & Townsend, 2017). Boundary reclamation extends beyond the work-life balance or resilience conversation to engage an emotional process of work (Hochschild, 2012).
3. The ability or inability to enforce boundaries is both a function of personal choice and permission from the system to enact the desired boundary (Cloud & Townsend, 2017).
4. When actors have the freedom to set boundaries, power is an expression of mutual respect (Cloud & Townsend, 2017). In this way, boundary setting is an act in relationship to the system.

We approached the system of Agricultural Education by focusing on the Journal of Agricultural Education (JAE) as we explored the resilience of a system beyond an examination of its actors (i.e., SBAE teachers). We recognize the limiting nature of this approach, particularly as we view JAE as an actor—or individual(s) with agency—within the system, and are unable to address the education system at large. However, JAE is a logical starting point given the recommending nature of publications toward understanding the system of Agricultural Education and those who interact with it.

Situating the Problem

In 2019, we hosted our first boundaries workshop for secondary SBAE teachers. While the opening vignette is a compilation of things we have heard from teachers, it could also describe any individual teacher on a given day. Guided by the work of Cloud and Townsend (2017) and Tawwab (2021), our workshop defined boundaries as limits between someone or something, where your job stops and where it starts, and the necessary expectations to allow one to feel comfortable, stable, and safe in their work. Since then, we have hosted 20 workshops with over 550 participants in 12 states and at four nation-wide professional development events. These workshops reached SBAE parents, preservice teachers, and veteran teachers from small and large departments, rural, suburban, and urban communities, and those teaching a variety of subjects in various program structures. During these workshops, we asked participants to share their experiences of boundary struggles and circumstances in which their boundaries were crossed or ignored. We then offered strategies to reclaim boundaries and be agentic in their work and life.

Several realizations resulted from this work. Workshop participants struggled with work-related boundaries. They felt crossed-boundaries most poignantly when perceived expectations were imposed upon them, their personal time was impeded due to various work-related obligations, and when various individuals (e.g., parents, students, administration) expected uncompensated commitment. It became evident agriculture teachers were interacting with blurred boundaries—a lack of defined limits or bounds—in their chosen vocation. Operating this way often resulted in frustration, feeling overworked, unappreciated, guilty, shameful,

disrespected, and overwhelmed (Cloud & Townsend, 2017). SBAE teachers in our workshops knew they needed to say “no” to additional commitments and expectations in order to protect and enhance their physical and mental well-being. Yet, external forces (e.g., community members, parents, students, other SBAE teachers, professional associations, professional norms) said otherwise. Our participants discussed feeling like they could not say “no” or put limits on their work, because saying “no” would negatively impact their program, reputation, students, or identity as an SBAE teacher. However, they also felt a deep need to reclaim their boundaries. Teachers spoke of missing children’s bath times, family reunions, home-cooked meals, and other life events due to work outside contracted hours. They were constantly asked to sit on committees, attend meetings, or accept other requests without being given time, opportunity, or resources to complete their other work. They mentioned pressures from state FFA or SBAE Teacher and CTE associations to fight for their programs and professions at the local, state, and national levels. They voiced a need for change (which is often why they chose to attend the workshop in the first place), but struggled to manage the tension between personal agency and external forces. Discussing boundaries allowed agriculture teachers to think about how they interacted with their work and the ramifications of those interactions.

These boundary workshops revealed something much bigger than the individual struggles of SBAE teachers. Our conversations with teachers exposed dysfunctionalities and problems in a broader system and profession. Teachers’ failed attempts at boundary ownership are evidence of system dysfunction. SBAE teachers do not feel like they have, can have, or are able to enforce boundaries. Teachers cannot keep attempting to set boundaries in a system that does not reciprocate.

Situating the System

Agricultural Education as a Resilient System

Acknowledging the limitations of research attending to single dimensions of a discipline, scholars have called for more holistic approaches in SBAE, including systems-based research (Kitchel, 2021; Pauley et al., 2019). A contextually defined specialization within the SBAE discipline warrants this systems approach (Harder et al., 2021). Therefore, we examined SBAE teacher attempts at boundary setting by conceptualizing SBAE as a complex system, an essential but uncommon approach within the discipline. Conceptualizing SBAE as a system required acknowledging the multitude of actors comprising the system. Actors within SBAE include, but are not limited to, students, teachers, administrators, community members, state staff, industry representatives, teacher educators, parents, alumni, associations and organizations, communities, and school systems (Phipps et al., 2008). We posit actors within SBAE are interrelated, however, do not share equal agency in directing the current or future direction of the system. For example, a vocal parent group or popular administrator may hold significantly more power than the SBAE teacher regarding decisions about the local agriculture program. Similarly, a teacher educator may shift components of the SBAE system by emphasizing certain concepts, theories, or practices in their curriculum or publishing a policy piece that influences state education practices. Embracing a systems-based perspective necessitates acknowledging and evaluating the distribution of agency across actors within a system when creating change. Thus, systems work often results in recommendations for reallocating agency by shifting traditional paradigms. In

this paper, we utilized SBAE teacher attempts at boundary setting to expose and critically analyze the SBAE system toward such recommendations.

Our systems-based evaluation is grounded in a Social Ecological Resilience framework. Social Ecological Resilience stems from ecological research exploring the ability of natural habitats to remain the same during patterns of disequilibrium (Holling, 1973). The inclusion of human interactions within these ecological investigations led to the emergence of a social-ecological framework (Gunderson, 2000; Folke, 2006). In this framework, resilience is defined as social and/or ecological systems maintaining similar identities as they interact with other social and/or ecological systems. Therefore, resilience can be a positive or negative attribute of a system. For example, if SBAE remains intact during challenging economic times, we may consider this positive resilience; however, if SBAE fails to evolve in alignment with emerging agricultural technologies, we might consider this negative system resilience. This enables a consideration of SBAE as a system which interacts with other systems (e.g., policy, other academic disciplines, agricultural industry); a definition that veers from existing SBAE literature and perspectives situating resilience as an individual attribute (Easterly & Myers, 2018; Thieman et al., 2012; Thieman et al., 2014). Recognizing resilience is not always favored, the framework includes two structures for system change. Adaptation is a change localized to one system element (Nelson et al., 2007; Smit & Wandel, 2006) and transformation is a change which permeates the entire system (Gunderson & Holling, 2002).

As we operationalize the Social Ecological Resilience framework to explore boundaries in SBAE, we must acknowledge SBAE is both a system itself as well as a composition of systems. As an example, SBAE teachers are actors within the system of SBAE; however, can also be viewed as a system themselves. Viewing SBAE teachers as a system means we can consider their resilience as they interact with other actors within the SBAE system (e.g., administrators, community members, parents) and actors external to the SBAE system (e.g., family, friends, spiritual/religious group). In this paper, we conceptualize SBAE teachers' attempts to reclaim boundaries as adaptations localized to one element of the SBAE system (i.e., the teachers) and argue the limits of these attempts towards resilience in a system that doesn't accommodate them. The perspective of SBAE teachers being a system embedded within SBAE provides an essential foundation to consider boundaries, resilience, adaptation, and transformation within SBAE.

Understanding SBAE Teachers as Actors in a System Seeking Resilience

To situate SBAE teachers in the conceptualized system, we used the articles published about SBAE in the Journal of Agricultural Education (JAE) in 2021 to understand what adaptations of SBAE teachers and the SBAE system are needed or recommended. We constrained our review to 2021 to align with the most recently available work produced in the system. Recognizing boundary work often comes about in response to perceived expectations (Cloud & Townsend, 2017), we focused on conclusions, implications, and recommendations pertaining with sentence stems indicating what SBAE programs and teachers “should,” “are,” and “need” (e.g., “teachers *need* additional professional development,” or “teachers *should be* advocates for their program to their administration”). In addition to the 22 articles discussing SBAE published in the JAE during 2021, four additional JAE articles focused on the broader system of SBAE. These shed light on teachers' interpretation of the demands of SBAE and

indoctrination within the system, accompanying the initial 22 articles in illuminating how the system indoctrinates teachers.

Interpreting the Demands of the System

Four articles elaborated the demands of SBAE from the teachers' perspective. These articles outlined the system of SBAE, identified how teachers operated in that system, and examined work-life balance in SBAE.

Not surprisingly, SBAE teachers functioned in a complex system of multiple accountability partners with varying expectations, low margin for error, high levels of competition, and intense need for validation (Traini et al., 2021b). To maintain effective operation within this landscape, teachers worked long days, piling on work to fulfill expectations (Traini et al., 2021b). They strove to meet expectations of individuals holding power in the landscape by meeting reified markers of professional success (e.g., winning awards), often at the expense of personal and familial goals. This manifested personal fear, pressure, self-consciousness, lack of confidence, inadequacy, stress, and tension as SBAE teachers navigated a low margin for error, judgment, and competition with and to those they felt accountable (Traini et al., 2021b). SBAE teachers felt silenced in their struggle to prioritize personal goals and create boundaries. They could not voice their challenges to individuals in power as those individuals invalidated their struggles (Traini et al., 2020). Cumulatively, this landscape required SBAE teachers to engage in intense emotional work as they sought belonging and meaning within their chosen profession (Traini et al., 2021b).

While these challenges painted a bleak picture to situate SBAE teachers, they also maintained their own resilience within the system. Clemons et al. (2021) identified teachers coping with challenges in their careers through family, peer, and spousal support and success in their local program. SBAE teachers, however, were reluctant in addressing professional challenges with their peers and counterparts (Clemons et al., 2021). They used student success and the autonomy afforded by their local program to function within a demanding profession (Clemons et al., 2021). However, SBAE teachers found themselves in a constant “tug-of-war between career and family” (Clemons et al., 2021, p. 109). Teachers bargained away personal capital as they struggled with boundary ownership to gain professional success through activities closely aligned with their self-worth as a teacher (Clemons et al., 2021). Teachers found their work affirming and were validated by professional success and achievement, but these evaluations did little to capture the personal sacrifice of the most overworked (Clemons et al., 2021).

Finally, teachers adjusted, appeased, and rearranged as they reconciled the multiple demands of the SBAE profession (Traini et al., 2021a). Their attempts to be good, successful, or competent required constant modification based on perceived expectations and varied accountability (Traini et al., 2021a). SBAE teachers navigated too many responsibilities to feel they were rearranging them effectively, and constantly worked to convince themselves (and others) of the legitimacy of revised competencies (Traini et al., 2021a). Perhaps most condemning was teachers' awareness of operating within and appeasing power dynamics to survive and find support (Traini et al., 2020; Traini et al., 2021a).

These navigations implied a power dynamic by which the system exerted influence over the teacher rather than a mutually resilient system. As we will see, the system imposed requirements of adaptation on the SBAE teacher with little accountability on the system to maintain resilience through transformation. This is both problematic and unsustainable. Continued demands for adaptation from the teacher without systemic transformation will continue to yield teacher shortages (Foster et al., 2021). Beyond maintaining the profession through supply and demand, we must look beyond survival to opportunities for accountable resiliency enabling the broader system to flourish.

Indoctrination Within the System

Against the backdrop of Agricultural Education as a system and the demands SBAE teachers interpret from the system, we are better equipped to understand how the system adapts through SBAE teacher efforts. To do this, we will outline the themes from 22 JAE conclusions, implications, and recommendations pertaining to what SBAE programs and teachers “should,” “are,” and “need.” We started with JAE as a source of knowledge regarding the system. Starting where knowledge is produced and disseminated makes logical sense when challenging the systemic implications of the individual experience of crossed boundaries.

SBAE Teachers Should. A substantial number of recommendations congregated around what SBAE teachers “should” add to or maintain in their practice. Four practices received the most attention: professional development, classroom practices, building the SBAE community, and local community development.

Researchers publishing in JAE recommended teachers attend additional professional development to understand and integrate the researched teaching strategies (Coleman et al., 2021; Thiel & Marx, 2021), grow in content specific competence (Clark et al., 2021; Toft et al., 2021; Wells et al., 2021b; Wells & Hainline, 2021), explore the norms of SBAE teachers and build relationships (Moser & McKim, 2021), and familiarize themselves with liability protection (Hainline et al., 2021). In addition to learning about new teaching strategies or growing in specific content, JAE researchers also recommended implementation of various classroom practices. These included reflection strategies (Coleman et al., 2021), inclusive and liberating pedagogy (Austin et al., 2021; Hartmann & Martin, 2021), student centered teaching (Bird & Rice, 2021; Thiel & Marx, 2021), interdisciplinary curriculum for increased subject representation (Moser & McKim, 2021), lab preparation days and flipped classrooms (Bird & Rice, 2021), and classroom rules (Hainline et al., 2021).

Research suggests teachers should also enact the role of building the SBAE community. This involved participating in additional mentoring and collaboration (Bird & Rice, 2021; Eck et al., 2021; Thiel & Marx, 2021), sharing resources and materials (Bird & Rice, 2021; Hainline et al., 2021; Swenson et al., 2021; Thiel & Marx, 2021), actively engaging in facilitating professional development (McKendree & McKim, 2021; Wells et al., 2021a & b), and building relationships (Moser & McKim, 2021). While these ideals have been long standing tenets of the SBAE profession, there was a further expectation of the SBAE teacher to do these *and* ensure their local community knew about it. Teachers were encouraged to educate their school administration (Doss & Rayfield, 2021), learn more about their advocates to better garner their

support (Bird & Rice, 2021; Pratt et al., 2021; Wells & Hainline, 2021), complete needs assessments (Toft et al., 2021), and adapt and be innovative (Hartmann & Martin, 2021).

In addition to the above, JAE researchers also advocated teacher growth in the areas of student and program development (Austin et al., 2021; Hainline et al., 2021; Hartmann & Martin, 2021; Pratt et al., 2021; Swenson et al., 2021; Thiel & Marx, 2021; Toft et al., 2021) and practitioner growth (Doss & Rayfield, 2021; Eck et al., 2021; Moser & McKim, 2021; Wells et al., 2021b). All this, in addition to maintaining classroom practices (Coleman et al., 2021; Doss & Rayfield, 2021; Toft et al., 2021), an integrated program (Pratt et al., 2021; Moser & McKim, 2021; Thiel & Marx, 2021), competence (Eck et al., 2021; Wells et al., 2021; Wells & Hainline, 2021), dispositions (Bird & Rice, 2021; Doss & Rayfield, 2021; Moser & McKim, 2021; Wells et al., 2021b), and compliance (Doss & Rayfield, 2021; Hainline et al., 2021). These “shoulds” are reified in the National Association of Agricultural Educators (NAAE) awards and recognition criteria as effective classroom and lab instruction, work-based learning implementation, student leadership development, supportive partnerships, effective marketing, and professional engagement (NAAE, 2022). Notably, only one recommendation released teachers from an expectation, as McKibben and Murphy (2021) contributed: “[Teachers should] feel empowered to stray from the widely accepted norms of providing ‘real-world’ authenticity in their project-based learning activities, and move into more novel projects that stimulate student interest and creativity” (p. 153). Arguably, even this release may implicate a need to cease current practice to find completely new methods and activities.

SBAE Teachers Are. The identity of the SBAE teacher has been well documented prior to our review (Roberts & Montgomery, 2017; Shoulders, 2018; Shoulders & Myers, 2011). While none of the articles in 2021 specifically mentioned SBAE teacher identity, several conclusions, implications, and recommendations described what SBAE teachers are. These illuminated teacher dispositions and personality, characteristics, deficits, and assets. Even for 2021, the assets of what SBAE teachers “are” was no small list. SBAE teachers were described as innovative and early adopters (Bird & Rice, 2021; Thiel & Marx, 2021; Wells et al., 2021a), student centered (Bird & Rice, 2021; Swenson et al., 2021; Thiel & Marx, 2021), competent, well trained, and proficient (Clark et al., 2021; Hainline et al., 2021; Wells et al., 2021b), essential (Wells et al., 2021b), seeking growth (Haddad et al., 2021; Wells & Hainline, 2021), experienced (Doss & Rayfield, 2021; Wells & Hainline, 2021), able to bring the real world into their classrooms (Bird & Rice, 2021), relying on existing support (Eck et al., 2021), and familiar with models in thinking and education (Bird & Rice, 2021; McKendree & Washburn, 2021).

Yet, in addition to these accolades, other dispositions (Haddad et al., 2021; Ismail & Miller, 2021; Thiel & Marx, 2021), and characteristics (Bird & Rice, 2021; Eck et al., 2021; Haddad et al., 2021; Hainline et al., 2021; Moser & McKim, 2021; Solomonson et al., 2021; Toft et al., 2021), SBAE teachers were also described with several deficits. These included lack of awareness (Austin et al., 2021, Thiel & Marx, 2021), struggling for balance in an integrated program (Thiel & Marx, 2021), lacking competence and confidence in several subject areas (Bird & Rice, 2021; Clark et al., 2021; Hainline et al., 2021; Thiel & Marx, 2021; Wells & Hainline, 2021), and encountering implementation barriers (Bird & Rice, 2021; McKendree & Washburn, 2021).

SBAE Teachers Need. One might hope to find a more supportive picture painted in the 2021 recommendations for what teachers need. Arguably, to meet the demands of the “should” and “are” categories, teachers likely “need” several things to set them up for success. The research, however, pointed to additional needs for the teacher, further removing accountability from the system and imposing resilience on the teacher to adapt to it. Most of the “need” recommendations focused on teacher professional development with others scattered around various resources. Overwhelmingly, SBAE teachers were portrayed as in need of content-related professional development (Hainline et al., 2021; McKendree & Washburn, 2021; Thiel & Marx, 2021; Wells & Hainline, 2021), though McKendree and Washburn (2021) advocated for new models of delivery.

Underwhelming, however, was the address of the resources SBAE teachers may need to fulfill the things they should be and are to their local programs. Resource needs were loosely scattered across support (Ismail & Miller, 2021; Pratt et al., 2021; Thiel & Marx, 2021), time (Thiel & Marx, 2021), conscious administrators (Haddad et al., 2021; Ismail & Miller, 2021), supplies and equipment (Bird & Rice, 2021), collaboration (Bird & Rice, 2021; McKendree & McKim, 2021), curricular support (Bird & Rice, 2021; Solomonson et al., 2021) and working environment (Ismail & Miller, 2021). While stated, most gave only cursory nods to the need rather than suggesting particular funding streams or opportunities outside the teacher’s own additional effort in securing funding. None addressed concessions for “should” and “are” if the necessary resources were not made available to the teacher. This gap alone shines a glaring spotlight on the indoctrination within the system to make personal sacrifices to do more with less.

SBAE Programs Should. Thus far, our one year review has illuminated how JAE perpetuates the SBAE system’s indoctrination of teachers in terms of what they should be, who they are, and what they need. Substantial recommendations from JAE in the last year addressed the teacher, with very few addressing what SBAE programs should be. This onus on the teacher further builds a case for a system requiring adaptation without transformation. Even among the scant recommendations for programs, few presented a holistic, community-oriented approach to a program, further suggesting additional work for the SBAE teacher as they developed partnerships with diverse organizations (Austin et al., 2021; Hartmann & Martin, 2021), expanded the adoption of science integration (Coleman et al., 2021; Thiel & Marx, 2021), included principals in activities and goal setting (Doss & Rayfield, 2021), and developed communities (Hartmann & Martin, 2021; Thiel & Marx, 2021).

Seeking Resilience

Where implications congregated bore significance for discussing SBAE as a resilient system. Notably, what programs “should” be and do received the least attention across the board, implicating a focus on the SBAE teacher rather than the local and other systems in which they act. In addition, teachers “need” received relatively little attention in the 2021 JAE publications. This exposed a perpetuation of a system asking teachers to be and do more without additional accountability on the system to provide further resources and support. Furthermore, little research existed to call the system into account. In this case, what isn’t said serves as a greater tell than what is. Recommendations for research tended to reiterate continued needs in specific lines of inquiry without holistic address of the broader actors or systems. When addressed, local

administrators received cursory attention (Austin et al., 2021; Doss & Rayfield, 2021; Eck et al., 2021; Haddad et al., 2021; Hainline et al., 2021; Ismail & Miller, 2021; Pratt et al., 2021; Rice & Bird, 2021; Solomonson et al., 2021; Thiel & Marx, 2021; Traini et al., 2021a; Traini et al., 2021b), but largely at the initiative of the SBAE teacher. Meanwhile, school boards, educational organizations, parent organizations, and others were not addressed with any significant scope. Scant recommendations called influencing organizations (FFA, NAAE, AAAE, NASAE, and others) into account. At best, the reviewed research sought to address the system by offering recommendations for pre-service teacher preparation programs. These recommendations included sharing research findings (Coleman et al., 2021; Haddad et al., 2021), encouraging implementation of programs, techniques, strategies, and initiatives (Swenson et al., 2021; Thiel & Marx, 2021; Toft et al., 2021), and providing additional training in specific content areas (Clark et al., 2021; Hainline et al., 2021; Wells et al., 2021b). Certainly, this paints a challenging picture to reconcile indoctrination within the system. If little exists to examine how SBAE programs are operating, it follows that researchers must point to the individual teacher to reconcile systemic shortcomings. It is almost justifiable, then, that little would be advanced to support additional needs of the teacher to address the broader system, given this lack of accountability.

Few recommendations, to date, suggested teachers could take anything *off* their already overflowing plate, instead demanding that teachers are not doing enough to satiate a system asking more of them with each passing year. In fact, if addressed, teachers were asked to continue improving and seeking balance to better navigate the system (Clark et al., 2021; Eck et al., 2021; Solomonson et al., 2021) and grow in their competence (Bird & Rice, 2021; Toft et al., 2021; Wells & Hainline, 2021). Certainly, we could argue for more support at the state or local level, but if research is important in informing that work, those publishing in JAE must be proactive in advancing recommendations addressing broader system transformation, rather than adaptations for individual teachers.

Situating Solutions

The resilience of the SBAE system is evident in its longevity. The history of agricultural education, however, is not absent of change. In fact, research suggests agricultural education has continually adapted to remain relevant (McKim et al., 2017). Our investigation into the recent literature offers a valuable glimpse into the adaptive and resilient nature of the discipline. Specifically, the 2021 research implies the work done to make the discipline resilient falls disproportionately on the shoulders of teachers while the benefits of resilience are enjoyed by all actors within the system. Therefore, we conclude the resilience of the agricultural education system is more adaptive than transformative, as only one component of the system (i.e., teachers) experiences the burdens of change.

Placing the weight of resilience on teachers is unsustainable; therefore, we envision a system in which resilience is the product of diverse actors within the system adapting and, when necessary, transforming the entire system. To inform this vision, we turn back to the Social Ecological Resilience framework for insight into characteristics which support system-wide ownership of change. Social Ecological Resilience literature identifies multiple factors which increase the ability of a system to adapt or transform to change and, thus, remain resilient. These factors include diversity and redundancy, connectivity, managing slow variables and feedbacks,

complex adaptive thinking, learning, participation, and multiple decision-making hubs (Biggs et al., 2012; Pauley et al., 2019).

The first factor, diversity and redundancy, refers to the importance of a system having actors with different functions as well as a system in which multiple actors are able to enact the same function (Kotschy et al., 2015). Diversity and redundancy support system resilience as these elements enable a response to diverse threats and opportunities *and* allow the system to progress should one actor within the system, and their abilities, be lost. The second factor, connectivity, suggests systems in which more closely connected actors are able to coordinate the actions of the system in response to external changes (Biggs et al., 2012). The third factor, managing slow variables and feedbacks, entails recognizing and intervening to address variables (e.g., enrollment trends, evolving teacher demographics, accumulation of teacher responsibilities) that influence the system over extended periods of time (Biggs et al., 2012). Complex adaptive thinking, the fourth factor, shifts attention to the way individuals think about the systems in which they operate. A system characterized by complex adaptive thinking is one where actors see the world as dynamic, non-linear, and interconnected (Pauley et al., 2019; Salomon et al., 2019). The fifth factor, learning, indicates systems are more resilient when the knowledge within the system is expanding and evolving. Systems which exemplify this factor are consistently seeking new ways to learn, expanding their knowledge of the system, and identifying effective ways to transfer knowledge to actors throughout the system (Pauley et al., 2019). The sixth factor, participation, entails a system in which actors are involved in making decisions which impact themselves (Biggs et al., 2012), a factor supported by system diversity, learning, and connectivity. The final system factor is multiple decision-making hubs. Related to participation, multiple decision-making hubs entail multiple groups empowered to contribute meaningfully to system operation, adaptation, and transformation (Pauley et al., 2019; Salomon et al., 2019). In total, these factors suggest a system in which all actors are meaningfully collaborating to learn about, evaluate, and manage the system, and are more prepared to experience adaptation, transformation, and resilience.

To examine potential adaptations and transformations to the SBAE system, it is useful to think about how we can employ the seven factors to support system-wide ownership change. And, while this is not the purpose of this paper, we offer a brief example to utilize a system breakdown as an entry point into a conversation about systems resilience. During nearly every boundary workshop, participants felt overworked and exhausted from work duties extending beyond contracted hours (e.g., FFA events, CDE practices, managing facilities, travel). Participants noted enjoying this aspect of the job, but felt guilty, shameful, and resentful for working during these hours due to consistently missing personal or familial activities such as child pick-ups and activities, family meals, or evening hobbies. Afterschool and weekend activities for SBAE teachers have been the status quo for decades, and much of the SBAE system is built upon the need for SBAE teachers to devote significant non-contracted hours to non-classroom activities, regardless of compensation. This is evident through the SBAE system's reifications (e.g., three-component model, award structures and qualifications, university curriculum, etc.) and participation (e.g., Instagram posts, NAAE messaging, ways of positioning SBAE teachers superior to other teachers, etc.). Despite this persistent challenge, echoed both by our workshop participants and in the literature (Clemons et al., 2021; Traini et al., 2021a; Traini et al., 2021b), few, if any, systems-wide efforts have addressed it. Instead, SBAE teachers are

told to keep their struggles to themselves (Traini et al., 2020) or find ways to adjust, appease, or rearrange their work to manage the expectations (Traini et al., 2021a).

Rather than placing the adaptation work solely on the shoulders of SBAE teachers to address this challenge, we can operationalize the factors of the Social Ecological Resilience model, both in a diagnostic and prescriptive manner, to examine adaptations and transformations to hold multiple actors in the system accountable. Employing the seven factors with this example, we can quickly see the lack of diversity and redundancy (i.e., SBAE teachers are expected to perform all duties of SBAE program), threats to connectivity (e.g., the isolation of teachers in their classrooms and the competitive nature of SBAE), and lack of slow variables and feedbacks (e.g., continued accumulation of teacher responsibilities). Additionally, we see limited participation by the SBAE teacher (e.g., if the community expects long-standing traditions to be continued or when the state association asks SBAE teachers to complete additional paperwork), and limited decision-making abilities (e.g., teachers are rarely convened to engage in systems-level conversation).

To address this issue, systems adaptation and transformation might involve hiring non-teaching professionals to manage the local SBAE program or FFA chapter (diversity and redundancy), emphasizing collaborative relationships between SBAE teachers rather than competitive ones (connectivity), or redefining SBAE teacher position descriptions to reduce teaching load and/or reallocate teaching, coaching, and program managing duties (slow variables and feedbacks). Additionally, multiple actors such as teacher educators, state staff, and national organization leaders could convene with SBAE teachers to illuminate tensions within the system and work together to reimagine the agricultural education model (participation, multiple decision-making hubs). With these adaptations and transformations in place, our beginning vignette may sound different:

Vignette: *The expectations associated with my job align with my assigned FTE, which is 40% teaching and 60% program management. I have sufficient time to perform these expectations during the workday, and well. If I find myself spread too thin, I am comfortable having conversations with my administrator, booster club, and advisory board to discuss adjustments to the program and my role in it. My colleagues honor my commitment to taking my son to swim meets in the evenings, which helps me be a more-present parent. Our program's recent strategic planning meeting resulted in a refined program vision where we "do less, but do it well," resulting in fewer afterschool and weekend commitments. The state's new program evaluation metrics emphasize community demographics and needs, allowing us to focus on initiatives that better benefit our students and community. I feel heard, seen, and valued as a SBAE teacher. I am able to consistently show up for students and family in a way I am proud of.*

An Invitation to Accountability

In this philosophical paper, we used teachers' attempts at boundary work to expose characteristics of the broader Agricultural Education system and its influence on SBAE teachers' felt inability to reclaim boundaries. As examined from the perspective of boundary setting attempts to understand SBAE as a resilient system, we find a system that develops the actors hoping they will be resilient enough to survive. Rather than allowing interactions that permit adaptations to evolve toward system transformation, our system exemplifies "survival of the

fittest.” The teachers who make the necessary adaptations (i.e., sacrifices) survive. Yet, we must make a turn to transform the system itself by asking the difficult questions aligning with a systems-oriented paradigm. This will require reciprocal and accountable resiliency. What follows are some recommendations for beginning this work.

Given our emphasis on JAE, and the opportunities of its contributors to interact with various actors in the system, we must consider how our research efforts report recommendations and address challenges without limiting the potential of teachers. Our processes must engage practitioners in participatory research, especially to consider feasible recommendations. Currently, if one sought to review the literature (even from a condensed period) to determine what it means to be an effective SBAE teacher, they would find a cyclical narrative to which they could not measure up. In addition to the self-fulfilling prophecy that becomes the literature review process, recommendations limited in scope to the current research question fail to capture more systemic issues. While we could argue for more support at the state or local level, if we are to suggest that research is important in informing that work, we must be proactive in advancing recommendations that also address broader system transformations, rather than adaptations for individual teachers. It bears reminding, scholars in agricultural education often enjoy access to resources not afforded SBAE teachers (e.g., time to read and process literature, support staff, technology, funding). When speaking to the profession via research, scholars must situate recommendations within the constrained realities of SBAE teachers. Extending recommendations to include funding for implementation, necessary policy reviews, and address of diverse actors in the system could lend starting points to this process.

In addition to considering adaptations for practicing teachers, further evaluation of SBAE programs must support additional actors in transforming local structures for the SBAE teacher. Few recommendations embraced the community-oriented approach to programs that SBAE advances as central (Phipps et al., 2008). If SBAE programs are to meet the needs of the communities they serve with sustainability, longevity, and adaptability, they must engage additional actors. This is not to dismiss the role of the teacher, but the teacher must be allowed to step back from roles of counselor, scheduler, judge, accountant, and coach (Traini et al., 2020). Transformation of this nature starts at home, but not without transformation at the systems-level to make local-level changes feasible.

As an academic association, we have established teachers as well equipped for this work. The assets highlighted above are not bad things. We admire teachers for being innovative, student centered, competent, well-trained, proficient, seeking growth, being experienced, bringing the world into their classroom, being well-read, and relying on support. However, our current system does not exist in a way that allows any individual to be *all* of these things. While it is not the place of three researchers to define what the system must be to allow this, we ask the following questions to advance the conversation: Which adaptations do we continue to uphold as core tenets of what an SBAE teacher should be? Which best align with relevance-increasing transformations enacted and embraced by all actors within a truly resilient system? Put another way, how do we reassess what teachers need (awareness, balance, competence, confidence, barrier free implementation) to evaluate the system’s demands? Does a system exist in which SBAE teachers can graduate prepared, competent, and well-situated to initiate their community’s vision for an integrated program? Is our system bound in such a way as to promote power as an expression of mutual respect?

As a system, and as scholars within it, we must be willing to evaluate our patterns of disequilibrium as keys to unlocking systemic transformation. We cannot continue with a “survival” mentality, in which adapting by setting boundaries is for the weak. SBAE teachers should not live in a system where boundary-setting takes enormous acts of courage– an uphill battle met with resistance. Fear of setting boundaries is natural (Cloud & Townsend, 2017). The expectation not to have them is a disrespectful abuse of power that will continue to maintain systemic disequilibrium. If SBAE does not have clear boundaries, how can anyone expect to have a lasting and meaningful relationship with it?

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Teaching Systems Thinking Using Hypothetical Case Scenarios: An Exploration in Agricultural and Natural Resource Education

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Abstract

Educators within agricultural and natural resource disciplines are tasked with educating students to critically engage with and problem-solve complex issues. As society's relationships with science and technology changes, coupled with an information-dense environment, strategies for sustainably addressing complex issues are needed. One potential approach for strategically addressing complex problems is systems thinking, which emphasizes the interdependence of the components of systems from ecological, social, and economic perspectives, among others. A mixed-methods study was used to explore the applicability of hypothetical case scenarios (HCS) as a teaching method to introduce and engage students in using systems thinking related to the seafood industry. Findings suggested HCS engaged students to think critically about socio-scientific issues. Participants demonstrated systems thinking capacity when discussing their decision-making processes in the hypothetical cases. The current study demonstrated the pedagogical potential of using HCS to enhance systems thinking capacities for students in the ANR disciplines. Implications for education and recommendations for future research are discussed.

Introduction

Scholarship at the nexus of agricultural and natural resources (ANR), both in the social and natural science disciplines, aims to address many of the complex, wicked problems facing the world (Pauley et al., 2019). Previous scholars have noted the potential to find solutions to wicked problems at times may seem to be an insurmountable challenge, especially with the public being exposed to vast amounts of information daily - information which can often be contradictory and factually incorrect (Ruth et al., 2018). To address complex challenges within ANR industries, researchers, practitioners, and policymakers will “require multiple perspectives and systems thinking to develop and implement sustainable solutions” (Andenorno et al., 2016, p. 58) as public perception increasingly drives markets and industry across the globe.

The relationship between science, technology, and society has become increasingly fluid in the 21st century, with society setting much of the agenda for science and technology - a stark contrast to previous decades (Fensham, 2014). With this new relationship dynamic, it is imperative for educators within ANR disciplines to foster critical thinking skills and reframe science controversies as socio-scientific issues to account for the role of society in the decision-making and agenda-setting processes (Fensham, 2014). Socio-scientific issues are defined as complex and/or controversial issues related to science and technology (Chen & Xiao, 2021).

Socio-scientific issues, purposefully integrated into students' formal science curriculum, may help connect STEM education to sustainable development (Onwu & Kyle, 2011).

One such issue within ANR is the impact of human activities on marine ecosystems (Hamilton & Safford, 2015). The human dimension of environmental issues within marine coastal ecosystems is significant (Hamilton & Safford, 2015; Rees et al., 2013). Overfishing and the contamination of marine ecosystems present a significant challenge to global food security (McLeod & Leslie, 2012). Empirically observed shifts in climate patterns, more frequent and intense weather events, ongoing changes to agricultural systems, and coastal flooding, all play a role in both marine ecosystems as well as the seafood industry (Hamilton & Safford, 2015; Intergovernmental Panel on Climate Change, 2007; McLeod & Leslie, 2012). Large-scale, global changes can impact local marine ecosystems, including disruptions from algae blooms and coastal development projects that increase regional vulnerability to flooding (Bauer et al., 2010). Additionally, these changes have aesthetic, recreational, and economic consequences that impact the lives of populations living near coastal ecosystems (Hamilton & Safford, 2015).

Aquaculture and the seafood industry have the potential to help sustainably feed a growing global population and to increase jobs, including opportunities within rural areas (Mazur & Curtis, 2006). However, there are social and ecological challenges facing the seafood industry that may inhibit sustainable food production and distribution, including lack of trust, perceived risk, and tensions between local, regional, and global stakeholders with competing interests (Mazur & Curtis, 2006). The public has also increased their awareness around the impacts of the seafood industry, leading the industry to begin adopting more sustainable standards for production (Belton et al., 2009). The intersection between public awareness and policy development for the seafood industry requires ANR students have the skills to critically engage with these socio-scientific issues to increase their efficacy in problem solving and generating solutions for sustainability in ANR disciplines (Onwu & Kyle, 2011; Ruth et al., 2018; Skladany et al., 2007; York et al., 2019).

Pedagogical tools which make explicit the relationship between humans and the environment can enhance science education by involving the cognitive and affective domains of experience (Littledyke, 2008). One method for enhancing cognitive and affective connections with scientific ANR content is hypothetical case scenarios (HCS). HCS, also known as choose-your-own-adventure scenarios, are a broadly used teaching method (Ferreri & O'Connor, 2013; McKim & Torres, 2010) and have been used as part of the gamification of learning process intended to enhance student engagement within the classroom (Bechkoff, 2019). HCS tools for teaching presents students with realistic scenarios and then provides an opportunity for them to support and justify their decisions within a structured group environment (Scott et al., 2021). By using HCS, participants are presented with a choose-your-own-adventure style of branching scenarios (Sider et al., 2021). Despite the potential utility of such an educational approach, little is known about using HCS to teach about complex issues related to ANR making it worthy of exploration as a potential pedagogical tool for improving learner engagement in the learning process (Bechkoff, 2019).

Conceptual Framework and Literature Review

The conceptual framework for this study was systems thinking. For the purposes of the present study, systems thinking was conceptualized to include characteristics generally associated with systems thinking in educational settings. According to Brandstädter et al. (2012), “*structural system thinking* is the ability to identify a system’s relevant elements and their interrelationships, altogether determining the system’s framework” (p. 2148) and “*procedural system thinking* is the ability to understand the dynamic and time-related processes that emerge from the systems’ structure, particularly occurring in within systems’ elements and subsystems” (p. 2148). Therefore, systems thinking was operationalized in the study to include both the ability to discern the relevant elements and relationships between system parts as well as the time related effects associated with events within a system.

In an increasingly interconnected and unpredictable world, systems thinking is a skillset that can identify the root of complex problems and propose interventions to improve outcomes (Rutherford, 2019). Systems thinking approaches can be described as those which emphasize the interdependence of component parts of a dynamic system and their interactions with other social, cultural, environmental, economic, political, and behavioral systems (Mahaffy et al., 2018; Sanders et al., 2021). Pauley et al. (2019) called for ANR scholars and practitioners to “foster complex adaptive systems thinking among their stakeholders through education and outreach” (p. 142). Experts have attempted to define systems thinking through multiple disciplinary lenses (Arnold & Wade, 2015) to reframe the ways in which problems are viewed and solutions proposed (Cabrera et al., 2008). Arnold and Wade (2015) present systems thinking as an increasingly necessary skill set required for leaders in a complex, interconnected world and defined it as “a set of synergistic analytic skills used to improve the capability of identifying and understanding systems, predicting their behaviors, and devising modifications to them in order to produce desired effects” (Arnold & Wade, p. 675).

Systems thinking has been used to improve the quality of professional programs (Dolansky et al., 2020), influence policy-makers (Haynes et al., 2020), and enhance student learning and abilities to tackle complex problems in STEM education (York et al., 2019). One method through which systems thinking can be understood is with the use of systems archetypes, which are commonly recurring behavior patterns within various systems (Rutherford, 2019; Senge, 1990). Archetypes, once understood, can be recognized within a situation and allow for systems thinkers to map out the scenario according to the archetype’s characteristics and more deeply investigate a problem (Rutherford, 2019). The three archetypes of interest in the current study are: the tragedy of the commons, fixes that backfire, and accidental adversaries. The tragedy of the commons archetype occurs when a common, collective resource becomes depleted as a result of individuals or groups taking too much demonstrating how the actions of individuals can affect the collective good (Rutherford, 2019). The fixes that backfire archetype occurs when a problem keeps repeating itself despite efforts to fix it. Often, unintended consequences occur as a result of competing or opposing long- and short-term needs (Rutherford, 2019). The third archetype, accidental adversaries, the unintentional action of one partner negatively affects or harms the interest of another partner, leading the two to develop into adversaries (Rutherford, 2019).

To date, few studies have examined how systems thinking archetypes may be integrated into a formal classroom environment as an educational tool. Even fewer studies couple systems thinking archetypes with a case study method. Generally, systems thinking archetypes or

approaches are applied to the analysis of data rather than in the educational intervention itself. Bardodel and Haslett (2004) use systems archetypes to develop case studies to facilitate learning in the classroom, though they examined different archetypes proposed by Senge (1990). Systems thinking HCS approaches have been found to be complimentary to experiential pedagogy (Bardodel & Haslett, 2004), and experiential learning is a foundational tenet of agricultural education (Baker et al., 2012). Thus, the current study addressed an existing gap within the literature, specifically considering the efficacy of a case-based systems thinking approach applicable to ANR-related disciplines.

Purpose & Research Questions

The purpose of this study was to explore the educational potential of HCS when students are learning systems thinking content. Three research questions guided the study:

1. What responses did participants provide for each hypothetical case scenario?
2. To what extent did participants incorporate systems thinking content in their responses to the hypothetical case discussion?
3. How did participants describe the experience of using hypothetical case scenarios method?

Methods

The current study used a mixed-methods approach to address the study's research purpose and questions. The purpose for using mixed methods was complementarity, which seeks broader and more comprehensive understandings of a phenomenon by using complementary methods to explore various dimensions of the phenomenon (Greene, 2007). The current study followed an embedded mixed method research design in which a focus group session followed the dissemination of a quantitative survey instrument using identical system thinking based scenarios (Greene, 2007). The mixed method design also allowed for triangulation of the data to enhance the trustworthiness of findings (Lincoln & Guba, 1985). The sample for the study included students enrolled in an agricultural leadership course within the University of Georgia Department of Agricultural Leadership, Education, and Communication.

Instrument Development

Quantitative HCS Survey Instrument

For the quantitative portion of the study, an instrument was administered using the Qualtrics online survey tool. As such, the HCS with various system thinking archetypal scenarios and choices were presented to each participant. The case study was structured such that participants were presented with a scenario and then two potential choices. Each choice then branched into a secondary set of two options. Therefore, two sets of choices were presented, resulting in four potential outcomes. After reviewing each scenario and progressing through two sets of choices for each scenario, the participants received descriptions (one out of four possible) of the outcome of their choices within each scenario. The first scenario presented a hypothetical case related to the decline of the population of Atlantic Cod in a coastal community. Content for the case was developed from real scenarios (Brodwin, 2015; Cudmore, 2009; Food & Water Watch, 2010).

This scenario was developed to represent the tragedy of the commons systems thinking archetype described by Rutherford (2019). The second scenario, modeled after Rutherford's (2019) fixes that backfire archetype, described a medium-sized oyster farming operation deciding between relocating or expanding their operation in the face of negative environmental impacts. Content for this case was adapted from real events (Kraft, 2017; Petrolia & Walton, 2018; Sink et al., n.d.; Tallis et al., 2009). The last scenario presented a case of a community planning commission deciding whether to invest in the local tourism or local fishing industry, developed from real world scenarios (Baynes, 2021; Coral Reef Alliance, 2021; Dance, 2019; National Ocean Service, 2021; Sustainable Travel International, 2019). The survey instrument also asked respondents to self-identify according to demographic questions related to age, gender identity, race/ethnicity, whether the participant grew up in a rural, suburban, or urban environment, whether or not they grew up in a coastal community, any dietary preferences or restrictions they had that might impact their perception of seafood, student classification, and college enrollment. Prior to dissemination, the instrument was reviewed for face and content validity by a panel of experts in agricultural communications, agricultural leadership, extension education, natural resources and aquaculture, and quantitative research methods.

Qualitative Focus Groups

A focus group protocol was developed to allow participants an opportunity to discuss each scenario and the outcomes presented in the quantitative HCS survey instrument. Questions in the focus group protocol related to a systems thinking archetype for each of the hypothetical scenarios in the survey instrument. The focus group protocol was assessed for face and content validity by a panel of experts specializing in agricultural communications, agricultural leadership, and program evaluation.

To begin, a moderator provided participants with a brief definition of the archetype presented in one of the hypothetical scenarios and they were asked to raise their hands to identify which outcome(s) they selected in the scenarios. Participants were then asked "knowing there were different possible results, how did you go about making the decisions you did?" Once group members discussed this question, a second moderator passed out a printed version of the entire HCS so participants could see the range of possible outcomes. Participants were given one minute to read through the handout and then asked the following questions: "What did you expect to happen?"; "How did your expectations differ from what played out in the scenario?"; and "Knowing what you know now, would you make any different choices?" This process and line of questioning was repeated for the subsequent two scenarios. At the end of the session, participants were asked to summarize their experience with the survey instrument and focus group session in one sentence. The moderator went around the room and asked each participant to respond to this question in turn.

Data Collection and Analysis

Data were collected for both the HCS survey and focus group sessions on November 10, 2021. The course instructor advised students prior to the focus group session that they could voluntarily participate in the focus group session on the specified day and the instructor remained absent from the focus group sessions to increase confidentiality for the participants. The study was approved by the University of Georgia Institutional Review Board (Protocol # 00004479).

Participating students were randomly assigned one of three focus group sessions once they arrived in the classroom. After a brief overview of what to expect in the sessions, the three groups were assigned to individual rooms. Once participants arrived in their assigned room they were provided an identification sheet with an identification number and a place to record the outcomes they selected for each hypothetical scenario. This sheet was used for reference during the focus group session. Quantitative data were analyzed descriptively using frequencies and percentages.

Numbers of participants in the focus group sessions ranged from eight to 10. Participants were first asked to complete a survey once seated in the room. The survey was disseminated via Qualtrics. The survey instrument consisted of three hypothetical case scenarios related to the seafood industry and demographic questions. Participants were prompted to select one of two offered options for the described case-based scenario. After completing each scenario participants received the results of their choices including a description of the hypothetical outcome explaining the impacts of their selections and any consequences that occurred based on the choices.

The qualitative portion of the mixed method study consisted of focus group sessions with the participants immediately after completing the survey instrument. Focus groups are group discussions designed to explore individual and collective views and experiences of a specific phenomenon, specifically using group interaction as data (Kitzinger, 1994). Due to the social interactions within the focus group, a constructivist perspective underlies the data collection method (Merriam & Tisdell, 2015). Participants could hear others' responses and had an opportunity to expand comments beyond their own original responses, considering their own views in the context with those of others (Patton, 2014).

The focus group sessions lasted an average of 60 minutes. Three focus group sessions were conducted simultaneously in person. Each focus group had a primary moderator, a secondary moderator, and a note taker. All focus groups used the same moderator guide during the session. At the conclusion of each session, a note taker read a summary of participants' statements to allow for member checking further enhancing the trustworthiness and rigor of the data (Lincoln & Guba, 1985).

Focus group data were transcribed verbatim, imported into MAXQDA for analysis, and analyzed through inductive coding using the constant comparative method (Glaser & Strauss, 1967), by which themes were derived from the data itself rather than from predetermined theory (DeCuir-Gunby et al., 2011). Two authors open coded the data followed by axial coding to make connections between codes derived from the open coding process (DeCuir-Gunby et al., 2011). The two coders created a codebook to document the development of codes and agreement between codes (DeCuir-Gunby et al., 2011). The coders engaged in peer debriefing to enhance the trustworthiness of the data (Lincoln & Guba, 1985).

To aid in the interpretability of findings a subjectivity statement is also provided as recommended within the literature (Preissle, 2008). The primary coder was pursuing a doctoral degree in science communication and program evaluation in the department in which the course

sample was taken. She specifically focuses on identity-oriented communication and evaluation in her research, with an emerging research inquiry about systems thinking around agricultural innovations. The second coder on this manuscript was pursuing a graduate degree in agricultural and environmental sciences with an undergraduate degree and professional experience in agriculture, which may have affected their views on food systems when coding the data. The second coder also possessed an undergraduate degree from the institution at which the study was conducted that may have led to biases toward students based on their presumed identities within the university observed during focus group sessions; however, the second coder possessed no previous relationships with any of the focus group participants.

Participants

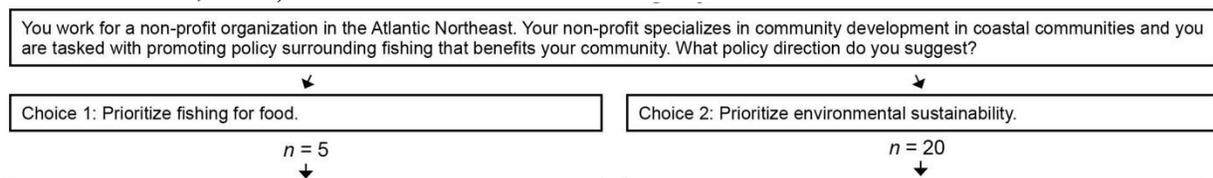
Twenty five students participated in the study. A majority of participants were White ($n = 16$, 59.3%) and female ($n = 15$, 55.6%). Participants also identified as Black/African American (14.8%), Hispanic/Latinx (7.4%), and Asian (3.7%). Participants ranged in age from 18 ($n = 2$, 7.4%), 19 ($n = 10$, 37.0%), 20 ($n = 5$, 18.5%), 21 ($n = 4$, 14.8%), and 23 ($n = 1$, 3.7%). Participants represented all undergraduate classifications: first-year ($n = 2$, 7.4%), sophomore ($n = 8$, 29.6%), junior ($n = 9$, 33.3%), senior ($n = 2$, 7.4%), and other ($n = 1$, 3.7%). College enrollments included the College of Agricultural and Environmental Sciences ($n = 16$, 59.3%), the College of Business ($n = 4$, 14.8%), and the College of Arts and Sciences ($n = 1$, 3.7%). When asked what type of community in which they grew up, 3.7% ($n = 1$) of participants selected urban, 40.7% ($n = 11$) selected suburban, and 37.0% ($n = 10$) selected rural. In addition, a majority of participants did not grow up in a coastal area (70.4%) and had no dietary preferences or restrictions (55.6%). Other dietary preferences included vegetarian ($n = 2$, 7.4%) and other ($n = 3$, 11.1%; open-ended responses included allergy to nuts; no seafood; no dairy, pork, or gluten).

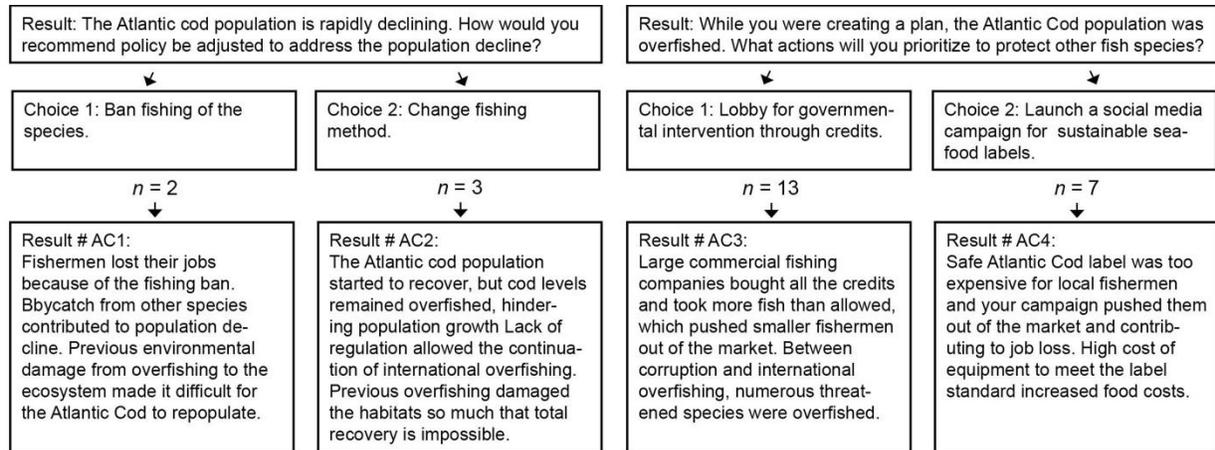
Results

RQ1: What responses did participants provide for each hypothetical case scenario?

Results used to answer the first research question were derived from the quantitative portion of the study and are presented below. Frequencies for the tragedy of the commons scenario (Atlantic Cod) indicated a majority of participants prioritized sustainability ($n = 20$) over an alternative option ($n = 5$) at the first choice stage. Based on the four potential outcomes associated with the secondary choice stage, the most participants ($n = 13$) selected lobbying for a governmental credit system as their preferred system intervention in their decision making (see Figure 1).

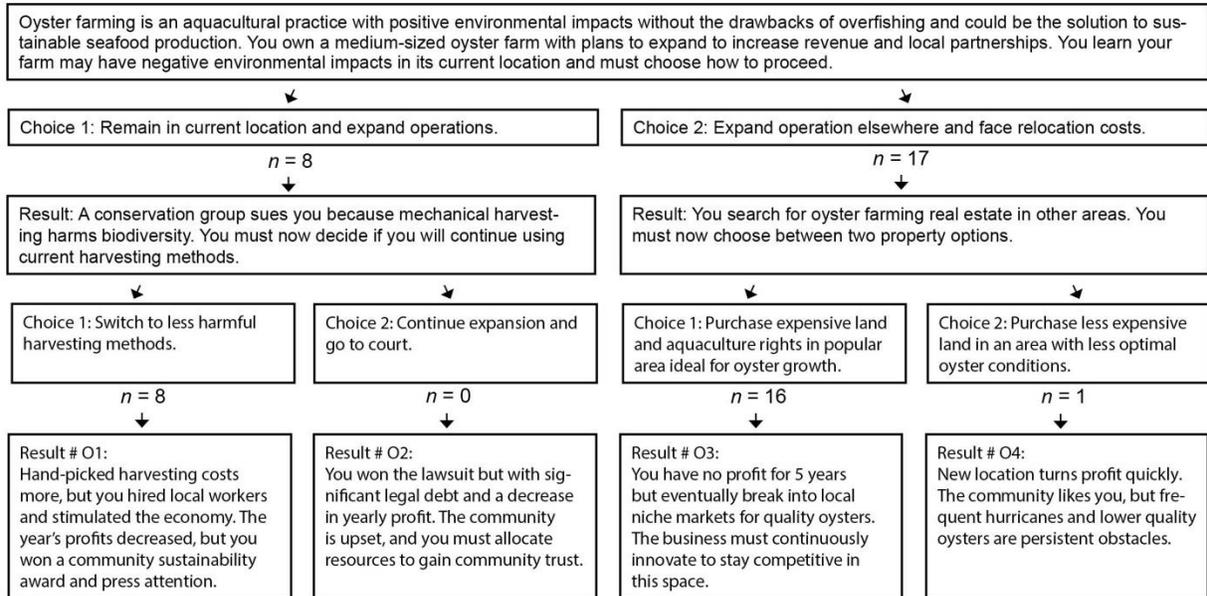
Figure 1. Tragedy of the commons scenario (adapted from Brodwin, 2015; Cudmore, 2009; Food & Water Watch, 2010).





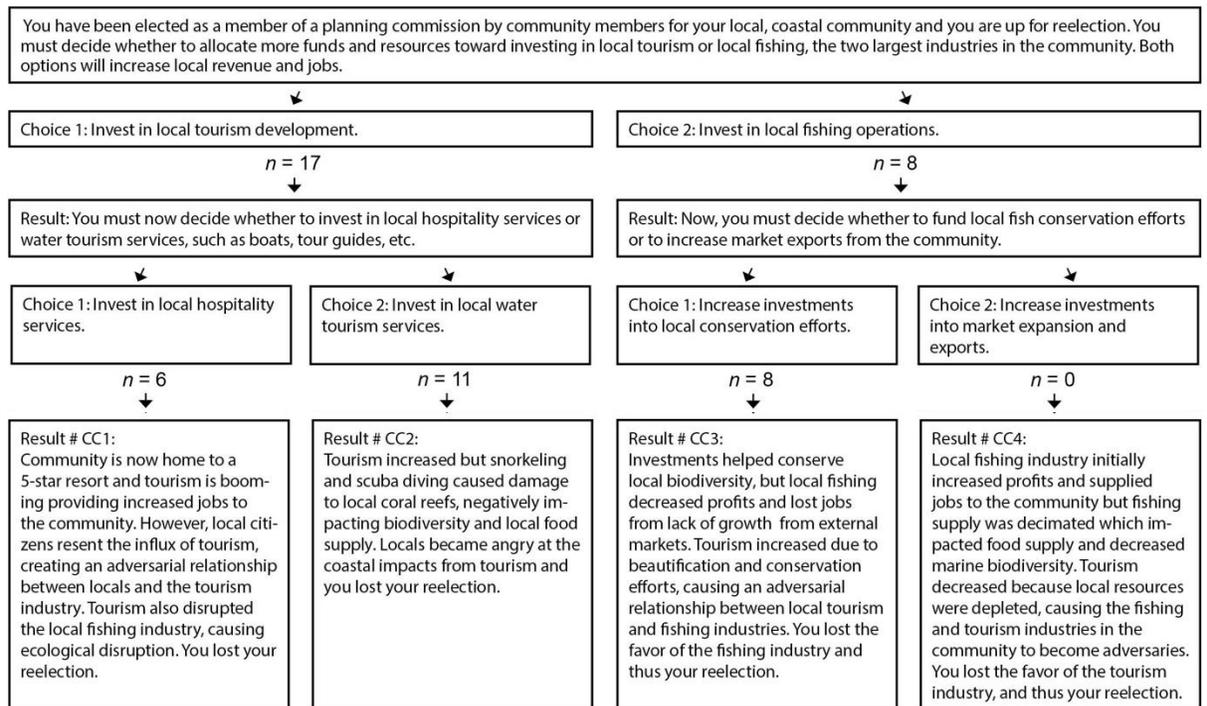
The second scenario, fixes that backfire, demonstrated participants' decisions related to moving or expanding an oyster farming operation facing potential environmental and economic impacts. At the initial choice stage, the majority of participants ($n = 17$) decided to expand their operation and face economic costs while prioritizing the environment. At the second choice stage, the majority of participants decided to prioritize the quality of their product ($n = 16$), considering the long- and short-term economic impacts of their decision (see Figure 2).

Figure 2. Fixes that backfire scenario (adapted from Kraft, 2017; Petrolia & Walton, 2018; Sink et al., n.d.; Tallis et al., 2009).



The last scenario, accidental adversaries (see Figure 3), presented a decision between investing in local tourism or the local fishing industry. At the first choice stage, the majority of participants chose to invest in local tourism ($n = 17$). At the second choice stage, the majority of participants chose to invest in local tour guide training ($n = 11$).

Figure 3. Accidental adversaries scenario (adapted from Baynes, 2021; Coral Reef Alliance, 2021; Dance, 2019; National Ocean Service, 2021; Sustainable Travel International, 2019).



RQ2: To what extent did participants incorporate systems thinking content in their responses to the hypothetical case scenario discussion?

During the focus group session participants were provided descriptions of the underlying archetype for each scenario, and then given an opportunity to respond to each scenario. Five themes were identified related to systems thinking in participants' responses: 1) evaluating consequences, 2) evaluating risk, 3) considering long-term impacts, 4) imagined improvements, and 5) comparing the efficacy of various approaches.

Within the first theme, *evaluating consequences*, participants expressed how they weighed different options in the survey based on potential consequences of the action. A participant in Focus Group (FG) 3 stated, “[t]his experience made me think about new consequences to certain choices and showed that most decisions often have unpredictable outcomes.” Three subthemes were identified for the *evaluating consequences* theme: *negative and unintended consequences*, *balancing consequences*, and *acknowledging downsides*. Participants discussed how they were surprised by the unintended consequences of their choices: “This activity showed me that there’s not a cut and dry, correct answer and that many of our choices have unexpected consequences that we can’t always see ahead of time” (FG 2). In addition, participants discussed how they tried to balance the negative consequences with the positive consequences of a choice, as one participant explained:

[My choices for the accidental adversaries scenario] ended up not at all working out. Because tourists came anyways, so the fishermen got mad. Then the fishing industry decreased because of the focus on sustainability. It ended up not working out at all, but ... that was the best happy medium. (FG 1)

Other participants acknowledged that most choices will be accompanied by downsides, as explained by one participant: “[i]n the end, everything will have a downside. Whatever decision we make, so you just want to do good, do what’s best, what you think is best” (FG 1).

The second theme identified was *evaluating risk* as described by participants in selecting their choices in the survey instrument. When making decisions in the survey, as well as reflecting upon the choices they made during the focus group session, participants evaluated choices based on the perceived risk associated with each choice. For example, one participant explained,

[For the fixes that backfire scenario,] I chose the more expensive one because of hurricanes and how drastic they are, they happen almost every year where I'm from. And it just ruins a lot of peoples' lives, so didn't want to go that way and just choose the safer option, more expensive but payoff and hard work. (FG 2)

Considering long-term impacts was the third major theme identified, as students considered the long-term impacts of their choices on the economy, the environment, and the stakeholders. One student described their consideration of long-term consequences: “I think in the long run, it will be the most effective thing” (FG 3). Two subthemes were identified, *economics* and *environment*. Related to *economics*, one participant explained their thought process for one of the scenarios:

[For the fixes that backfire scenario,] I was thinking more of the long-term results of “Yes, I might be in debt right now, but the rewards will show later.” I was thinking about, especially with the high quality I was like, “If I have a high-quality oyster people are going to still keep coming to me because I have the best oysters out of everyone.” (FG 1)

Many participants prioritized sustainability and the *environment* in their decision-making processes:

I definitely just think that it's about thinking long-term and having what you believe and sticking to those core beliefs. For me, the environment is one of those things. And so, I definitely put profits under environment because if we don't have a planet, then nothing really matters. (FG 2)

Within the fourth theme, some participants *imagined improvements* they would make to the scenarios, indicating an expansion of systems thinking beyond the choices presented. One participant described how they would alter the choices in the scenario to provide a better outcome:

[For the tragedy of the commons scenario,] I did environmental sustainability. But I feel like out of those two choices, I feel like there could have been a third choice that might've been a better option like maybe placing a temporary ban on the Atlantic Cod... (FG 2)

Within the final theme, participants *compared the efficacy of various approaches* after they learned about the consequences of their decisions in the survey instrument. One participant expressed:

Just out of the choices that were given [for the tragedy of the commons scenario], I don't really think either one of them was very beneficial to what they were trying to achieve, but I went with the social media campaign. I don't really think that did very much good in the end, but with the governmental intervention credits, it pushed the local fishermen out of the market and then all the large companies bought it up. So really, either one is not the greatest solution. (FG 2)

RQ3: How did students describe the experience of using the hypothetical case scenario method?

Participants were asked to describe the overall experience of the survey and focus group session relating to the scenarios. Three themes were identified. First, most participants perceived it as a *positive experience*, describing the HCS teaching method as “thought-provoking and informative” (FG 3). The second primary theme which emerged indicated, participants indicated that the experience *challenged them to think more deeply* about the content as well as the consequences of decision-making for complex issues. One participant explained how the experience “made me think deeper about the issues” (FG 3). A subtheme for the second primary

theme was how the experience *enhanced critical thinking* “about your actions and how they can trickle down... how it affects the whole population” (FG 2).

For the third primary theme, participants described the HCS teaching method as an *eye-opening* experience. One participant described the experience as “pretty eye-opening, [as I] don’t often think about the seafood industry...it’s very interesting to see how there’s not one perfect solution, and we just have to be collaborative about finding the right solution” (FG 2).

Conclusions and Recommendations

The current study highlights the pedagogical potential of using the HCS teaching method in ANR disciplines and classrooms. Overall, participants were highly involved in what they described as a positive experience, and the results indicated a high-degree of systems thinking capacity demonstrated in their responses in the focus group sessions. While participants were not exposed to systems thinking as an academic concept prior to the study, the results indicated HCS have the potential to foster learning environments which encourage systems thinking related to decision-making for ANR topics. Participants demonstrated systems thinking approaches within the HCS experience through evaluating consequences of their choice in the survey instrument, evaluating the perceived risk associated with each option, considering long-term impacts from both an economic and environmental perspective, and comparing the efficacy of various approaches. Additionally, some participants moved beyond the limited options presented in the scenarios to imagine how they would make changes to the choice options to improve the outcomes, and limit the unintended consequences, of each choice.

As a pedagogical technique, it is important to examine the experience of the HCS itself. Participants described the experience as positive, thought-provoking, informative, and eye-opening. For others, it provided an opportunity to explore a topic to which they otherwise would not have been exposed. Findings suggest HCS teaching methods for systems thinking and ANR issues has the potential to increase students’ critical thinking skills for complex, socio-scientific issues (Fensham, 2014). ANR disciplines, and agricultural education specifically, have been called to incorporate systems thinking and adaptive processes to foster sustainable development through educational practices (Andenorno et al., 2016; Pauley, 2019). While the current study focused specifically on the seafood industry due to the complex social and ecological issues embedded within the industry and its stakeholders (Mazur & Curtis, 2006), the HCS method may be used to foster dialogue, collaboration, and systems thinking for other ANR topics to enhance experiential pedagogies to educate for complex issues (Fensham, 2014; Onwu & Kyle, 2011).

Several limitations exist for the current study. First, the sample is only from one course in the College of Agricultural and Environmental Sciences at a single large public university. Thus, results of the descriptive study should not be generalized beyond the sample. Second, the focus for the case studies was an unfamiliar topic for most learners. This may have influenced the observed results. Replicating the approach with content familiar to participants is recommended to further examine the role of systems thinking in the learning process. Despite the noted limitations, readers may wish to consider the findings to glean pedagogical potential from the HCS method to apply to their own educational contexts. Other considerations for implementing the HCS method include developing a scenario and discussion setting conducive to the busy

schedules of undergraduate students. A few students found the experience long and struggled contributing to, or engaging in, the discussion following the scenarios, so adapting the HCS method for various learning styles may increase the potential systems thinking capacity development for students.

Future research should examine students' systems thinking capacity and analyze the relationship between this capacity and their choices and outcomes of an HCS experience. A potential outcome from such analysis could lead researchers and educators to further develop HCS that can elicit specific systems thinking capacity development for students focused on developing more specific systems thinking structures, such as structural and procedural systems thinking (Brandstädter et al., 2012). In addition, research could examine students' systems thinking capacities with other scales related to ANR concepts, such as consumer values, perceptions of climate change, or others related to the wicked problems facing agriculture and the environment.

Responding to Pauley's (2019) call for ANR educators to "foster complex adaptive systems ... through education and outreach" (p. 142), the use of HCS offers a novel approach and proposed set of methods to increase the pedagogical reach of ANR disciplines to help educate around complex, wicked problems. The literature contains a limited number of examples coupling systems thinking with HCSs (e.g. Bardodel & Haslett, 2004), indicating a gap in scholarship surrounding this potentially beneficial educational approach. The current study demonstrated the engagement and critical thinking enhancements which accompanied the HCS experience and the systems thinking content demonstrated by the participants.

With the increasingly complex issues discussed within ANR disciplines, educators are tasked with teaching skills to help students navigate and solve opaque and multipart problems (Fensham, 2014). As the nexus between public awareness and policy development becomes increasingly intertwined in an information-dense society (Ruth et al., 2018), ANR education students must be able to critically engage with socio-scientific issues to increase their efficacy in problem solving and generating solutions for sustainability (Onwu & Kyle, 2011; Ruth et al., 2018; Skladany et al., 2007; York et al., 2019). Thus, educators must develop adaptive pedagogical tools to respond to the complex needs of ANR students. The results present a proof of concept indicating HCS may be a promising opportunity for experiential, adaptive learning processes to further increase students' critical thinking and dialogical skills in the classroom and beyond.

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SAE Experiences of Novice Agriculture Teachers: A Longitudinal Qualitative Collective Case Study

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Supervised Agricultural Experiences (SAEs) are a vital component of the three-circle agricultural education model providing students experiential learning and work-based opportunities. Of the three-circle model components, SAEs may be the most challenging for teachers to facilitate, especially for beginning teachers. This longitudinal case study followed six traditionally certified beginning teachers through their first three years of teaching. This study describes the successes and challenges beginning agriculture teachers experienced as they worked to establish and maintain SAEs into the agricultural education program. The results showed beginning teachers understood the value of SAEs and their role in a balanced program. However, they were challenged in getting students motivated, maintaining, and utilizing record keeping systems such as the AET, and finding time to guide students in establishing and maintaining SAEs. It is recommended that supporters and mentors in agricultural education help beginning teachers break down barriers to SAE development. These barriers many include providing SAE for All training to beginning teachers to identify new ways to define and conduct SAEs, training on SAE record keeping systems, assistance with funding SAE record keeping systems, and guidance on implementing SAEs into the classroom.

Introduction

Many veteran teachers are challenged to provide a balanced agricultural education program including classroom/laboratory, FFA, and Supervised Agricultural Experiences (SAEs). Therefore, it is not a surprise that our novice teachers also struggle delivering a balanced program early in their career. Myers et al. (2005) found “organizing and planning FFA chapter events and activities” (p. 53) was in the top five problems rated by beginning teachers. When it comes to time, agriculture teachers of all experience levels spent most of their time planning and executing instruction (Torres et al., 2008). Specifically, for beginning teachers they spent 46% of their time teaching, 16% preparing for instruction, and 7% on laboratory repair/maintenance and 7% on CDE preparation (Torres et al., 2008). If time represents teachers’ priorities, teachers in Torres et al.’s (2008) study showed us their priority is the classroom, followed by FFA and then SAE. Wolf (2011) suggested beginning agriculture teachers were the most efficacious in classroom followed by FFA and the least in SAE. This further showed SAE is the most challenging agricultural education program component for beginning teachers to execute because they feel the least efficacious in that role and therefore spent the least amount of their time supporting SAEs.

Rubenstein et al. (2016) looked at what successful SAE implementation looks like in urban schools. Their study found “the presence of an SAE culture was found throughout the data and was an essential factor in the development and implementation of student SAE programs.” This

study was specific to urban schools. However, this ties to the purpose and objectives of this study, what are beginning teachers' experiences related to SAE programs?

The SAE component of the three-circle model is intended to provide experiential learning and career skills to students. Kolb's experiential learning model interpreted for agricultural education by Baker et al. (2012) made suggestions for what full implementation of experiential learning in agricultural education, could look like. Baker and Robinson (2016) reinforced the need for experiential learning contributed to higher creativity and practical use of the knowledge when compared to direction instruction. Baker et al. (2012) encourages teachers to plan experiential learning, reflect on the learning, and incorporate it into curriculum planning and assessment.

Purpose & Objectives

This research sought to understand the experiences of beginning agricultural education teachers in [State] related to SAEs. The research objectives were:

- 1) To describe the successes beginning agriculture teachers experience when supporting the establishment and maintenance of SAE programs.
- 2) To describe the challenges beginning agriculture teachers face when supporting the establishment and maintenance of SAE programs.

Conceptual Framework

Experiential learning through agricultural education guided this research. As identified by Baker et al. (2012) "experiential learning is a critical component of a comprehensive agricultural education model" (p. 6). Baker et al. (2012) identified, four conclusions when applying the Experiential Learning theory to Agricultural Education,

- (a) "encompass each of the three components of the agricultural education model,
- (b) requires purposeful and planned support from the agricultural education instructor,
- (c) lead to the development of important meta-cognitive skills, and
- (d) include curriculum planning and assessment." (Baker, et al., 2012, p.6)

This study sought to understand how beginning agriculture teachers' successes and challenges related to SAE development as guided by experiential learning in SAE related to these conclusions in their agricultural education programs.

Methods

Constructionism guided the research that sought to understand the lived experiences of beginning teachers related to SAEs. Following Constructionism, research was led by the theoretical perspective of interpretivism through phenomenology which provided an anchor (Crotty, 2015) for the research as all participants experienced the unique phenomenon of their induction years as a teacher and their work to incorporate SAEs as a component of the agricultural education program. This subset of data specifically related to SAE's was a component of a larger study.

Participants

Case study design was used with a bounded system (Creswell, 2018) created by all participants being agricultural education graduates from Kansas State University in 2016 who chose to teach agriculture in Kansas. Each of the nine teachers who meet the criteria of the bounded system were invited to participate through an e-mail invitation (Creswell, 2018). Throughout the study, pseudonyms were used to protect the identity of the teachers. To further protect their autonomy, individual identifying characteristics of the teachers were shared collectively.

Data Collection

Following the protocol for conducting interviews by Creswell (2018), creating research questions was the first step of data collection. As part of a broader study, the interview protocol addressed multiple aspects of the novice teacher experience. After the protocol and questions were established, IRB approval was granted.

The visit and interview protocol were piloted with a second-year agriculture teacher who was not engaged with the study. Adjustments were made to the protocol following a debriefing session with the pilot teacher. It is important to note that rapport (Creswell, 2018) was already established between the researcher and the study participants based on previous interactions before the data collection process was initiated. The researcher was the professor for over half of their undergraduate agricultural education course work.

The case study began with a visit to each teacher at their school between the 6th and 8th week of classes during their first year of teaching. The half-day visit included an in-person semi-structured interview (Merriam, 2009). Following the initial visit, the researcher conducted semi-structured phone interviews every month, that lasted approximately 30 minutes. The same interview protocol was used throughout the study.

During the second and third years, only teachers who had changed positions were visited on site again. The same protocol for the initial visit was used during the additional in person visits. Additional visits were conducted for three of the eight original teachers in the study because they changed positions during the study.

Each of the three years of data collection concluded with participants completing an individual reflection guide prior to a focus group hosted via Zoom. The reflection guides were provided to the teachers electronically and asked them to reflect on their year individually and were returned to the researcher. The monthly interview responses and reflection guides influenced the focus group questions. The three-year study yielded 11 in-person teacher observations, 19 reflection guides, 129 individual monthly interview transcripts and three focus group transcripts. The data collection timeline and tasks are summarized in Table 1.

Table 1

Data Collection Timeline and Tasks

Time	Task
Year 1 August	Obtain Institutional Review Board (IRB) approval for study

		Identify and correspond with 1 st year agriculture teachers who were graduates of the Kansas State University Agricultural Education Program and invited them to be involved in the study
	September-mid-October	Between the teacher's 30 th and 45 th day of school, the eight teachers who responded positively to the request to join the study received a site visit that included: <ul style="list-style-type: none"> - Option to consent - Meeting with administration - Observation of teaching - Tour & photographs of facilities - One-on-one interview following monthly interview protocol
	October-May	Monthly phone interviews with individuals were conducted every 4 weeks for each teacher following the monthly interview protocol Reflexive journaling, transcription and data analysis of interviews were conducted
	August	Participants completed individual reflection guides and provided them to the researcher
		Year one focus group utilizing the moderator guide
Year 2	August- May	Phone interviews were conducted with each teacher during the first week of their school year following the monthly interview protocol Reflexive journaling, transcription and data analysis of interviews were conducted
	October	Between the teacher's 30 th and 45 th day of school, each teacher who changed schools received a site visit with the same components as year 1. One-on-one interviews following monthly interview protocol were conducted every four weeks
	June	Participants completed individual reflection guides and provided them to the researcher
		Year two focus group guided by the focus group moderator guide
Year 3	August- May	Phone interviews were conducted with each teacher during the first week of their school year following the monthly interview protocol Reflexive journaling, transcription and data analysis of interviews were conducted
	October	Between the teacher's 30 th and 45 th day of school, each teacher who changed schools received a site visit with the same components as year one and two. One-on-one interviews following monthly interview protocol were conducted every four weeks.

June	Participants completed individual reflection guides and provided them to the researcher
	Year three focus group guided by the focus group moderator guide

Data Analysis

Guided by the Grounded Theory approach, the constant comparative technique was used to analyze the data by employing multiple rounds of coding including open, axial, and selective coding (Glaser & Strauss, 1967). The first step in data analysis was up-loading the transcripts into the NVivo 12 program. The researcher utilized the aid of a computer program to provide an organization system, to ease sorting and retrieval (Creswell, 2018). NVivo 12 was only used for structure, no automatic coding feature were employed. Transcripts were analyzed chronologically using the constant comparative method (Creswell, 2018). The transcripts were reviewed in multiple rounds, first using open coding to separate the data into smaller segments, those categories were reviewed and connected using axial coding to create categories and finally reviewed using selective coding to create themes. The themes evolved and were revised over time and ultimately Through the coding, the theme of “SAE” emerged that framed this study.

Practices of quality qualitative research were established and documented to address rigor and trustworthiness. Rigor was established by selecting participants who were part of an established bounded system (Tracy, 2010). Interviews were recorded and transcribed and were solely analyzed by the researcher. Field notes were taken during the interviews and reflexive journaling (Guba & Lincoln, 2005) was conducted after the interview. A research log documented the thoughts of the researcher during the coding and analysis processes. Potential bias was addressed by the creation of a subjectivity statement that identified the researcher’s background relationships with the study participants. The researcher is positioned (Jones, et al., 2006) within the research, acknowledging the researcher within the study rather than observing from the outside. Furthermore, the data were provided to a peer/colleague for review at each step of the coding and analysis process. Triangulation (Tracy, 2010) was established through multiple data sources including interviews, field notes, focus groups, reflection guides, teacher observations and photographs. Specifically, the annual, end-of-year focus groups provided triangulation of the monthly interviews as a reflection and peer consensus.

Results

Participants

Participant descriptions changed over the three-year study, and a collective summary of the participants is provided to protect their individual identities. In year one, there were eight participants, seven females and one male. All participations were white and ranged in ages 22-25 in their first year of teaching. Six teachers were in programs where they were the only agriculture teacher, two teachers were in multi-teacher programs. One participant returned to their hometown to teach. One participant did not have high school agricultural education experiences. One teacher was married and two of the teachers each had one child.

In year two of the study seven teachers remained, of which one was male. Five teachers were the only ag teacher in their school and two were in multi-teacher programs. Two participants changed positions between years one and two, one moved from a single teacher program to a multi-teacher program, and one moved from a multi-teacher program to a single teacher program. One participant left the study after year one due to time demands but remained teaching agriculture in their original school. Two teachers were married and two had one child each.

In year three, six teachers remained in the study, all of which were female. One participant left the study and the teaching profession after year two to engage in production agriculture. Of the six teachers remaining, two were teaching in multi-teacher programs and the rest were the only agriculture teacher in their school. Two participants were married, and one had a child. One participant moved between years two and three to return to their home program. At the conclusion of the three-year study, seven of the eight original participants entered their fourth-year teaching agriculture, six of whom completed the study. General details about each participant are summarized in Table 2.

Table 2

Demographics of Participants

Pseudonym	Gender	Age at beginning of study	Ethnicity
Clare	Female	22	white
Claudia	Female	22	white
Crystal	Female	23	white
Hank	Male	24	white
Helen	Female	23	white
Paige	Female	23	white
Sophia	Female	25	white
Wendy	Female	23	white

Sites of Research

The teachers taught in eleven different communities throughout the three-year study. This included the eight communities in which they started their teaching careers, and the three communities’ individuals moved to after their first-year teaching. The schools were in communities spread across Kansas. Utilizing the United States Department of Agriculture (2019) definitions, two communities were greater than 2,500 in population and would be considered “urban clusters” while the other nine communities met the definition of rural with populations less than 2,500 (para. 2). The community populations ranged from 414 to 3,983 (United States Census Bureau, 2020). All the communities were predominately white populations.

Utilizing the Kansas State High School Activities Association classifications, five schools were classified as 1A with high school enrollments 14-108 students; four schools were classified as 2A with high school enrollments between 109-171 students; and two schools were classified as 4A with high school enrollments ranging between 312-661 students.

The First Year

At the beginning of their first year, the beginning teachers ranged significantly in their implementation of SAE's. Some had everyone on the AET record keeping system the first day of school tracking their experiences and others had instead decided to focus on the classroom and FFA components first. Clare was ready to get started, she said,

The first few days of class after the students got their technology, we focused on setting up an AET account for them regardless of whether they were in FFA. Some of them did have an AET already previously set up... I was ok with if they babysit their siblings that was fine for their SAE and some of these kids work and so that was what their SAE is.

In contrast, Crystal said, "I have not done anything with SAE...I haven't gotten much into that, right now there are two circles, classroom and FFA."

As the teachers moved into the second quarter some teachers were maintaining SAE engagement, Claudia said "with the SAE grant, that's due tomorrow, we've been talking about SAEs a lot in all of the classes." Others were making plans to start after the first of the year with a focus on the younger students Crystal said, "I plan on hitting SAEs in January, I know some students have SAEs but I kind of want to get just some classroom things tight and then we'll swing into January with some SAEs." Some implemented record book Fridays to establish an SAE tradition. However, for others, there were no plans for SAE implementation, in fact, Hank said "the idea of an SAE is kind of foreign language in recent past year at [school]." Wendy and Sophia both talked about how funding and learning AET was a hurdle to implementing SAEs for students, Wendy said, "The one area probably I need to work on the most is SAE and that's probably just because I'm not quite sure how work the AET exactly."

In the third academic quarter, implementing SAEs was a challenge, but they had a plan to improve. Only one teacher shared evidence about using SAE as a graded component in the program, Clare said, "I did look at every proficiency application and some of them did not turn it in and that will affect their grade and they were jacking around and not working on what they needed to." Many talked about SAEs with community members who are excited to support it, Hank said, "I've been excited, I should say, about student and community reactions to the idea." However, getting the students motivated and find the time were the most frequently discussed challenges. Sophia was challenged to get funding to pay for AET as an SAE recording keeping tool, she said "I'm in the process of getting the AET and sending off the money so we can get that." Most of the emphasis in developing SAEs was focused on younger students in the program, Claudia said, "we have a lot of things going on in the SAE area like the freshmen they aren't very motivated, but I feel like this year the 8th graders coming up as freshmen will be way better."

During the final quarter of their first year, teachers still admitted SAEs were something they needed to work on. Hank took his students to district banquet to motivate them and expose his students to SAE ideas, "They were very surprised and aghast on the various awards and also diverse proficiencies." As they looked forward to the next year, they were making plans for enhanced SAE engagement, Claudia said "I need to do more with SAE, and I definitely plan on doing that more next year."

As the teachers reflected on the entire year during the focus group it was clear, they had good intentions of SAEs being a component of the agricultural education program, but all the teachers

fell short of their goals. Hank talked about how the idea of SAEs seemed daunting to both the teachers and the students,

See, I think for me, I kind of seemed like a big cloud hanging over my head and it really seemed daunting to my students and I kind of got the idea from my students that this was going to be an extra project or an extra part of the class, so they really didn't seem interested in.

The Second Year

Looking back on last year, they knew they did not engage with the level of SAEs they wanted, and they were setting goals to do better. Claudia said,

I'm starting with my freshman class...they all are going to have to come up with something and keep records over it. I didn't do any SAE last year really, and I want to try to hit those a little harder this year.

Two participants attended the SAE for All conference, it broadened their definition, and decreased the limitations to SAE integration. Hank said, "some basic principles that they shared were the mentality behind SAEs, it's not necessarily done just to fill out an application but if it's focused around the student, how much more beneficial it is." Helen moved programs between year one and two noticed there were some great SAE programs happening, but records were lacking, she said "there are SAEs, but they are not documented." It is a steep learning curve for everyone regardless of the unique situations they are in.

In the second quarter of year two, Claudia was making plans,

We haven't done much on the SAE front yet, I'm going to wait till the beginning of the year when the record books start in January. It's still lacking a little bit, but it happens every once in a while.

Hank felt he was making progress, but still not where he wanted to be, "I think we are a more rounded program than it looked a month, or a year ago." Helen got the opportunity to conduct a SAE visit, this was one of few that have been talked.

During the third quarter, Claudia and Hank talked about how they started SAEs with freshmen after they got back from winter break, Claudia said,

So, with my freshman when we came back from break, we've started SAEs, and getting them excited about SAEs is really cool that they are like, oh, I could do this, or I could do this, and I got a greenhouse manager out of the deal.

Hank started having a few freshmen share about their SAEs at each chapter meeting, "They share their SAE with the chapter at our chapter meeting...you know what, when they were talking, everybody else is listening." He went on to say this has really sparked conversations about interest in SAEs among students. Both Claudia and Hank were trained in SAE for All, and they talk more about SAE implementation than the others. Helen was really focusing on getting the SAEs that were happening documented at a higher level.

That the end of the second year, there are some with SAE success stories and others are still thinking about how they can better manage SAEs in the future. Claudia felt the increase in SAE activity led to a more balanced program, "I think we are becoming a little more well balanced than we have before and like SAE they are starting to take a bigger part than they had in the

past.” Clare was thinking about getting SAE visits started this summer. Crystal was excited to have her first state FFA degree. Finally, Paige as teacher in a multi teacher program, talked about how the different advisors support SAE and what her role was,

We don't really do much with freshmen like going into sophomores [co-teacher] will be doing some of the visits with the older kids that he's had. That's one thing that we're actually adding next year is [co-teacher] will have an hour of SAE coordinator. He'll be in charge of grading and meeting with students for their SAE.

During the second-year focus group, Crystal talked about the value of SAEs being incorporated into teacher conference, she said,

Going to different conferences like the summer event and SAE conference thing because I'm not going to lie, we as schools not good at SAE, because I had no idea what they were when I got there last year. So, I was slowly building up by going to something that can be beneficial for me and my kids and it's going to help me to grow.

The Third Year

The teachers talked about the progress they made towards a more balanced program by enhancing the SAE component, but readily admitted they still had work to do to be where they felt they should be. Claudia said,

I feel like we are more balanced than we have been. First year I was kind of focused on classrooms, second year I got more focused on FFA and this year we are probably bringing in the SAE part of it. It's more balanced than it definitely was first year. By just having discussions with the kids without their SAE and I already have 8th graders talking about SAEs and so getting excited about that component of the program

In the second quarter of the year, there is a theme of waiting until after the first of the year to focus on SAEs because the classroom and FFA components are so demanding during this time. Claudia said,

Still a little lacking on the SAE department right now as we get closer to like Christmas break, we'll start talking about SAEs so the kids going to be thinking about what they want to do in their home over Christmas break and then really have hard once they come back in January, but for the most part everything, running pretty smooth right now.

After the first of the year there was an increased focus on SAEs including awards and applications. Wendy was more comfortable with SAEs and AET, but there were challenges, including filling out applications,

Filling them out and filling them out correctly. I'm, still trying to figure out AET. I feel more comfortable with it but it's not exactly like, 'Oh, if I have a problem here is what I do?' I have no idea.

As they complete their third year, Helen talked about SAE success including students getting their State FFA Degrees while Claudia talked about a challenge being her lack of proficiency applications. It seems ultimately, their measure of SAE success is still reflected in FFA awards and applications.

During the third end of year focus group, all of the teachers agreed SAEs were still an area they needed to continue to work on. Helen said,

I could also agree with SAEs. I'm not as good in them as I could be. We really talk about them a lot in the beginning of the year, and I set them up on the AET and they picked their SAEs. They put stuff in that they already had but then my follow-through isn't that great. So probably just, you know kind of making it more like a project-based portfolio kind of a thing that would be a lot better for me. And I think with the new SAE is a SAE for All or something that [state supervisor] gave to all of us. I mean I think something that I want to implement more in our program

Summary

Research question one sought to understand the successes beginning agriculture teachers experience when supporting SAEs. In year one, teachers who experienced more success dedicated class time to SAE development and some had it as a graded component of the course. In year two, the teachers who attended the SAE for All conference discussed fewer hurdles and more solutions to SAE integration than those who did not. Claudia attended the training and said,

Starting with my freshmen class...they are going to have to come up with something and keep records over it. I didn't do any SAE last year really and I want to try to hit those a little harder this year.

In year three, some teachers had experienced success, which got both the teachers and students more motivated to continue SAEs.

Research question two sought to understand the challenges beginning agriculture teachers face when supporting SAE programs. Time management was a challenge for all components of the agricultural education model, but was most significant in year one, especially when it came to dedicating time to SAEs. Hank described his experiences in year one,

The classroom is rolling, FFA activities are ramping up and thinking about SAEs, we have been through quite a bit of coursework and it's balancing a lot of things at one time, and I see the point where it gets a little bit challenging."

In year two the teachers were making progress, but teachers who did not participate in the SAE for All conference experienced more barriers to implementation, Crystal said "I'm still struggling with the whole SAE component...I really just need to sit down and go through AET and just take the time to do it with them and they're going to complain a little." Finally, in year three student motivation related to SAEs was a major hurdle.

Did teachers embrace experiential learning related to Supervised Agricultural Experiences? All teachers were aware of the three-circle agricultural education model, but also identified SAE as the most challenging component to facilitate as an agriculture teacher (Wolf, 2011). The "purpose and planned support" (Baker, et al. 2021), varied by the teacher, but those who had attended the SAE For All training show more evidence of planned SAE support to students. There was no evidence this group of teachers exercised meta cognitive skills related to SAE. Finally, there were some teachers who incorporated SAE into the curriculum planning and had it as a component of assessment (Baker, et al. 2021) but some did not. Since all teachers were early career teachers, there were no variations between experience level of the teachers.

Conclusions, Recommendations, & Implications

In responses to the research questions this study sought to understand the successes and challenges faced in establishing and maintaining SAEs as a beginning teacher. This study showed beginning teachers understood the value of SAEs and their role in a balanced program. However, they were challenged in getting students motivated, maintaining, and utilizing the AET recording keeping program, and finding time to guide students in establishing and maintaining SAEs.

As Baker et al. (2012) identified, experiential learning through agricultural education should “encompass each of the three components of the agricultural education model” (p. 6). The beginning teachers knew and understood the three-circle model and the importance of delivering a complete agricultural education program. However, the component of the model that was provided the least time and energy was self-identified as the SAE component by these teachers. Baker et al. (2012) also stated experiential learning in agricultural education should “require purposeful and planned support from the agricultural education instructor” (p. 6) This research suggests there was evidence of planning and support for at least some students in the agricultural education program, but not always all. Some teachers were dedicated to having all students experience SAEs, while others focused on those more willing. Baker et al. (2012) also stated experiential learning “lead to the development of meta cognitive skills” (p. 6) and this research showed there was little evidence of the teachers conducting reflective exercises with students, and reflection that did happen was not related to agricultural education. We cannot conclude this did not happen, but there is no evidence in this study to show the use of reflection and metacognition in SAE facilitation by this group of teachers. Finally, Baker et al (2012), stated experiential learning should “include curriculum planning and assessment” (p. 6). There were two teachers who discussed SAE being an assessed component of the program, but many who did not.

It is recommended supporters and mentors in agricultural education help beginning teachers break down barriers to SAE development. These may include providing SAE for All training to identify new ways to define and conduct SAEs, training on SAE record keeping systems, assistance with funding SAE record keeping systems, and guidance on implementing SAEs into the classroom as a graded component.

This study is limited to the experiences of these individuals. While the lived experiences may be like other novice agriculture teacher’s experiences, they each work in a unique school and community with their own backgrounds and experiences. Future research could examine the SAE experiences of non-traditionally certified teachers. Furthermore, future research should include teachers from a more diverse background in suburban and urban communities.

This study was conducted prior to the COVID-19 pandemic, experiences of the teachers could have been changed by that historical experience. Therefore, a follow up study should examine the current experiences of beginning teachers. It is possible the virtual nature of the pandemic fostered new ideas for SAE implementation.

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Lead Teacher Perspectives of Virtual CASE Institute Professional Development

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The purpose of this study was to explore the experiences of Curriculum for Agricultural Science Education (CASE) Lead Teachers (LT) who facilitated a CASE virtual professional development (PD) institute during the summer of 2021. The central research question that guided the study was how effective were virtual CASE PD institutes from the LT perspective? This research employed a single case study design where the CASE virtual PD institutes held during summer 2021 served as the case. Participants included 23 CASE LTs who participated in focus group interviews and feedback via Flipgrid technology. Secondary data sources included a document analysis of the CASE LTs and Hosts Facebook group. Four themes emerged from data analysis: maintaining the integrity of CASE, face-to-face preference for virtual delivery, hurdles unique to virtual PD, and organizational structure for future virtual PD. Recommendations for practice include streamlining processes associated with virtual PD including building community and engagement strategies, alignment with the CASE model and philosophy, additional training for LTs on technology use and delivery methods for virtual platforms, and clearer division of responsibilities for CASE staff, LTs, and hosts. Recommendations for future research include qualitative and quantitative exploration into the experiences of participants and follow-up studies to gauge participant implementation of CASE curriculum after attending virtual PD.

Introduction/Conceptual Framework

Teacher professional development (PD) opportunities allow a teacher to continue to refine and enhance their teaching and learning practices, as teachers must be able to hone their skills throughout their careers (Darling-Hammond & Bransford, 2005). Washburn et al. (2001) indicated identifying which PD opportunities to offer teachers can be difficult when meeting the needs of the population, and teachers' needs can change over time due to their vast array of experiences (Cannon et al. 2012). The most effective type and delivery mode of PD has also been debated in the literature. Mizell (2010) indicated the most visible PD has been offered in various forms such as formal conferences, seminars, or workshops. Teachers also benefit from other forms of PD such as observations, readings, or networking (Desimone, 2009).

Professional development is a formal process in-service teachers use to improve their knowledge and skills related to classroom practice and instruction (Greiman, 2010; Guskey, 2000). Studies have emphasized the importance of professional development in agriculture teacher change (Shoulders & Myers, 2014). Professional development design has four main characteristics to consider: the teachers, the facilitator(s), the context, and the program design (Borko, 2004). It is important to remember teacher learning is inherently social and rarely occurs in a vacuum (Guskey, 2002; Putnam & Borko, 2000; Shulman & Shulman, 2004). The facilitator(s) shape the community of learners and experience for the participants (Borko, 2004).

Research has identified and confirmed five characteristics of professional development leading to teacher change: duration, collective participation, content focus, active learning, and

coherence (Desimone et al., 2002; Garet et al., 2001). The traditional “one and done” approach associated with day long workshops may have little effect on practice due to its abbreviated length (Desimone, 2009; Desimone et al., 2002; Garet et al., 2001). However, agriculture teachers identified these types of professional development workshops as good sources of technical knowledge (Hurst et al., 2015; Rice & Kitchel, 2015).

Collective participation occurs when groups of similar teachers (school, grade level, or content area) take part in professional development together (Desimone et al., 2002; Garet et al., 2001). This allows teachers to develop a community of practice, which allows them to work through the complexities of changing classroom practices with a support network familiar with the situation (Greiman, 2010). Career and Technical Education (CTE) teachers have noted the importance a community of practice plays while integrating new literacy material into the classroom (Santamaria et al., 2010). The content aspect focuses on the material being taught.

Teachers must be given opportunities to think about how new information can be integrated into their classroom practice (Putnam & Borko, 2000). Active participation allows the teachers to engage with the content; it can be physical or mental and takes on a variety of appearances (Desimone et al., 2002; Garet et al., 2001). The final aspect to be considered in professional development design is coherence. Teachers are likely to use the material if they feel it aligns with personal or school educational goals (Greiman, 2010). The professional development must align with the problems and challenges they face daily (Desimone et al., 2002; Garet et al., 2001).

The National Council of Agricultural Education (NCAE) established Curriculum for Agricultural Science Education (CASE) (CASE, n.d.). CASE is an organization that provides teachers with PD in the area of STEM, which was established due to lack of agriculture curriculum and PD opportunity within CTE. CASE has developed curriculum for agricultural education teachers in the areas of animal systems, plant systems, agricultural engineering, and natural resources, with ten courses currently available. The PD is offered in a traditional, FastTrack and BriefCASE formats. The PD institutes allow teachers to complete the activities, projects, and problems (APPs) associated with the curriculum for a course and become CASE certified. All PD sessions are led by two experienced teachers, known as lead teachers (LT), who have taught the courses in their own programs. During the COVID-19 pandemic, only online CASE PD was offered to participants across the country.

Purpose of Study and Central Research Question

The purpose of this study was to explore the experiences of CASE LTs who facilitated a CASE virtual PD institute during the summer of 2021. This study aligns with the American Association for Agricultural Education (AAAE) research priority four: meaningful and engaged learning in all environments (Roberts et al., 2016). The following central research question guided the study: How effective were virtual CASE PD institutes from the LT perspective?

Methods

This research employed a single case study design where the CASE virtual PD institutes held during summer 2021 served as the case (Hancock & Algozzine, 2011). Case studies are bound by time and explore contemporary phenomena using empirical investigation through

multiple data sources (Hancock & Algozzine, 2011). This case was chosen to explore the experiences of LTs during CASE virtual PD institutes because of the unique nature of a full conversion to virtual PD for CASE and the opportunity to examine the effectiveness of their delivery from the LT perspective. As virtual PD is expected to gain permeance in educational settings, this is a timely and worthy topic.

We approached this study from a constructivist lens. Constructivists posit that knowledge is not absolute but is instead co-constructed by individuals experiencing a phenomenon (Boghossion, 2006). Our research team included three agriculture teacher educators at three separate land grant universities. All of us currently serve on the national CASE advisory committee as representatives from our respective states, two of us have served as CASE institute hosts, and one of us has served as a CASE LT. It is important to disclose our positionality, and to continually reflect on its role in the research process, to avoid bias (Creswell, 2013).

This study focused solely on the experiences of LTs who led summer 2021 CASE virtual PD institutes. In total, 88 LTs taught one or multiple CASE institutes in the summer of 2021. There were 10 CASE courses offered across 41 individual institutes including: Introduction to Agriculture, Food, and Natural Resources (AFNR), Animal and Plant Biotechnology (APB), Agricultural Power and Technology (APT), Agricultural Research and Development (ARD), Principles of Agricultural Science- Animal (ASA), Principles of Agricultural Science- Plant (ASP), Environmental Science Issues (ESI), Food Science and Safety (FSS), Mechanical Systems in Agriculture (MSA), and Natural Resources and Ecology (NRE). A total of 856 participants became CASE certified in one or more CASE courses. All 10 courses were offered in a purely virtual format in summer 2021, except for MSA, which was offered in a hybrid modality with five days online and five days in-person at the host location (CASE, 2021).

While this study focuses on experiences of LTs, it is important to discuss the other individuals that are instrumental in the planning and delivery of CASE institutes. CASE institutes are structured with four participating parties- LTs, hosts, participants, and National CASE staff. LTs serve as the teachers at the institute and are responsible for adhering to the CASE institute daily schedule, delivering each of the APPs, facilitating the inquiry-based learning process, and building community amongst participants. LTs are current middle or secondary agriculture teachers or university level instructors, and there are typically two LTs per institute. For the summer of 2021, some institutes had three LTs. Hosts provided the physical site for the institute prior to the shift to virtual delivery which included managing participant registration, acquiring all supplies, securing lodging and meals, and leading the initial orientation meeting. For summer 2021, hosts purchased and shipped supplies to all LTs and participants, managed registration, and led the virtual orientation meeting. Hosts are typically university level personnel but can also include high school teachers. Participants are enrolled in the CASE institute for 8-10 days and fully participate in the programming. At the completion of their institute, they become certified in the CASE curriculum for that course and the majority implement the curriculum in their schools. Participants are typically current middle or high school agriculture teachers and preservice teachers, but sometimes university personnel or other science teachers attend CASE institutes. Finally, National CASE staff organize CASE institutes, determine the type and frequency of institutes offered, assign LTs to institutes, collaborate with hosts on implementation, create daily schedules, and serve as a liaison between all parties.

To recruit participants, an email was sent to all 88 LTs who taught a CASE virtual PD institute during the summer of 2021 with a link to a short Qualtrics questionnaire. Out of the 88 LTs, 45 indicated interest in participating in one of eight focus groups. Of those 45 LTs, 19 ultimately showed up to participate in the focus group. To capture additional LT insight, an email was sent out to the 26 LTs who indicated interest but did not participate in a focus group to leave their comments via Flipgrid. Four LTs provided Flipgrid responses and their data was integrated with the original 19 for a total of 23 LT participants. An effort was made to capture a wide variety of LTs from across various states, experience levels, and courses. LTs from every CASE course offered in the summer of 2021 participated, except for Environmental Science Issues (ESI) and Agricultural Research and Development (ARD). Four of the LTs were first time LTs during summer 2021, eight identified as men, and 15 identified as women.

Data were collected from August through October 2021. Eight focus groups were conducted via Zoom and structured to allow for LTs who taught the same courses to participate together. Each of the focus groups was mediated by two or three researchers and consisted of semi-structured interview questions focuses on three phases- prior to the institute, during the institute, and reflection on the institute. Participants in the focus groups ranged from one to five individuals. Four participants could not attend the focus groups due to scheduling conflicts and instead participated via Flipgrid, which allowed them to video record their responses to the same interview questions. This data was then integrated with the focus group data for analysis. To capture the voices of additional LTs, a document analysis was conducted of the Facebook group called CASE LTs and Hosts. Posts, pictures, and videos from this Facebook group were reviewed for additional insight on the experiences of LTs and effectiveness of the summer virtual institutes. The analysis spanned from March when Elite Elevation (first training for LTs and hosts) occurred through mid-August when all institutes were complete.

Data were analyzed utilizing all sources- focus group interviews, Flipgrid responses, and documents from the CASE LTs and Hosts Facebook group. Using a variety of sources allows for triangulation in the case study method (Hancock & Algozzine, 2011). Data were analyzed for trends in the data corresponding to the central research question. A three-step coding process was employed consisting of initial codes, categories, and emergent themes. The data were analyzed deductively using the conceptual framework and again inductively to capture emergent ideas that lay outside of the conceptual framework (Gelo et al., 2008).

To ensure trustworthiness of the study, a variety of strategies were employed as recommended by Tracy (2010) for quality, qualitative research. First, a variety of data sources were utilized in collection and analysis to achieve triangulation. Second, rich, thick description was used in the form of participant quotes. Third, memoing occurred throughout the research process to uncover emergent themes. Fourth, member checking was employed with select participants on emergent findings to ensure they were reflective of their experiences and perspectives. Finally, the positionality of the researchers was disclosed and reflected on throughout the research process as we realize we are the instrument in qualitative research.

Findings

Four themes emerged from the data and included: maintaining the integrity of CASE, face-to-face preference for PD delivery, hurdles unique to virtual PD, and organizational

structure for future virtual PD. These four themes and their subthemes showcase the experiences of the LTs who participated in the CASE summer 2021 virtual PD institutes. We acknowledge that not all LTs who delivered PD during summer 2021 were captured in this study.

Theme 1: Maintaining the Integrity of CASE

The findings revealed that the majority of LT's were concerned with maintaining the integrity of CASE institutes, particularly if they had served as a LT for an in-person institute previously. One emergent idea related to maintaining the integrity of CASE revolved around what constitutes a true and authentic CASE PD experience. The word "true" CASE institute was used by multiple LT's when comparing in-person and virtual modalities. Joan commented, "You just don't get that collaboration and building relationships like you do in a true CASE institute." Rebecca also used the word "true" when comparing modalities. She said, "I would really like to return to teaching in-person. Not just because of the familiarity, but because of giving participants the true CASE experience that we've come to know, that's really based on how those relationships that are formed."

Many of the comments about an authentic PD experience within CASE included discussion about the relationships developed at a CASE institute, and how this was lacking within the virtual environment. Isabel stated, "And part of CASE is the comradery and the CASE family you build across the country. And you don't do that in a virtual institute to the extent that you do it in an in-person institute." Within the CASE LTs and Hosts Facebook group, several posts shared comments like "can't wait to be back in-person" and "see you next year." There was an eagerness to reconnect in-person expressed by LTs via focus groups and Facebook.

Other comments about an authentic PD experience included worries about the value and outcomes of the virtual training. Maria shared, "I really don't feel like they [participants] got the same value as if they had done it in person." Dawn also commented on value in another direct comparison between in-person and virtual. She said, "I know the value of in-person, I've done a lot [of institutes], and it's obviously better in terms of the participants, especially people who have not had CASE before." While all the comments regarding value of virtual training applied to all participants, there was particular concern for individuals taking a CASE institute for the first time. Natalie elaborated, "I'm not sure that the participants have the value of CASE defined in their mind and how successful it can be to have more than one certification."

LTs also commented on the rigor of the content itself, which is intended to be STEM focused and inquiry-based in nature. Erin shared that as a LT she was unsure how in-depth to go with the content in the virtual setting. She said, "We [her and her LT teaching partner] really struggled with knowing what we needed to just briefly go over and what we were going to go in-depth." Veronica directly connected this hesitation about rigor with the integrity of the CASE brand:

I am a little concerned about the integrity of CASE and what it's supposed to be. It's supposed to be hard; it's supposed to make you think, it's not something that is a cookie cutter. It's supposed to be inquiry based; it's supposed to hurt your brain at the end of the day. I think virtually you can tune out and get away from that component and not everybody likes for their brain to hurt so they can tap out.

Walter called for CASE to consider the philosophy when making future decisions and commented that we “cheated the philosophy a little bit” with virtual institutes. By altering the curriculum for virtual delivery, LTs shared that uniqueness of CASE might be compromised.

Theme 2: Face-to-Face Preference for PD Delivery

The second theme focused on the LT’s preference for face-to-face PD delivery. This preference was multifaceted and stemmed from difficulties assisting participants, technology issues, the limited amount of content they were able to cover in a virtual environment, lack of commitment from the participants, and supply inconsistencies. Overwhelmingly, LTs discussed that in-person was their ideal method for delivering CASE curriculum. Some LTs were on the extreme end of the spectrum. Dennis claimed, “Honestly if we go all virtual again, I won’t do it. I want to be a team player and be part of solving the problem we were in, but I’m done with this virtual stuff as much as possible.” Other LTs discussed not desiring virtual delivery, but their willingness to serve CASE if virtual institutes were needed.

One emergent idea within the face-to-face preference for PD delivery was centered upon difficulties LTs had assisting participants in the virtual environment. This included developing meaningful connections with participants that was constrained by the virtual space, and challenges with helping participants complete in-depth, hands-on lab activities. All LT’s expressed that these issues could have been mitigated by being in-person. Because relationships were described by the LTs as an important component of the CASE philosophy and overarching framework, this lack of relationship building hindered their ability to effectively assist teachers. Sarah shared how the complex lab activities were more difficult to assist participants within a virtual environment. She elaborated:

It's so much easier to demonstrate and clarify in person, as opposed to when you're virtual. You may be pointing to something, and you may be telling them what it is, and they may not be looking at their screen, so they may not get it. So, the clarity piece for me and then attention to detail that you're able to get into when you're in person.

Within the CASE LTs and Hosts Facebook group, numerous photos were posted of labs being set-up, in-progress, and final results. There were also videos walking participants through entire lab processes created by LTs. George highlighted the differences between in-person and virtual in his ability to help participants who might be struggling with specific labs. He shared, “She did the lab three times because she kept doing it wrong. She wasn’t in there, she wasn’t with us.”

Technology was also perceived as a barrier within the virtual PD, causing LTs to prefer in-person delivery. Veronica commented, “Trouble shooting was very challenging. Not being able to walk up to someone and say, ‘oh no, your circuits are not correct, let me look at it through the screen backwards.” April said, “I don’t personally have a document camera, so it was a little bit more difficult to guide them through the dissection versus the group that did.” Other LTs shared that they were new to the technology platforms themselves, making it difficult to teach using the technology. Dennis highlighted the limiting nature of Google Meets, “The two lead teachers were kind of the co-hosts, but only one could send people to rooms and go visit the room, while the other one could not do that.” Within the CASE LTs and Hosts Facebook group, various technology applications were highlighted included Google Jam Board and virtual

interactive notebooks. Erin shared about the overwhelming amount of technology tools provided to LTs overall and her attempt to balance tools with content. She said, “So I think we were given some really cool things [technology tools] that if I had like a full-time classroom, I could use them. But not over two weeks, where I’m just worried about the content.”

It was not just the LTs who had issues with technology, it was also many of the participants. Dennis said, “Some of our teachers just didn’t have the computer skills. We had one guy...Walter and I spent a lot of time just talking computers with him. It’s almost like push that button there to turn it on.” Kelly commented on participant issues with turning things into Google classroom, “I had one [participant] that for the life of her could not figure out how to turn everything in and I have no idea what she was doing wrong.” This comment highlights the intersection between lack of technology skills for participants, and lack of technology skills for LTs to mitigate difficulties experienced. Beyond participant technology skills, some of the environments were not conducive to virtual PD. Isabel commented, “Some people, their bandwidth was limited. So, for them to leave their cameras on while they were doing things [labs] was a challenge.” George expressed his concerns with technology itself being a barrier to participant and LT engagement with CASE in the future. He said, “I just didn’t want anybody to be chased away because of that, you know, the technology aspect.”

LTs shared various experiences from their summer institutes regarding participant engagement and commitment within virtual PD. Many desired a greater commitment level from participants and commented on how participants were being pulled in multiple directions. Joan commented, “I think virtual has some good things as far as convenience, but again, in that setting, your participants aren’t always engaged.” Rebecca shared that she “needed additional virtual engagement strategies to use with adult learners” as an LT to combat engagement issues. Logan spoke to the differences in participant engagement and participation in a virtual environment. He said, “In a large group, it was just silent. Even the chat was pretty silent in the large group.” Isabel reflected on the organic conversations that were noticeably absent in a virtual setting. She said, “So it’s not the same enriching small group conversations that you can have when you’re all sitting around doing homework at 5:00pm at night.”

In addition to engagement, absenteeism was a major concern for LTs. Kelly expressed her frustration, “The main issue was absentee. Yes, they signed the agreement, and yes, we told them, and yes, we threatened them, but they didn’t listen.” Tony shared, “When you go to a break or at the end of the day, you’d have people that would never disconnect because they were just gone.” There was a perceived lack of accountability in the virtual space to know if participants were even absorbing the material. The setting participants were in and life happening around them also contributed to a lack of participant engagement. Jose shared, “Some of our participants participated in the orientation on the road or from a location where they couldn’t really interact with what they needed resulting in some participants realizing they didn’t have what they needed until too late.” Veronica said, “I think too life just go in the way. One lady messaged, ‘oh I’m a foster parent, I’m getting this child dropped off today and I won’t be available for the first session.’” Stories like Veronica’s were common and encompassed a variety of participant experiences balancing family, professional life, and the virtual institute.

The final concept that led LTs to prefer face-to-face delivery was supply inconsistencies and broader issues with the virtual teaching environment. Out of all the LT's interviewed, every single one mentioned issues with the supplies sent to them and their participants by their host sites. Maria stated, "I wish we had the same box that the participants had." For Joan, this was more than an inconvenience and severely impacted her teaching. She said, "I think if we go virtual that your Lead Teachers need to be given the materials that the participants get because I couldn't really, it was hard for me to answer their questions when they were having troubleshooting issues." Across most institutes, LTs did not receive the same supplies as participants because it was not required in the host manual. This also led to differences in direction sets for conducting labs based on the lab technology the LTs and participants had available. Erin shared, "Had I known ahead of time that I didn't have the same sensors as my participants, I could have prepared myself a lot better for that." There were also issues with the participants themselves receiving the correct supplies to complete the labs. Numerous experiences were shared about lost supplies, broken supplies, or delayed supply delivery. Courtney said, "A lot of our participants didn't receive a lot of the materials they were supposed to receive so that was a huge challenge." Even if the participants received the materials, there was no guarantee they knew what they were or how to use them. April suggested, "It might be helpful for CASE to have a PPT of what all the materials look like...we have like four boxes, full of materials from different vendors, but the participants struggled finding it."

In addition to supply issues, there was also a burden on LTs to create a quality teaching environment to deliver the virtual PD. Isabel said, "I spent quite a bit of time setting up my space, practicing my camera angles, and the materials in my lab space." Her attention to this was fueled by her desire to give a quality CASE experience to her participants. She shared, "Because if I were a participant and I couldn't even see what was going on, that would be very frustrating." Within the CASE LTs and Hosts Facebook group, LTs were also creative in their lab set up, utilizing ring lights, multiple laptops, standing desks, and classroom TV screens. Some LTs taught from their local high school classroom or laboratory and others taught from their homes.

Theme 3: Hurdles Unique to Virtual PD

LTs surfaced many unique challenges inherent within the delivery of virtual PD. This theme included difficulties with lead teacher collaboration, use of asynchronous and synchronous time on the schedule, collaboration with labs and learning, and building community amongst participants. For many of the LTs, the learning curve with virtual delivery combined with the navigation of a quality PD experience for all participants was complicated. Veronica commented, "Did it work? Yes. Would I ever want to do it again? Oh, good Lord, no." The first hurdle that LTs had to overcome was working directly with their teaching partner. These individuals typically begin collaborative efforts at Elite Elevation (formerly titled Lead Teacher Orientation). April said, "We didn't get to spend a lot more time outside of Elite Elevation to hammer out the details." In a typical institute, LTs would have face-to-face time during Elite Elevation, at the start of their institute directly at the host site, and in the evenings throughout the institute. Isabel reflected on how this impacted her institute, "Normally a lead teacher team will get together in the evening and say, 'okay how did things go'...and that kind of stuff went by the wayside."

To facilitate the transition to virtual learning, CASE developed institute schedules with combinations of synchronous and asynchronous time. Synchronous time meant the LTs and participants completed APPs together, often with cameras on. Asynchronous time was intended for participants to work on their own and LTs were often available for assistance. However, the lack of clarity in what should be occurring during both synchronous and asynchronous time created issues and uncertainty for many LTs. LTs at various institutes treated asynchronous and synchronous time differently. Logan shared, “The asynchronous time, I’m not sure how we were supposed to use that either. Some days you know we were on a lot longer than that one hour afterwards, depending on the lab we were setting up.” Other LTs commented that they appreciated the asynchronous time to break up the monotony of online learning. Walter said, “I think my brain would melt out of my ears if we had to go like six hours straight talking all the time...I thought it was weird to give them time off, but in the end, it worked out.”

The nature of the CASE curriculum is dependent upon collaboration between participants. For each course, the teaching method utilized is inquiry-based instruction, which requires participants to converse with one another as they work through each individual APP. In a virtual setting, the LTs described many barriers to collaboration between participants. April shared, “You lose those connections and the networking and the collaboration that you get from being face-to-face.” Grant elaborated, “I didn’t have that connection with the participants that you normally have when you’re all in the trenches together.” Kaycie described the difference she saw between virtual and in-person institutes:

If you had failure or if you had success, you only had one of them if you're at home. Whereas if you're in an institute you get to see four or five or more experiments all at one time, failure or success. You only really have one physical example, but if you're together, you can kind of, say, ‘oh look at that, that worked better, what did you do different?’ So those conversations just really enrich the experience.

Many of the LTs employed strategies to facilitate collaboration at their virtual institutes. Erin revealed, “We tried to be intentional about putting them in different groups, so they got some time with other people. It was really hard to pop into every group when you did that, so who knows what they actually discussed.” Kelly took it a step further, “We stacked our breakout rooms strategically. Okay this person knows what’s going on, so I should pair them with this person that doesn’t really know.” Tony reflected on his previous experience with in-person CASE institutes, “I’d much rather be able to move around the room and interact with everyone.” Due to the lack of collaboration witnessed in virtual institutes, LTs discussed if participants would reach out to their LTs or fellow participants if they struggled in the future. Isabel commented, “Some of them, I would say yes. But it’s not going to be the same as my Maine Institute two years ago.” Many LTs discussed previous in-person institutes that included group chats, bonds formed, and collaboration long after the institute commenced. They feared that these types of sustained relationships would not occur with virtual participants.

Veronica shared a desire to receive more strategies from CASE on how to facilitate community in a virtual setting. She said, “I would have liked to have maybe a brainstorm session among the teachers about a way to form a virtual community because I saw some really cool things.” From the CASE LTs and Hosts Facebook group, ideas for building community shared

amongst LTs included an ugly Christmas sweater contest, show and tell time, virtual graduation ceremonies, and polls for participants at the start and the end of each institute day. However, Walter commented that this virtual connection still wasn't the same. He claimed, "I saw on Facebook somebody posted that they were doing a trivia night in their group, but it's not the same as going to the hotel lobby and water coloring with Kaycie." Logan shared, "So yeah, that that the interaction part was the heart hardest portion to compensate or replace or replicate, whatever you want to say, because it it's just really hard to do in a virtual setting."

Theme 4: Organizational Structure for Future Virtual PD

The final theme focused on improvements for the future organizational structure of CASE PD, with attention to collaboration between hosts and other parties, a clear division of responsibilities for all participating parties (National CASE, LTs, hosts, and participants), clear expectations for virtual participants, and recommendations for pre-institute events like CASE Elite Elevation. Experiences with host collaboration varied between LTs. Some hosts were new to the experience and others had hosted CASE institutes for numerous years. However, the role of the host for virtual institutes drastically changed due to the virtual modality and primarily focused on ordering and shipping materials to participants and LTs. The experiences between LTs ranged from praising their hosts for their efforts to deep issues with host collaboration.

Maria shared about her host experience, "He [host] made it so easy for me to do my job and I cannot thank him enough." Veronica had a particularly difficult experience with her host. "It was not good, there was just a lot of miscommunication...She was a nice lady, but I think a lot of issues that I had was just in her personality and how she handled things." Additional issues with hosts centered around time zones as all institutes were held in the hosts local time zone. Veronica shared, "Ariel and I had a weird one because our hosts were in [state omitted], so if you are on the east coast, you didn't start class until afternoon and didn't finish until late evening. That was a bit challenging." Erin shared that her host was on vacation during her institute. She commented, "Hosts are great, and they did a lot on the front end this time, but I would have maybe needed a little more assistance throughout."

With the first foray into virtual delivery, there were issues with who was responsible for what when planning for and delivering the CASE institute. Specifically, the division of responsibility between hosts and LTs was blurred from the LT perspective, which then led to some confusion from participants. George shared, "I think, from a participant standpoint, they get confused. Who's really in charge? Is it the host? Is it the lead teacher?" This uncertainty of who oversaw what aspects of the institute permeated many of the focus group conversations. Dawn shared that she found it "weird there wasn't a host specific thing" to do during the institute itself after inviting her host to the Google meets. Erin also shared that she "talked directly to CASE staff when we had problems", something that would typically fall to the host during an in-person institute.

From the participant side, LTs desired clearer expectations for participants from National CASE. This included absentee agreements, what constituted engagement in the virtual setting, and how to hold participants accountable for their participation. Rebecca requested, "Clearer expectations from CASE about the absentee agreement and how to handle that. It's tougher to

have the excuse of going home when you're in an in-person institute away from home." Kelly shared, "There definitely has to be a hard line on attendance. Making sure they are going to be present and reinforcing that if you miss more than X amount of live class time you aren't allowed to make it up." LTs mentioned both true emergencies like family illness and death that prevented participants from being fully engaged, but also non-emergency situations like "poor planning", "engagement pictures", "double booking", "being on their phone", "taking other meetings", and "presenting at conferences" that inhibited full engagement. Isabel commented on the difficulty of balancing home life and the institute when virtual. She said, "I think the hard thing is striking a balance between giving them scheduled time to be at the institute and still take care of business at home and teaching with integrity. I don't know where that balance is."

Overall, the most praise for any component in the planning for virtual CASE institutes was focused on Elite Elevation. Elite Elevation also occurred virtually for all LTs, who were required to attend, and for hosts who were granted optional attendance. Many comments revolved around the creative use of "houses" during Elite Elevation and how the event got LTs excited to deliver their CASE institute. Isabel said, "The thing that stood out the most was the comradery piece that they worked so hard to build the houses, and all the little things that Elizabeth sent to us. She does an excellent job with that." Rebecca shared her appreciation for team meetings at Elite Elevation, "The idea of a team meeting for your content beforehand is exceptional. I think that's something that needs to continue just to keep us up to date with the current curriculum and how we should be teaching."

Despite the value that many LTs expressed from participating in Elite Elevation, there were recommendations for future improvement. Rebecca shared, "Give us a chance, if we are selected to present virtually next year, to present virtually during Elite Elevation with our teaching partner so we can practice." Dawn suggested, "Maybe we can break it up by subject content area into different mini-LTE or mini-Elite Elevations if we did it virtually again, and then have some sessions where we all get together." Walter suggested having a "fake class and fake students" to test out the technology. Sarah shared, "After Elite Elevation we needed to put in more work so that we were prepared for the virtual institute because we may not have had the time during Elite Elevation this year to go over those components." Kaycie reflected that for much of Elite Elevation she was unsure what to even ask because the situation was new to everyone. She said, "I think we made the best of the situation we had."

Discussion/Implications/Recommendations

Theme 1: Maintaining the Integrity of CASE, aligns with active learning, coherence, and content focus aspects of the conceptual framework (Desimone et al., 2002; Garet et al., 2001). Within content focus, the rigor of the content was perceived as watered down by LTs within the virtual environment. The virtual modality also impacted active learning as the content had to be truncated to fit the new schedule and there were less opportunities for meaningful collaboration and engagement with the content. It is important for teachers to have the opportunity to consider how new information can be put into classroom practice (Putnam & Borko, 2000). The altered schedule also impacted the coherence of the PD, ultimately causing LTs to question if the current virtual PD truly reflected the CASE philosophy and model. Recommendations for practice aligning with this theme include a call for CASE to formalize a plan for delivering the

philosophy and background of CASE within institutes, including LT instruction on how to deliver and reinforce this content. Additionally, CASE should carefully consider the philosophy and model when making future decisions on programs to ensure that the quality of programming is maintained, as some decisions might compromise CASE values.

Theme 2: Face-to-Face Preference for Virtual Delivery, aligns with active learning, collective participation, and content focus aspects of the conceptual framework (Desimone et al., 2002; Garet et al., 2001). Within active learning, delivery of the content was perceived to be impeded by the virtual format for LTs, leading to a preference for face-to-face delivery. More specifically to delivery, there were issues with the use of technology, assisting participants, and the environment in which PD was delivered and received. Within collective participation, there were concerns surfaced about participant engagement and buy-in with the PD due to the virtual modality. Many LT's expressed that commitment level from participants was not the same as in-person institutes. Within content focus, the issues with supply acquisition caused participants and LTs alike to be missing some of the needed materials important for learning to occur. Recommendations for practice aligning with this theme include a structure to mitigate the shift from face-to-face to virtual from CASE. Additionally, LTs and participants should receive the same supplies. Direction from CASE should be provided on how to best motivate participants and encourage engagement, along with a clear absentee agreement for virtual institutes.

Theme 3: Hurdles Unique to Virtual PD, aligns with duration and collective participation aspects of the conceptual framework (Desimone et al., 2002; Garet et al., 2001). Within duration, there was a lack of a clear structure on the use of asynchronous time expressed by LTs. LTs also surfaced concerns for the total time allotted, APPs omitted, and the navigation of various time zones. Within collective participation, there were issues with building community amongst participants and concerns about collaboration in a virtual space. While breakout rooms and other procedures did work for some LTs, it is recommended that future direction on how to collaborate virtually and develop relationships is built into the virtual platform space, as developing a community of practice allows for a support network important for PD (Greiman, 2010). It is also recommended that a clear use of asynchronous time and a singular time zone be employed.

Theme 4: Organization Structure for Future Virtual PD, aligns with all five aspects within the conceptual framework (Desimone et al., 2002; Garet et al., 2001). Virtual PD will continue to gain permanence in educational spaces. CASE must consider ways to take the process that was spurred by COVID-19 and improve upon it to create a sustainable program that can meet the quality and expectations of a CASE institute. This can lead to teacher change and continued CASE curriculum permeation. It is recommended that CASE explore alternatives to full virtual PD such as hybrid opportunities and weekend opportunities to mitigate virtual issues. It is also recommended that additional planning time is reflected in training for LTs through Elite Elevation. More purposeful assigning of LT partners, elimination of two new LTs for a single institute, and potentially three LTs for virtual institutes is encouraged. Finally, there is a need for a clear division of responsibilities between national CASE staff, hosts, and LTs and further clarification on the roles of each party for future virtual institutes.

While this study yielded insight on the LT perspective, there is also much to be gleaned from research focusing on CASE participants. A quantitative questionnaire was dispensed at the

end of the institute season to all participants, but this should be expanded upon to investigate implementation one and two years following the institute. This research can explore which APPs past participants are teaching and if it corresponds to the ones they did within their virtual CASE institute. For the individuals who took the CASE institute virtually, did they sign up for another institute, and if so, did they choose virtual or in-person and why? Observations of teachers and qualitative focus group interviews of participants could also yield further insight into the effectiveness of virtual CASE institute PD, which can contribute to future programmatic decisions by CASE.

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Experiential Learning in Agricultural Education: A Philosophical Discussion

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While all learning and knowledge can be attributed to experiences, not all experiences are educative. Experiential learning is a highly utilized theory and pedagogical practice in agricultural education and has been since its inception as a subdiscipline. The purpose of this research is to examine the theory of experiential learning as it applies to agricultural education. Therefore, this theoretical work aims to continue the seminal research conducted by Roberts (2006), and aid in further understanding the phenomenon of experiential learning. Specifically, this study includes a synthesis of recent empirical research on experiential learning, especially in agricultural education settings. We present a revised process model that emphasizes experiential learning is not a stepwise process. Also, we provide revisions to the model for contextualizing experiential learning. Lastly, we present a holistic model of experiential learning that includes both the process and context of experiential learning.

Introduction

While all learning and knowledge can be attributed to experiences, not all experiences are educative (Dewey, 1938). The act of having an experience does not necessarily result in knowledge acquisition or complex understanding by the learner. In fact, human experience is so complex that theorists have examined the phenomenon and still find, after numerous decades, an immense need to continue to study the relationship between experience and learning (Baker et al., 2012; Kolb, 2015; Roberts, 2006). Even John Dewey, arguably the most prolific author on the subject of American education, published multiple works on experience because he felt his prior work had been largely misunderstood. Further, Dewey grappled with the term *experience* in his 1951 draft of *Experience and Nature*. He pondered whether it was the most appropriate and encompassing term with which to refer to his philosophic work, suggesting the term *culture* might be more appropriate (Kolb, 2015). The complexity among the relationships between experience and learning is so enormous and nuanced that its continual study and examination is required so we may best understand its use in agricultural education and beyond.

Roberts (2006) examined the theory of experiential learning and offered a philosophical framework for its use in agricultural education. Experiential learning is a highly utilized theory and a pedagogical practice in agricultural education, and has been since its inception as a subdiscipline (Baker et al., 2012; Estep & Roberts, 2011; Hughes & Barrick; 1993; Knobloch, 2003; Moore, 1988; Phipps et al., 2008; Roberts, 2006). At the secondary school level, experiential learning is embedded into the very framework of agricultural education (Baker et al., 2012; Phipps et al., 2008). Historically, experiential learning was foundational to agricultural education through the use of project-based learning (Moore, 1988; Phipps et al. 2008). Such learning was often a cornerstone of instruction through the implementation of supervised projects in agriculture, which are now referred to as supervised agricultural experience (SAE) programs. Additionally, experiential learning is often reflected in direct instruction and FFA activities, both of which are important components of agricultural education (Phipps et al., 2008). In fact, Baker

et al. (2012) purported that Kolb's (1984) experiential learning cycle could be overlain with the tri-pillared model of agricultural education (classroom and laboratory instruction, SAE programming, and FFA). The authors suggested that while agricultural education is well-positioned to implement experiential learning across the components of instruction, SAE, and FFA, this requires intentionality by agricultural educators. Specifically, agricultural educators should "include purposeful reflection, gentle guiding toward abstraction, and an opportunity for students to experiment actively with their newfound learning" (Baker et al., 2012, p. 12). Therefore, practitioners seeking to implement experiential learning should be well informed about the theory and should utilize appropriate conceptual models to drive their pedagogical practices (Baker et al., 2012; Kolb, 2015; Roberts, 2006).

Experiential learning is also foundational to post-secondary models of agricultural education. Estep and Roberts (2011) offered a pedagogical model for implementing experiential learning in undergraduate agricultural education settings. The model emphasized experiential learning in three areas: classroom/laboratory instruction, co-curricular activities, and extra-curricular activities (Estep & Roberts, 2011). Eyler (2009) suggested that experiential learning would be beneficial across higher education settings because it deepens learning, expands learners' capacity for critical thinking, allows learners to utilize concepts in applied settings, and fosters a desire to be a lifelong learner. For all the same reasons, experiential learning is also considered foundational to post-secondary agricultural education (Andreasen, 2004; Estep & Roberts, 2011; Roberts, 2006; Phipps et al., 2008).

Purpose

The purpose of this research was to examine the theory of experiential learning as it applies to agricultural education. Roberts (2006) contended that while the *practice* of experiential learning is widely researched in agricultural education settings, the *theory* of experiential learning has been researched far less. Well over a decade later, this is still largely the case; therefore, further examination of experiential learning theory in agricultural education settings is warranted. Furthermore, the continued practice and empirical examination of experiential learning has transpired over the past decade. The results of such research and practice have several implications for the process and context models of experiential learning developed by Roberts (2006). Therefore, this theoretical work aimed to continue the seminal research conducted by Roberts (2006), and to aid in further understanding the phenomenon of experiential learning. Specifically, this study included more recent empirical research on experiential learning, especially in agricultural education settings. Second, we presented a revised process model that emphasizes that experiential learning is not a stepwise process. Third, we provided revisions to the model for contextualizing experiential learning. Fourth, we presented a holistic model of experiential learning that includes both the process and context of experiential learning. And finally, we offered implications and recommendations for the use of such models in agricultural education.

From Roberts (2006) to Present Day: A Review of the Literature

The theoretical framework for the implementation and contextualization of experiential learning established by Roberts (2006) has been used extensively in agricultural education

settings and beyond. While the seminal work has been widely beneficial to practitioners of experiential learning, over a decade of literature and empirical research has since been produced and should also be considered alongside Roberts' (2006) framework. While much of the literature in agricultural education reported on experience-oriented activities (i.e., service learning, internships, study abroad, classroom projects, etc.), the literature that has examined the *theory* of experiential learning was reviewed as part of this theoretical examination. Such literature has added to the profession's body of knowledge on experiential learning theory, and thus, has implications for the philosophical models proposed by Roberts (2006).

Baker et al. (2012) stated, "Agricultural education is uniquely poised to help students through an effective model of instruction that is experiential by nature. However, simply providing experiences does not constitute learning" (p. 12). Educators must consider the entire process of experiential learning to effectively facilitate the learning cycle (Baker et al., 2012; Clark et al., 2010; Kolb, 2015). However, in their study of teachers' use of experiential learning in agricultural education laboratory settings, Shoulders and Myers (2013) found this is often not the case. The authors found most teachers did not plan for or implement all four of Kolb's (1984) stages of the experiential learning cycle. Teachers also spent the most amount of planning and lesson time on learning activities in order to help students grasp learning experiences (experience and conceptualization). The least amount of time was spent in learning activities designed for students to transform their experiences into knowledge (reflection and application). Further, Shoulders et al. (2013) conducted a national survey of agriscience teachers and found that they perceived the incorporation of students' background knowledge to be of little importance when planning for experiential learning. However, when learning experientially, connecting one's experience to prior knowledge is theorized to be of critical importance (Dewey, 1938; Kolb, 2015). This evidence suggests agricultural educators may need further training on implementing experiential learning holistically (Shoulders et al., 2013; Shoulders & Myers, 2013).

Other research in agricultural education has tested the effectiveness of the experiential learning process and some of its theoretical components (Baker et al., 2014; Baker & Robinson, 2016; Baker & Robinson, 2017a; Baker & Robinson, 2017b; Baker & Robinson, 2019; Blackburn et al., 2015; Bradford et al., 2019; Coleman et al., 2020; Coleman et al., 2021a; DiBenedetto et al., 2017; Smith & Rayfield, 2017). Some researchers have examined the order in which the experiential learning process is implemented and its effects on students' knowledge, knowledge retention, scientific reasoning, and learning preferences (Baker et al., 2014; Coleman et al., 2020; Coleman et al., 2021a; DiBenedetto et al., 2017; Smith & Rayfield, 2017). However, results have been fairly inconsistent across the studies. Researchers have also examined modes of reflection on student learning in agricultural education (Baker et al., 2014, Blackburn et al., 2015; Coleman et al., 2020; Coleman et al., 2021a; DiBenedetto et al., 2017), and results have also varied across these studies. Such inconsistencies suggest the specific nuances, such as order and methods, by which the process of experiential learning is implemented may be of less importance than the combined effects of the grander, holistic theory of learning by experience. However, studies that have examined experiential learning in comparison to more traditional methods of pedagogy (i.e., direct instruction) have found significant effects in favor of experiential learning approaches or no difference between the two approaches (Baker & Robinson, 2016; Baker & Robinson, 2017a; Baker & Robinson, 2017b; Bradford et al., 2019). This suggests that the process of experiential learning is equally, if not more, effective as a

pedagogical approach for use in agricultural education settings. However, this does not mean the provision of concrete experiences should serve as the only pedagogical approach for agricultural education. Research studies have evidenced positive outcomes when learning experiences have been tailored to meet the preferred learning style of students (Baker & Robinson, 2019; Lamm et al., 2011; Moore et al., 2010; Smith & Rayfield, 2019), suggesting that a balanced delivery of the holistic experiential learning model can be an ideal method through which multiple learning style preferences can be delivered.

Experiential Learning Theory

Theoretical Contributors to Learning by Experience

The theory of experiential learning is rooted in a constructivist epistemology. Jean Piaget is known as an early pioneer of constructivism through his work on the theory of cognitive development (Piaget, 1952). Piaget's work focused on one's ability to make meaning of their experiences by connecting them to abstract ideas. Piaget proposed that one's cognitive ability develops over time during approximate life stages, and how such stages affect one's internal cognitive functions and their perceptions of experiences and interactions.

Lev Vygotsky contributed to the field through his theory of social constructivism and the zone of proximal development (Vygotsky, 1978). Vygotsky emphasized that social interactions are critical to learning, and that knowledge is often the product of the interaction of two or more people. The zone of proximal development is the potential one has to learn new knowledge and skills based on the individual's current developmental level (i.e., a child's developmental level is likely not the same as that of an adult). Further development occurs when one can connect their current knowledge and ability to new knowledge and skills through the guidance of another person (Vygotsky, 1978). Vygotsky emphasized how critical other people involved in a person's environment and experiences are to their development of knowledge and behavior.

John Dewey is one of the most influential and prominent philosophers of American education and his work has important, yet lofty, implications for experiential education. First, Dewey believed the fundamental principle of education was to prepare learners for a democratic society and to have the ability to adapt to a continuously changing world (Dewey, 1938). This consideration was reflected in his article, *My Pedagogic Creed*, when Dewey (1897, Article I, para. 3) stated, "...it is impossible to foretell definitely just what civilization will be twenty years from now. Hence it is impossible to prepare the child for any precise set of conditions." Dewey was pragmatic, and preferred education that was realistic and adaptive to student and societal needs (Dewey, 1897). Second, Dewey (1897, 1938) expressed that learning experiences needed to be accompanied by real-life applications. Dewey found traditional schools to be inadequate at accomplishing this due to their inability to foster the freedom and experiences learners needed to be successful. He criticized the experience offered by traditional schooling because it isolated subject matter and separated learning experiences from one another (Dewey, 1897). For Dewey, learning experiences that were clinical and isolated could not be further from being educative.

Third, Dewey (1938) recognized that our experiences are situated in the context of all human experience which has come before them, which influences all educative experiences that

may come after. Engaging with, and understanding, the experiences of others was critical for Dewey (1938), because "...the principle of continuity of experience means that every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after" (p. 35). Thus, for Dewey, the vicarious understanding of others' experiences and perspectives, and the comparison of such to our own, was critical for education. Dewey believed that for an experience to be educative, it should be interdisciplinary, bridging connections between social contexts and one's personal experiences (Dewey, 1897, 1938). Lastly, Dewey emphasized the vital role the teacher has in providing experiences to students. He believed it was up to the teacher to assess the needs and prior experiences of their students so they could provide them with appropriate subsequent learning experiences (Dewey, 1938). Dewey (1938) described the teacher as a facilitator of experiences and the social process. Education should be a communal exchange of ideas and experiences. When this was achieved, "The teacher loses the position of boss or dictator but takes on that of a leader of group activities" (Dewey, 1938, p. 59).

Kurt Lewin was also a prominent contributor to the theory of learning by experience. Lewin was widely known for his action research and laboratory training processes, which have heavily influenced experiential learning theory (Kolb, 2015; Lewin, 1951). In fact, Kolb's (1984, 2015) model of experiential learning closely aligns with the Lewinian model of action research and laboratory training. The model begins with here-and-now concrete experiences used in to test abstract concepts in concrete, empirical settings (Kolb, 2015; Lewin, 1951). Moving further, the model continues with feedback processes such as one's observations and reflections of the concrete experiences, and the formation of abstract concepts and generalizations. The last step in the process is to test implications of the abstract concepts in new settings, which leads back to a concrete experience.

Process of Experiential Learning

Many theorists have developed models to depict the process of experiential learning (Joplin, 1981; Kolb, 1984; Roberts, 2006). Such models have been cyclical in nature, designed to reflect Dewey's (1938) sentiments that all experiences are connected to previous and subsequent experiences. Joplin (1981) presented a cyclical model composed of five stages: focus, challenging action, support, feedback, and debrief. The model was presented as a continuous spiral to represent each experiential learning cycle to be connected to previous and future iterations of the cycle. Stage one, *focus*, is the beginning of the process where a learner is exposed to a phenomenon. Next, in the *challenging action* stage, learners have direct interaction with the phenomenon. Finally, in the *debrief* stage, learners reflect on their experiences and observations and draw connections to existing knowledge and experiences. The *support* and *feedback* stages of Joplin's (1981) model occur throughout all stages of the process. Support and feedback are provided as needed by the learner and they encourage the learner to evaluate their progress throughout the learning process.

Kolb (1984, 2015) summarized experiential learning as the cyclical learning process by which experience is transformed into knowledge. In his 1984 model, Kolb purported there are two modes by which to grasp experience: concrete experience and abstract conceptualization. There are also two modes by which to transform experience into knowledge: reflective

observation and active experimentation (Kolb, 1984). Further, Kolb (2015) suggested that no one stage is always the starting point for the process. Roberts (2006) presented a model of the experiential learning process that synthesized the work by Dewey (1910/1977, 1938), Kolb (1984), and Joplin (1981). The process begins with an *initial focus*, which is the learner's exposure to the phenomenon of interest. The learner then has an *initial experience* in which they engage with the phenomenon. This is followed by *reflection* upon what the learner has experienced or observed, which allows the learner to draw *generalizations* regarding the phenomenon. The learner then applies those generalizations in similar or new experiences through *experimentation*. The on-going cycle continues through future iterations of the process where learners continue to reflect, generalize, and experiment with the phenomenon in future settings.

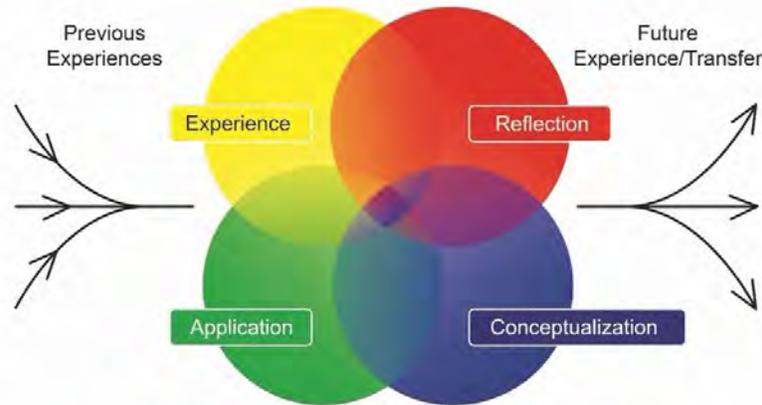
Seaman (2008) contended that the representation of experiential learning as a stepwise cycle or sequence should be ended, suggesting that, "the pattern of 'experience-reflect-learn' might be considered an *ideology* of experiential learning rather than a *philosophy* or a *theory* of experiential learning" (p. 15). Others have also viewed stepwise models of experiential learning as oversimplified (DeCantis & Kirton, 1996; Fenwick 2001; Holman et al., 1997; Quay, 2003), including Kolb (2015), who explained that while his model was initially created as a simplistic model, learning from experience is, in reality, more complex. Providing a reconsidered process model will reflect the complexities that lie within the theory of learning by experience, while also providing a theory-based model to guide how practitioners can holistically implement the experiential learning process.

Figure 1 is a revised model of the process of experiential learning. This model begins with one's previous experiences and existing knowledge. Dewey (1938) emphasized that all experiences are connected to those which have come before them. When discussing the quality and effectiveness of learning experiences, Dewey posited, "Just as no man lives or dies to himself, so no experience lives and dies to itself. Wholly independent of desire or intent, every experience lives on in further experiences" (1938, p. 27). Educative experiences are those which are framed with one's previous experiences, and the collective experiences of humankind. Dewey (1938) discussed this as the principle of the continuity of experience. For learning to occur, one must be able to make meaning of their experiences and transform them into abstract knowledge which can be reapplied in future learning and contexts. To do this, we look to our past experiences, learning, and knowledge in order to draw connections to what is new.

Moving on to the center of the model, there are four overlapping circles that include the four components of experiential learning suggested by Kolb (2015) and Roberts (2006): experience, reflection, conceptualization, and application. The overlap of the components is intentional, in order to avoid the stepwise isolation of such variables. In reality, components of experiential learning are not often isolated, nor should they be depicted as such (Seaman, 2008; Quay 2003). Researchers in agricultural education have also evidenced this when experiential learning variables have been tested, and significant interaction effects between two independent variables were found (Coleman et al., 2020; DiBenedetto et al., 2017). Therefore, this model showcases the blending of the four components with one another. It is important to note that this model depicts the possibility of multiple components of experiential learning occurring simultaneously. None of the four circles served as a starting point to the experiential learning

process because a learner could begin at any phase of the process; however, we will begin by discussing experience. Concrete experiences occur when our physical experiences are absorbed and interpreted by our sensory organs (Kolb, 2015). However, not all experiences are concrete; therefore, the *experience* circle is labeled as such to be more inclusive of all learning experiences that may fall on the continuum of concrete to abstract.

Figure 1
Revised Model of the Experiential Learning Process



The next circle, *reflection*, can be defined as, “a conscious exploration of one’s own experiences” (Silver, 2013, p. 1). Quay (2003) criticized Kolb’s model because it depicts reflection occurring *after* a concrete experience where learners, “step out of experience to reflect and process, then we step back in. Experience exists as a memory to be processed via reflection” (p. 108). While this is the case sometimes, it is not always the case. Experience and reflection are not separate tasks to be checked off a list one-by-one. Schön (1983) discussed the idea of reflection-in-action by suggesting that our thoughts cannot always be separated from our actions. Reflection-in-action leads to problem solving that is situational in nature, when reflection occurs in the simultaneous context as our concrete experiences. It is possible that both reflection-in-action and reflection-on-action can occur (Schön, 1983), and research suggests a variety of reflection modes should be implemented around an experience (Blackburn, et al., 2015; Coleman et al., 2020; Coleman et al., 2021a; Lamm et al., 2011). In Figure 1, this is depicted by the overlap between the experience and reflection circles. In some instances, learners may be engaged in an experience (i.e., a laboratory activity, field trip, project, etc.) where they reflect-*in*-action. While participating in a laboratory activity, learners may think, “What am I seeing/doing/feeling?” or “Why might this phenomenon be occurring?” Reflection is often embedded within, and occurs naturally as part of our experiences (Hutchinson & Bosacki, 2000; Quay, 2003; Schön, 1983). However, learners may also reflect after the conclusion of an experience, or reflection-*on*-action, which would also be an experience in and of itself. Lastly, Akyol and Garrison (2011) included pre-task reflection as part of their synthesis of the metacognitive process associated with one’s learning experiences, suggesting that reflection and metacognition can occur before, during, and after an experience. This reinforces the notion that the experiential learning process does not always “begin” with a concrete experience.

Conceptualization is the next circle. This occurs when learners form ideas, theories, or concepts around a phenomenon. Conceptualization overlaps with reflection because the act of reflection often leads to or encompasses the process of conceptualization. As learners reflect about their experiences, they may simultaneously generate conceptualizations around a phenomenon. However, the reverse sequence could occur too. After learning about abstract concepts around a phenomenon, a learner may be prompted to reflect on how such concepts could be applied in other situations. Therefore, conceptualization and reflection should not always be viewed as separate or linear steps in experiential learning. Conceptualization could also occur during an experience, such as participating in a lecture or while reading literature; hence the overlap between the conceptualization and experience circles. Then, as learners apply or test their conceptualizations in new or similar settings, they might also modify or adjust their conceptualizations regarding a phenomenon, which is represented by the overlap between conceptualization and application.

Finally, *application* occurs when learners apply learned concepts to similar or new experiences. In many cases, learner application can be its own experience, which is represented by the overlap between the application and experience circles. Application is sometimes interchanged with the word *transfer* which Haskell (2001) defined as, “our use of past learning when learning something new and the application of that learning to both similar and new situations” (p. xiii). Following an experience, learners should reflect on how their experiences can be transferred into different contexts in the future (Dewey, 1938), which could lead to new iterations of the process (Roberts, 2006). Therefore, the far-right end of this model indicates the connection between experiential learning with *future experiences* and opportunities to transfer knowledge in new or similar settings.

Lastly, while this model represents just one iteration of the experiential learning process, it is important to note that multiple iterations of this process may occur within one experience (Joplin, 1981; Roberts, 2006). For example, during a single lesson or class session a learner may move through several iterations of this process. Joplin (1981) referred to this as mini versus maxi experiences, and Knowles et al. (2015) discussed it as micro versus macro experiences, meaning the process of experiential learning can be a series of smaller, nested episodes within one grander experience. An internship might be viewed as one macro experience, but each week, day, or hour working within the internship might be a micro experience in which a learner completes an iteration of the experiential learning process. Therefore, where one experience ends another begins creating a continuous, nested chain of experiences, which is why multiple theories have depicted the process as a continuous, cyclical model (Dewey, 1938; Joplin, 1981; Kolb, 2015; Roberts, 2006).

Contextualization of Experiential Learning

Roberts (2006) developed a model by which to contextualize experiential learning. The model considered several theoretical works from which to draw the criterion used to contextualize experiential learning. The first consideration is the *duration* of experience based on Joplin’s (1981) scope of the experiential learning ranging from mini to maxi experiences. Therefore, Roberts’ (2006) model depicted learning experiences that occur on a continuum of

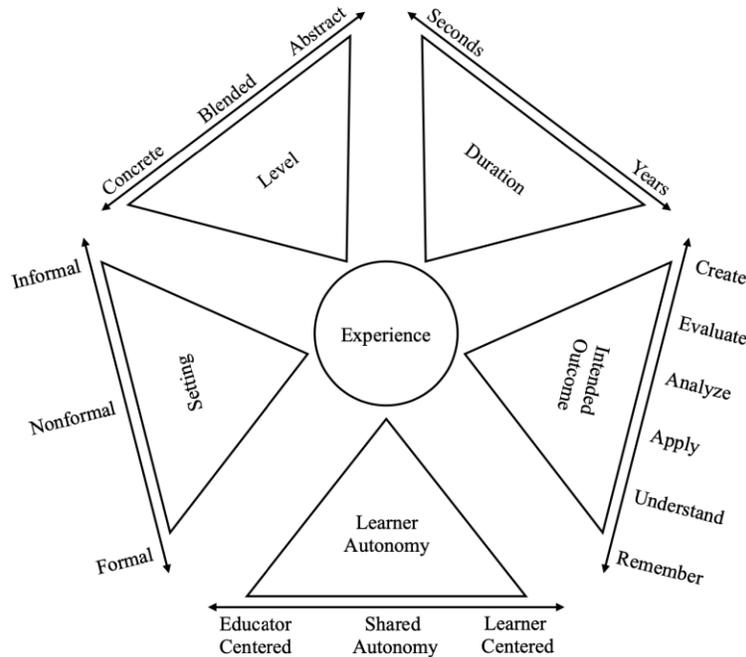
duration from seconds to years. Second, the *setting* of experiential learning can be contextualized on a continuum from formal, to nonformal, and informal. This setting of an experience is based on the work by Etling (1993) who proposed these three terms by which to contextualize educational settings. Third, Roberts' (2006) model included the *level* of an experience which ranges from abstract to concrete. The process is based on Dale's (1946) *Cone of Experience*. Dale (1946) proposed a continuum of learning experiences that ranged from abstract experiences such as verbal or visual symbols, and then moved on to observation experiences such as exhibits or demonstrations. The base of the *Cone of Experience* continuum included concrete experiences where the learners participate in physically doing something (Dale, 1946). The final criterion used for contextualizing experiential learning is *intended outcome*. The intended outcome ranges on a continuum from exposure to dissemination and is based on the work by Steinaker and Bell (1979).

Researchers have used Roberts' (2006) model by which to contextualize learning experiences in order to conceptually frame studies focused on experiential learning (Coleman et al., 2021b; Heinert & Roberts, 2016). While the contextualization of learning experiences is critical to understanding the theory of experiential learning, Roberts' (2006) process model has been referenced far more in research than the model of learning contexts. This theoretical study will offer three modifications to the 2006 context model to increase its utility and relatability to educational practitioners, researchers, and contexts. The first modification focuses on the context of *intended outcome*. Roberts' (2006) model proposed five taxonomic levels for intended outcome based on the work by Steinaker and Bell (1979). The authors offered that their five taxonomic levels "are intrinsically linked together," and learners should move through the levels "in a natural and logical progression" (Steinaker & Bell, 1979, p. 3). While we do not disagree that such a learning progression is possible and likely effective, Steinaker and Bell (1979) intended their levels to be linked, and they envisioned that all five levels would be achieved by a learner in an ideal learning experience. We believe this results in their taxonomy being less appropriate for the purpose of contextualizing individual learning experiences categorically, because not every learning experience will achieve every taxonomic level offered by Steinaker and Bell. However, this does not mean that an experience which does not attain all five levels is not an educative one. We suggest the taxonomy by which to contextualize *intended outcome* be replaced with the seminal, cognitive taxonomy offered by Bloom et al. (1956), which was later revised by Anderson & Krathwohl (2001). The revised model of experiential learning contexts, which includes the revised Bloom's taxonomy, is presented as Figure 2.

Bloom's taxonomy was intended to categorize cognition and experiences into six primary classes: knowledge, comprehension, application, analysis, synthesis, and evaluation. Bloom et al. (1956, p. 10) stated this comprehensive list by which to classify learning outcomes would allow educators "to understand more completely the relation between the learning experiences provided by these various programs and the changes which take place in their students." Further, Bloom et al. (1956, p. 12) stated that the purpose of their taxonomy was "to be a classification of the student behaviors which represent the intended outcomes of the educational process." This is also our goal for including *intended outcome* as a mode by which to contextually classify learning experiences. We also find Bloom et al. (1956) more appealing for this model because each of their six taxonomic classes were intended to be equal to one another. That is, no class had more value or quality than another class, but rather, each class has its own unique function

within education, as is the case with learning experiences. Lastly, we think the inclusion of Bloom’s taxonomy is most suitable for this model because it has stood the test of time and has become widely recognized and adopted by educational practitioners globally. Therefore, the taxonomy was revised to employ action verbs as labels for the six levels: remember, understand, apply, analyze, evaluate, and create (Anderson & Krathwohl, 2001).

Figure 2
Revised Model of Experiential Learning Contexts



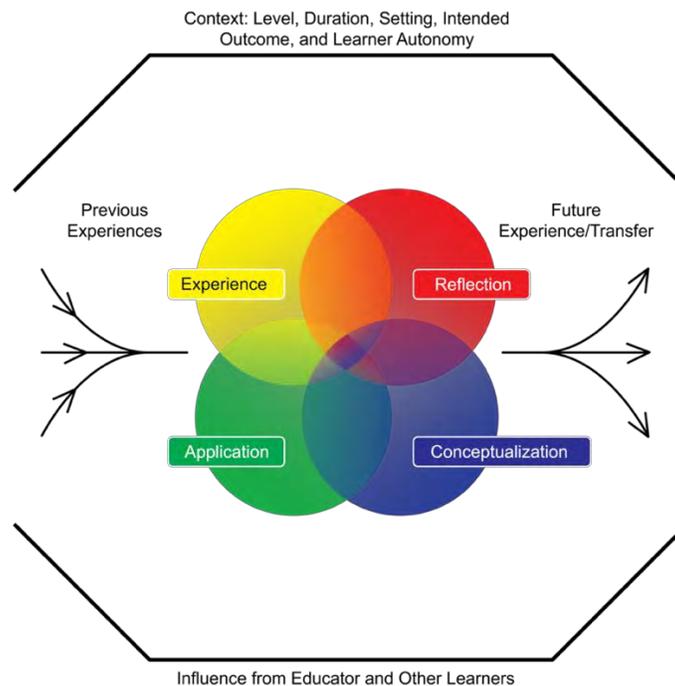
The second adjustment made to this model was made to the *level* by which to contextualize a learning experience. Roberts’ (2006) model offered a continuum of concrete to abstract experiences. However, as technology and teaching advance, more and more learning experiences offer a blend of both concrete and abstract experience. For example, electronic field trips (EFTs) are being used to connect students to scientists and field experiences at a distance in situations where it may not be feasible for them to attend in-person (Beattie et al., 2021; Loizzo & Beattie, 2019). When examining Dale’s (1946) cone of experience, activities such as watching demonstrations, attending field trips, viewing exhibits, watching movies, and looking at photos are all classified as *observing*, which falls somewhere in between fully concrete and abstract experiences. Therefore, to represent such experiences in this model the word *blended* has been included on the experience level continuum in between abstract and concrete. Lastly, the third revision made to Roberts’ (2006) model was the inclusion of an additional context area: learner autonomy. Dewey (1938) emphasized the role of the educator and their influence upon a learner’s experiences. However, the role an educator might play in a learning experience varies based upon the context. Roberts et al. (2010) offered a taxonomy of commonly used instructional methodologies in agricultural education settings and the level of learner autonomy associated with each. The spectrum of autonomy between the teacher and the learner fluctuated based on the

context. Roberts et al. (2010) included teacher-centered activities, shared interaction activities, and student-centered activities. Therefore, in the revised model of experiential learning contexts (Figure 2), learner autonomy ranges from educator-centered autonomy to learner-centered autonomy, with shared autonomy in between.

Holistic Model of Experiential Learning (Process and Context)

Thus far, we have presented two models which were used to describe the process of experiential learning, and by which to contextualize learning experiences. While both have their own merits and purposes as independent models by which to explain, frame, and research the phenomenon of experiential learning, theorists of experiential learning have suggested true, real-life experience does not occur without its accompanying context (Dewey, 1938; Kolb, 1984, 2015). Hutchinson and Bosacki (2000) discussed the concept of embeddedness which emphasizes “the transactional relationship between student, teacher, and environment which is so critical to experiential education” (p. 180). Therefore, we present a third, holistic model, that includes both the process and the contexts of experiential learning (Figure 3).

Figure 3
A Holistic Model of Experiential Learning



In this holistic model, the process of experiential learning occurs through the contextual frame. Any given experience is framed by its level, duration, setting, intended outcome, and level of learner autonomy. Additionally, Dewey (1897, 1938) explained how critical the educator was for education. This notion is reflected in Dewey’s (1938, p. 58) remark, “[The educator] must survey the capacities and needs of [their learners] and must...arrange the conditions which provide the subject-matter or content for experiences that satisfy these needs and develop these

capacities” (Dewey, 1938; p. 58). Therefore, this model also includes *influence from educator and other learners* as contributing factors that frame a learning experience. This also aligns with Vygotsky’s (1978) theory of social constructivism, which highly emphasizes the influence educators and other learners might have on one’s learning experiences. Other theorists concur, citing the educator as one of the most critical influencers of a student’s learning. Nussbaum (1997), whose work was heavily influenced by John Dewey and William James, suggested the educator was “the most important ingredient” to a student’s learning (p. 41). Further, Joplin (1981) included *support* and *feedback* as critical components of experiential learning. Support and feedback should be a continual component that are included throughout a learning experience (Joplin, 1981). As such, support and feedback are an important part of the influence provided by an educator and other learners. Therefore, the *influence from educators and other learners* is essential to one’s learning experience, and it is visualized in this model as part of the contextual frame of a holistic learning experience. Lastly, it is important to note that the *context* and *influence* components intentionally encapsulate the experiential learning process in order to showcase the way one’s learning experience is framed, and that the process of experiential learning does not occur separately from its context.

Implications and Recommendations

We maintain that the process of experiential learning is cyclical in nature. That is, each iteration of the process is connected to the next in an on-going fashion (Dewey, 1938; Joplin, 1981; Kolb, 2015; Roberts 2006). However, the experiential learning process should not be viewed as a stepwise recipe. This is not to say that the components of experiential learning (experience, reflection, conceptualization, and application) cannot be performed in steps one after another, but the components need not be conducted in the same order every time for learning to take place. It is important to recognize that many components of experiential learning overlap, can occur simultaneously, or can even occur at multiple points in the process (i.e., reflection-pre-experience, reflection-in-experience, and reflection-on-experience).

We offer the model of experiential learning contexts as a measurement tool for practitioners and researchers to describe learning experiences. Researchers could also test different contexts of experiences and utilize this model as a lens by which to taxonomize contextual experiences and associated phenomena. The context of an experience is critically important, and experience cannot be separated from its context (Dewey, 1938). Therefore, we included the holistic model of experiential learning, which includes variables from both the process and context models. Additionally, this model includes the critical influence from the teacher/facilitator, as well as other learners. As a result, it is imperative that practitioners understand experiential learning holistically, especially in agricultural education. As a profession, instructors in agricultural education embrace experiential learning and claim it as foundational to our practice. However, if we are to continue to do so, experiential learning must be facilitated with intentionality for the experiences to be educative. It is not enough to simply provide hands-on activities and expect learning to occur – all aspects of experiential learning ought to be considered. It is also up to agricultural teacher educators to ensure that preservice teachers are well informed about the theory that drives their practice. Continued research should be conducted on the theory of experiential learning, and how the theory informs pedagogical practice. As we continue to explore and test the complexity that is experiential learning, we build

a stronger future for agricultural education, and increase our profession's ability to provide impactful educational experiences.

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Teachers' Perceptions of Integrating Science Within the SBAE Curricula

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By the end of the 12th grade, regardless of future career paths, students will need enough science knowledge to be functional members of society as informed consumers and decision-makers. To convey scientific core ideas and technical concepts in unison, teachers must have adequate knowledge and experience in both areas. The content knowledge and instructional practices that teachers develop have been shown to improve science and STEM learning. The theory of planned behavior can be used to understand, predict, and ultimately change behavior. The purpose of this study was to examine agriscience teachers' intentions to illuminate science within their plant science courses. Overall, teachers displayed increased mean scores in all five factors across the total testing period. Significant differences were found for four of the five factors: attitudes and perceptions toward science integration (PTIS); preparation to integrate science (PIS); support for integration (SI); and perceived impact of integration on recruitment (IIR). Recommendations for future research include measuring teachers' actual content knowledge to compare perceived knowledge. In-service teachers should look for targeted, content-specific professional development opportunities through university programs, teachers' organizations, and industry to maintain and support positive attitudes toward integrating science into their curricula.

Introduction and Review of Literature

By the end of the 12th grade, regardless of future career paths, students should possess enough science knowledge to be functional members of society as informed consumers and decision-makers. Additionally, students must continue to learn and utilize science throughout their lives (National Research Council, 2012). Agriculture can add to the structural framework of the Next Generation Science Standards (NGSS) by providing a context for the application of scientific core ideas (National Research Council, 2012). SBAE curricula provides ample opportunities to facilitate this type of knowledge acquisition, as many agricultural contexts and problems typically involve numerous disciplines (National Research Council, 2014). Career and Technology Education (CTE) courses, such as those included in SBAE programs, have helped provide a seamless education aligned with K-12 core concepts by drawing on the active and applied learning strengths found in CTE. CTE has helped make scientific core ideas meaningful by providing opportunities to apply concepts through real-world contexts, such as agriculture (Community for Advancing Discovery Research in Education; CADRE, 2014).

The foundations of SBAE have resided in developing the knowledge and skills in agriculture to support industry and occupational needs (Phipps et al., 2008). Comprised of three distinct structural components, SBAE has been provided through classroom and laboratory instruction, supervised agricultural experiences (SAEs), and the National FFA Organization. Classroom and laboratory instruction have allowed students to understand and learn the principles and skills needed to solve complex agricultural problems (Phipps et al., 2008). SBAE curricula has reflected real-world work experiences in agriculture as supported by scientific disciplines and

has been rooted in the idea that students learn best through application (Phipps et al., 2008). Science illumination is a term used to describe the action of teachers connecting scientific core ideas with procedural or technical agricultural knowledge (McKim, Velez, Lambert, & Balschweid, 2017). The illumination of scientific principles in agriculture has allowed fundamental science concepts to be re-emphasized and applied in a concrete format (Phipps et al., 2008). Some teachers may have been purposeful science illuminators, while others may have tried, but were not able to illuminate science, known as illumination attempters. The key difference between those who are purposeful illuminator and illumination attempters is possession of knowledge of technical agriculture concepts and paired scientific core ideas (McKim, Velez, Lambert, & Balschweid, 2017).

The content knowledge and instructional practices that teachers develop have been shown to improve science and STEM learning (National Research Council, 2013). In recent years, the perceptions of teachers and their intention to feature science within the SBAE curriculum has been a significant focus of research related to STEM in SBAE (Haynes et al., 2014; McKim, Pauley, et al., 2018; Pauley et al., 2019; Stubbs & Myers, 2015, 2016; Thompson & Warnick, 2007; Thoron & Myers, 2010; Warnick & Thompson, 2007). Barriers, attitudes, types of use, confidence, and overall perceptions were major themes explored in the studies. Collectively, previous literature supports a connection between agricultural curricula and core scientific ideas (Haynes et al., 2014; Myers & Washburn, 2008; Smith et al., 2015; Stubbs & Myers, 2016; Thompson & Warnick, 2007; Thoron & Myers, 2010). Agriscience teachers have noted that science is the most related and natural fit of the four STEM content areas within agriculture (Haynes et al., 2014) and they are most confident in teaching science (Smith et al., 2015). While science was shown as profoundly intertwined with agriculture, teachers also reported that a significant amount of scientific knowledge is needed to teach scientific core ideas in an agricultural context (Stubbs & Myers, 2015). Interestingly, however, teachers have also noted that lack of scientific knowledge is the most significant barrier to their integration of science within the agriculture curricula (Myers & Washburn, 2008; Stubbs & Myers, 2015; Thompson & Warnick, 2007; Thoron & Myers, 2010).

Teacher knowledge has been a less common focus of inquiry related to science within the SBAE curricula. Self-efficacy, perceived knowledge measures, and actual measured content knowledge have all been examined. McKim, Velez, Lambert, and Balschweid (2017) emphasized the need for knowledge and competence in both science and technical content areas to illuminate science within the SBAE curriculum effectively. The only recent study to test the science knowledge of agriscience teachers found that only 9% of teachers were proficient on a biology exam (Scales et al., 2009). Teacher confidence and self-efficacy have been more frequently studied. Overall, agriscience teachers feel confident in their ability to teach science content within SBAE, regardless of their actual knowledge level (Hendrix et al., 2020; Scales et al., 2009). Further, self-efficacy to teach science content within SBAE has been found to be related to participation in professional development (Ferand et al., 2020; McKim, Velez, & Clement, 2017).

With respect to plant science curricula, few studies have investigated the abilities of agriscience teachers. McKim et al. (2018) found that teachers perceived 57% of plant science curriculum to be related to scientific core ideas. However, science knowledge was found by agriscience teachers to be a negative predictor of their intention to teach science within the SBAE curricula

(McKim et al., 2018). Science knowledge is most likely seen as a negative predictor of the intent to teach science because those with more science knowledge will be more realistic about their ability to incorporate science into their assigned curricula. Lastly, Chumbley et al. (2019) reported a low, negative correlation between teachers' confidence to incorporate science within their curricula and SBAE courses offered for science credit. This study aimed to investigate the impact of a content-specific professional development program on teachers' intentions to illuminate science within the SBAE curricula.

Theoretical Framework

The theory of planned behavior can be used to understand, predict, and ultimately change behavior, and was applied to guide this study (Ajzen, 2012). Originally put forth by Ajzen (1985), the theory of planned behavior combined several central ideas from the social and behavioral sciences, such as motivation, self-efficacy, and control, to provide information useful in behavioral changes (Ajzen, 1991). The individual elements of perceived behavioral control, subjective norms, and attitudes towards the behavior aggregate to provide the intention to complete a specific action or behavior (Ajzen, 1991). Intention includes both motivation to engage in a behavior and the amount of effort a person is willing to give to complete the behavior or to be successful. While intervening events can affect a person's intention between assessment and completion of the behavior, in general, the stronger a person's intention to engage in a behavior, the higher the likelihood the person will complete the actual behavior. The use of the theory of planned behavior is beneficial when there is a choice of behavior among available alternatives (Ajzen, 1991).

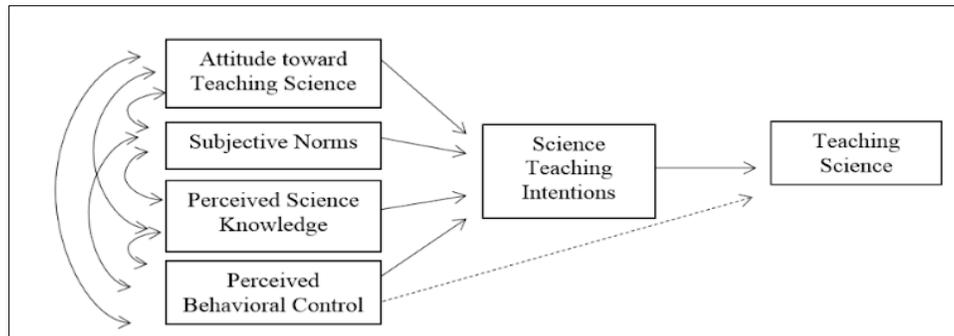
While conceptually independent, attitudes, perceived subjective norms, and perceived behavioral control toward the action aggregate to become determinants of intention to complete a task. Attitude refers to the degree to which a person has a positive or negative view of the behavior. Salient behavioral beliefs inform a person's attitudes. Subjective norms are defined as the collective influence from perceived social pressure to either engage in the behavior or not, and they are influenced by normative beliefs. Perceived behavioral control is the felt ease or difficulty of performing the behavior (Ajzen, 1991).

Lastly, perceived behavioral control is the felt ease or difficulty of performing the behavior (Ajzen, 1991). The greater number of resources a person believes they possess related to the action, and the fewer obstacles anticipated, the more control a person likely perceives. However, perceived behavioral control can vary significantly across situations (Ajzen, 1991). Directly related to Bandura's (1986) theory of self-efficacy, belief in control is dramatically influenced by the confidence of success in the behavior's performance. Broadly, the more positive the attitudes and subjective norms a person has toward a behavior, especially when accompanied by high perceived behavioral control, the stronger the intention that person will have to engage in the behavior (Ajzen, 1991).

Figure 1 illustrates a modified version of the theory related to teachers' intention to integrate science within their instructional practices to address teachers' perceived science knowledge as a factor influencing their intention to integrate science concepts.

Figure 1

Adapted Model of the Theory of Planned Behavior by McKim, Velez, Lambert, and Balschweid (2017)



When applying the theory of planned behavior to the context of this study, attitudes, perceptions of subjective norms, and perceived behavioral control should culminate to impact the teachers' likelihood of completing the behavior. What teachers believe are the likely consequences of a behavior will influence their positive or negative feelings related to integration of science within their SBAE classrooms. Perceived expectations and norms of what the teachers believe others, such as administration, parents, and students think they should do will also affect the level to which science is integrated within their instruction (McKim, Velez, Lambert, and Balschweid, 2017). School culture, personal relationships, and interactions will also play a part in the perceptions of norms. The presence of control factors, such as barriers, support, or collaboration opportunities, will influence the level at which teachers believe they have the power to integrate science concepts within their classrooms (Ajzen, 2012).

As both internal and external factors influence the extent to which people act on intentions, mental skill, and ability related to the task should also be accounted for (Ajzen, 2012). Further, teachers have been found to spend less time on content they believe they do not know enough about (Ramey-Gassert & Shroyer, 1992). Teachers' perceived science knowledge may represent an additional barrier, ultimately influencing students' knowledge and perceptions of scientific core ideas in the SBAE curriculum. McKim, Velez, Lambert, and Balschweid (2017) noted the importance of scientific knowledge in teachers' illumination of science in the SBAE curriculum.

Purpose and Objectives

The purpose of this study was to examine agriscience teachers' intentions to illuminate science within their plant science courses. The specific objectives for this study were to:

1. Describe agriscience teachers' mean level of science integration, preparation to integrate science, support for integration, the impact of integration on recruitment, and barriers to integration for pre-, post-, and post-post test assessments; and
2. Determine any differences in agriscience teachers' pre-, post-, and post-post test mean levels of science integration, preparation to integrate science, support for integration, the impact of integration on recruitment, and barriers to integration.

Methods and Procedures

A portion of data collected for this study was part of a large-scale study (Ferand, 2021). According to the Publication Manual of the American Psychological Association (2020), multiple publications from a large-scale research project can have the same methods section with some uniqueness. As such, the way in which data were collected followed the same methodology (Ferand, 2021); however, this study focused on different variables.

An exploratory, multiple time-series research design was appropriate for investigating the effects of professional development on agriscience teachers' intentions to illuminate science within their plant science courses (Campbell & Stanley, 1963). The multiple time-series design controls for selection-maturation interaction through testing on multiple occasions (Isaac & Michael, 1995).

The first observation consisted of a pre-test that measured teachers' attitudes, perceived behavioral control, subjective norms, and perceived science knowledge related to the teachers' intention to illuminate science within their classrooms. The first observation was completed before they participated in the three-day intensive program. The second observation, which measured the same items as the pre-test, was completed immediately following the three-day program's conclusion. The third observation, which consisted of a post-post test measuring the same items of teachers' attitudes, perceived behavioral control, subjective norms, and perceived science knowledge as related to the teachers' intention to illuminate science within their instructional practices, occurred in December 2020 and 2021 for each group respectively, approximately two months after the conclusion of all interventions.

Population and Sampling

This study's population consisted of secondary agriscience teachers in the U.S. who taught horticulture, floriculture, or plant science courses. The sampling frame consisted of a convenience sample of secondary agriscience teachers who applied to the *STEM-it Up: Everything You Need to Know to Get Your Floriculture Curriculum in Bloom* (SIU) program for the 2020 and 2021 co-horts. To be eligible to apply for the program, teachers were required to teach at least one high school level or grades 9–12 horticulture, floriculture, or plant science course during the fall semester following their enrollments in the program (either fall 2020 or 2021). Teachers were also required to have completed at least two years of teaching starting at least their third year in the fall. All teachers from the SIU program were invited to participate in the study ($N = 43$). A response rate of 65% was achieved for completion of all three testing occasions ($n = 28$). Non-response is a threat to external validity of a research study, which for this study is a limitation (Lindner et al., 2001).

Teachers were recruited to participate in this study through convenience sampling methods. Teachers participated in the program, which took place during the summers and falls of 2020 and 2021. The program was “designed to deliver an intentional, systematic, and high-quality professional development with embedded inquiry-based opportunities focused on promoting exposure to [plant science] curricula” (Ferand et al., 2020, p. 191). The participating teachers received a three-day intensive professional development program, along with six 90-minute follow-up sessions. One follow-up session occurred each month from July through December,

resulting in over 40 contact hours of content-specific professional development when combined with the summer conference. The conference and additional sessions included plant systems, the international floral industry, pathology, agriscience experiments, industry tours, and more.

The majority of the participants were female ($f = 22$; 78.6%), were an average of 38 years old ($SD = 12.9$; Min. = 24; Max = 66) and were white in ethnicity ($f = 27$; 96.4%). More than half of the teachers held a bachelor's degree ($f = 15$; 53.6%). Most of the teachers were certified to teach through a traditional university program in agricultural education ($f = 25$; 89.3%), as opposed to alternative certification or being initially certified in another subject area. Almost two-thirds ($f = 18$; 64.3%) of teachers reported they had taught only agriculture. Teachers had an average of 9.3 years of teaching experience ($SD = 7.8$; Min. = 0; Max = 27). Sixty percent ($f = 17$) of the programs taught by the participants offered at least one SBAE course for science credit.

Applications for the program were distributed nationwide through listservs of national agricultural education organizations, such as the American Association for Agricultural Education, North American Colleges and Teachers of Agriculture, and the National Association of Agricultural Educators. Solicitation to apply for the program was also posted on social media groups for current agriscience teachers, such as "Ag Teacher Buddies" on Facebook.

Instrumentation

A modified version of the Myers and Washburn's (2008) Integrating Agriscience Instrument (IAI) was utilized to measure teachers' attitudes, perceived behavioral control, subjective norms, and perceived science knowledge related to their intention to illuminate science within their classrooms. Myers and Washburn (2008) utilized items from an instrument originally created by Thompson (1996) with the purpose of identifying characteristics associated with the integration of science into SBAE and the implications of such integration. The instrument has also since been used with other populations of agriscience teachers and resulted in Cronbach's alpha reliabilities of .84 and .80 (Balschweid & Thompson, 2002; Myers & Washburn, 2008).

Myers and Washburn (2008) operationalized the IAI elements to align with Ajzen's (1991) theory of planned behavior. Attitudes were operationalized as teacher perceptions of science integration, while subjective norms were viewed as support of integration from stakeholder groups. Finally, the effects of integration on enrollment and perceived barriers operationalized perceived behavioral control. The final IAI instrument used in this study consisted of five factors of perceptions toward integration of science. Each factor ranged from six to 18 items with total of 48 total items related to integrating agriscience in the instrument. The five factors, along with example items from each section and included below.

1. **Attitudes and perceptions toward science integration (PTIS):** "students learn more about agriculture when science concepts are an integral part of their instruction" and "students are better prepared in science after they completed a course in agricultural education that integrates science"
2. **Preparation to integrate science (PIS):** "I feel prepared to teach integrated science concepts" and "teacher preparation programs in agriculture should require students to take more science courses"

3. **Support for integration (SI):** “how [do] you feel integrating science into your agricultural education program would (or does) increase or decrease the support you receive from: local administrators”
4. **The impact of integration on recruitment (IIR):** “how [do] you feel integrating science into your agricultural education program would (or does) increase or decrease the enrollment from the following student groups: high achieving students”
5. **Barriers to integration (BI):** “lack of support from local science teacher(s)” and “concerns about large class size”

Responses were measured on a five-point summated rating scale. Sections on perceptions toward integration of science, preparation to integrate science, and barriers to integration utilized the following scale: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. The two sections on support for integration and the impact of integration on recruitment also utilized a five-point scale: 1 = greatly decrease, 2 = decrease, 3 = no change, 4 = increase, and 5 = greatly increase. Lastly, a section on demographic information was included with questions about participants’ gender, age, teaching experience, and education. Content and face validity for this instrument were established by a panel of experts consisting of faculty in agricultural and science education at two land grant universities. This panel was considered experts based on their experience in teaching and learning, science integration, and experience with in-service teacher professional development.

The instrument was distributed to teachers via Qualtrics online survey software. Teachers took the pre-test IAI immediately before they participated in the initial 3-day conference and the post-test immediately following the conference’s conclusion. The post-post tests were administered the first week of December 2020 & 2021.

Data Analysis

Data were analyzed using the R programming language Version 4.0.4 for macOS. Descriptive (mean, standard deviation, and frequency) and inferential statistics (repeated measures analysis of variance; ANOVA) were used to address all objectives. The average scores of the individual factors were utilized to conduct the repeated-measures ANOVA. Assumptions of outliers, normality, and sphericity were tested using the *rstatix* package in R. The R function *identify_outliers()* was used to check for outliers, and two extreme outliers were identified, one in PTIS post-post test and the other outlier was in the PIS post-test. Results from analysis using the untransformed data were compared with transformed data using log and square-root techniques, and were found to be similar (Bartlett, 1936; Feng et al., 2014). Therefore, all the cases, including outliers, were used for the analysis, considering that the results were not substantially affected by the outliers.

Assumptions of normality were checked by computing the Shapiro-Wilk test using the R function *shapiro_test()* and QQ plot using *ggqqplot()* for each assessment point (Shapiro & Wilk, 1965). QQ plot is recommended over the Shapiro-Wilk test when the sample size exceeds 50 (Mishra et al., 2019); therefore, both analyses were conducted for redundancy. The QQ plots and Shapiro-Wilk test results show that the post-test of PTIS, the post-post test of PIS, and the pre-test of SI violated the normality assumption. Schmider et al. (2010) indicated that ANOVA

procedures are robust to violations of normality. Thus, along with data from the QQ plots, no data transformation were employed in this study.

Mauchly's test was conducted using the *anova_test()* R function to test the assumptions of sphericity (Mauchly, 1940). Mauchly's test for the PTIS ($X^2(2) = 0.95, p = 0.514$), SI ($X^2(2) = 0.99, p = 0.838$), and BI ($X^2(2) = 0.86, p = 0.141$) factors indicated that assumptions of sphericity were not violated. However, the Mauchly's test results for the PIS ($X^2(2) = 0.61, p = 0.002$) and IIR ($X^2(2) = 0.43, p = 0.000$) factors revealed that assumptions of sphericity were violated. Greenhouse-Geisser estimate of epsilon was reported for the factors that violated the sphericity assumption, as it is a conservative correction (Greenhouse & Geisser, 1959).

Post-hoc reliability analysis for the pre, post, and post-post tests of the instrument resulted a Cronbach's alpha of 0.72, 0.87 and 0.88, respectively.

Results

Objective One sought to describe the mean levels of the attitudes and perceptions toward science integration (PTIS); preparation to integrate science (PIS); support for integration (SI); the perceived impact of integration on recruitment (IIR); and barriers to integration (BI) factors for the pre, post, and post-post tests (see Table 1). Teachers reported a pretest mean of 3.72 ($SD = 0.29$) for PTIS, 3.79 ($SD = 0.48$) for PIS, 3.66 ($SD = 0.49$) for SI, 3.67 ($SD = 0.78$) for IIR, and 2.88 ($SD = 0.51$) for BI. Post test results immediately after conclusion of the conference signified an increase in mean scores of PTIS ($M = 3.85, SD = 0.52$), PIS ($M = 4.01, SD = 0.48$), SI ($M = 3.71, SD = 0.40$), IIR ($M = 3.78, SD = 0.72$) and BI ($M = 2.91, SD = 0.62$). The post-post test results from the final phase of study indicated a further increase in means score from post test for PTIS ($M = 3.98, SD = 0.58$), PIS ($M = 4.12, SD = 0.67$), SI ($M = 3.88, SD = 0.54$), IIR ($M = 3.97, SD = 0.72$) and BI ($M = 3.05, SD = 0.53$).

Table 1

Means, Standard Deviations, and Repeated-Measures Analyses for Variance for PTIS, PIS, SI, IIR, and BI factors

Measure	Pre Test (n = 28)		Post test (n = 28)		Post-Post test (n = 28)		F	Generalized Eta ²
	Mean	SD	Mean	SD	Mean	SD		
PTIS ^a	3.72	0.29	3.85	0.52	3.98	0.58	(2,54) = 4.94	0.05
PIS ^a	3.79	0.48	4.01	0.48	4.12	0.67	(1.44, 38.96) = 6.98	0.06
SI ^b	3.66	0.49	3.71	0.40	3.88	0.54	(2,54) = 5.41	0.04
IIR ^b	3.67	0.78	3.78	0.72	3.97	0.70	(1.28, 34.45) = 4.46	0.03
BI ^a	2.88	0.51	2.91	0.62	3.05	0.53	(2,54) = 1.44	0.02

Note. ^a1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. ^b1 = greatly decrease, 2 = decrease, 3 = no change, 4 = increase, and 5 = greatly increase

The second objective of this study was to determine possible differences in pre, post, and post-post test mean levels of the PTIS, PIS, SI, IIR, and BI factors. Results from the repeated-measures ANOVA, displayed in Table 1, indicated a significant effect of time for the testing period for PTIS ($F_{(2,54)} = 4.94, p = 0.011$), PIS ($F_{(1.44,38.96)} = 6.98, p = 0.006$), SI ($F_{(2,54)} = 5.41, p$

= 0.007), and IIR ($F_{(1.28,34.45)} = 4.46, p = 0.033$) factors. A significant effect for the testing period was not found for the BI factor, $F_{(2,54)} = 1.44, p = 0.247$. The generalized eta squared was computed to find the effect size of the mean differences, as the predictors variable was not manipulated but only observed (Bakeman, 2005). The eta squared values for the factors suggested a small effect size for all five factors.

Post-hoc, pairwise paired t-tests were computed to determine any specific differences between group means for the four factors with significant differences (PTIS, PIS, SI, and IIR; see Table 2 and Figure 3). The p-value was adjusted for the comparisons using the Bonferroni method. The pairwise comparisons for the PTIS and SI factors show that pre and post-post tests were significantly different. Whereas for the PIS factor, pre and post and pre and post-post tests differed significantly. Finally, the IIR factor indicated significant difference between the pre and post tests, as well as the post and post-post testing periods.

Table 2

Pairwise Comparisons between the pre, post, and post-post tests

Measure	Group 1	Group 2	<i>t</i>	<i>df</i>	<i>p</i> (adjusted)
	(<i>n</i> = 28)	(<i>n</i> = 28)			
PTIS	Pre test	Post test	1.63	27	0.345
		Post-Post test	2.86	27	0.024*
	Post test	Post- Post test	1.70	27	0.300
PIS	Pre test	Post test	2.64	27	0.041*
		Post-Post test	2.91	27	0.022*
	Post test	Post- Post test	1.67	27	0.318
SI	Pre test	Post test	0.731	27	1.000
		Post-Post test	3.35	27	0.007**
	Post test	Post- Post test	2.32	27	0.085
IIR	Pre test	Post test	0.891	27	1.000
		Post-Post test	2.69	27	0.036*
	Post test	Post- Post test	3.57	27	0.004**

* $p < 0.05$, ** $p < 0.01$

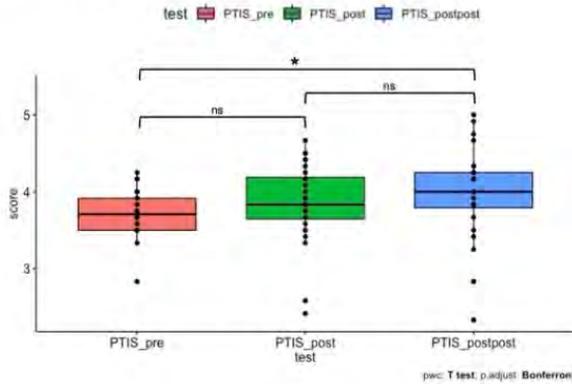
Pairwise comparisons using box plots showing the pre, post, and post-post tests' distribution are depicted in Figure 2. The lines above the box plots show pairwise comparisons' significance (* = significant, ns = not significant).

Figure 2

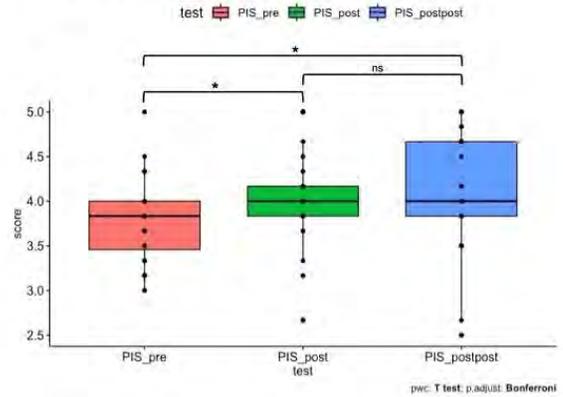
Pairwise Comparisons Between Pre, Post, and Post-Post Tests

Pairwise Comparisons

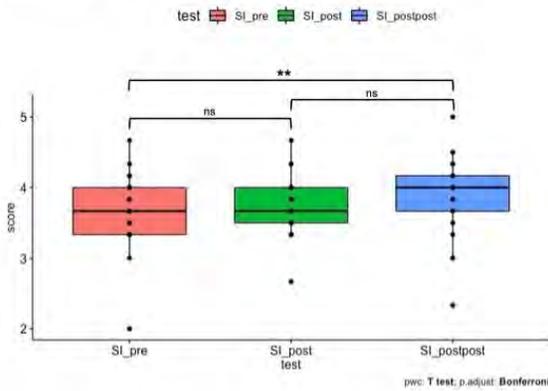
Anova, $F(2,54) = 4.94$, $p = 0.011$, $\eta_p^2 = 0.05$



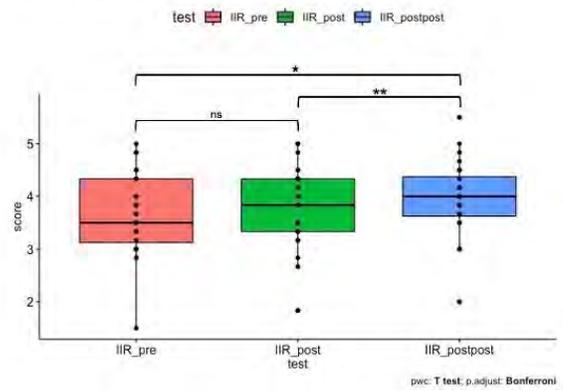
Anova, $F(1,44,38.96) = 6.98$, $p = 0.006$, $\eta_p^2 = 0.06$



Anova, $F(2,54) = 5.41$, $p = 0.007$, $\eta_p^2 = 0.04$



Anova, $F(1,28,34.45) = 4.46$, $p = 0.033$, $\eta_p^2 = 0.03$



Limitations

This study's population consisted of agriscience teachers who applied to be part of the *STEM-It Up: Everything You Need to Know to Get Your Floriculture Curriculum in Bloom* program. The sample was a convenience sample from this population. Therefore, the findings of this study were not generalizable beyond the population of teachers who applied. Additionally, the researchers acknowledge the small sample size and impact on effect size. However, as common with discipline of agricultural education, recruiting and maintaining participation is difficult despite best research practices.

Conclusions and Discussion

Overall, teachers displayed increased mean scores in all five factors across the total testing period. The positive increase indicated the professional development program was impactful in all four areas of the McKim, Velez, Lambert, and Balschweid (2017) modified version of the theory of planned behavior: perceived behavioral control, subjective norms, attitudes, and perceived science knowledge. The observed increases in mean scores after participation in targeted professional development aligns with previous research (Ferand et al., 2020; McKim, Velez, Clement, 2017; Ulmer et al., 2013).

Attitudes and perceptions towards science integration (PTIS) increased from a neutral score to an overall level of agreement at the end of the program. Additionally, the standard deviation remained relatively tight across the testing periods. The IIR, or impact of integration on recruitment, factor was similar to PTIS displaying an overall increase in means across the testing period with participants moving from neutrality on average to agreement. As the SIU program is an elective professional development program, it can be assumed the participants voluntarily entered the program with fairly positive attitudes toward integrating science into their curricula. Additionally, it is also likely that teachers with more positive attitudes and perceptions of integrating science within the SBAE curricula would self-select into a program with aims that align with their personal beliefs (McKim, Velez, & Clement, 2017). Participation in the program additionally supported the teachers' positive attitudes.

Unique to this study, perceived science knowledge (PIS) was also investigated in relation to intention to integrate science. Previous research has noted a negative correlation between level of science knowledge and intention to teach science (McKim et al., 2018). For this study, the PIS factor resulted in a positive increase over the program moving from neutral to agreement, and with a significant difference between the pre and post and pre and post-post tests. As providing scientific content knowledge and hands-on experience in implementing science integration in the plant science curricula is the main purpose of the program, the results of the PTIS, IIR, and PIS factors were affirmative that the targeted professional development program was successful.

The barriers to integration (BI) factor was not found to have significant differences. The last of significant results were not entirely surprising as the program could not provide any solutions to many items included in this factor such as funding, class size, infrastructure, or classroom management. However, several items such as lack of curricula, lack of experience integrating science, and content knowledge were items addressed through the program. While previous research found that lack of scientific knowledge is the most significant barrier to integration of science within agriculture (Myers & Washburn, 2008; Stubbs & Myers, 2015; Thompson & Warnick, 2007; Thoron & Myers, 2010), a positive sense of perceived behavioral control, or success in completing the action has been noted as very influential in decision making (Ajzen, 1991). The BI factor had the lowest mean scores of any factor with mean scores starting in the "slightly disagree" choice and ending in "neutral." The growth in results could indicate that items participants did not see as a barrier, or they slightly disagree was a barrier, was seen as a greater barrier after participating the program.

Across the factors, the effect size for the significant difference was small, suggesting a small proportion of change associated with perceptions resulting from teachers participating in the program. The pairwise comparison indicated the changes in perception observed before and after the program was more evident at six months than immediately after completion of the program. When one leaves a professional development program, especially held during the summer, there is often an overall positive attitude and desire for change. However, after re-entering the classroom, and especially when nearing the end of a semester, the realities of teaching and the impact of perceived barriers are more likely take precedence over positive attitudes; therefore, the smaller increase in mean score from the post to post-post test was not surprising. As Ajzen (1991) noted, the fewer obstacles to complete action, the greater likelihood of a person accomplishing the behavior. However, even small levels of growth are growth, nonetheless. Growth in any capacity should not be discounted as any positive change for teachers can impact their students.

Recommendations

We recommend measuring teachers' actual content knowledge in order to compare perceived knowledge. This comparison would allow us to see specific content areas where teachers need development in conjunction with perceptions of their knowledge level versus reality. Future research should investigate teachers' thoughts on the "rigor" provided through science integration and SBAE courses offered for science credit versus those offered in traditional SBAE courses. Such research could reveal more information related to teachers' attitudes towards integrating science into their curricula. Future research should be conducted focusing on removing barriers to integrate science within the SBAE curricula such as by providing teachers funding stipends or materials and curricular resources in order to see the effects on their intentions. Finally, this study should be repeated with a larger sample size

Recommendations for university teacher educators include providing more instruction in science and integration techniques to pre-service and in-service teachers. Targeted, content-specific professional development has been shown to provide teachers with both the specific content knowledge needed to effectively integrate science within the SBAE curricula, to help them develop more positive attitudes, and to develop higher perceived behavioral control. Courses in integrated instruction for pre-service teachers, as well as more technical science courses, could improve expectations, and could provide the tools needed for integration after pre-service teachers enter their classrooms.

Lastly, recommendations for in-service teachers focus on knowledge and support. In-service teachers should look for targeted, content-specific professional development opportunities through university programs, teachers' organizations, and industry. Teachers should share their positive attitudes on the impact of integration toward increased support and student enrollment with their administration. Such conversations could also open doors for communication around teachers' perceived barriers to integration, such as lack of funding, time, and space. Teachers are encouraged to reach out to other teachers, both agriscience and core science teachers, or to community members, to find additional support. Lastly, there is no measure of what constitutes science integration. Teachers are encouraged to attempt illuminating science in small ways, little

by little if they wish to integrate more science into their courses. Small steps can increase efficacy while also making barriers, such as funding or resources, seem less daunting.

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Purposeful STEM Integration in School-Based Agricultural Education Programs

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The emphasis for STEM integration in classrooms continually becomes more apparent, resulting in a need for teacher educators to generate a positive view on the integration. Specifically, SBAE teacher aspirants need to be prepared to deliver relevant agricultural curriculum grounded in STEM, therefore this study was grounded in self-efficacy theory. The purpose of the study was to evaluate the content knowledge and interest in STEM-related careers for secondary students enrolled in SBAE programs in Oklahoma. Eight pre-service SBAE teachers from Oklahoma State University were charged with delivering a sustainable bioenergy unit of instruction to their students. This study resulted in a statistically significant gain in students' STEM knowledge as a result of teaching the content and laboratory experiences $F(1,118) = 106.04, p < .01$. Mean scores increased three letter grades and almost 30 percentage points. Unfortunately, minimal differences existed in student interest in STEM as a result of the experience. Future research needs to explore the preparedness of SBAE teachers to develop, teach, and evaluate the impact of all four components of STEM (i.e., science, technology, engineering, and math). Additionally, an analysis of state and national SBAE standards could help determine the expectation and rigor of SBAE courses.

Introduction

Students are failing in STEM – especially as in the area of science. A part of the reason for the struggle could be due to teachers' lack of instructional time and challenging activities in the content area. According to the latest NAEP results, fourth grade teachers spend less than two hours of instructional time per week teaching science. Further, almost one-third admit their students rarely participate in inquiry-based activities throughout the course year (NAEP, 2019). However, when compared with twelfth-grade students, the data are not much better. The report found that roughly one-quarter of twelfth-grade students have little appetite for science. Further, more than one-half indicate they have no interest in pursuing a science-based career (NAEP, 2019). Yet, STEM-based jobs continue to be in high demand across the U.S. and world (Donaldson & Franck, 2020).

Agriculture has been referred to as the oldest science in the world (Ricketts et al., 2006). Therefore, it stands to reason that SBAE programs should teach STEM and prepare students for careers therein. Unfortunately, according to at least one study, students appear to be only moderately motivated to learn about agriscience (Chumbley et al., 2015). This is perhaps explained by the fact that STEM-based careers lag behind other areas in the workforce and are in constant demand due to a lack of competent individuals to occupy them.

Individuals ranging from the business sector to government have advocated for the integration of additional science, technology, engineering, and math (STEM) concepts within education (Ferand et al., 2020; Roberts et al., 2020). STEM integration within school-based agricultural education (SBAE) appears to focus more heavily on science and mathematics while

deemphasizing technology and engineering (Eck et al., 2021b; Wang & Knobloch, 2020). Yet, SBAE teachers have a genuine desire to integrate each curricular area of STEM into their classes so long as they are appropriate for the varying level of student ability (Stubbs & Myers, 2016).

As the emphasis for STEM integration in various classrooms becomes more apparent, it is important that teacher educators generate a positive view on the subject. According to Margot and Kettler (2019), “teachers’ years of experience are inconsistently related to their perceptions of STEM integration or education, and teachers’ value or interest in STEM may mediate the relationship” (p. 5). Essentially, those who value STEM education and are self-efficacious within the subject tend to implement STEM concepts within their curricula more readily than those who are not as self-efficacious or do not value STEM as highly (Margot & Kettler, 2019). Therefore, “it is imperative to determine how a pre-service teachers’ preparation program impacts student teachers’ lesson plan quality” (Whisenhunt et al., 2021, p. 4).

Unfortunately, research has suggested that SBAE teachers do not possess the efficacy to teach STEM at an appropriately rigorous level (Roberts et al., 2020). To make matters worse, SBAE teachers often overestimate their efficacy for teaching concepts of STEM (Scales et al., 2009). Swafford (2018) proposed that SBAE educators place STEM education in the heart of the 3-circle model of agricultural education, indicating that all three components – classroom and laboratory instruction, FFA, and SAE – should expose students to STEM. Therefore, to adequately prepare SBAE teachers for integrating STEM, various real-world experiences for learning the content and using it appropriately must be provided (Roberts et al., 2020).

A primary component of pre-service SBAE teacher preparation programs include instructional methods and/or curriculum design courses to help prepare students to develop and deliver curriculum (Whisenhunt et al., 2021). The delivery of instructional planning methods, i.e., lesson plans, aid in effective teaching strategies which increase student engagement and learning (Whisenhunt et al., 2021). Research has shown that students who are taught by teachers who use highly structured lesson plans tend to exhibit higher levels of comprehension, retention, and academic achievement when compared to students who are taught the same curricula by teachers who refrain from using highly structured lesson plans (Sung, 1982). Wang and Knobloch (2020) noted, “beliefs influence practices, and teachers’ beliefs are predictive indicators of certain instructional practices, such as inquiry” (p. 58). All too often, pre-service SBAE teacher lesson plans omit clear and obvious connections to STEM integration (Eck et al., 2021b), leading to the need to further investigate the inclusion of purposeful STEM connections in SBAE teacher preparation programs.

The student internship is the culminating experience for the students to implement their course content in a structured, real-world environment, ultimately impacting the student’s intent to enter the SBAE teaching profession (Eck et al., 2021). The student teaching internship has been identified by both teacher educators and state staff in agricultural education to be a valuable preparatory experience for preservice teachers prior to entering the profession (Whisenhunt et al., 2021). Although different institutions have varying standards and assignments that must be completed within the program, all require their preservice teachers to demonstrate the appropriate pedagogical knowledge necessary for teaching (Whisenhunt et al., 2021). During the student teaching internship, student teachers are required to develop lesson plans that incorporate

STEM concepts and activities using standards-based curricula (Eck et al., 2021b; Sorensen et al., 2018; Stripling et al., 2014).

Ultimately, the SBAE pre-service teacher preparation program prepares teacher aspirants to make a substantial impact on future generations through the delivery of effective secondary agricultural education programs (Wardlow & Osborne, 2010). Coupling this potential impact with the identification of SBAE as an effective platform to facilitate STEM integration and address the nationwide STEM workforce demands (Haynes et al., 2012; Swafford, 2018) allows SBAE teacher aspirants the unique opportunity to make purposeful connections between STEM and agriculture. If SBAE teachers can make these purposeful connections, careers within the various agricultural sectors which require comprehension and application of STEM concepts now more than ever before (Stubbs & Myers, 2016) can establish a pipeline for a future workforce. Further, research has shown that implementing STEM within SBAE programs can increase students' science and mathematics achievement (Stubbs & Myers, 2016). Therefore, it is possible that teacher preparedness and teaching self-efficacy can lead to increased student engagement and achievement, especially as it relates to teaching STEM concepts in the context of agriculture.

The overarching question becomes one of determining whether SBAE teachers are adequately prepared to make the purposeful, relevant connections essential to meet the nationwide demand of a STEM enhanced agricultural workforce. To address this concern, SBAE teacher education programs should be assessed to determine their effectiveness at preparing students to teach STEM.

Theoretical and Conceptual Framework

The study was undergirded by the self-efficacy theory (Bandura, 1984). Self-efficacy “is concerned with people’s judgement of their capabilities to execute given levels of performance” (Bandura, 1984, p. 232). Perceived self-efficacy can be viewed as a person’s ability to perform a task given differentiated circumstances, ambiguous, and stressful elements (Bandura, 1984). Self-efficacy can impact an individual’s level of effort, persistence, and choice of activities (Zimmerman, 1999) ultimately allowing that person to gauge their own interests within themselves. As self-efficacy increases, the level of participation from within individuals also increases (Bandura, 1984), resulting in academic achievement (Zimmerman, 1999).

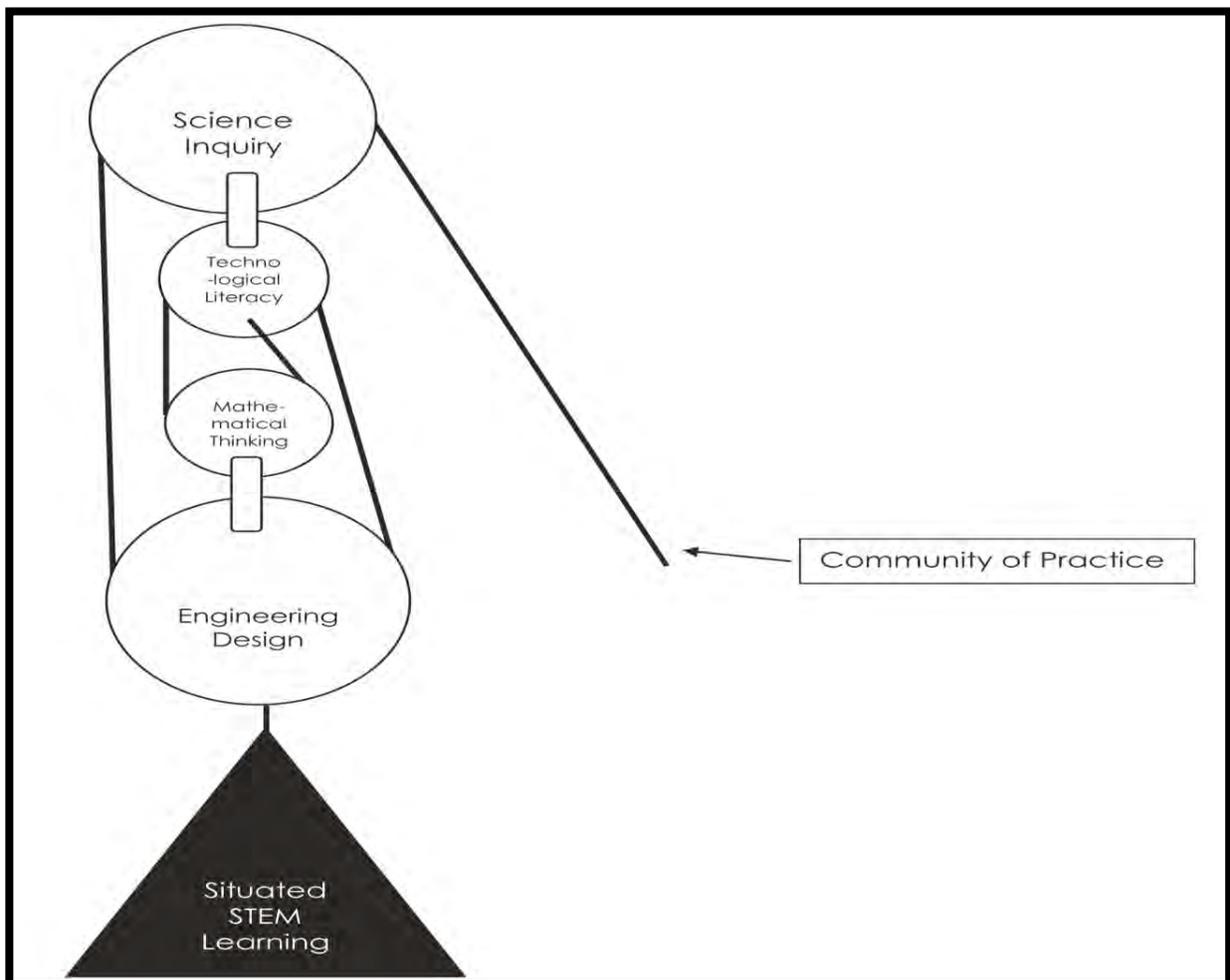
In addition to Bandura’s (1984) self-efficacy theory, we used the conceptual model (see Figure 1) developed by Kelley and Knowles (2016) to further guide our study regarding the variables of interest. Their model, *A Conceptual Framework for Integrated STEM Integration* (p. 4), illustrates five different areas of “situated learning, engineering design, scientific inquiry, technological literacy, and mathematical thinking as an integrated system” (p. 3). Kelley and Knowles (2016) identified that engineering design offered students a foundation to a systematic approach to solve problems in the STEM fields. For students to methodically encounter, identify, execute, and propose findings, teachers must first be prepared to teach using inquiry-based practices and have experienced authentic inquiry research practices (Kelley & Knowles, 2016).

Technological literacy (Kelley & Knowles, 2016) has many different meanings to different individuals. Instead of viewing technological literacy for face value, Kelley and Knowles (2016) identified it as volition. “Technology as volition is the concept that technology is driven by the human will and as a result is embedded within our culture driven by human values” (Kelley & Knowles, 2016, p. 6). The incorporated mathematical thinking in the model included the integration of mathematical analysis and evaluation as an integral STEM practice essential for making relevant connections between content knowledge and potential future career skills (Kelley & Knowles, 2016).

The community of practice is the final piece of the model (Kelley & Knowles, 2016). The concept of a community of practice can allow the SBAE teacher to work with community experts in STEM careers to model engineering and technological practices to students that ultimately help them conceptualize real-world STEM education applications (Kelley & Knowles, 2016).

Figure 1

A Graphic of Conceptual Framework for STEM Learning



Note. Adapted from “A Conceptual Framework for Integrated STEM Education,” by T. R. Kelley and J. G. Knowles, 2016, *International Journal of STEM Education*, 3, Article 11 (<https://doi.org/10.1186/s40594-016-0046-z>). Copyright 2016 by the *International Journal of STEM Education*. Reprinted with permission.

Although integral STEM education occurs in multiple content areas, we propose this as a potential model for SBAE. Specifically, our study focuses on the delivery of a sustainable bioenergy unit of instruction that is grounded in STEM education delivered to secondary agricultural students. The community of practice depicted in Figure 1 represents the cohort of pre-service SBAE teachers at Oklahoma State University (OSU) during the spring 2021 semester. Combined, this provides the pre-service SBAE teachers with a model for inclusion of purposeful STEM integration within their respective student teaching centers.

Purpose/Objectives

The purpose of the study was to determine the impact of a sustainable bioenergy curriculum on the content knowledge and interest in STEM-related careers of secondary students enrolled in SBAE programs in Oklahoma. Two research questions guided the study:

1. Determine the change in content knowledge of SBAE students prior to and after being taught using a sustainable bioenergy curriculum; and
2. Identify SBAE students' career interest in STEM prior to and after being taught using a sustainable bioenergy curriculum.

Methods

SBAE students in Oklahoma whose program served as a clinical teaching site for pre-service SBAE teachers at OSU ($n = 8$) during the spring 2021 semester served as the study's accessible population (Privitera, 2020). The pre-service teachers participated in a two-hour bioenergy curriculum training prior to their clinical teaching experience. The training provided an overview of the resources, materials, and activities included in the curriculum. The sustainable bioenergy curriculum was compiled from Oklahoma Ag in the Classroom (n.d.) curriculum, National 4-H Council (2016) activities, and from modules developed by the Department of Plant and Soil Sciences at OSU. Specifically, the curriculum consisted of five lessons including bioenergy history and biodiesel, bioplastics, plant growth readings, ethanol and fermentation, and oil extraction. Each of the lessons included the delivery of critical content through readings and content shared through a PowerPoint presentation, followed by a relevant laboratory experiment. To further facilitate the learning experience for SBAE students, five corresponding laboratory activities were developed, including biodiesel, bioplastic, soybean, Arabidopsis germination, ethanol, and oil extraction from vegetable matter. Each laboratory experience was embedded with STEM-based connections and conveyed the use and importance of the scientific method.

After completing the sustainable bioenergy curriculum training and the five bioenergy laboratories on campus, pre-service teachers were asked to deliver the sustainable bioenergy curriculum to SBAE students during their student teaching internship. To further support the curriculum, pre-service teachers were provided a complete sustainable bioenergy laboratory kit

to use including all components of the curriculum, which consisted of the following: a chemistry glassware set, petri dishes, rubber gloves, PH meter, spring scale, pipettes, digital scale, caliper, timer, tape measure, filtration system, filter paper, tea candles, string, bromothymol blue, yeast, pens, centrifuge tubes, tape, thermometer, goggles, laboratory coats, matches, hot plate/stirrer, hand operated vacuum pump, grow system, coffee grinder glycerin, balloons, corn starch, vegetable oil, canola oil, growing containers, planters, soil brick, methanol, ethanol, separatory funnel, fertilizer, potassium hydroxide, and nine seed varieties. In addition to the technical elements necessary to carry out the experiments, a detailed lesson plan (both hard copy and digital) and video tutorial accompanied each lesson and laboratory exercise to serve as a refresher to boost student teaching interns' self-efficacy prior to teaching the lesson. Pre-service teachers were asked to collect pre- and post-test data from their students. In return for teaching the sustainable bioenergy curriculum and providing their pre- and post-test data, pre-service teachers were allowed to keep the sustainable bioenergy laboratory kit for their future use as an in-service teacher or leave it with their cooperator. In total, the biofuels kits were valued at \$1,200 each and were purchased through a grant-funded project through USDA NIFA.

A criterion-referenced examination was developed to measure SBAE students' bioenergy content knowledge. The examination consisted of 25 multiple-choice questions to measure the knowledge of students on bioenergy history, biodiesel, bioplastics, plant growth, ethanol and fermentation, and oil extraction. The requirements of Wiersma and Jurs (1990) were followed to ensure reliability of the examination. In addition to the criterion-referenced questions, the STEM semantics instrument (Knezek & Christensen, 2008) was included to assess students' perceptions of each of the four disciplines represented by STEM and a STEM-based career. Specifically, five questions were asked for science, five for math, five for engineering, five for technology, and five related to the motivation to engage in a career in STEM. Each of the items was ranked on a seven-point summated scale. Face, content, construct, and criterion-related validity were assessed by the research team and through a pilot test.

The research team has over 40 years combined experience in SBAE and SBAE teacher preparation, in addition to two members of the team having expertise in instrument development. A pilot test was administered with 35 pre-service teachers enrolled in the agricultural education program at OSU during the Spring of 2019 (Eck & Robinson, 2020). Between the research team and the pilot test, the instrument was deemed reliable, as the criterion-referenced items used in the examination served as a predictive measure of current knowledge prior to content delivery, followed by the post-test demonstrating knowledge gain (Privitera, 2020). The STEM semantics scale was previously validated through the work of Knezek and Christensen (2008) and then implemented within this study. The pilot group not only participated in the sustainable bioenergy content delivery but also completed the pre- and post-test, ultimately providing feedback on face and content validity (Privitera, 2020) of the instrument.

Eight pre-service SBAE teachers from OSU administered the sustainable bioenergy pre-test to a total of 142 secondary SBAE students. Of those initial 142 students, 42% ($n = 60$) completed the entire unit of instruction, including the post-test. The 60 students represented four pre-service SBAE teachers from OSU teaching at four different secondary programs. After informal qualitative questioning by the research team, it was identified that four of the initial eight pre-service SBAE teachers from OSU did not complete the unit of instruction for one of two reasons:

1) COVID-19 interruptions in the school district attendance of face-to-face instruction, causing students to not be able to participate in hands-on laboratory activities, or 2) Pre-service SBAE teachers failed to administer the post-test and collect data on the secondary SBAE students. Therefore, only the data from the 60 secondary SBAE students who completed both the pre- and post-test data were used in the study. Data were analyzed using SPSS Version 26 and included descriptive and inferential statistics. Table 1 outlines the personal characteristic data (i.e., gender, age, ethnicity, race, year in FFA, and school classification) for SBAE students participating in the study.

Table 1

SBAE Student Participant Characteristic Data (n = 60)

Demographic		<i>f</i>	%
Gender	Male	33	55.0
	Female	26	43.3
	Other	0	0.0
	Prefer to not respond	1	1.7
Age	14	4	6.7
	15	24	40.0
	16	20	33.3
	17	9	15.0
	18	2	3.3
	Prefer to not respond	1	1.7
Ethnicity	Hispanic/Latino	6	10.0
	Non-Hispanic/Latino	51	85.0
	Prefer to not respond	3	5.0
Race	Indigenous American	6	10.0
	Black or African American	2	3.3
	White	37	61.7
	Two or more races	12	20.0
	Other	0	0.0
	Prefer to not respond	3	5.0
Year in FFA	First	31	51.7
	Second	11	18.3
	Third	12	20.0
	Fourth	5	8.3
	Prefer to not respond	1	1.7
School Classification	Rural	25	41.7
	Suburban	27	45.0

Urban	5	8.3
Unknown	3	5.0

The limitations of this study were broken into two main focus areas, the first being delivery of instruction. It was assumed all students in each SBAE classroom completed the electronic pre-test prior to any curricula being delivered. Having students take the pre-test at varying intervals could allow for potential differences in scores should questions be shared with other individuals. Secondly, it was assumed all students completed the post-test individually and after the final lesson had ended. Without having direct access to observe students taking the post-test, it can only be assumed students followed instructions to complete the online post-test individually. Similarly, it is assumed all students completed the post-test under the same conditions. The following conditions were assumed for all secondary students: the use of notes during the test was prohibited, the tests must have been completed individually by students and not in groups or teams, and accessing additional outside sources of information during the commencement of the post-test was not allowed. Finally, the assumption was made that although all eight pre-service teachers were consistently trained throughout the teacher preparation program and in the delivery of the sustainable bioenergy curriculum, students, classroom resources, and teaching styles may vary from one school to another.

The second area of limitation focused on the small accessible population to deliver this curriculum, as only eight pre-service teachers were trained and provided the curriculum and resources to deliver the sustainable bioenergy unit of instruction during their clinical teaching experience. The research team acknowledges the limited scope of curriculum delivery with eight student teachers in eight different communities throughout Oklahoma. In addition, the delivery of this content was scheduled for the Spring of 2021, where the ongoing COVID-19 pandemic limited the face-to-face, in-person instructional time available within certain schools across Oklahoma. Specifically, 50% ($n = 4$) of the accessible population for delivery of this content was not able to complete the unit of instruction and/or collect complete pre- and post-test results. The findings of this study should be viewed with an understanding of the limitations.

Findings

Research Question 1: Determine the Change in Content Knowledge Prior to and After the Delivery of the Sustainable Bioenergy Curriculum

The student teachers began their sustainable bioenergy unit of instruction with a 25-question criterion-referenced examination to establish a baseline of content knowledge. The 25-questions were equally weighted and worth 1-point each, for a maximum score of 25 points. A total of 60 students completed both tests. The pre-test resulted in a mean score of 12.94 ($SD = 3.16$), which equated to a 52%, or an F letter grade. Scores on the pre-test ranged from a low of 1 correct answer to a high of 21 correct answers. After students completed the pre-test, a five-day sustainable bioenergy unit of instruction was delivered by the student teachers. After completion of the unit, a post-test was administered to measure student growth. The post-test included the same 25 criterion-referenced questions related to content from the unit of instruction. The questions and answer choices were reordered prior to distribution to account for test effect. Sixty

students completed the post-test with a mean score of 20.45 ($SD = 4.72$), which equated to an 81%, or a B letter grade. The post-test scores ranged from a low of 7 to a perfect score of 25.

To further understand the change in content knowledge based on the sustainable bioenergy curriculum, a one-way ANOVA was implemented to compare the pre- and post-test scores. The results of the ANOVA indicated a statistically significant difference $F(1, 200) = 159.88, p < .01$ in scores after the five-week unit was taught (see Table 2).

Table 2

Comparative Analysis of Student Performance by Group Means as Measured by the Sustainable Bioenergy Criterion Referenced Exam

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between Groups	2190.80	1	2190.80	159.88	.00
Within Groups	2740.59	200	13.70		
Total	4931.39	201			

Research Question 2: Identify the Career Interest in STEM Prior to and After the Delivery of the Sustainable Bioenergy Curriculum

To determine STEM career interest, a 25-item STEM semantics instrument (Knezek & Christensen, 2008) was used. The instrument implemented a 7-point semantic scale, as outlined in Table 3. The mean scores for each of the five-item stems (i.e., science, math, engineering, technology, and pursuing a career in STEM) are provided in Table 2 for both the pre-test and post-test, along with the corresponding semantic ranges.

Table 3

SBAE Student STEM Semantic Ratings (n = 60)

Item Stem	Semantic Scale	Pre-Test	Post-Test
Science . . .	Is fascinating (1) to Is mundane (7)	3.68	3.12
	Is appealing (1) to Is unappealing (7)	3.86	3.09
	Is exciting (1) to Is unexciting (7)	4.07	3.22
	Means Nothing (1) to Means a Lot (7)	4.09	3.86
	Is boring (1) to Is interesting (7)	3.53	3.60
Math . . .	Is boring (1) to Is interesting (7)	3.08	3.06
	Is appealing (1) to Is unappealing (7)	4.14	4.20
	Is fascinating (1) to Is mundane (7)	4.36	3.76

	Is exciting (1) to Is unexciting (7)	4.54	3.69
	Means Nothing (1) to Means a Lot (7)	3.85	3.57
Engineering . . .	Is appealing (1) to Is unappealing (7)	3.47	2.86
	Is fascinating (1) to Is mundane (7)	3.47	2.96
	Means Nothing (1) to Means a Lot (7)	4.86	4.41
	Is exciting (1) to Is unexciting (7)	3.83	3.10
	Is boring (1) to Is interesting (7)	4.41	4.18
Technology . . .	Is appealing (1) to Is unappealing (7)	3.05	3.28
	Means Nothing (1) to Means a Lot (7)	4.37	4.13
	Is boring (1) to Is interesting (7)	4.47	4.21
	Is exciting (1) to Is unexciting (7)	3.42	3.14
	Is fascinating (1) to Is mundane (7)	3.54	3.16
A Career in STEM . . .	Is irrelevant (1) to Is relevant (7)	3.87	4.04
	Is boring (1) to Is interesting (7)	4.23	4.22
	Is exciting (1) to Is unexciting (7)	3.61	3.12
	Is fascinating (1) to Is mundane (7)	3.69	3.23
	Is appealing (1) to Is unappealing (7)	3.83	3.37

Note. Sematic scale ranged from 1 to 7.

Considering the semantic range was on a seven-point scale, the majority of pre- and post-test mean scores fell in the middle of the range, with pre-test scores ranging from 3.05 to 4.86 and post-test scores from 2.86 to 4.41. It is important to consider the semantic scale stems for each item, as four of the five semantic scale mean scores for science look to indicate a decrease between the pre- and post-test, although, four of the five actually resulted in a gain. Students found science to be more fascinating, appealing, exciting, and meaningful after participation in the sustainable bioenergy unit. Similarly, math became more fascinating, exciting, and meaningful; although, it also became less interesting and more unappealing. Engineering was found to be more appealing, fascinating, and exciting. Technology was found to be more exciting and fascinating after the unit of instruction; yet, it became less meaningful, less interesting, and more unappealing. Pursuing a career in STEM became more relevant, exciting, fascinating, and appealing, while the interest remained almost constant as a result of teaching the biofuels curriculum kits.

Conclusions/Recommendations/Implications

Students participating in the study were mostly male and white 15- to 16-year-olds. The majority were in their first year of FFA and lived in either a suburban or rural town in Oklahoma. The findings of this study mirror the state's demographics for students enrolled in public schools. Further, although other studies have tried to specifically target and engage "more girls and

minority youth” in science (Donaldson & Francke, 2020, p. 15), the fact remains that more males are engaged in science-related learning opportunities and educational endeavors than females.

A statistically significant increase in students’ STEM knowledge was detected because of teaching the content and laboratory experiences in the sustainable bioenergy curriculum kit $F(1,118) = 106.04, p < .01$. Mean scores increased three letter grades and almost 30 percentage points from 12.94 or an F letter grade (52%) on the pre-test to 20.45 or a B letter grade (81%) as a result of pre-service teachers teaching the five-week sustainable bioenergy unit. This increase in knowledge can be attributed to criterion-referenced STEM curriculum that was developed for student teachers to deliver to their secondary students after an in-service training to improve their teaching self-efficacy related to the STEM curriculum development and delivery. Perhaps additional curriculum with a STEM focus on inquiry-based teaching practices and hands-on delivery of instruction needs to be developed specifically for SBAE teachers to teach after receiving in-service training. Doing so would align with other researchers (Eck et al., 2021b; Kelley & Knowles, 2016; Ferand et al., 2020; Roberts et al., 2020) who have clamored for the need to further integrate STEM in SBAE. It would also emphasize the relationship between teachers’ STEM self-efficacy and their willingness to integrate STEM curriculum (Kelley & Knowles, 2016; Margot & Kettler, 2019).

Although a change in content knowledge was documented, SBAE student interest in STEM settled in the middle of the 7-point semantic scale. Although minimal differences existed in student interest in STEM as a result of the experience (see Table 2), many of the areas did result in some growth. The greatest changes in the semantic scale were in students’ appreciation for science and interest in STEM-based careers after participating in the sustainable bioenergy unit of instruction. Even though the changes were minimal, perhaps the delivery of additional STEM-based units of instruction would further increase the appreciation for STEM and interest in STEM careers. With the documented need of additional STEM-related training for SBAE teachers (Stubbs & Myers, 2016), emphasis should seek to further develop instructional planning methods and effective teaching strategies to aid in student engagement and learning in SBAE teacher preparation programs. Doing so aligns with the findings of Whisenhunt et al. (2021). Further research on the instructional delivery method preferred by the secondary students may also uncover evidence of additional needed revisions to the current curriculum base.

Considering the self-efficacy of the pre-service teachers in this study, it can be concluded that the situated STEM learning (i.e., sustainable bioenergy unit of instruction) depicted in Figure 1, was a success based on SBAE student test scores on the criterion-referenced exam. Could it be that integrating the training specific to the sustainable bioenergy unit of instruction prior to the student teaching experience better positioned the pre-service teachers to effectively integrate STEM? Regardless, as depicted in Figure 1, the cohort type approach served as a community of practice to integrate the STEM components within an agricultural unit of instruction. Further, the self-efficacy of the SBAE students can be viewed through their achievement (Zimmerman, 1999), shown with increased test scores, along with their change in perception, level of interest, or choice of activities (Zimmerman, 1999), as it relates to STEM. Long-term, individual attention also increases (Bandura, 1984), resulting in increased STEM interest and participation. Therefore, continuing this type of purposeful STEM integration within SBAE could help address

the nationwide STEM workforce demands identified in previous research (Haynes et al., 2021; Swafford, 2018).

Unfortunately, mathematics, engineering, and technology are still areas that SBAE teachers need to address further within their curriculum, as those STEM components tended to show less impact using the semantic scales. This conclusion aligns with Wang's and Knobloch's (2020), study which found SBAE teachers focus primarily on science when integrating STEM within agricultural education. Although the sustainable bioenergy curriculum attempted to incorporate all components of STEM, science served as the primary connection. Additional work should emphasize technology, engineering, and mathematics for SBAE teachers.

Considering this study and others, SBAE teacher preparation programs and professional development opportunities need to focus on the complete STEM model and not solely on science. Using Swafford's (2018) model, future studies should assess the impact of STEM-integrated lessons and experiences in FFA and SAE activities. Future research also needs to explore the preparedness of SBAE teachers to develop, teach, and evaluate the impact of all four components of STEM (i.e., science, technology, engineering, and math). In addition, an analysis of state and national SBAE standards could help determine the expectation and rigor of SBAE courses in different career pathways. Understanding SBAE teacher preparedness and self-efficacy, along with the expectation and rigor in each state, will allow SBAE teacher preparation faculty the opportunity to tailor the development of in-service and pre-service teachers to increase STEM integration.

Future research should further evaluate the change in self-efficacy of both the pre-service teacher and the SBAE students participating in a STEM enhanced curriculum. Perhaps this research could be replicated using CASE curriculum as a potential model for STEM integration. As the number of participants within this study were limited, future delivery of the sustainable bioenergy curriculum should aim to reach a larger sample, replicating the study to better understand how to best develop purposeful STEM integration in SBAE programs.

Finally, increasing students' desires, motivations, and competencies for pursuing and fulfilling STEM-based careers will take more devotion than a five-week biofuels kit. Therefore, researchers and teacher educators must continue to help their pre-service teachers think about ways in which they can integrate, interrogate, illuminate, highlight, and emphasize STEM in all areas of the SBAE program.

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Integrating Virtual Reality Technology into Beginning Welder Training Sequences

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Virtual reality (VR) technology is an advanced modern resource, commonly integrated into various forms of training. VR training simulations are customizable in that quality-grading parameter settings, physical environment, and user capacity can all be modified to personal or professional preference. In this study, VR technology training practices are utilized to enact meaningful learning. Meaningful learning is achieved by providing visual and audial cues within the virtual training environment, weld performance skill development, and ample skill practice time over a four-week span. This method of practice will reflect a new training style where beginning welders receive personalized feedback from both the VRTEX 360 virtual reality welding simulator and welding instructor. This training method benefits learners by expediting and enhancing their skill acquisition, adjusting their performance according to the various feedback they receive, and thereby experiencing meaningful learning. Results indicate that with each round of VR welding training participants' test weld scores continuously increased, as well as consistently scored 80% and higher. This enhanced performance of beginning welders implies VR welding training can effectively aid in developing complex welding skills. We recommend that future research investigate the effectiveness of parameter cues and total cost-savings of integrated VR technology into welding training methods.

Introduction

Traditional Welding Training

Welding is considered a highly valued skill in that it requires advanced psychomotor dexterity, cognitive capacity, and kinesthetic proficiency (Bland-Williams, 2017). Not only does this job require great skill, but it also demands that welders perform their job in precarious and difficult environments, as it remains a great necessity to overall infrastructure and manufacturing process chains (Sangwan et al., 2016). In the past, these skills have been taught and developed through traditional welding training, comprised of repetitious and secluded training environments (Bland-Williams, 2017). Unfortunately, traditional welding training is often costly and time-intensive (Whitney & Stephens, 2014), two characteristics that threaten the welding industry as there exists a projected welder deficit of roughly 400,000 welders within the next five years (Croy, 2016). As the need for adeptly trained welders increases, training will need to pivot to a more cost and time efficient model while still providing meaningful learning to these welders.

Throughout welding training, various factors affect a welders' ability to develop proper welding skills including individual backgrounds/abilities, cognitive capacity, and psychomotor dexterity (Wells & Miller, 2020). There also exist many weld processes, as well as different metals, electrodes, and wires to utilize while welding. Traditional welding training can be intimidating, and understandably so as the welder manages flammable gases, sparks, and burning metal throughout the fabrication process. Events like these can distract from learning the complex parameters required to perform high-quality welds. Five welding parameters are used as

quality guides by welders to assess the durability and strength, as well as aesthetics of a weld. The five parameters include 1) Travel speed, 2) Travel angle, 3) Work angle, 4) Contact-to-workpiece-distance and 5) Position or “aim”. Travel speed is the term used to describe how quickly the welder moves their weld gun (or electrode) across their metal workpiece. A very specific speed is required when welding: with a travel speed too fast, the metal will not fuse, but with a travel speed too slow, the metal will likely melt or distort. Travel angle represents the angle in which a welder positions their weld gun (or electrode) on the horizontal plane, while Work angle represents where the weld gun is positioned on the vertical plane. Different types and positions of welds require very specific angles to ensure stability and thorough penetration. Contact-to-workpiece-distance (CWTD) is understood as the distance between the tip of the weld gun and the metal. Welders must maintain proper CTWD by hovering their weld gun a distinct distance above the metal to perform quality welds. The last weld parameter, Position, is understood as the location in which a welder aims their weld gun. To ensure accuracy and complete joining, positioning and proper aim are essential.

All these components of welding, along with learning the ins and outs of machine settings and equipment maintenance, are elemental when learning this fabrication skill (Sangwan et al., 2016; Stone et al., 2011). Considering where improvements can be made within the welding training sector, we turn to technology. Advanced technology offers a solution with benefits consisting of cutting consumable costs, lessening emission pollution, increasing accessibility, and decreasing training time, all while still providing effective learning opportunities for welders of all skill levels. Augmented and virtual reality (AR and VR, respectively) technologies have recently been developed to provide personalized welding training, though their full potential is yet to be fully investigated (Potkonjak et al., 2016; Stone et al., 2013; Yunus et al., 2011). AR welding training technologies involve real-life training methods simply supplemented with audial cues from AR systems that utilize cameras and sensors. Similarly, VR employs cues, however the training takes place in a 100% virtual environment. This paper will focus specifically on the VR welding training technology.

Virtual Reality Welding Training

VR technology, an advanced modern resource, is now commonly integrated into training throughout several skills-based professions. VR technology is used in training methods for industries such as aviation, surgery, engineering, construction, and countless more (Bailenson et al., 2008; Whitney & Stephens, 2014). VR technology allows for computer-generated simulations to create a virtual environment in which users experience and conduct various training tasks. Over the course of many years, simulations have become more advanced than researchers had initially imagined (Helsel, 1992; Virtual Reality Society, 2020). VR training simulations are now customizable in that performance and grading parameter settings, physical environment, and user capacity can all be modified to personal or professional preference (Wells & Miller, 2020). More specifically, VR welding training simulations have seen great benefits to training beginning and novice-level welders (Byrd et al., 2018). Users are immersed into a virtual welding environment through use of oculus headsets, real time audio generation, and three-dimensional displays of the weld pool, metal workpiece, and weld gun (White et al., 2010). While offering exposure to advanced technology and unique training methods, VR technology also yields several added benefits, four of which will be considered in this paper.

One primary benefit to integrating VR technology into a welding training program is the provision of a safe learning environment for beginning welders. Learners that participate in traditional welding training are exposed to sparks, burning gas, metal fumes, and ultraviolet radiation. Many of these factors are concerning to inexperienced welders. During VR training, all these events are simulated to the user virtually, rendering them safe from common dangers of traditional welding training (Whitney & Stephens, 2014). As VR offers an environment that is both safe and authentic to users, it is an ideal training platform for dangerous activities like welding training (Morozova, 2018). Not only does the virtual environment protect users from welding hazards, but it aids in maintaining anxiety levels for beginning welders as well. Being that welding is a task demanding advanced focus and skill, increased levels of anxiety are likely to affect weld quality and job performance (Byrd, 2014). Byrd (2014) utilizing VR weld process training revealed that anxiety levels directly affected ability of welders to perform welds that pass visual inspections. Removing stressors commonly found in traditional welding training equip VR training with the advantage of a less stressful learning environment, allowing for better concentration on welding skill development (Byrd, 2014).

In addition to providing a safer alternative to its traditional counterpart, VR welding training has proven to be a more time and cost-efficient manner for training beginning welders (Dalto et al., 2010; Whitney & Stephens, 2014). VR welding simulators, such as the Lincoln Electric VRTEX 360, include software systems that afford straightforward, realistic set up tasks (*VRTEX® 360® Single User Virtual Reality Welding Training Simulator on Pallet*, 2021). Traditional welding booths require users to initiate and prepare various gas cylinders, welding tools, welding machines and gun attachments, and many other ancillary tasks. The VRTEX 360 allows users to complete these actions within the virtual environment at a more efficient rate. VR welding training also allows for multi-user access, meaning multiple users may train on the machine at the same time using dual VR welding stations. Whitney and Stephens (2014) found that this decrease in setup and breakdown time led to shorter required training times. They found that groups trained using VR training methods required two to three hours less total training time than those trained using traditional welding training methods. With less training time spent carrying out setup and breakdown tasks, more time can be devoted to increasing beginning learners' weld skill acquisition through more experience.

Whitney and Stephens (2014) were also able to measure the dollar amount of materials consumed during VR welding training and compare it to the actual amount of materials used in traditional training. They found that the VR training required 33% less energy than the traditional welding training, while also maintaining a high qualification rate for all weld types. A study conducted by Stone et al. (2011) measured the cost of materials consumed by a group of welders trained using 50% VR and 50% traditional training and compared it to a group using 100% traditional training. Stone et al.(2011) observed the group receiving both VR and traditional training consumed significantly less materials (flat plates, groove plates, and electrodes) than the traditional training group. Total savings amounted to \$243.68 per student as a result of integrating VR welding training (Stone et al., 2011). By consuming less materials, decreasing required training time, and allowing for multi-user training, VR proves to be a practical asset within welding training settings.

The final and arguably the most important benefit of integrating VR technology into welding training is that it serves as a remarkable tool for the provision of meaningful experiential learning (Chan & Leijtan, 2012; Shoulders & Myers, 2013). Administering meaningful learning is especially important for beginning learners in that it facilitates knowledge creation and retention (Shoulders & Myers, 2013). As users train in the virtual environment, they receive personalized feedback after every weld pass in the form of numerical weld and weld parameter grades. The VRTEX 360 tracks users' performance as they weld, scoring their ability to maintain acceptable welding techniques. This allows users to improve their welding techniques (work angle, travel angle, CTWD, travel speed, and position) while also receiving direct instruction from teachers observing the welders via external monitors. Cheater lenses are also available for use in VR welding training which allow for an enhanced view of the weld process for the user, another aspect of personalized feedback that VR welding simulators offer. Chan and Leijtan (2012) identified an improvement in both engagement and metacognition of beginning welders upon completion of VR welding training in which they received personalized feedback. More recently, Byrd et al. (2018) observed an increase in welder dexterity with the use of instant and accurate feedback from VR welding simulation training. Byrd et al. (2018) also observed a faster rate of weld replication by using VR welding training. By allowing faster replication rates, learners receive more welding practice, feedback personalized to their welding style, direct instruction from the welding instructor, and thus in-depth experiential learning.

Amidst all these benefits, there also exist perceived drawbacks. One seemingly daunting hindrance to incorporate VR technology into welding training is the high initial associated cost. However, in most cases the initial cost of the training system can be partially or completely funded by green initiative and STEM grants for organizations and campuses (Whitney & Stephens, 2014). Further, the cost savings the system would accumulate, depending on use, will ultimately match and exceed the initial cost of the technology implementation. Another perceived drawback is the classroom/laboratory management associated with the VR technology. Set up and management of the VR welding training equipment is relatively simple and minimal. The space required for a virtual welding machine and welding dock is up to 10ft. by 4ft., taking up minimal space in the classroom or lab. The headset, weld gun, coupons, and other attachments are all afforded storing compartments on the welding machine, therefore presenting no further issue than a traditional welding training station. The accessibility of the VR welding training systems can be 100% limited by the instructor via password protection, or left available for students who wish to practice outside of lab hours. Utilizing VR welding training systems can offer an advanced, personalized form of welding training, though the effectiveness of the training method has yet to be fully identified.

Theoretical Framework

The theoretical framework that guided this study was Ausubel's (2012) assimilation and knowledge acquisition theory. Ausubel's assimilation theory establishes that repetitious learning, in this case traditional welding training, is less impactful for learner's development of metacognition and self-regulated learning than meaningful learning (Schunk, 2008). Repetitious learning is understood as comprehending lower-level concepts with a high frequency for skill practice. Meaningful learning is seen as understanding high quality information while participating in high quality skill practice. Ausubel (2012) explains that solely practicing

repetitious learning is not sufficient for establishing an in-depth understanding and retention of complex skills. Meaningful learning is attained by providing a level of inclusiveness of relevant concepts to the learning task, cohesivity and stability of the concepts, and distinguishability of concepts from the learning tasks (Ausubel, 2012).

In this study, VR technology and training practices are utilized to enact meaningful learning. Meaningful learning is to be achieved by providing visual and audial cues within the virtual training environment, weld performance skill development, and sufficient skill practice time throughout the training period. This method of practice will reflect a new training style in that beginning welders will receive personalized feedback from both the VRTEX 360 welding simulator as it assigned immediate grades to their welds, and the welding instructor as they monitor the participants' welding performance progress. This training method laced with meaningful learning benefits learners by allowing them to self-regulate their performance according to the personalized feedback they receive through the virtual cues, thus expediting and enhancing their skill acquisition.

Purpose

The purpose for this study is guided by the framework established by the American Association for Agricultural Education National Research Agenda Research Priority Area 3: *Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century* (Stripling & Ricketts, 2016). This descriptive study is a part of a larger quasi-experimental study, and it aims to assess the effectiveness of VR welding training methods by comparing weld scores following each round of training. The secondary purpose of this descriptive study is to compare participants' live weld scores to their virtual weld scores. Live welds are performed using the traditional live welding training method and graded by an American Welding Society (AWS) Certified Welding Inspector (CWI). VR welds are performed using the VR welding training protocol established in this paper and graded by the VRTEX 360 welding simulator. The purpose for this study is to compare participants' weld scores produced using different welding training methods, identifying any statistical significance between the two. The objective guiding this study is to determine if a statistically significant relation exists between students virtual welding and live welding performance exists.

Methods and Procedures

Over the course of four weeks, students enrolled in the Introduction to Agricultural Engineering course at Texas State University participated in a larger, quasi-experimental study that aimed to assess the effectiveness of three different welding training methods. Within the larger study exists this more specific, descriptive study in which we compare weld scores from VR and live welding training. Upon approval from the Institutional Review Board, participants were assigned to one of three welding training sequence groups and asked to complete a demographic survey encompassing questions regarding basic demographic information as well as any prior welding experience. All sequence groups underwent identical training methods involving traditional live welding training, Augmented Reality (AR) welding training, and VR welding training, at separate times. For this study, all participants completed the same weld configuration (2F filet weld) using the same weld process (GMAW) across all methods of

training during the four weeks, with a final test weld performance expected to be completed at the conclusion of the study.

Sequence groups for this study were labelled as Sequence Group 1, 2, and 3. Each sequence group underwent identical training, simply at different times (Table 1). Sequence Group 1 underwent VR welding training during Week One, AR welding training during Week Two, and finally Live welding training during Week Three. Sequence Group 2 underwent AR, Live, and then VR welding training, and Sequence Group 3 underwent Live, VR, and then AR welding training. All groups underwent a final Live welding training session during Week Four, producing their best physical weld to be evaluated and graded by the CWI. Table 1 gives a complete schedule of sequence groups for this study.

Table 1

Weld Process Training Sequences

Sequence Group	Weld Process Training for Week One	Weld Process Training for Week Two	Weld Process Training for Week Three	Weld Process Training for Week Four
Sequence Group 1	VR	AR	Live	Live Weld Test
Sequence Group 2	AR	Live	VR	Live Weld Test
Sequence Group 3	Live	VR	AR	Live Weld Test

The VR welding training portion of this study took place in the virtual reality welding lab, using the Lincoln Electric VRTEX 360 virtual reality welding simulator. To first introduce the participants to the process of VR welding, an initial demonstration was given by the researcher in which the learning tasks for this training method were described. The learning tasks included understanding how they should hold their weld gun while performing a weld, how fast to move the weld gun across the metal, at what distance to hold their weld gun with respect to the weld, and how to maintain proper joint aim throughout the weld process. As previously stated, these skills are known as the five weld quality parameters: travel angle, work angle, travel speed, arc length, and aim. The VRTEX 360 VR welding simulator offers parameter cues, observed visually through the headset, that guide the learner throughout their weld performance, enhancing their understanding of how to apply these various weld quality parameters. Participants were then shown how to complete a single pass 2F fillet weld using the GMAW process in the VRTEX 360's virtual environment. Weld passes using each of the four parameter cues were also performed to demonstrate how to understand what the cue is relaying with regards to weld performance feedback. The researcher also explained the parameter and overall scores provided by the VRTEX 360 and how to interpret them.

Following the demonstration, participants were given traditional welding personal protective equipment (PPE- i.e., gauntlet welding gloves, welding jacket, closed toes shoes) and a scoring sheet to track their parameter scores and overall weld scores following each weld pass they produce. Participants were instructed to complete three rounds of VR Welding Training

Protocol throughout the training session, rotating with their partner after each round until completion. One round is comprised of four practice weld runs, each employing a different parameter cue, and one test run, performed using no cues. An example of one round is given below in Table 2.

Table 2

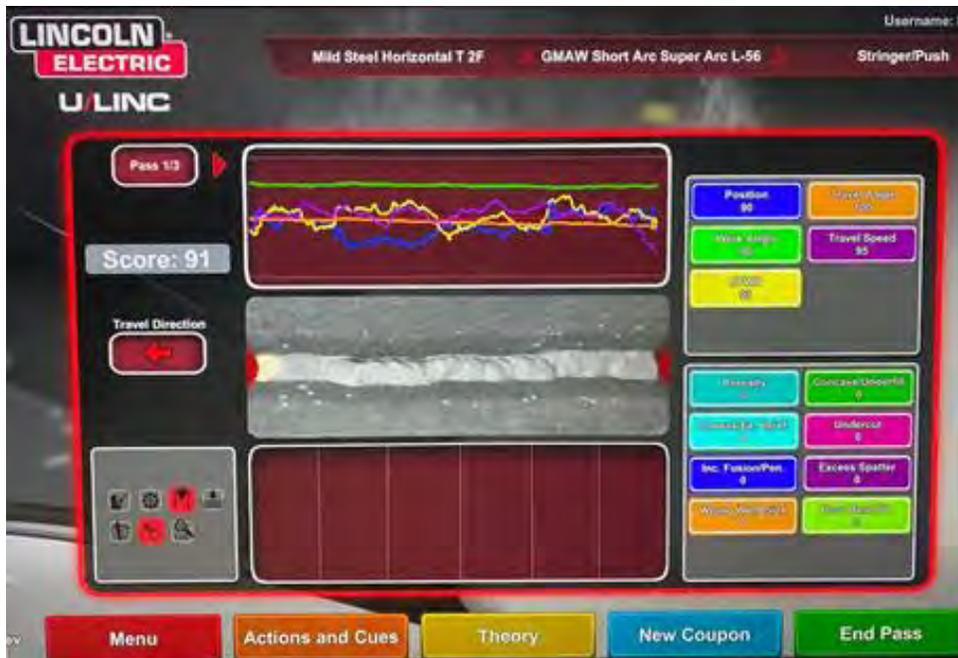
Protocol for One Round of VRTEX 360 Weld Process Training

Weld Pass	Visual/Audial Cue Employed
(1) Practice Run 1	Travel Speed Cue
(2) Practice Run 2	Position/Aim Cue
(3) Practice Run 3	Travel/Work Angle Cue
(4) Practice Run 4	CTWD Cue
(5) Test Run	None

The purpose behind this training structure is to familiarize participants with the virtual welding process, as well as the welding skills aided by the parameter cues. This allows for more complex consideration on the participants' part, where they then test their acquired skills with a test weld at the conclusion of the training round. Upon completion of each virtual weld, each of the five participants' weld parameter performances (Travel speed, Travel angle, Work angle, CTWD, and Position) are graded by the VRTEX 360 weld inspection system and assigned a numerical score on a 100-point scale. Additionally, the welds are assigned overall weld quality scores that are calculated by averaging the five parameter scores. The VRTEX 360 provides both welding practice and grading feedback immediately following each weld performance, offering real-time personalized feedback to each participant. The feedback score screen of the VRTEX 360 virtual welding simulator is displayed below in Figure 1, the five parameter scores visible on the right, the overall weld quality score visible on the left.

Figure 1

Score screen of the Lincoln Electric VRTEX -360 Virtual Welding Simulator



Following completion of all welding training processes in Weeks One through Three, participants were given a final live welding training session during Week Four. During this one and a half hour training period, participants were asked to perform single pass 2F live welds on ¼” mild steel, as a form of self-regulated skill practice, reflecting traditional welding training methods. At the conclusion of the lab, students were instructed to submit their best weld. Using a grading criterion developed by Herren (2009), students provided a self-evaluation of the weld quality for the submitted weld, which was also graded and visually examined by an AWS accredited CWI and the course instructor. Using the grading criterion developed by Herren (2009), the CWI assigned a numerical grade to each weld. Additionally, the CWI visually examined each weld using AWS standards and determined if the weld passed or failed the examination. The participants received a welding certificate if they passed the visual inspection.

Results

Demographic information was collected from all participants ($n = 47$) prior to study commencement. Three participants’ information was excluded as they failed to complete all welding training sessions, resulting in a new total number of participants ($n = 44$). The demographic information determined that most participants identified as female ($f = 23$; 52.3%). Most of the participants were sophomores ($f = 19$; 43.2%) and the typical age of our participants was 19 years old ($f = 12$; 27.3%). Most participants had no welding experience prior to this study ($f = 29$; 65.9%), and all participants reported having no welding simulator or simulation experience prior to this study. Demographic information from this study is presented in Table 3.

Table 3

Participant Demographics (n = 44)

Item	<i>f</i>	%
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Gender			
	Female	23	52.3
	Male	19	43.2
	Other	2	4.5
Age			
	18	3	6.8
	19	12	27.3
	20	9	20.5
	21	7	15.9
	22	6	13.6
	23+	7	16.1
Dominant hand for most tasks			
	Right hand	36	81.8
	Left hand	8	18.2
Dominant hand for welding			
	Right hand	39	88.6
	Left Hand	5	11.4
Academic grade level			
	Freshman	7	15.9
	Sophomore	19	43.2
	Junior	13	29.5
	Other	5	11.4
Previous welding experience			
	No	29	65.9
	Yes	15	34.1
If you have welded before, which of the following processes have you performed?			
	Shielded metal arc welding (SMAW; “Stick welding”)	12	27.3
	Gas metal arc welding (GMAW; “MIG”; “wire welding”)	7	15.9
	Oxy-fuel welding (OFW)	5	11.4
	Gas tungsten arc welding (GTAW)	2	4.5
	Flux-cored arc welding (FCAW)	1	2.3
	Submerged arc welding (SAW)	1	2.3
Previous welding simulation / simulator system use			
	No	44	100
	Yes	0	0

Participants’ Test Run weld scores from each of the three training rounds were collected from Weeks One, Two, and Three. Compiling Weeks One, Two, and Three data, mean score analyses for each round were performed to determine if VR welding training was as effective, or more, at teaching beginning welders compared to live welding training. Participants’ mean score for Round 1 Test Run, performed and graded using the VRTEX 360 welding simulator, was 80.11 ($SD = 9.67$). The mean score for participants’ Round 2 Test Run was 82.43 ($SD = 7.98$). The mean score for participants’ Round 3 Test Run was 83.11 ($SD = 10.22$). Live weld scores, performed and graded under the CWI, were collected during Week Four and a mean score

analysis was performed. The mean score for participants' live welds produced during the final week was 80.66 ($SD = 11.12$). Mean score results are displayed for comparison below in Table 4.

Table 4

VRTEX 360 Mean Scores for Test Runs and CWI Mean Score for Live Welds (N = 44)

Weld Scored	Mean Score	<i>SD</i>	<i>t</i>	<i>p</i>
Round 1 Test Run	80.11	9.67	-0.28	0.78
Round 2 Test Run	82.43	7.98	0.88	0.39
Round 3 Test Run	83.11	10.22	1.03	0.31
Live Weld (CWI Grade)	80.66	11.12		

Conclusions and Recommendations

Results from this study illustrate that with each consecutive round of VR welding training, participants' Test Run scores continued to increase. Furthermore, Test Run mean score analysis shows that participants in this study consistently had weld quality scores at 80% and higher. Stone et al. (2011) conducted research in which a mean pass rate for 2F fillet welds was established by welders who had received traditional welding training. This established mean pass rate exists at <40% (Stone et al., 2011). In this study, beginning welders who received virtually integrated welding training far surpassed this pass rate by exemplifying an 80% and higher mean pass rate for the 2F fillet weld. This enhanced performance among beginning welders implies that VR welding training can be effective and has the potential to offer an alternative to traditional welding training.

It is fully understood that developing these complex welding skills is no easy task, however, incorporating VR welding training can decrease the amount of required training time while still increasing welding skill retention. Participants in this study received only one VR welding training session, along with three separate welding training sessions. With such impressive mean pass rates resulting from a small amount of training time, it is a clear indicator that VR decreases required training time for beginning welders, and supports findings from similar studies (Stone et al., 2011; Stone et al., 2013; Wells & Miller, 2020; Whitney & Stephens, 2014; Yunus et al., 2011). Furthermore, participants' demeanor during the virtual weld training was relatively more relaxed compared to their experience of live welding training. Participants were unafraid to attempt the welds and in fact, became immersed in the welding environment as more of a video-game competition than an educational experiment. This behavior throughout our study supports the idea that exposing beginning welders to the weld process in a VR environment can be more comfortable and effective for the learner (Yunus et al., 2011). Instead of immediately placing the learner into the live welding lab, giving an introductory lesson in the VR environment may lead to the learner's increased confidence in the live welding lab later.

There exists obvious concern for the reliability of weld quality grades assigned by VR welding training simulations (White et al., 2011). VR welding simulation technology, though relatively new to educational environments, is programmed to mimic the grading parameters of industry respected CWIs. In this study, mean scores for Test Welds performed and graded using the VRTEX 360 (80.11, 82.43, and 83.11) were comparable to the Live Weld mean score (80.66) graded by a CWI. This outcome suggests that the factory quality-grading settings of the VRTEX 360 used in the study are in close alignment with the quality-grading parameters for AWS CWI's. To adequately train beginning welders, industry and professional standards must be upheld to ensure that learners receive the entry-level skills required of the welding sector.

Recommendations for future research and practice involving VR welding training have been developed from the results of this study. Future research investigating the individual welding parameter scores should be conducted to identify the professional development needs of beginning welders. Knowing what parameters that beginning welders struggle with the most will improve the effectiveness and efficiency of VR welding training methods. Results from this particular study indicate that the VRTEX 360's visual and auidial parameter cues assist learners in understanding the complex skills and weld quality parameters required in the welding process as their scores continued to improve as the progressed through each round of virtual training. Welding parameters comprise a majority of welding training, therefore utilizing these cues may enhance training methods immensely. We recommend future researchers replicate this study with a larger sample size improve reliability and to determine if there were any statistical differences in the scores in the week that the students were trained using the VRTEX 360. We also recommend future studies replicate this study utilizing more complex weld configurations, materials, and processes. Out of position welds and configurations such as overhead and pipe require longer durations of practice and skill development.

Additionally, further research should track the exact amount of metal, gas, wire, and electricity saved by utilizing the VRTEX 360 VR welding training simulator. By utilizing a virtual welding training environment, welders can spend more time welding and fine-tuning their skills without the burden of using materials and expenses until they are ready to move into the live welding environment. Research that involved virtual welding training should record and calculate the total savings from integrating these technologies as, although already realized by researchers, such information would further build the understanding of cost savings from integrating VR technology into welding training sequences (Morozova, 2018; Stone et al., 2011; Whitney & Stephens, 2014). The cost savings from reduced consumable usage and training time has been touted as the major benefits of VR training, the equipment cost has been cited as the major barrier. Knowing that the VRTEX 360 VR welding training simulator has a high upfront cost, we recommend educators pursue green initiative, technology-based, workforce development and/or STEM-based grants to purchase enough machines to ensure students have enough one on one time to gain meaningful learning while reducing our carbon footprint.

Future research integrating VR welding training are also recommended to provide extensive lengths of training sessions. The purpose behind this extended training time is to allow learners ample time to familiarize themselves within the virtual environment. Though the VRTEX 360 virtual welding simulator training system is simple in function and easy-to-use, the virtual environment can be disorienting at first (Byrd et al., 2018). Further, providing ample

practice time is key in achieving meaningful learning as it allows learners to move from simple repetitious learning to practicing self-regulated learning (Ausubel, 2012). Existing research has investigated the use of VR welding training methods with similar timeframes as this study, therefore extended training times are recommended for future research and investigation (Stone et al., 2011; Stone et al., 2013; Wells & Miller, 2020).

Instructors that plan to incorporate VR welding training simulations are recommended to allot for ample amounts of training time for their learners, as this enhances the learners' welding skill acquisition and performance. Increased welding practice time ultimately leads to increased welding skill performance (Wells & Miller, 2020; Whitney & Stephens, 2014). The impact of virtual welding training methods into welding training sequences is yet to be determined, however it is known that it can play a beneficial role. Further practice, as well as research, is required to understand the crucial role that virtual reality technology will play in the future of the welding industry.

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Perceptions of Female Instructors in a Post-Secondary Welding Course

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Agricultural mechanics and welding have traditionally been perceived to be reserved for males, however more females are entering the profession. The number of females teaching welding courses is growing. There is evidence of gender bias in post-secondary teaching and in traditional male-dominated careers. In this study, a sample of undergraduate welding students were randomly assigned a female or male instructor. Students completed a pre-survey based on their experience in the course at week 4. Lessons, demonstrations, and lab work completed were identical. At week 8, the male and female instructors switched sections and a post-survey was completed at week 12. Week 12 survey results indicated there were significant differences between laboratory sections on students' evaluation of learning from a female instructor ($t = 3.08(19)$, $p = .009$) and learning from a male instructor ($t = 2.53(19)$, $p = .021$). Over the course of the semester, students' perceptions did not change significantly but students' mean rating score of "I would learn more from a female instructor" increased from 2.58 ($SD = 1.74$) to 3.37 ($SD = 1.98$) while students' mean rating of "I would learn more from male instructor" were consistent from week four ($M = 3.67$, $SD = 2.09$) to week 12 ($M = 3.50$, $SD = 2.07$). The Pygmalion effect is a possible explanation of these results indicating gender bias of female instructors in a post-secondary welding course from the student perspective may exist. We recommend more research to be conducted in a similar environment to add to the literature and research regarding gender bias in careers perceived to be reserved for males.

Introduction and Need for the Study

According to the U.S. Bureau of Labor Statistics, the most popular occupations for males include jobs in the categories of production/craft, professional/technical, and managerial. (Gabriel & Schmitz, 2007). The most popular occupations for females are service-based or clerical, which are considered female-dominated occupations (Gabriel & Schmitz, 2007). "Pink-collar" is a term used to describe typical female occupations such as; nurses, secretaries and school teachers (Howe, 1977). Blue-collar jobs have traditionally been considered and continue to be careers perceived for males (Gabriel & Schmitz, 2007). Blue-collar jobs are considered manual skilled or unskilled labor in an industrial environment (Oxford University Press, 2022). Examples of "blue-collar" jobs include painters, repair workers, electricians, carpenters, welders, heating, and plumbers (The Center for Construction Research and Training, 2007). Blue-collar jobs are an example of a group of careers perceived to be reserved for males.

There are several theories behind why blue-collar jobs are male dominated careers and less females are involved in blue-collar work. England (2010) argued that women avoid working in careers perceived to be reserved for males such as blue-collar jobs. Bergmann (2011) discussed the lack of training opportunities for female workers in blue-collar trades. These theories along with others provide a basis regarding the reasons behind the lack of females in blue-collar and male dominated careers.

Based on these theories, one can argue females are less inclined to work in any career perceived to be strictly males' careers. Yet in recent years, more females have entered male-dominated careers and more males have entered female-dominated careers. There are more males who are nurses or school-teachers and more females in industrial trades. The gender divide has declined in recent decades with more females in traditionally male-dominated occupations (England, 2010). For example, the number of women in construction has grown by 73.5% from 1985 to 2005 which has changed the overall percentage of females in construction to approximately 9% of the total employees (The Center for Construction Research and Training, 2007). In 2020, the US Bureau of Labor Statistics completed a survey of employed Americans and found that 10.9% of workers in construction were female (U.S. Bureau of Labor Statistics, 2021).

This trend in construction is the same for other blue-collar careers and in agricultural education. In a 1987 study, females held a mere 5.1% of secondary agricultural education positions nationwide (Knight, 1987). Foster's (2001) study on women in agricultural education aimed to gain an accurate number of female agricultural educators nationwide. The reported percentage of female teachers from was 15.77% and 38.6% of the study sample taught some form of agricultural mechanics. McKim and Saucier (2001) estimate agriculture teachers on average teach four classes daily including one potential agricultural mechanics competency. The number of female teachers in agricultural education has grown significantly in the past decades and continues to rise as Shultz et al. (2014) reported approximately 33% of agricultural educators were female. Teacher preparation program have seen an increase in female enrollment as approximately half of student teaching populations are female (Burriss et al., 2010; Saucier & McKim, 2011). Tummons et al. (2017) argues many agricultural mechanics positions traditionally filled by males are now being filled by young female teachers.

A common agricultural mechanics competency at the secondary level is welding. With more females entering careers in teaching agricultural mechanics, many are teaching welding courses traditionally taught by males. However, with the increase of females teaching welding courses, issues may arise such as gender bias from students. Mitchell et al. (2018) completed a study on gender bias in student evaluations and argues females and males are evaluated on different criteria. The criteria include personality, appearance, and students' perceptions of intelligence and level of competency. The data from this study was quite intriguing; the male instructor received higher student evaluations in an identical online course compared to a female instructor (Mitchel et al, 2018). Clearly from this recent study, there is gender bias in teaching and therefore potential for bias in agricultural mechanics courses.

In recent years, research has been conducted to estimate the number of female teachers in agricultural mechanics and to learn more about gender bias in teaching. Little to no research has been conducted to describe the perceptions of female teachers in agricultural mechanics. Little research has also been conducted on students' perceptions of their teachers. This study combined the two concepts to form this study which sought to describe the student perceptions of female instructors in a post-secondary introductory welding course to examine gender preference and bias. This research aligns with the AAAE National Research Agenda under priority five "Efficient and Effective Agricultural Education Programs" (Thoron, Myers, & Barrick, 2016) by addressing bias within the classroom.

Literature Review and Conceptual Framework

Multiple theories assist to explain gender bias in the workplace. For this study, we rely primarily on Pygmalion leader theory and the application to a teacher-student relationship (Karakowsky et al., 2016). Merton's (1948) Self-fulfilling prophecy explains the Pygmalion effect as performance increases because of raised expectations of a leader. In our situation and reference, the described leader is a teacher. Pygmalion leader theory in essence is when students have high expectations of their teacher, the teacher will result in a higher performance. As we study the Pygmalion effect and theory, we can increase understanding of gender bias in teaching. Specifically for this study, gender bias of female instructors in a post-secondary welding course from the student perspective.

Karakowsky et al. (2016) suggests gender of the Pygmalion leader (e.g., teacher) is not accountable for the Pygmalion effect to trigger, but instead gender biases or gender stereotypes. Gender stereotypes significantly influence subordinates' (e.g., students) perceptions of their leaders (e.g., teachers) (Karakowsky et al., 2016). Initial trust in a leader can happen through stereotyping or ranking an individual in a certain category based on classification such as race, gender, etc. (McKnight et al., 1998). Initial expectations (perceptions) about the competencies of a leader can be based on gender (Berger et al., 1980). Gender stereotypes continue to define success (Schein et al., 1996). Females and males are continually judged based on socially acceptable gender stereotypes Mitchel et al (2018).

There are socially acceptable gender assigned occupations (e.g. blue-collar versus pink-collar). Social role theory suggests consequences in subordinates' (e.g. students) perceptions in incongruent gender role and work role situations (e.g. female welding instructor) (Eagly, 1987; Eagly and Karau, 2002). If roles are incongruent, (e.g. a female holds a socially defined male occupation) her leadership ability will be potentially devalued (Eagly and Karau, 2002; Eagly et al., 1995; Rosette and Tost, 2010). Karakowsky et al. (2016) suggests congruent gender and socially defined gender work roles will positively influence perceptions of trust and expertise of the leader.

It is important to consider that many occupations which are traditionally perceived to be reserved for males continue to remain male dominated even with the increased number of females entering those careers (Vancouver and Ilgen, 1989). An example of this is the increase in female construction workers mentioned above; the percentage of females has increased yet females continue to be the minority.

Many challenges exist for teachers, particularly agricultural education and mechanics teachers. There is little literature examining gender bias and preference regarding teachers in agricultural education and none of the literature examines agricultural mechanics or welding specifically. As the number of female welding teachers increases, this research is critical to understand the bias students have towards their teachers and the challenges this may present.

Purpose and Objectives

The purpose of this study was to examine students' perceptions of female instructors versus male instructors in a post-secondary welding course. This research is guided by the question: Are there differences in students' perceptions of female teachers versus male teachers of a welding course? The following research objectives were developed to guide this study.

1. Describe the demographics of students participating in a collegiate welding course
2. Describe collegiate students' preferences on gender of welding instructor
3. Describe collegiate students' evaluations of the female and male welding instructors
4. Determine the effect of instructor gender on collegiate welding students' preference on gender of welding instructor.

Methodology

Design and Population

The research was reviewed and approved by Utah State University Institutional Review Board under protocol #12108. The research was a two-group repeated measures counterbalance quasi-experimental design. The population consisted of undergraduate students enrolled in an introductory welding course in the Fall of 2021 ($n=28$) at Utah State University. The treatment was gender of instructor. Students were enrolled in the course and one of two lab sections. Lab sections were either a Tuesday or Thursday offering. The two lab sections were randomly assigned either a male or female instructor. The course was taught separately from the laboratory sections. All students shared the same course instructor. The only difference between lab sections was the instructors' gender, all curriculum and teaching strategies were identical in design. Deception was used to limit influence of experiment effect. Students were not informed about the experiment but instead were told the surveys were to be used for course improvement. During week four of the semester, a course evaluation survey was given to students to collect data on their preferences on gender of instructor. To legitimize the deception and limit student sensitization to the question about preference on gender of instructor, additional questions were asked to gauge students' perceptions of welding technology ($\alpha = .80$), perceptions of learning welding technology ($\alpha = .81$) and tinkering self-efficacy ($\alpha = .90$). At week eight (mid-term) of the semester, male and female instructors switched sections (e.g., students assigned to the female instructor for the first eight weeks received instruction from the male instructor for the last eight weeks). During week 12 of the semester, the course evaluation survey was given to students to record their preferences on gender of instructor. For the week 12 survey, the same questions about students' perceptions of welding technology ($\alpha = .80$), perceptions of learning welding technology ($\alpha = .77$), and tinkering self-efficacy ($\alpha = .94$) were asked to legitimize the deception and limit students' sensitization towards questions regarding preference on gender of instructor. At week 14, students were debriefed on the experiment and were asked by an independent observer to provide informed consent to allow the use of the survey results.

Instrumentation

The survey instrument consisted of questions/statements to gauge students' preference of instructor gender using two independent statements on a Likert-scale (See Table 1). The Likert-scale items were measured on a seven-point scale (1 = *strongly disagree* to 7 = *strongly agree*).

Additional questions collected demographic data on students' age, gender, and major. Students were asked to respond by selecting true or false to the statement, "I have no preference towards gender of the instructor if they can teach welding well." Additionally, students were asked to respond to the prompt, "given an option of instructors with similar background and knowledge of welding, which instructor gender would you choose?". Survey responses were analyzed using descriptive statistics. Content validity for the instrument were evaluated and confirmed by a panel of experts which included agricultural education faculty knowledgeable in survey research methods and analysis.

Table 1

Instructor Evaluation Items

I would learn more from a female instructor

I would learn more from a male instructor

Analysis

Descriptive statistics were used to report data on student perceptions and demographic characteristics. To assess if differences were present between lab sections on students' rating of learning from different instructor genders, an independent samples *t*-test was used. To assess the impact of changing instructor gender on students' rating of learning from different instructor genders, a paired-samples *t*-test was used.

Results

Objective 1: Describe the Demographics of Students Participating in a Collegiate Welding Course

The first research objective sought to describe the demographics of collegiate students in the welding course. A total of 25 students agreed to participate. The Tuesday lab section of 10 students began with the male instructor. The Thursday lab section of 15 students began with the female instructor. There were 9 males and 1 assigned female at birth (AFAB) students who participated in this study in the Tuesday lab. There were 9 males and 4 females who participated in the Thursday lab section. The average age of the Tuesday lab was 24.6 ($SD = 5.85$) and the average age of the Thursday lab was 21.1 ($SD = 2.02$). Students' majors enrolled in the Tuesday Lab included three agricultural systems technology, three technology systems, two outdoor product design development, one applied economics, and one technology/engineering education. Students' majors enrolled in the Thursday lab included five agricultural education, two outdoor product design development, one agricultural systems technology, one civil engineering, one technology and engineering education, one technology systems, and one exploratory. Two students from the Thursday lab did not provide their major.

Objective 2: Describe Collegiate Students' Preferences on Gender of Welding Instructor

The second research objective sought to describe the students' preferences towards the gender of their welding instructor. Students were asked to respond by selecting true or false to the statement, "I have no preference towards gender of the instructor if they can teach welding well." All students in the Tuesday lab section responded with true. This was the same pre- and post- test for the Tuesday lab section. The Thursday lab section contained one female who selected false. This individual chose false in both the pre- and post- tests. The remaining students enrolled in the Thursday lab section chose true.

Table 2

I have no preference towards gender of the instructor if they can teach welding well (n = 25)

Lab Section	Student Gender	Fourth Week Survey		12 th Week Survey	
		<i>True</i>	<i>False</i>	<i>True</i>	<i>False</i>
		<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)
Tuesday	Male	9 (100%)	0	8* (88.9%)	0
	AFAB	1 (100%)	0	1 (100%)	0
Thursday	Male	9 (100%)	0	5 (55.6%)	0
	Female	3 (75%)	1 (25%)	3 (75%)	1 (25%)

**Note.* For Tuesday, one student did not answer the question for the 12th week survey. For Thursday, four students did not answer the question for the 12th week survey.

The second question regarding gender preference was "Given an option of instructors with similar background and knowledge of welding, which instructor would you choose? Please select one option." Students were instructed to choose either male or female. In the pre-test, 15 total students (combined Tuesday and Thursday sections) selected a male instructor, 3 students selected a female instructor, and 3 students wrote in "either". 71.4% of both lab sections agreed they would choose a male instructor over the female instructor in the pre-test. The data changed significantly from the pre- to the post- test. The percentage of individuals who selected the male instructor dropped from 71.4% to 57.1% and 4 more students wrote in their own answer instead of selecting either male or female instructor. A total of 7 students, 33.3%, selected either. The students who selected either wrote phrases such as "doesn't matter", "either", "not important", and "no preference". See tables 3 and 4.

Table 3

Given an option of instructors with similar background and knowledge of welding, which instructor would you choose?

Lab Section	Student Gender	Fourth Week Survey			12 th Week Survey		
		<i>Instructor Choice</i>			<i>Instructor Choice</i>		
		<i>Male</i>	<i>Female</i>	<i>Neutral</i>	<i>Male</i>	<i>Female</i>	<i>Neutral</i>
	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)	<i>f</i> (%)	
Tuesday	Male	8 (88.9%)	0 (0%)	1 (11.1%)	6* (75%)	2 (25%)	0 (0%)
	AFAB	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1 (100%)
Thursday	Male	6 (85.7%)	1 (14.3%)	0 (0%)	3 (50%)	0 (0%)	3 (50%)
	Female	1 (25%)	2 (50%)	1 (25%)	2 (50%)	0 (0%)	2 (50%)

**Note.* For Tuesday, one student did not answer the question for the 12th week survey. For Thursday, two students did not answer the question for the fourth week survey and three students did not answer the question for the 12th week survey.

Objective 3: Describe Collegiate Students' Evaluations of the Female and Male Welding Instructors

The third research objective sought to describe the students' evaluations of learning from female and male welding instructors. These questions were analyzed using the seven-point scale (*1 = strongly disagree, 7 = strongly agree*). Students were asked to rate their level of agreement for the statements "I would learn more from a female instructor" and "I would learn more from a male instructor". Table four presents means and standard deviations for students' ratings.

Objective 4: Determine the Effect of Instructor Gender on Collegiate Welding Students' Preference on Gender of Welding Instructor.

To assess if differences were present between lab sections (instructor gender) on students' rating of learning from different instructor genders, an independent samples *t*-test was used. The fourth week survey results indicated there were no significant differences in students' evaluation of learning from a female instructor ($t = -.192(21), p = .849$) and learning from a male instructor ($t = .454(20), p = .655$). The 12th week survey results indicated there were significant differences between laboratory sections on students' evaluation of learning from a female instructor ($t = 3.08(19), p = .009$) and learning from a male instructor ($t = 2.53(19), p = .021$). Paired-Samples *t*-test revealed no significant differences between the fourth week and 12th week responses on their evaluation of learning from a male ($t = .381(17), p = .708$) or female ($t = -1.45(18), p = .164$) instructor.

Table 4*Student Mean Ratings of Instructor Evaluation Items*

Lab Section	Item	Week 4 Survey			Week 12 Survey		
		<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Tuesday	I would learn more from a female instructor	10	2.40	2.01	9	4.56	1.81
	I would learn more from a male instructor	9	3.89	2.37	9	4.78	1.99
Thursday	I would learn more from a female instructor	13	2.54	1.45	12	2.33	1.50
	I would learn more from a male instructor	13	3.46	2.03	12	2.67	1.83

Conclusions/Limitations

The purpose of this study was to examine students' perceptions of female instructors versus male instructors in a post-secondary welding course. This research study is unique as there is little research in gender bias in agricultural education courses such as welding. Little to no research has been conducted and little is known about gender bias of instructors in agricultural mechanics. This research adds to previous literature regarding gender bias in teaching and is a guide for future gender bias research in agricultural education and mechanics. It is critical to understand students' perceptions of their teachers, the potential impact on the perceived quality of instruction, and the Pygmalion effect on female teachers' intention to provide agricultural mechanics instruction (Merton, 1948).

Most students did prefer a male instructor at the beginning of the course as indicated from week four survey results. Students' preference of a male versus female instructor evolved over the course of the study. In the Tuesday section pre-survey (week four), none of the students selected a female instructor. This shifted as two male students selected the female instructor in the post-survey. Between the week four and week 12 survey, for the Thursday lab section, a

higher frequency of male students selected preference for a female instructor. In the Thursday section, the number of students who selected either grew from three to five students from week four to week 12. Students disagreed they would learn more from a male versus female instructor. This may have resulted from switching instructors during week eight of the semester. Students experiencing a qualified and experienced female instructor may have changed their perception of their ability to learn the content.

A limitation of this research was the potential for student bias towards socially desirable or acceptable responses when it came to learning from different instructors. Paired-Samples *t*-test revealed no significant differences between week four and week 12 responses on evaluation of learning from a male ($t = .381(17), p = .708$) or female ($t = -1.45(18), p = .164$) instructor. Over the course of the semester, students' perceptions did not change significantly but it should be noted that students' mean rating score of "I would learn more from a female instructor" increased from 2.58 ($SD = 1.74$) to 3.37 ($SD = 1.98$) while students' mean rating of "I would learn more from male instructor" were consistent from week four ($M = 3.67, SD = 2.09$) to week 12 ($M = 3.50, SD = 2.07$). The Pygmalion effect is a possible explanation of these results indicating gender bias of female instructors in a post-secondary welding course from the student perspective may exist. This supports Thoron et al. (2016) call for a continuing need to emphasize gender representation in agricultural education. We recommend more research to be conducted in a similar environment to add to the literature and research regarding gender bias in careers perceived to be reserved for males. We also recommend teacher preparation programs address gender bias to prepare teachers with strategies to combat these issues in the classroom.

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“It’s Engrained in Them...Education Doesn’t Matter”: Empowering Youth in Kentucky Coal Mining Communities

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Whether it be the social, political, educational, and/or economic climate, the coal mine regions in Kentucky are often forgotten and overlooked. At one point a location of vibrant communities and prosperous homes; now resides as one of the poorest and lowest-performing educational regions in the entire United States. Amid the economic deficiencies, success stories are occurring as some schools find unique methodologies to motivate, educate, and create students who exceed 21st century skills and standards that are evaluated in the Commonwealth’s mandated End of Pathway (EOP) assessments. In a multiple-case study design, qualitative in nature, the researchers sit down with teachers of these successful programs to determine how they improve the Human Capital among their students to obtain the academic achievement that is higher than the state’s average. Findings include a unique method of rapport building, improving family beliefs toward higher education, and expanding lived experiences. Future recommendations include the need to expand research in low economic communities where agricultural education exists and improve the teacher education programs that serve the coal mine regions and regions similar in nature.

Introduction

Kentucky’s coal mining industry is valued for creating thousands of jobs and providing the state’s economy with usable energy and billions of dollars in annual income (Black et al., 2005). Since its discovery in 1750, the amount of coal mined in Kentucky each year continued to increase annually; the Industrial Revolution generated a greater demand for coal and quickly became the primary energy for the southeastern and midwestern regions of the United States (Kentucky Energy and Environment Cabinet, 2017). For coal mining companies, their profits were significant but did not reflect the low wages provided to their workers. As working conditions in the mines worsened and wages remained low, coal miners began to unionize, leading to decades of conflict, often involving violence, in the coal regions of Kentucky (Callahan, 2009). Eventually, coal supplies decreased, leading to coal companies abandoning the once-prosperous coal towns to leave behind jobless, impoverished communities which have yet to recover even a century later (Patridge et al., 2013).

Despite the challenges that have arisen from Kentucky’s coal industry, coal mining as a profession holds traditions that contribute to Kentucky’s demographics that frame the culture of coal mining families. Kentucky’s coal mining counties are in both the eastern and western regions of the Commonwealth. Specifically, a *coal mining county* refers to a county with at least one active coal mine.

Outside of the coal mine region, coal culture is often painted with a stereotypical image of the region and its people (deMarrais, 1998). The current tabloids of opioid addiction, poverty, educational attainment, and poor health (Burton et al., 2013) have not assisted in tarnishing a

reputation and demoralizing communities. Kentucky's poverty rate is at 14.9% and has historically remained higher than the national average (U.S. Census Bureau, 2020). Although studies cite educational attainment as a top indicator of whether an individual will live in poverty (Rogers et al., 2018), only 24.2% of individuals aged twenty-five and older receive a bachelor's degree (U.S. Census Bureau, 2020). Furthermore, this region's high school dropout rate far exceeds the national average (Pollard & Jacobsen, 2021). In coal mining communities, a large portion of the population often enters the workforce or pursue technical training after high school (Ali & McWhirter, 2006). While an increased number of trade positions are found in the coal-producing counties of the state (Hargis, 2011), coal mining culture's beliefs toward education contribute to the low percentage of the population pursuing postsecondary education (Pollard & Jacobsen, 2021).

Studies investigating postsecondary enrollment of underserved youth, specifically those from impoverished and rural backgrounds, find the level of education attained by the child's parents or caregivers influences the likelihood of a student pursuing a college degree (Rogers et al., 2018). For the children of coal miners, most often neither parent has any form of postsecondary education which leaves youth with minimal direction or towards pursuing higher education (Ali & Saunders, 2006). These children of coal miners and youth in coal mining communities are referred to as "coal mining youth" by the researchers in this current study.

As a profession, coal mining reflects an ideology beyond the scope of a simple career pathway, rather deeply rooted in tradition and family ties; thus, establishing an engrained culture. An ancestral legacy is often associated with coal mining as the profession is continued from one generation to the next due to pride and heritage of coal mining families (Ali & McWhirter, 2006). While educational opportunities in the coal mining counties of Kentucky have increased (Mobelini, 2013), traditional beliefs in the culture often view education as a force that dismantles coal mining traditions and causes coal mining youth to leave their communities to pursue higher education and never return to the mines like their ancestors worked before them (Kinzie, 1999).

Limited research exists about the postsecondary achievement of Appalachian youth (Austin et al., 2018). Studies have examined the lack of postsecondary aspirations among youth, accounting for limited support and lack of educational confidence from students and their teachers (Ali & McWhirter, 2006). Ali and McWhirter (2006) also identify coal mining youth are more likely to pursue full-time employment or enroll in technical training after high school. Therefore, secondary career and technical education programs are essential building blocks for developing coal mining youth's skills and aspirations to pursue a career that could improve their quality of life. Specifically, secondary agricultural education programs provide students with learning opportunities through classroom instruction and lab-based experiences that enhance the teaching of technical and soft skills (Roberts, 2006).

Many states administer End-Of-Pathway (EOP) examinations to determine if students are proficient in a specific career pathway as part of a college/career-ready model. The passing rate on these examinations is directly correlated to significant decisions affecting funding utilized to enhance learning opportunities and improve facilities used for instruction (KDE, 2021). In Kentucky, students who pass the EOP examinations are awarded three hours of college credit to

select colleges and universities (KDE, 2020). While college credit may be an incentive for students who wish to pursue a college degree, the investment to perform highly on these examinations is low for youth who are not interested in attaining higher education. Among coal mining communities where college enrollment rates are often lower than the national and state averages (National Center for Education Statistics, 2019), creating student interest and engagement to achieve on standardized tests can be challenging for educators.

As agricultural education programs are already resource-depleted, decisions regarding funding, such as Perkins, are crucial for improving learning opportunities. The challenge rests in each educator's pedagogical approach to encourage learning, maintain active attendance, and obtain achievement on the state-mandated examinations (Davis, 2014). A phenomenon was examined across multiple Kentucky coal mining counties as agricultural education programs within them achieve EOP assessment pass rates higher than the state average despite belonging to counties with a high poverty rate and low educational attainment.

Theoretical Framework

Human capital theory (HCT) was conceptualized by Becker (2009) to argue that knowledge and learning skills increase the overall quality of life. HCT proposes that the economic return opportunity has a positive correlation with the amount of value someone places on education (Hout, 2012). Residents of a community with low-wage jobs and a dependence on a large firm (i.e., coal mining) tend to have a lower value of education because there is no economic reward (Broomhall & Johnson, 1994).

HCT assists in explaining why educating the youth of coal mining regions provides specific challenges that are not found in other areas of the country (Bailey et al., 2014). Based on economic principles, HCT emphasized the importance of education and how it is directly correlated to the amount of benefit that follows (Becker, 1962). In other words, if we look at education as an investment, the higher the return on the investment, the more effort we will be willing to put into that investment. If a student sees that they will benefit from their investment in their education, they will be more willing to spend their time and energy on that investment. Therefore, the higher the monetary return, the higher the value of the investment in an individual's education (Paulsen, 2001). The term investment is beyond the scope of simple monetary value, it is an investment that connects more psycho-social needs (i.e. time, attention, work ethic, organization, etc.).

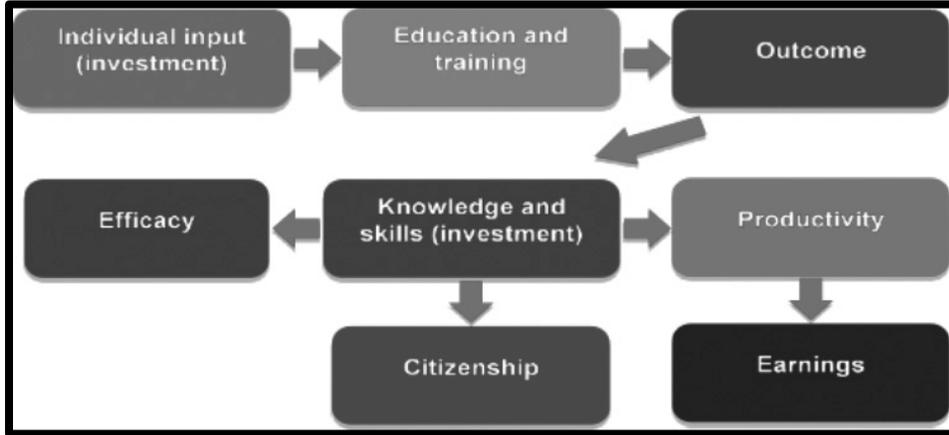
The general concept of HCT is that additional investment yields additional output (Figure 1). Education and training are assets of investment, while outcomes result in economic gains for individuals, businesses, society, and nations. Education and training are pivotal investments in developing human resources and generating economic growth (Ranis et al., 2000).

An individual's expertise is referred to as their intellectual capital, including skills, knowledge, experiences, thoughts, and opinions (Bontis, 2001). Although intellectual capital can be challenging to assess, individuals and companies benefit from intellectual capital in private and social returns (Nahapiet & Ghoshal, 1998). Qualities and capabilities possessed by workers are

valuable and vital assets to their employers to survive in today's global economic environment (Mahoney & Kor, 2015).

Figure 1

Model of Human Capital Theory



Note. Model of Human Capital Theory. Adapted from R. A. Swanson and E. F. Holton III, 2001, Foundations of Human Resource Development, p.110. Copyright 2001 by Berrett-Koehler Publishers.

Purpose

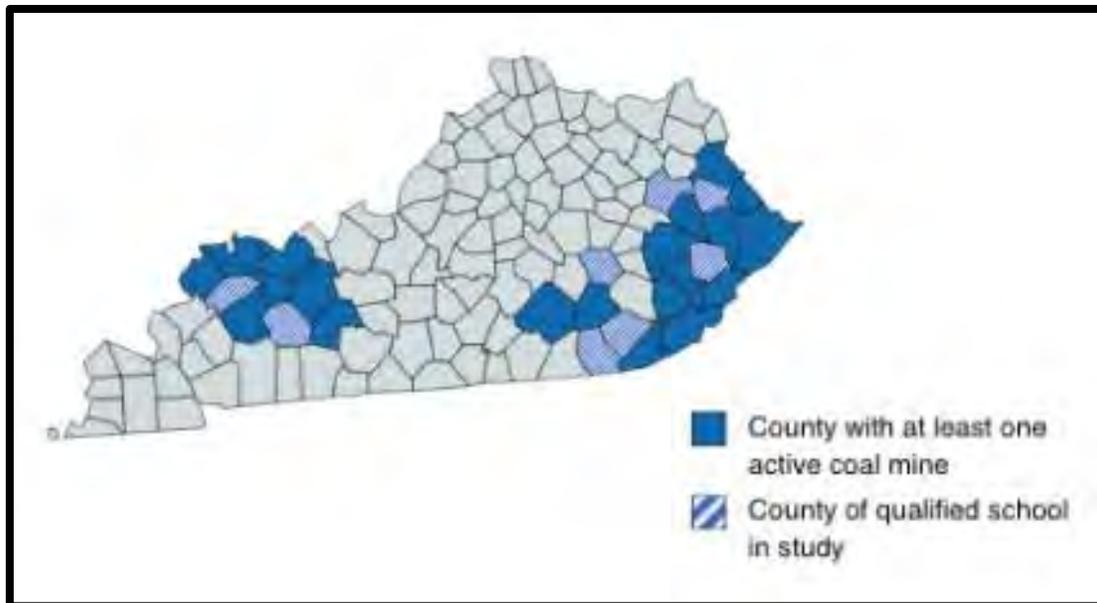
The broad purpose of this multiple-case study qualitative design study was to analyze best pedagogical practices at improving Human Capital by agriculture educators in coal mining counties that result in the academic success, defined within the context of graduation rates, decreased drop-out rates, and EOP pass rates as compared to regional and state averages. Specifically, the researchers explored the pedagogical methodologies and philosophies of agricultural educators who were accredited for the success of their student performances. To do so, the researchers needed to describe the practices implemented by the qualified secondary agriculture teacher participants that achieved such success among the coal mining youth.

Methodology

The multiple-case study design (Stake, 1995) examined agriculture educators from coal mining counties in Kentucky who were successful in EOP assessment pass rates in the top 50% of the state. In describing a case, Creswell and Creswell (2018) suggest the term can be defined as a program, event, activity, process, or a specific individual or group. This type of design studies a phenomenon in its natural context through multiple forms of supporting evidence. In the current study, the research team strived to explain the practices of agriculture teachers in coal mining counties who demonstrate exceptional pass rates on EOP assessments. Therefore, a multiple case design was utilized as the schools included were from various counties and regions in the state (Patton, 2015). Figure 2 highlights the coal mining counties of Kentucky and the qualified schools included in the study.

Figure 2

Kentucky's Coal Mining Counties and Location of Qualified School Participants



Note. Adapted from 2020 *Coal Production and Number of Mines by State, County, and Mine Type*, by U.S. Energy Information Administration, 2020 (<https://www.eia.gov/coal/annual/pdf/table2.pdf>).

The research team obtained a list of all secondary agriculture programs within the coal mine regions and cross-referenced with the list of top-50th percentile programs on the state’s EOP assessments. A total of 14 schools within the designated region exceeded the state average on the EOP assessment. For the participant to qualify for the interview, they must be a secondary agricultural teacher and be teaching at the identified school for at least five years. The criterion ensured they had taught students for an entire pathway (4 courses) completion which narrowed the list to ten schools. One member of the research team contacted each school requesting participation. A total of eight schools responded following the third and final email invitation and agreed to participate at a centralized location. After receiving approval from the university’s IRB, consent was obtained from each school administrator. Of the eight schools, the research team obtained consent from each teacher ($n = 12$) at the identified schools.

Interviews were conducted in July, prior to the beginning of the school year at a centralized location. All interviews were conducted with two of the three researchers present. The research team had 6 questions designed to lead to more guided conversations than strict questioning. This style of interviewing follows the principles outlined by Rubin and Rubin (2005) who explained questions should be fluid and allow for conversation which they described as “unstructured interviews” (Patton, 2015). Interviews occurred in the form of focus groups no larger than four; thus, three focus groups were formed. For programs with more than one agriculture teacher, the teachers from the same school were separated among focus groups to allow participants to answer their programs freely without combining answers with their coworkers. The focus group interviews ranged from ninety to one hundred twenty minutes.

All interviews were recorded and transcribed for coding and interpretation. Pseudonyms were utilized to ensure responses remain anonymous in the transcriptions. The transcriptions were coded through the lens of Human Capital Theory. For coding, a codebook was developed

(Creswell & Creswell, 2018), and all researchers participated in the inductive coding process in the form of thematic analysis (Braun & Clarke, 2006). All interview transcriptions were coded twice to ensure a correct interpretation of the codebook. Codes were identified by the research team and categorized into themes through a model established by Miles and Huberman (1994).

As qualitative research is valuable in understanding the experiences of the participants in a study, it is critical for this research to be conducted in a methodical way to produce meaningful and trustworthy results (Nowell et al., 2017). To establish trustworthiness in the results Lincoln and Guba (1985) describe the methodology must fulfill the criteria of credibility, transferability, dependability, and confirmability. Credibility was established using data triangulation and member checking of the methodology and data (Lincoln & Guba, 1985). In addition to recording interviews to later be transcribed, the research team noted body movements such as facial expressions, side comments, and participants' tone of voice which allowed transferability to be attained to the review process. After coding the transcriptions individually, the research team compared their results to establish inter-reliability while maintaining an audit trail (Koch, 1994) to attain both dependability and confirmability. The researchers maintained an intercoder reliability score of 73.4%, which is deemed acceptable (Morrissey, 1974). Additionally, markers (Koch, 1994) were utilized in these audit trails to provide reasoning for methodological choices throughout the study.

As lived experiences by the researchers can affect the facilitation and interpretation of the study, the research team utilized bracketing (Fischer, 2009), to minimize the effect prior preconceptions could have on the research process. The four researchers involved in the study have a childhood upbringing in rural Appalachian communities as well as three of the four members being first-generation college graduates. Half of the researchers reside in counties where coal mines are active, yet the school in their county did not qualify for the study. Additionally, the research team members all possess a background in agricultural education across secondary and postsecondary institutions.

Findings

The teacher interview responses revealed pedagogical practices that were based upon years of immersed experiences in the coal mining communities. Each teacher shared an element of compassion for their students, yet reflected a stern, unapologetic passion and pride for the community in where they teach. The themes discovered reflect practices and philosophies that were unorthodox yet were imperative toward the enhancement of students' academic achievement and intrinsic investment in active learning within the agriculture classroom. Before coal mining youth would invest in their education, the educators had to first invest in the students themselves by forming mentoring relationships to foster the personal and academic growth of the students. These relationships were established by the teachers educating and immersing themselves in the coal mining culture of their students as it relates to their educational goals and experiences. By immersing themselves into the coal mining communities, the teachers identified and instilled a path toward successful academic achievement.

Theme 1: Unique Rapport Building Techniques

Agriculture teachers recognized the importance of developing a rapport with their students upon first teaching in these communities before trust could be formed between the educator and learners. Across the different agricultural education programs, teachers recognized the personal financial and familial struggles of their students noting most of their students were of impoverished backgrounds creating issues relating to food insecurity, poor housing, and conflict within the family structure (i.e., divorce, separation, grandparents as caretakers). For students experiencing these hardships, the educators explained how behavioral and academic problems are also expressed which is often misunderstood for insubordination or lack of caring by other teachers in the school who lack rapport with these coal mining students. Mr. Price described how family dynamics influences student behavior and engagement saying, “You’ll see a lot [of students] where the dad isn’t involved a lot in the kid’s life. I mean, if daddy’s not involved everybody can pretty much see the difference.”

Mr. Howard explained the lack of rapport coal mining students experience from other teachers:

“A lot of times you will see those [coal mining] kids being disciplined by other teachers because those teachers don’t get that maybe you know that’s the way they’re [students] are raised and that’s why, the way they believe what they do or why they act the way they do because that’s what they’ve [students] been around their whole life.”

This lack of rapport with other teachers in the school often lead to disciplinary concerns from the students that were not present in the agriculture classroom. Mrs. Jackson describes this as, “Some of the kids they’ll send to alternative school, we don’t have a problem with them in the agriculture department.”

In understanding the economic hardship most of their students endure, the agricultural teachers admitted they have learned through their teaching experience at their school what will motivate their students to become engaged in learning. This common sentiment shared by all the educators was best summarized by a statement from Mr. Robinson stated, “These children don’t value money because they’ve lived so long without it. They value relationships because they understand, and they’ve been taught since a very early age, ‘I’m never going to have enough money.’ It’s the culture there.”

By understanding and respecting the circumstances of their students, the agriculture teachers from all eight programs admitted they have formed strong relationships with these students which allows them to positively influence the personal and academic goals of their coal mining students. Teachers from the first focus group echoed statements agreeing learning cannot occur until their students know the teacher cares about them as a person above being just a student. These echoes arose from a statement made by Mr. Robinson stating, “Until you go to their [the students’] homes and you meet them, and you understand where they come from; you’re not going to change them. They’re not going to listen to you.”

Even beyond the four years in the high school agriculture program, many students remain in contact with their agriculture teachers and continue to foster these relationships after graduation. Due to the lack of parental involvement of many of these coal mining youth, the agriculture teachers expressed these teacher-student relationships often serve as a mentorship or parental relationship in place of the missing relationships at home. Mrs. Lee describes this by saying,

“Even kids that have graduated come back and ask me things or advice...to kind of get your approval because I think they look at us in a different fashion than what they do their core content teachers.”

Across all eight schools, the agriculture teachers recognized the relationships fostered with their coal mining students extend beyond the classroom walls but relate to how they embrace the community and culture they teach in. By understanding the students’ backgrounds and cultural identity, the educators were able to assist the student to become a member of the community to prevent being an outsider to these students which is often negatively perceived in Appalachian culture as outsiders are seen as untrustworthy. To combat these negative perceptions, eleven of the twelve teachers agreed living in the county they teach in is essential for building trust among their students. Mrs. Lee described the need for living in these communities saying, “You have to build their trust. It makes a big difference if you build that trust by living there. You have to show them you don’t think you’re too good to live there.” Similarly, Mr. Campbell echoed saying relationships cannot be built with these students if they do not know they can trust their teacher, “Until they accept you, you’re fighting a losing battle.”

In living in the communities these teachers work within, a greater understanding of the Appalachian and coal mining culture can be formed to better influence these students especially as their culture influences beliefs about higher education. While half of the participants in the study admitted to growing up in Appalachia themselves, their understanding of their culture was enhanced by living in these communities through testimonials from their students about educational aspirations and familial influences about education.

Theme 2: Improving Coal Mining Families’ Educational Attitudes and Beliefs

Among all three focus groups, the educators emphasized their coal mining students can achieve a higher education as they possess the work ethic and discipline necessary to attain a college degree. However, while these students are capable of earning a college degree, most of their students lack support from their families both financially and emotionally to leave their communities to attend college. First, lack of support from parents or other caregivers diminishes the perceived value of higher education coal mining youth acknowledge especially when neither parent has completed any education past high school. Teachers from different schools expressed students do not care about gaining a college degree because they do not see a monetary value in investing in their education to hopefully pursue a better quality of life – undermining the need to see an investment in education as outlined by Human Capital Theory. Recognition of this challenge in displaying value in investing in a college education was expressed in comments from various teachers:

They don’t see the value of education because they [the students’ parents] didn’t really need an education. Their parents or their dad, typically coal mines. It’s almost like a waste of money because, “I [the parent] didn’t go to college and I make this much money.”

I know a student very capable, very able to go to college, but the comment his dad made was, ‘Well if it was good enough for me to go out and start working, then it’s good enough for him.’”

A lot of parents don't want their kids to go off to school and be more educated saying, "I ain't paying for you to go to college. Nobody paid for me to go to college, and I made good money and supported my family. You can do the same."

Additionally, the educators recognized the strong sense of familism within their students' families even in the presence of disrupted family structures. This familism creates a fear of leaving their communities to pursue higher education as most colleges and universities in this state are at least an hour away from these coal mining communities. For coal mining youth who do pursue a college degree, job acquisition can be challenging in their communities as most careers are limited to healthcare, education, or mining. Moreover, familism creates a fear of betraying one's family and abandoning the values of one's culture. In explaining these details of familism among their students, Mr. Baker recalled a statement from one of their coal mining students who said, "I might want to go to college, but if I go to college, I might not be able to come back here and get a job." The educator added to this student's comment, saying, "Most of them [the students] want to live near home. They might not be willing to move away."

Most of all, the educators expressed how education altogether, not just college, is resented by many adults in their communities who serve as parents or caregivers of their coal mining students. Teachers in all three focus groups expressed students' lack of enthusiasm for school through absences, behavioral problems, and poor academic performances. Furthermore, the teachers described these negative behaviors as a result formed from a belief system that an education will not improve one's quality of life. In many of the communities, hope seemed lost for a better quality of life associated with higher education and well-paying careers. Mr. Robinson described these attitudes and feelings of helplessness in their communities by stating, "It's engrained in them [coal mining youth] that education doesn't matter. You still aren't going to make money. You aren't good enough."

As most coal mining youth will not or do not plan to pursue a postsecondary degree, the teachers recognized the majority will immediately enter the workforce or a technical training program following high school. Moreover, most students admit to wanting to work in the mines for reasons not limited to family traditions, higher incomes compared to other jobs in the community, and job availability. Rather than try to deter students from a coal mining career, agricultural educators admit to embracing students' goals while also mentoring students to visualize other job opportunities in their community.

Theme 3: Recognizing the Power of the Coal Industry

Teachers expressed the pressure and control coal mining companies have in their communities as these companies are most often the largest employers in their county. Coal companies are active in their schools by sponsoring sports and clubs, providing guest speakers to assemblies, marketing at career fairs, and even offering coal mining classes to receive mining certification at local community colleges. Therefore, coal mining youth are exposed to the industry often at a young age from their parents or other guardians employed by these companies but gain additional exposure through their educational experiences. While these companies' market open positions to students by highlighting wages that are often significantly higher than the county's average income, companies fail to disclose the long hours and dangerous working conditions

youth will encounter. Mr. Miller described trying to explain to students how coal mining incurs great risk despite offering high wages saying, “Trying to get them [the students] to understand that you may be making a lot more money than people with a lot less education, but your body is going to pay for it.”

While these promises from coal companies pertaining to high wages intrigue youth in these communities, the eleven teachers in the study who are originally from the counties they teach in speak of the long history of distrust between coal companies and their workers. These teachers recall coal companies leaving the area after all the coal has been mined leaving many citizens unemployed spiraling to increased poverty, drug use, and emigration from the region. Additionally, the educators discussed how recent legislation and political shifts at both the state and national levels of government have created fear in many of their communities that clean energy initiatives may replace coal in the future as the top fuel source. This change in energy could result in lost jobs which would only spiral the socioeconomic challenges already endured in these Appalachian, coal mining communities. While teachers and other adults in these students’ lives recognize the precaution one should take in trusting these coal mining companies, all twelve teachers in the study expressed their concerns for their students who believe coal mining is a lasting profession with promising opportunities for their futures. Mr. Williams from the second focus group explains:

Even though coal may be there for another one hundred years, if our laws and our government don’t allow us to extract it, the jobs are not going to be there. So that’s one of the struggles we fight with our kids in school is trying to get them to look ahead ten or twenty years in the future.

After at least five years in the profession, participants in each of the focus groups admitted they learned to embrace students’ goals of working in the coal mines, but found it was still important to educate their students about other career options in the community if employment was no longer an option in the mines. When explaining additional career options to students without degrading their plans to work in the coal mines, Mr. Neal emphasizes to their students, “I try helping students understand they need a backup plan as most of my students don’t consider the distant future and only look a couple years ahead.” Mr. Howard echoed the prior comment explaining, “I always try to say to my students, ‘Yes, coal mining is an option, and it can be a very good option. You can make very good money with it. But there is still something else out there if you want to.’” By respecting students’ goals for future career decisions, the educators in the study agreed they were able to build greater rapport with these students which allowed them to influence students at a deeper level than if they did not embrace students’ ambitions.

In addition to recognizing the appeal coal mining provides to youth in their communities, the educators also noted the lack of educational opportunities and academic confidence among their coal mining students. The lack of opportunities as well as confidence translates into limited representation of coal mining students in advanced courses or gifted programming in their schools. Coupled with the lack of role models with a college degree in their community, coal mining youth see the mines as the only career choice available to them. While working as a miner is a key position seeking fulfillment by coal mining companies, additional roles such as equipment operators, technicians, and engineers are available in the industry. In positions other

than mining, income, job satisfaction, and safety are often higher and can be applied to other industries aside from just coal mining. Unfortunately, educators from all three focus groups noted students in their classes do not believe they can attain these higher skilled positions due to lack of familial support and educational resources from other departments in the school. These sentiments of lack of support for their students were expressed in comments such as:

“The kids who go off to work in the engineering section of coal mining tend to be kids that are in all AP [advanced placement] classes and the kids that I’m having in the classroom are still on the mindset of labor, labor, labor.”

Therefore, as these educators battle with pressures from coal mining companies, lack of parental involvement, and educational deficiencies, the teachers from all eight programs admit to promoting their coal mining students to consider maintaining certification in a technical area. Technical training programs are offered at most community colleges in the state where this study occurred and are in most counties these participants are located. Technical training programs often last six to eighteen months in length and are offered to students at a relatively low cost compared to traditional college programs. These programs offer training in trades such as carpentry, welding, electricity, plumbing, and heavy equipment operators. While the economic investment to attain these certifications is low, the economic reward of these professions is high in these regions with annual wages often exceeding those professions which require a bachelor’s degree or higher. To persuade coal mining youth they are capable of completing these programs and their investment into this type of education is worthy of their resources, Mr. Cook explains:

You know college is not for everyone. I tell them [the students] if you are a good electrician, carpenter, or mechanic, more than likely you will make more money in your lifetime than I will teaching with a master’s degree.

Of the three findings thus far, a common trend among the themes lies in the agriculture teachers seeking to understand and respect the culture these coal mining youth identify among. By immersing themselves in the communities, the teachers gain an understanding of the beliefs and attitudes towards education and expectations of adulthood. Through these understandings, all educators in the study recognized the lack of cultural exposure the coal mining youth in their programs experienced outside their Appalachian region which results in a lack of understanding for why investing in education is important. To combat this, all twelve participants noted providing diverse cultural experiences for the coal mining youth in their programs. Mr. Robinson echoed these sentiments by saying:

I think ambition is driven by experiences. If you can get them [the students] out of Appalachia and let them see some of this stuff, some of these careers...they know it’s there [outside Appalachia], but you have to actually get them there to see it.

Conclusions, Inferences, and Recommendations

Human Capital Theory (HCT) describes education as an investment whereas the learner is more likely to invest in this education if the return on investment exceeds the initial investment (Paulsen, 2001). For coal mining youth, the investment in a high school diploma is minimal, and its return on their investment is viewed to be low due to availability to work in the coal mines following graduation (Ali & McWhirter, 2006). In coal mining communities, education is often

not valued and is seen as a threat to the Appalachian beliefs and values (Kinzie, 1999) which could degrade familial bonds as young people leave the region to pursue a college education further establishing a rural brain drain (Carr & Kefalas, 2009).

Societal pressures in these communities from the familial, communal, and industrial environments instill a mindset to bypass a postsecondary education to pursue a career in the mining industry. For coal mining youth, the high wages offered are appealing as it creates an unstable picture of an outlet from their current socioeconomic circumstances into social middle class lifestyle. Despite these challenges, the twelve agricultural educators demonstrate an investment in their students' learning as it is reflected in the state EOP assessment. This phenomenon sought explanation for how these agriculture teachers persuaded coal mining youth to invest in their education despite internal and external challenges in the coal mining culture.

Unlike any other studies within agricultural education utilizing Human Capital Theory (Davis, 2014), the current study mirrored that of HCT in that within the successful agriculture programs where students were performing well academically, a gained investment was occurring within their community. Furthermore, as the student's capital improved, their self-efficacy improved, thus establishing an impactful and ever-changing relationship with their agricultural educator (Becker, 2009). As a result, it is recommended that secondary teachers within the Appalachian, Mississippi Delta, and similar regions focus on improving the human capital among their learners. As seen through higher state assessment scores by the students, teachers are increasing their students' human capital through rapport building, improving family beliefs towards higher education, and expanding students' lived experiences. While quality classroom instruction is powerful in impacting the future of underserved and undervalued youth, improvement is made through the communal elements of the teacher's interaction and involvement (Muller, 2001; Bowling & Ball, 2020).

Moreover, research is lacking in examining HCT applied to underrepresented populations (i.e., coal mining youth) found in the Appalachian region of the United States (Baxter, 2009). Further research is needed to understand how to apply HCT and the effects of successfully integrating the theory in resource-depleted regions and groups in education. By utilizing HCT in resource-depleted areas, teachers have an approach to help advocate for students to invest in their learning.

Higher education is not a means to remove young people from their communities. Instead, it is a pillar to prevent the collapse of coal mining economies by empowering youth to feel liberated to seek higher education to enrich their communities.

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The Influence of Same-Sex Secondary Agricultural Education Classrooms on Student Career Interests: A Quasi-Experimental Design

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Same-sex classrooms have been a topic of interest in the educational community since the No Child Left Behind Act of 2001. Proponents of same-sex classrooms argue that it reduces social anxiety, physical aggression, and can close the achievement gap between boys and girls. This quasi-experimental study compared students in same-sex classrooms and coeducational classrooms of ten various Principles of Agriculture courses in [STATE], and the influence these teaching models had on students' career interests. Key findings from this experimental study included: (a) boys in same-sex classrooms ranked their interest in the agriculture, food, and natural resources career pathway the highest; (b) boys in both groups ranked agricultural education as one of their top three pathways of interest; and (c) boys and girls in both classroom structures ranked science, technology, engineering, and mathematics careers in the bottom three pathways of interest. Recommendations from this study include: (a) exposing boys to careers in agricultural education early in high school; (b) provide trainings for teachers to address gendered stereotypes among perceived "masculine" and "feminine" careers; and (c) professional development for teachers on same-sex classrooms; and additional longitudinal and qualitative research

Introduction

Experts continue to weigh in on whether same-sex classrooms have a place in the United States' public school system. Recent amendments to educational policy have resurfaced an unsettled debate between educators, researchers, and policymakers on the effectiveness of these learning environments (Klein et al., 2014). In response, researchers have attempted to resolve this debate with support from empirical evidence, yet methodological limitations, primarily the inability to randomize samples in public schools, have prevented a clear resolution.

Coincidentally, educational administrators are increasingly implementing same-sex classrooms in the hope to increase students' academic performance (Klein et al., 2014). Advocates for same-sex classrooms argue that such learning environments help reduce the national achievement gap between boys and girls (Gurian et al., 2009), empower youth by reducing stereotypes (Bowe et al., 2015), reduce social anxieties (Hart, 2016), and decrease physical aggression in adolescents (Dijkstra & Berger, 2017). These beliefs are primarily based through the lens of the biological differences perspective that suggests males and females have biological differences that need specialized attention. In educational settings, same-sex classrooms allow for instructors to tend to these biological differences by amending their pedagogy (Sax, 2017).

Arguments against same-sex classrooms emphasize the similarities between boys and girls. Supporters for coeducational designs claim that gendered differences are small or nonexistent (Pahlke et al., 2014). Moreover, structures of sex segregation are argued to hinder academic performance (Legewie & DiPrete, 2012), promote gendered stereotypes (Fabes, et al., 2013), and

may have severe cross-gender relationship outcomes such as gender-based violence, harassment, and bullying (Hunt & Gonsalkorale, 2014).

Consequently, the deliberation between scholars continues to inform teaching practice, improve academic performance, and reduce gendered stereotypes. Critically evaluating outcomes of same-sex classrooms is important to determine the future direction of public education in the United States. Much of the research on same-sex classrooms has focused on the academic performance of students enrolled in single-sex classrooms compared to coeducational classrooms. Less research has directly evaluated the effectiveness of these outcomes in public school settings, and even less literature is present for studies that controlled for selection effects (Pahlke, et al., 2014).

This study attempted to address an ongoing debate on the effectiveness of single-sex classrooms in public schools. Addressing these discrepancies in the literature is important because there is a growing need for policymakers, administrators, teacher educators, scholars, and teachers to find solutions to improve students' academic performance.

Conceptual/Theoretical Framework & Literature Review

Gender Schema refers to the mental structures that organize incoming information according to gender categories (Bem, 1981). Children determine the in and out groups in which they learn social dichotomies according to their biological sex. Once an identity is acquired, they are able to understand information as it applies to their own group (Priess & Hyde, 2010). Priess & Hyde (2010) posit that people do organize and remember information according to their sex and are more likely to preference activities, classes, hobbies, and extra-curricular associated with their own sexual identity. As discussion of gender issues become more mainstreamed in society the differentiation between the terms sex and gender has emerged and is evolving. Sex refers to one's biological characteristics that distinguish male and female individuals while gender is more complex as it is a socially and culturally constructed identity (Muehlenhard & Peterson, 2011). In this context, sex is a binary classification between male and female whereas gender is a nonbinary continuum between masculinity and femininity (Lindsey, 2015). Although some people believe that one's biological sex dictates their gender, Lindsey (2015) declared a widely accepted notion that one's sex does not necessarily determine one's gender.

Few would argue that gender is influenced by social and environmental factors. The formations of gender may begin early in a child's development. As early as age two, children can dictate differences in gender and by age three children begin to believe their sex cannot change (Woolfolk & Usher, 2018). By age four, children prefer to spend more time, approximately three times as much, with same-sex friends; at age six, preference to same-sex friendships grow to 11:1 (Halim et al., 2013). Scholars suggest that as children age, they are exposed to more sociocultural factors and influences. According to Woolfolk and Usher (2018), children begin to understand what it means to be male or female through a complex network of knowledge, or gender schemas.

As boys and girls develop, they begin to form an understanding of gender roles. As such, they conceptualize correct behaviors and attitudes in effort to fulfill what it means to be "masculine"

or “feminine.” These notions are broadly stroked stereotypes. Aronson and Steele (2005) described stereotypes as “pictures in our heads,” or a simplified expectation of what one’s ability, behavior, intelligence, etc. Woolfolk and Perry (2015) suggested that stereotypes and gender roles are rigid and difficult to change, especially in ideas of what is socially acceptable as masculine or feminine (e.g., perceived feminine or masculine careers).

Teachers also contribute to learning gender. Gansen (2017) used ethnographic data collected over ten months of observations in preschool classrooms to argue that teachers construct (and sometimes disrupt) gendered norms. Gansen argued that teachers, even as early as preschool, contribute to heteronormativity or the concept that heterosexuality is normal, appropriate, and privileged. Such beliefs induce gender bias in the classroom. Gender bias that favors hegemony are often subtle, such as wall art, reading selections, and the overuse of gendered pronouns (Brown & Stone, 2016). All bias is not advantageous for boys. Some researchers proclaim that current educational pedagogy, methodology, and learning environments have contributed to the national underachievement of boys. Some scholars suggest the academic performance of boys to be, “one of the most pressing educational equality challenges of current times” (Hartley & Sutton, 2013, p. 1716). Recently scholars held discussions and shared anecdotal beliefs regarding boys taking less student leadership roles within agriculture youth organizations (Meyers, 2018), which inadvertently encourages and engages youth to consider careers within the agriculture field. Coincidentally, colleges of agriculture are noticing a depletion of males seeking to be prepared for post-secondary careers in agriculture (Conger & Long, 2010).

As such, implications from gender studies serve as possible enhancements in teaching practice. Woolfolk and Usher (2018) suggested these biases were often unintended and teachers are not aware of their subconscious, implicit behavior. For instance, the way teachers group students, response opportunity may be given to one sex over the other, and gendered speech are some of the ways teachers demonstrate gender bias without realizing it. In science laboratories, scholars found that when teachers grouped students without purposively assigned responsibilities the “girls end up as secretaries, boys as technicians” (Woolfolk & Usher, 2018, p. 246). As a result, male students gain more skill development in science than their female student counterparts.

The perspective that suggests teachers have a significant role in safeguarding student equality seems undisputed. Yet, how their gender beliefs influence students’ development into young men and women is ongoing. Much work is left to understand how teachers may provide different experiences to students of different genders.

Newsom-Stewart and Sutphin (1994) found that girls and boys held differing perception about agricultural education and called for further investigations that “examine cultural and gender differences” in SBAE (p. 55). Their recommendation for future research spurred studies that investigated the effects of gender on student achievement (Johnson et al., 1998), students’ rationale for course selection (Sutphin & Newsom-Stewart, 1995), and the emergence of girls in leadership roles (Ricketts et al., 2004). Over 25 years after Newsom-Stewart and Sutphin’s introductory study on gender dynamic, literature in SBAE still remains scarce in gender studies and gender related issues (Enns & Martin, 2015). In the meantime, a supply and demand study reflects a significant difference in male and female student enrollment in agricultural education (Lawver, et al., 2018).

Purpose of the Study

The purpose of this nonequivalent comparison group quasi-experiment was to evaluate the effectiveness of single-sex classrooms on student career aspirations. The independent variable in this study was the manipulation of learning environments within *Principles of Agriculture* courses by mediating the composition of classrooms to either single-sex classrooms (treatment; X+) or coeducational classrooms (control; X-). Analyses between X+ and X- were conducted along with analyses between the four levels of the independent variable: X+₁ (boys in treatment group), X+₂ (girls in treatment group), X-₁ (boys in control group), and X-₂ (girls in the control group). The dependent variables included general career interest and agricultural career interest. The following research objectives and hypotheses guided the scope of the study:

RO1: Examine student interest of X+₁, X+₂, X-₁, and X-₂ in 16 career pathways.

RO2: Examine student interest of X+₁, X+₂, X-₁, and X-₂ in 8 agriculture career pathways

H₀1: The gain in student interest in the 16 career pathways, over the course of six months, are the same for X+ and X-.

H₀2: The gain in student interest in the eight agricultural career pathways, over the course of six months, are the same for X+ and X-.

Methodology

The untreated control group design with dependent assessments (Shadish et al., 2002), frequently called the nonequivalent comparison group design, was utilized in this study. This quasi-experimental design is recommended in educational field research for ethical, practical, and legal reasons (Steiner et al., 2009).

The intervention for this quasi-experiment was separating the *Principles of Agriculture* courses in homogenous, same-sex classrooms. The intervention was randomly assigned to three of the five selected schools to form the treatment group (Group A) following a selection protocol for participating schools. The following table explains the random assignment:

Table 1
Control and Treatment Classroom Assignment

Subgroup Identity	Enrollment Identity	Teacher Identity	<i>n</i>	# of Schools
Group A-boys (X+ ₁)	Male	Male	68	3
Group A-girls (X+ ₂)	Female	Female	76	3
Group B-boys (X- ₁)	Male	Male & Female	21	2
Group B-girls (X- ₂)	Female	Male & Female	26	2

The intervention lasted one semester of the Fall 2019 school year, a total of 15-weeks. No other intervention was provided. All instructors taught the *Principles of Agriculture* course to the state's course standards. The only manipulated difference between the groups was the composition of biological sex in the classroom. Biological sex was determined as the dyadic area

being compared versus gender which is socially constructed and cannot be disseminated into a dyadic comparable group (Lips, 2020). Both groups were administered a pretest and posttest.

The assessment of threats to internal validity, also known as ambiguous temporal precedence (Shadish et al., 2002), is a critical methodological approach for a quasi-experimental design (Creswell & Creswell, 2018; Martin & Bridgmon, 2012; Cook & Steiner, 2010). Actions were taken in this study to minimize potential threats to internal validity. Threats to internal validity that were addressed in the design included history, maturation, regression to the mean, participant selection, study attrition, and diffusion of treatment.

Inclusion and exclusion criteria were used to recruit a study sample with certain characteristics and control for extraneous variables (Creswell & Creswell, 2018). Inclusion criterion was implemented to recruit a sample that shared the following characteristics:

1. The school was located in STATE;
2. The secondary agriscience department had a minimum of two teachers;
3. The school had a minimum of one male instructor and one female instructor certified to teach secondary agriculture;
4. Both teachers were willing to teach a *Principles of Agriculture* course to the standards set by the STATE Department of Education;
5. The school provided a minimum of three *Principles of Agriculture* course for students/parents who may not consent to participate.

Forty-three schools met the inclusion criterion and were contacted through an initial recruitment e-mail. Two follow-up recruitment e-mails were sent within a month of the initial correspondence from a faculty member who had a positive established reputation among the teachers. At the end of the recruitment, 10 schools expressed interest to participate in the study. Two of the ten schools later declined to participate because of the uncertainty of enrollment and course offerings. In December, eight schools confirmed interest and ability to participate in the study and were asked to obtain written school consent. By January, seven schools received written letters of support from their administration. Teachers ($n = 12$) from six schools attended a meeting at a central location in January to discuss the process and the random assignment. Three schools were randomly assigned by simple random assignment to the treatment group and three schools were randomly assigned to the control group. In June, one school in the control group had a change of teachers and did not participate in the study. As a result, three schools (six classrooms) served as treatment (single sex classrooms) and two schools (two classrooms) served as a control (coeducational classrooms). Each school was located in a rural, primarily Caucasian, farming community (STATE Department of Education, 2016).

Participants

A total of 191 freshman students enrolled in their first year of high school (14-16 years of age) participated in this study. Of this sample, 102 (53.4%) were female students and 89 (46.6%) were male students. A total of 144 (76 female students, 68 male students) students were placed into single-sex classrooms as the treatment group, and the remaining 47 students (26 female students, 21 male students) stayed in coeducational classrooms as the control group. Participation in the study was granted by collection of parental permission and student assent within the first two weeks of school. Student participants in the treatment group (same-sex classrooms) had the

option to opt-out into a traditional coeducation classroom. Parents also had the option to opt-out their child to a coeducation classroom. No students or parents requested to opt-out of same-sex classrooms.

The school districts reported that of the student participants, 21 (11.3%) had an identified Individualized Education Plan (IEP) or 504 plan and 10 (5.4%) students were considered gifted. Over half of the student participants qualified for free and/or reduced lunch ($f = 95$; 56.4%) and were considered economically disadvantaged. Additionally, many of the students were paid FFA members ($f = 111$; 66.1%). Ethnicity was not collected due to a lack of critical mass representation beyond white/non-Latino.

Students reported the marital status of their biological parents. Respondents indicated that many of their biological parents were not married ($f = 89$; 54.6%). Most of the students ($f = 84$; 51.5%) were unsure about their father's level of education, while the majority of students reported their mother's level of education to be a Bachelor's degree ($f = 89$; 16.0%).

The study followed all protocols, confidentiality, and safety measures approved by the university's Institutional Review Board (IRB) for protocol 51555 to protect the rights and welfare of human research subjects.

Measures

Analyses between X+ and X- were conducted along with analyses between the four levels of independent variable: X+₁ (boys), X+₂ (girls), X-₁ (boys), and X-₂ (girls). The dependent variables included general career interest and agricultural career interest and was distributed at the end of the academic semester.

Career Pathway Interest

Career pathway interest was measured by the Career Clusters Interest Survey (Advance CTE, 2005). The survey included 16 items that represented 16 career paths ranging from (1) Agriculture, food, and natural resources to (16) transportation, distribution, and logistics. Each item had 17 possible interest statements (seven activities, five personal qualities, and five subjects that relate to the career path). Internal consistency was evaluated by calculating the post-hoc Cronbach alpha ($\alpha = .95$).

Agricultural Career Pathway Interest

Agricultural career pathway interest was measured by the GrowNexGen Agriculture Career Survey (GrowNextGen, 2017). The survey included eight items that represented eight agricultural career pathways, which included agricultural education. Each item had 12 interest statements (four activities, four personal qualities, and four subjects that relate to each career path). Internal consistency was evaluated by calculating the post-hoc Cronbach alpha ($\alpha = .92$).

Data collected from each student was inputted into IBM Statistical Package for Social Sciences® (SPSS) version 26 for data analysis. The data were organized and cleaned prior to analysis. As recommended by Field (2018), descriptive analyses (e.g., means, standard deviations, skew, kurtosis, histograms) of the data and examined items for normality (Shapiro-Wilk test and

Levene's test) was conducted prior to fitting to any statistical model. A *strict* confidence level ($\alpha \leq 0.05$) was established for statistical test required in investigating the research objectives.

Findings/Results

To examine student interest of X_{+1} , X_{+2} , X_{-1} , and X_{-2} in 16 career pathways, means, standard deviations, and ranges were calculated for each career pathway for X_{+1} , X_{+2} , X_{-1} , and X_{-2} (see Table 2). Boys in the treatment group (X_{+1}) had the highest interest in agriculture, food, and natural resources ($M = 6.49$; $SD = 3.13$) with education and training ($M = 4.95$; $SD = 3.15$) being the eighth highest. Girls in the treatment group (X_{+2}) had the highest interest in health science ($M = 8.49$; $SD = 4.11$) with education and training ($M = 7.70$; $SD = 3.93$) being third and agriculture, food, and natural resources ($M = 7.35$; $SD = 3.68$) being fourth. Boys in the control group (X_{-1}) had the highest interest in architecture and construction ($M = 7.63$; $SD = 3.48$), with agriculture, food, and natural resources ($M = 7.16$; $SD = 3.20$) ranking fourth and education and training ($M = 6.63$; $SD = 4.10$) ranking ninth. Girls in the control group (X_{-2}) had the highest interest in human services ($M = 7.58$; $SD = 4.44$), with agriculture, food, and natural resources ($M = 6.74$; $SD = 2.88$) ranking sixth and education and training ($M = 5.89$; $SD = 2.93$) ranking eleventh out of the 16 pathways.

Table 2
Career Pathway Interest

Career Pathway	Treatment (N = 144)						Control (N = 47)					
	Boys (n = 68)			Girls (n = 76)			Boys (n = 21)			Girls (n = 26)		
	M	SD	Range	M	SD	Range	M	SD	Range	M	SD	Range
CC1	6.49	3.13	14	7.35	3.68	16	7.16	3.20	11	6.74	2.88	11
CC2	6.44	3.62	17	6.24	3.06	14	7.63	3.48	10	6.89	3.84	13
CC3	3.66	3.62	17	5.54	4.19	16	6.37	4.11	13	5.37	3.39	14
CC4	4.21	3.28	17	5.43	3.06	13	6.05	3.45	12	5.74	2.62	10
CC5	4.95	3.15	13	7.70	3.93	15	6.63	4.10	14	5.89	2.93	11
CC6	4.44	3.25	16	4.87	2.89	12	6.74	3.91	14	6.00	3.11	10
CC7	4.95	3.70	15	6.17	3.55	15	6.68	3.04	11	6.84	3.55	12
CC8	5.30	3.55	17	8.49	4.11	15	7.58	4.74	14	6.37	4.26	14
CC9	4.79	3.79	17	6.97	4.00	16	6.79	3.75	13	6.95	4.50	13
CC10	4.61	3.56	17	8.03	4.37	17	7.37	3.90	14	7.58	4.44	14
CC11	5.20	3.83	17	3.83	2.84	11	5.79	3.72	12	6.05	4.03	12
CC12	5.67	4.15	17	6.90	3.86	17	7.01	3.82	14	7.00	3.58	11
CC13	5.67	3.76	16	5.70	3.14	14	5.74	3.06	11	6.63	3.50	14
CC14	4.95	3.56	16	6.11	3.32	15	5.68	3.58	10	6.09	3.33	12
CC15	4.38	3.86	16	4.14	3.08	12	5.63	3.89	13	5.89	3.99	13
CC16	5.57	3.96	16	6.60	2.99	13	6.05	4.65	13	6.21	3.71	13

Note. CC1 = agriculture, food and natural resources; CC2 = architecture and construction; CC3 = arts, audio/visual technology, and communications; CC4 = business management and administration; CC5 = education and training; CC6 = finance; CC7 = government and public administration; CC8 = health science; CC9 = hospitality and tourism; CC10 = human services; CC11 = information technology; CC12 = law, public safety, corrections, and security; CC13 = manufacturing; CC14 = marketing; CC15 = science, technology, engineering, and mathematics; CC16 = transportation, distribution, and logistics. $N = 191$. Scale from 1-17.

The second research objective sought to examine student interest of X_{+1} , X_{+2} , X_{-1} , and X_{-2} in eight agriculture career pathways. The eight pathways included (1) animal science, (2) food processing and food science, (3) plant systems and plant science, (4) environmental science and natural resources, (5) global agricultural systems, (6) agribusiness, (7) power, structural, and technical systems, and (8) agricultural education. Table 3 explains the agriculture career interest by groups. Boys in the treatment group (X_{+1}) had the highest interest in agricultural education ($M = 5.23$; $SD = 3.15$) and girls in the treatment group (X_{+2}) had agricultural education ($M = 5.59$; $SD = 2.79$) as their fourth highest interest. Boys in the control group (X_{-1}) had agricultural education ($M = 6.00$; $SD = 3.16$) as fourth highest interest while girls in the control group (X_{-2}) ranked agricultural education ($M = 5.33$; $SD = 3.03$) fifth in their areas of interest. Global agricultural systems was the only career interest that ranked in the top three of all groups.

Table 3
Agricultural Career Pathway Interest

Ag Pathway	Treatment (N = 144)						Control (N = 47)					
	Boys (n = 68)			Girls (n = 76)			Boys (n = 21)			Girls (n = 26)		
	M	SD	Range	M	SD	Range	M	SD	Range	M	SD	Range
ACP1	3.92	2.72	11	5.78	2.70	11	5.21	2.66	8	4.85	2.68	9
ACP2	4.02	2.94	12	4.57	2.76	11	5.21	2.32	8	4.89	3.13	10
ACP3	4.33	2.76	11	4.73	2.72	12	4.89	2.47	9	4.58	2.65	10
ACP4	4.62	2.48	11	5.87	2.87	13	6.16	2.48	8	5.89	2.79	9
ACP5	5.02	3.42	12	5.73	3.07	13	6.32	3.58	11	5.61	2.85	9
ACP6	4.48	3.34	15	4.83	2.95	13	5.00	3.06	12	5.56	3.63	11
ACP7	5.20	2.95	12	3.95	2.11	10	5.32	2.69	10	5.56	4.39	13
ACP8	5.23	3.15	13	5.59	2.79	13	6.00	3.16	9	5.33	3.03	10

Note. ACP1 = animal science; ACP2 = food processing and food science; ACP3 = plant systems and plant science; ACP4 = environmental science and natural resources; ACP5 = global agricultural systems; ACP6 = agribusiness; ACP7 = power, structural, and technical systems, and ACP8 = agricultural education. $N = 191$. Scale from 1-15.

The students in the single-sex classroom had a gain in their interest in the agriculture, food, and natural resources (AFNR) career pathway ($M = 1.82$; $SD = 3.77$). By comparison, the students in the coeducational classrooms had a smaller gain in interests for the agriculture, food, and natural resources pathway ($M = .56$; $SD = 3.07$). To test the hypothesis that the students in the single-sex classrooms and the students in the coeducational classrooms were associated with statistically significantly different mean career interest gain for AFNR pathway, a one-way analysis of variance (ANOVA) was conducted (see Table 4). The one-way ANOVA was associated with a statistically significant difference in the gain of students' interest in the AFNR career pathway between the treatment group and control group, $F(1, 190) = 3.74, p = .035, \eta^2 = .023$. Thus, the null hypothesis was rejected, and the alternative hypothesis was supported, the students in single-sex classrooms (X_{+}) had a statistically significant larger gain in interests in the AFNR pathway than the students in the coeducational classrooms (X_{-}).

Table 4

One-Way ANOVA in Career Interest between the Treatment and Control Groups

Source	Treatment (N = 144)		Control (N = 47)		<i>Levene's Test for Normality</i>	<i>F</i>	<i>p</i>	η^2
	M	SD	M	SD				
CC1GAIN*	1.82	3.77	.56	3.07	<i>F</i> = 161, <i>p</i> = .231	3.741	.035	.023
CC2GAIN	.56	3.38	.88	3.88	<i>F</i> = 161, <i>p</i> = .285	.261		.002
CC3GAIN	.59	3.34	1.12	6.25	<i>F</i> = 161, <i>p</i> = .018	.624		.004
CC4GAIN	.16	3.22	.07	3.78	<i>F</i> = 161, <i>p</i> = .285	.022		.000
CC5GAIN	.29	3.35	.19	4.68	<i>F</i> = 161, <i>p</i> = .097	.079		.000
CC6GAIN	.24	3.10	.85	4.83	<i>F</i> = 161, <i>p</i> = .004	.893		.017
CC7GAIN	.41	3.50	.49	4.69	<i>F</i> = 161, <i>p</i> = .020	.013		.019
CC8GAIN	1.01	3.58	.95	5.03	<i>F</i> = 161, <i>p</i> = .006	.006		.000
CC9GAIN	.49	3.31	.17	4.49	<i>F</i> = 161, <i>p</i> = .009	2.39		.006
CC10GAIN	.60	3.64	1.17	5.13	<i>F</i> = 161, <i>p</i> = .003	.592		.004
CC11GAIN	.03	3.67	.83	3.92	<i>F</i> = 161, <i>p</i> = .284	1.380		.008
CC12GAIN	.87	3.86	.90	3.99	<i>F</i> = 161, <i>p</i> = .610	.002		.038
CC13GAIN	.27	3.24	-.02	4.20	<i>F</i> = 161, <i>p</i> = .038	.241		.001
CC14GAIN*	.57	3.21	-.51	3.66	<i>F</i> = 161, <i>p</i> = .097	3.266		.020
CC15GAIN	-.28	3.79	.83	4.28	<i>F</i> = 161, <i>p</i> = .256	2.485		.015
CC16GAIN	.40	3.09	-.49	5.01	<i>F</i> = 161, <i>p</i> = .004	1.805		.011

Note. CC1GAIN = agriculture, food and natural resources; CC2GAIN = architecture and construction; CC3GAIN = arts, audio/visual technology, and communications; CC4GAIN = business management and administration; CC5GAIN = education and training; CC6GAIN = finance, CC7GAIN = government and public administration, CC8GAIN = health science, CC9GAIN = hospitality and tourism; CC10GAIN = human services; CC11GAIN = information technology; CC12GAIN = law, public safety, corrections, and security; CC13GAIN = manufacturing; CC14GAIN = marketing; CC15GAIN = science, technology, engineering, and mathematics; CC16GAIN = transportation, distribution, and logistics. **Bolded items show Levene's test $p > .05$. * $p \leq .05$.**

To test the hypothesis that the students in the single-sex classrooms and the students in the coeducational classrooms were associated with statistically significantly different mean career interest gain for agricultural career pathways, eight separate one-way analysis of variance (ANOVA) was conducted for each of the agricultural career pathways (see Table 5). The one-way ANOVA was associated with a statistically nonsignificant difference in the gain of students' interest in each of the agricultural career pathways between the treatment group and control group, ($p \geq .05$). Thus, the researcher failed to reject the null hypothesis and the alternative hypothesis was not supported, the students in single-sex classrooms had a statistically nonsignificant gain interest in a specific agricultural career pathway than the students in the coeducational classrooms.

Table 5

One-Way ANOVA on the Agricultural Career Pathways Interest Between Treatment and Control Groups (N = 191).

Source	Treatment (N = 144)		Control (N = 47)		<i>Levene's Test for Normality</i>	<i>F</i>	<i>p</i>
	M	SD	M	SD			
ACP1GAIN	.238	2.56	.367	3.08	<i>F</i> = 161, <i>p</i> = .061	.069	.793
ACP2GAIN	.672	2.59	.902	3.18	<i>F</i> = 161, <i>p</i> = .073	.214	
ACP3GAIN	.488	2.30	.609	2.94	<i>F</i> = 161, <i>p</i> = .106	.074	
ACP4GAIN	.647	2.46	.878	2.91	<i>F</i> = 161, <i>p</i> = .107	.244	
ACP5GAIN	1.04	2.63	.68	4.13	<i>F</i> = 161, <i>p</i> = .097	.416	
ACP6GAIN	.760	3.12	.365	3.48	<i>F</i> = 161, <i>p</i> = .310	.461	
ACP7GAIN	.516	2.95	.780	4.11	<i>F</i> = 161, <i>p</i> = .107	.199	
ACP8GAIN	.603	2.43	.390	3.95	<i>F</i> = 161, <i>p</i> = .068	.166	

Note. ACP1GAIN = Animal science; ACP2GAIN = food processing and food science; ACP3GAIN = plant systems and plant science; ACP4GAIN = environmental science and natural resources; ACP5GAIN = global agricultural systems; ACP6GAIN = agribusiness, ACP7GAIN = power, structural, and technical systems; ACP8GAIN = agricultural education.

Conclusions/Implications/Recommendations

As stakeholders strive to enhance academic performance, the findings of this study may lead to improved quality of secondary teaching. The evaluation of the effectiveness of single-sex classrooms in this study can inform decision makers (on advantages of different learning environments. Although many scholars have studied same-sex classrooms, few have done so in public school classrooms (Pahlke et. al, 2014).

At the end of the study, the boys in the treatment group (X_{+1}) had the highest interest in the agricultural, food, and natural resources career pathway compared to X_{+2} , X_{-1} , and X_{-2} . They also ranked it highest in interest level among all 16 career pathways. No other group (X_{+2} , X_{-1} , and X_{-2}) ranked the agricultural, food, and natural resources pathway as one of their top three career pathways of interest. For X_{-2} , the agricultural, food, and natural resources pathway was not in their top five career pathways.

Intriguingly, all four groups (X_{+1} , X_{+2} , X_{-1} , and X_{-2}) ranked the science, technology, engineering, and mathematics (STEM) in the bottom three career pathways of interest. According to Scherer and colleagues (2019), the incorporation of STEM in agricultural curriculum is noted to increase student motivation. However, the findings in this study indicate that the freshman students, despite treatment or control, are less interested in the STEM career pathway.

Woolfolk and Perry (2015) found that stereotypes and gender roles are rigid and difficult to change, especially in ideas of what is socially acceptable as a masculine or feminine career. For example, societal beliefs that STEM careers are most appropriate for men have hindered women to enter STEM professions (Dunlap & Barth, 2019). The National Science Foundation (2017) reported only 28.4% of the STEM workforce is comprised by women. Teachers' implicit behavior, or what they unknowingly do, may contribute to the underrepresentation of women in STEM careers (Woolfolk & Usher, 2018; Brown & Stone, 2016). However, teachers can also empower girls to pursue STEM careers by increasing access to role models and mentors (Stout et al., 2011), deconstruct stereotyped casting of STEM as a more appropriate pursuit for boys (Nosek et al., 2009), and increase girls' sense of belonging in STEM (Cheryan et al., 2009).

Secondary teachers are recommended to seek professional development to deconstruct gendered stereotypes in careers so that girls and boys are empowered to enter careers without the influence of what is deemed appropriate by teachers and society. If a strategic goal of agricultural education is to incorporate more STEM concepts into the national curricula (Scherer et al., 2019), then providing teacher professional development for the destigmatizing of gender stereotypes in STEM careers is a necessary pursuit of national agricultural educator teacher preparation programs. But first, agricultural education scholars need to empirically investigate how to destigmatize gender stereotypes in STEM careers.

Boys (X_{+1} , X_{-1}) ranked the agricultural education in their top three agricultural career pathways of interest. Boys in the treatment group (X_{+1}) displayed higher interest in agricultural education, as they ranked the agricultural education career pathway number one. In comparison, boys in the control group (X_{-1}) ranked agricultural education as their third highest pathway of interest. Girls (X_{+2} , X_{-2}) did not rank agricultural education in their top three agricultural career pathways.

Garter and Swan (2018) advocate that to meet the need of a growing teacher shortage on the state and national level, intentional recruitment efforts are needed. Knight (1988) reported 95% of agriculture teachers in the United States were men. Now, only 29% of agricultural education program completers – those who complete accredited agricultural education teacher preparation program – were men (Smith, et al., 2019). Yet, the results from this study suggest that freshman boys are more interested in the agricultural education career pathway compared to freshman girls.

Teacher preparation programs are recommended to initiate recruitment programs that intentionally target boys in their freshman year of high school. Waiting until senior year to recruit boys to pursue a career in agricultural education may be too late. The researchers do not discount the importance of teacher preparation programs to recruit young women into the profession nor do the researchers find issue with the high number of young women entering the profession. However, the findings of this study suggest that teacher preparation programs may fail to recruit boys who are interested in agricultural education, particularly early in their high school years.

Secondary teachers are also recommended to discuss agricultural career pathways, especially agricultural education, to their students. Intentional integration of agricultural education into the curriculum may empower boys to pursue a career in education by destigmatizing educational careers to boys (Bowe et al., 2015).

Since No Child Left Behind (NCLB), over 1,000 school districts across the United States have implemented some degree of single-sex education (Klein et al., 2014). As more public-schools ratify single-sex learning environments it is important for research to determine the effects. Since this study is limited to the SBAE students in [STATE], replication of this study in other context will assist in understanding the effects of single-sex classrooms.

The significance of this study was underscored by the call to answer critical methodological issues in previous study whereas: (a) quasi-experiential design is utilized; (b) conducted in a

public school setting with traditionally trained teachers, larger class size, and more representative socioeconomic status; and (c) students will represent the demographics of the community (Palike et al., 2014). Future single-sex classroom studies are recommended to utilize similar methods. Future studies are recommended to examine the influence of single-sex classrooms over the course of a full academic year. Other longitudinal studies that evaluate this line of inquiry throughout high school (i.e., sophomores, juniors, and seniors) would also be benefit scholarship.

Lack of professional training on same-sex classroom instruction was a limiting factor in this quasi-experiment. Advocates for same-sex classrooms argue that males and females have biological differences that need specialized attention. In educational settings, same-sex classrooms allow for instructors to tend to biological differences by amending their pedagogy (Sax, 2017). Teachers did not receive any type of training on teaching methodologies for single-sex classrooms in this study. Nor were the teachers assessed on their pedagogical knowledge. Thus, future research can investigate interventions to determine if single-sex classrooms are more effective if teachers receive pedagogical training on single-sex classrooms beforehand.

The students in single-sex classrooms had a statistically significant gain in their interest in the agriculture, food, and natural resources career pathway. Single-sex classrooms were more effective in increasing student interest in the agriculture, food, and natural resource (AFNR) career pathway. The finding is important since this intervention occurred over a 15-week semester. According to Lundry et al. (2015), the primary goal of SBAE is to develop the knowledge and skills necessary for employment in the agriculture industry. However, students must first have interest in the AFNR career pathway. The results reveal a relatively quick (over 15-weeks) increase in student interest in AFNR for the students in single-sex classrooms.

It is recommended that agricultural education researchers extend the merits of this finding through qualitative research. Qualitative investigations will also aid in the debate on the effectiveness single-sex classrooms could have in public schools and in agricultural education, from a sociological standpoint. As stated by Creswell and Creswell (2018), the research questions of quantitative investigations, such as this study, answer the questions of *if* while qualitative research answers *why* or *how*.

The researchers failed to reject the null hypothesis and concluded that there was no statistically significant gain in student interest in the eight agricultural career pathways. Thus, the single-sex treatment did not have a greater effect on student interest in the eight agricultural career pathways during the 15-weeks. However, when factoring the sexual orientation of the student, the researchers identified a major gain in the male same sex classroom's interest in agricultural education. A longitudinal study or a follow-up to the population in this study may reveal significant gain of student interest among the treatment group.

Longitudinal studies that measure the effects of single-sex classrooms would aid a discrepancy in the literature. The findings of longitudinal studies may indicate how single-sex classrooms influence student outcomes throughout their academic progression. The short duration of this study may have a limiting factor. It should be noted, that the researchers do hypothesize that if MANOVA was performed that looked at significant gains between sex and treatment/control,

that boys in the treatment would be significantly higher than any other group toward the agricultural education career pathway.

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Exploring Agricultural Education Students' Modes of Informal Reasoning Regarding an Agricultural Socioscientific Issue

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Scholars suggest school-based agricultural education (SBAE) instructors should help students prepare for the future by promoting scientific reasoning, encouraging the application of STEM concepts, and addressing community-based issues. While socioscientific issues (SSI), an educational framework used to promote scientific literacy, is an instructive approach that may address these goals, few pieces of relevant literature utilize agricultural education as a context. This research study explores how a class of secondary agricultural education students negotiate an agricultural SSI related to an environmental issue, soil erosion. The hypothetical scenarios provided for activities were based on real-life situations in the region. Data regarding the students' modes of informal reasoning were collected via qualitative questionnaire. Various modes of informal reasoning, such as social, ecological, practical, and scientific/biological, were utilized by students during the decision-making process. While all of these modes of reasoning were exhibited, students did not utilize them simultaneously during the negotiation of the SSI.

Introduction

Although our daily lives are increasingly influenced by science and technology, such as the production, availability, and nutritional quality of the food we eat, school science has frequently failed at addressing these influences (Linder et al., 2011). Compared to other developed countries, students in the United States have struggled with the skills needed to navigate complex problems that deal with science (Organization for Economic Co-operation and Development, 2016). Consequently, students have often come up short when it comes to understanding the functionality of science (Braund & Reiss, 2006; Osborne et al., 2001; Zeidler, 2014) as our educational system has largely failed to produce scientifically literate citizens (Linder et al., 2011). While the United States faces a scientific literacy crisis, we are confronted with various challenges that involve science, technology, and society (STS), such as food insecurity, climate change, and water quality issues. Accordingly, agricultural educators have had their hands full, as these issues deal with agriscience and have huge social ramifications. Yet, some agricultural students have displayed a low disposition for critical thinking (Rudd et al., 2000), while various agricultural instructors have noted a lack of curiosity and analytical skills among their students (Telg & Irani, 2005).

Students seem to be losing interest in school science overall, as the subject has largely been taught in a fashion that is based purely on science content (Braund & Reiss, 2006). Science that is based on the concerns and interests of students is needed for successful teaching within the discipline (Schreiner & Sjøberg, 2007). Some have argued school science curriculum is no longer meeting the needs of students (Braund & Reiss, 2006; Hodson, 2003). Although the United States education policy requires high stakes test taking, students have not scored well, compared to other developed nations, on the international science achievement test, also known as the Program for International Student Assessment (PISA), which is based on problem solving and the application of scientific concepts (Organization for Economic Co-operation and

Development, 2016). Consequently, scholars have questioned whether the science curriculum prepares students to apply knowledge and become autonomous learners (Trilling & Fadel, 2009; Zeidler, 2014). Furthermore, science education has not always supported holistic, systematic thinking, which is used to solve problems (Trilling & Fadel, 2009; Edwards & Baldauf, 1983), as many students have completed their K-12 education without being asked to address real problems, such as hunger and pollution (Linder et al., 2011).

Science education needs to move beyond the instruction of isolated facts and theories, as it is important for students to be able to recognize pseudoscience claims and distinguish between good and bad science (Bell & Lederman, 2003; Zeidler & Sadler, 2011). It is of utmost importance to move science education curriculum towards the instructional paradigm based in progressivism (Zeidler, 2014; Zeidler et al., 2011), which focuses on student-centered learning (Zeidler et al., 2011). Accordingly, bringing relevant, real life, problem solving into the classroom has gained popularity in recent years (Roberts & Bybee, 2014; Linder et al., 2011; Phipps et al., 2008; Zeidler, 2014), with particular emphasis on ensuring that students are aware of social issues (Zeidler, 2014). While learning about scientific processes has arguably always been a worthwhile objective for science education, many are now trying to make the curriculum more applicable to students' everyday lives (Phipps et al., 2008; Roberts, 2007; Roberts & Bybee, 2014; Zeidler & Sadler, 2011; Zeidler, 2014). The STS field has addressed problem solving through critical thinking and inquiry-based practices (Kortland, 1996), yet some argue this is not enough to solve SSI, social issues that involve science (Sadler et al., 2007; Zeidler et al., 2004). SSIs, such as the use of genetically modified organisms and climate change, involve political, moral, economic, and social concerns, and therefore, require the application of scientific concepts, as well as social constructs, such as reasoning (Sadler et al., 2007).

The ability to reason, which involves developing and evaluating arguments (Shaw, 1996), as well as drawing conclusions (Galotti, 1989), is needed to think well (Kuhn, 1991). While we use reasoning skills every day to make decisions and solve problems (Galotti, 1989), the formal educational system does not always include curriculum that supports learning these abilities (Perkins, 1985a; Voss et al., 1991). However, science education research has increasingly involved utilizing the SSI educational framework to explore reasoning skills, especially everyday reasoning, also known as informal reasoning (Sadler, 2004; Sadler & Zeidler, 2005; Wu & Tsai, 2007). Informal reasoning is often used when an individual has a challenging time navigating a problem (Shaw, 1996). Because SSIs are often controversial and lack clear cut solutions, the educational framework can provide a context for exploring the informal reasoning construct (Sadler, 2004). Informal reasoning has been explored within the context of SSI in secondary, as well as postsecondary, traditional science classrooms (Sadler, 2004).

However, few pieces of scholarly literature suggest the SSI framework is being utilized in the agricultural education classroom (Cross & Kahn, 2018), which is surprising given that many SSIs, such as the use of genetically modified organisms (GMOs), food insecurity, climate change, and land use issues, are related to agriculture. Secondary agricultural education students could seemingly be a good audience for the facilitation of SSI-based curriculum. Considering one of the most severe environmental issues affecting public health and food security is arguably soil erosion (Pimentel, 2006), this SSI may be worth exploring with students. Perhaps the agricultural education classroom is a good place to facilitate SSI-based curriculum that aims to

promote informal reasoning skills through the exploration of an agricultural SSI, such as land use issues related to soil erosion.

This exploratory study seeks to investigate secondary agricultural education students' informal reasoning skills regarding the negotiation of an agricultural SSI. The research questions are as follows: what informal reasoning modes are evident in the negotiation of an agricultural SSI in an agricultural education class?; and how can the informal reasoning modes utilized by agricultural education students in the negotiation of an agricultural SSI inform future curriculum? To answer these research questions, a theoretical framework composed of informal reasoning, SSI, as well as agricultural and environmental education has been developed.

Theoretical Framework

Informal Reasoning

Informal, or everyday, reasoning encompasses our daily lives (Galotti, 1989; Perkins, 1985a). For example, on a day-to-day basis, we reason to make daily decisions, such as the type of coffee we buy, whether to change car insurance agencies, or for whom to vote for an election. Instances of decision making, as well as critical thinking, are examples of everyday reasoning (Galotti, 1989). Most of the reasoning people do is informal in nature (Perkins, 1985a; Perkins, 1985b). Nonetheless, research surrounding the construct of informal reasoning was scant until a few decades ago (Galotti, 1989; Perkins, 1985a). While many may believe informal reasoning functions similarly to formal reasoning, this argument has been disputed (Perkins, 1985b).

Galotti (1989) explains the difference between formal and informal reasoning: Formal reasoning involves thinking about logical and numerical problems where all premises are given in advance, and informal reasoning refers to everyday thinking where all premises may not be given with the problem, which is often ill-structured, and thus, the individual must search for relevant information. Reasoning, however, does not necessarily mean good reasoning, as the information provided for reasoning may be modified by the thinker, and therefore, the conclusion may be deductively invalid (Galotti, 1989). How, then, does good informal reasoning differ from good formal reasoning? Perkins (1985b) suggests the following: While a good informal argument often addresses various perspectives of a case, there are often multiple lines of reasoning. In contrast, the author adds, good formal reasoning does not always address both sides of a case and only requires one line of reasoning.

Although students need informal reasoning skills, our more formalized educational system does little to promote these abilities (Perkins, 1985a), and there is a need for research-based curriculum that promotes informal reasoning skills (Means & Voss, 1996). When multifaceted issues arise that do not appear to have clear cut solutions, informal reasoning can be used to evaluate and create positions to problem solves (Sadler, 2004). While informal reasoning problems are ill-defined (Galotti, 1989), it makes sense to pair this construct with SSI, which are ill-structured in nature and require more than one line of reasoning (Sadler & Zeidler, 2005).

Socioscientific Issues (SSI)

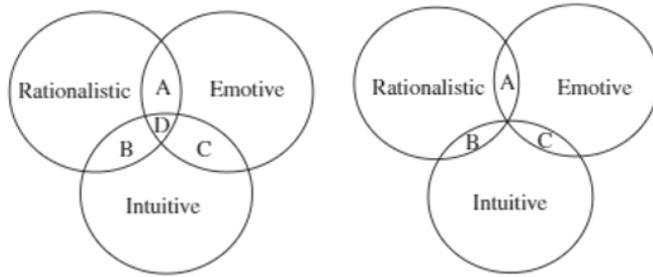
There is a great need for problem examination and solving in education, where individuals play a part in finding solutions to social issues (Trilling & Fadel, 2009). While problem solving is not new to the STS field, many have argued a need for broad conceptual frameworks that include a progressive view of scientific literacy which entails a commitment to morals, ethics, as well as social and character development (Zeidler & Keefer, 2003). Consequently, SSI has become quite popular in science education research (Roberts & Bybee, 2014), as the framework is utilized to promote progressive scientific literacy (Zeidler, 2014), critical thinking (Zeidler & Nichols, 2009), as well as practical discourse (Walker & Zeidler, 2007). However, many teachers do not feel comfortable utilizing the framework, as research regarding SSI curriculum development is limited (Hofstein et al., 2011; Presley et al., 2013). While many teachers are used to abiding by the traditional instructional, teacher-centered paradigm, changing to a progressive model where responsibility is the focus of education, is challenging (Zeidler, 2014).

The SSI educational framework, which is based on a progressive instructional paradigm, provides a student-centered, constructivist, learning environment for students while promoting dialogue related to real world problems and the consequences of decisions (Castano, 2008; Zeidler, 2014). To solve these, often controversial, issues, informal reasoning is used to generate and evaluate various positions (Sadler, 2004). Therefore, many researchers have examined the construct of informal reasoning while utilizing this educational framework (see, e.g., Kortland, 1996; Patronis et al., 1999; Sadler & Zeidler, 2005). Several scholars have investigated the relationship between nature of science (NOS) conceptualizations and informal reasoning, while others have explored patterns of informal reasoning (see, e.g., Sadler & Zeidler, 2005), reasoning modes, (see, e.g., Patronis et al., 1999), and reasoning quality (see, e.g., Sadler & Zeidler, 2004).

As Wu & Tsai (2007) explain in their literature review regarding informal reasoning on SSI, scholars have represented informal reasoning in different ways, including decision-making modes, reasoning modes, and reasoning quality. Regarding decision-making modes, Sadler & Zeidler (2005) found three patterns of informal reasoning. In this study, college students exhibited various patterns of informal reasoning while negotiating resolutions to a SSI; while exploring genetic engineering scenarios, students' responses including rationalistic, emotive, and intuitive patterns of informal reasoning. In other words, students responded to the SSI in a rational way, in an emotional manner, as well as an intuitive way or gut response. In this study, students employed multiple patterns of informal reasoning in response to the same issue. In a different SSI study looking at decision making modes, Topçu et al. (2011) found the same three patterns of informal reasoning. However, in this study, students did not employ multiple patterns regarding a single SSI. The diagram below is from the Topçu et al. (2011) study.

Figure 1

Informal reasoning patterns and overlapping conditions. Reprinted from Topçu et al. (2011)



The Venn diagram on the left represents the Sadler & Zeidler (2005) study, while the one on the right represents the findings from Topçu et al. (2011). The lack of overlap in the diagram on the right shows students did not use all patterns of informal reasoning while negotiating a single SSI.

Other scholars have represented informal reasoning through “reasoning modes” when exploring SSI (see, e.g., Patronis et al., 1999; Wu & Tsai, 2007, 2011; Yang & Anderson, 2003). A reasoning mode, a qualitative indicator used to assess the argumentation and decision-making process on SSI (Wu & Tsai, 2007), is used to evaluate the perspectives utilized while negotiating a solution to an issue (Patronis et al., 1999; Yang & Anderson, 2003). Patronis et al. (1999) investigated the reasoning modes used by 14-year olds during the negotiation of how to design a road, which was an actual problem in the area. While there was no “right” or “wrong” answer to the issue, students were asked to try to persuade other students through argumentation. Results indicated that students utilized four modes of reasoning, including social, ecological, economic, and practical, during the argumentation process (Patronis et al., 1999).

Wu and Tsai (2007) examined the informal reasoning of tenth grade students regarding nuclear energy usage. As for reasoning modes, the researchers suggested students may generate their arguments from various sides, including ‘social-oriented,’ ‘ecology-oriented,’ ‘economic-oriented,’ and ‘science- or technology-oriented’ perspectives (Wu & Tsai, 2007, p. 1171). Overall, the participants utilized multiple perspectives during the reasoning process and exhibited evidence-based decision-making skills. While the most common perspective utilized was “ecological-oriented,” the least common was “social-oriented.” The scholars proposed that students’ usage of various reasoning modes might help them in suggesting more counterarguments, which may inform rebuttal construction. In a later study, Wu & Tsai (2011) investigated reasoning modes of high school students regarding a nuclear power SSI. Once again, students generated arguments from various perspectives, including ‘social-oriented,’ ‘ecology-oriented,’ ‘economic-oriented,’ and ‘science- or technology-oriented.’

Overall, SSI promotes a functional scientific literacy, one that aims to work towards an informed citizenry, where people can adequately partake in decision making on issues that involve science and have social consequences (Christensen, 2001; Roberts & Bybee, 2014). Although several scholars have investigated informal reasoning while utilizing SSI-based curriculum in the classroom, it seems the construct has yet to be operationalized while employing agricultural SSI-based curriculum.

Agricultural and Environmental Education

While the use of real-life situations and the collaborative learning process are valued within the SSI framework (Zeidler, 2014), these research-based strategies for teaching science

are also important approaches for teaching agriscience (Phipps et al., 2008). Although scientific reasoning is thought to be an important goal of agricultural education (National Research Council, 1988), limited research has been conducted that explores the construct in the field (Ricketts & Rudd, 2005). In recent years, however, there has been a call for SBAE teachers to promote scientific reasoning skills, facilitate student-centered learning, and include STEM concepts and principles in the curriculum (American Association for Agricultural Education, 2017; DiBenedetto et al., 2015). Therefore, agriculture education teachers are encouraged to develop and implement curriculum that encourages students to apply scientific concepts in an agriscience context (Phillips et al., 2008; Ramsey & Edwards, 2004).

Although several SSIs are related to agriculture, only a few studies have united the disciplines (see, e.g., Cross & Kahn, 2018; Shoulders & Myers, 2013; Wilcox et al., 2014). However, SSIs related to agriscience, such as land use dilemmas and how to alleviate food insecurity, are vital to the wellbeing of our society. Considering the stability of civilization depends on an adequate food supply (Cole, 1987) and food insecurity plagues our civilization, land seems to be increasingly valuable. From federal government leaders to city council representatives, there is a continual debate on how public and private land should be developed.

There is also a lot of controversy, from consumers and producers, on how agricultural land should be developed, cultivated, and utilized. While some are in favor of certified organic operations, others depend on synthetic commercial chemicals for high yields, disease prevention, and pest control. As soil erosion, loss of soil organic matter, and water-soluble pollutants have been major concerns for producers and environmental stewards (Cole, 1987), crop producers have contemplated how and/or if to till the soil, as the over dependence on tilling is causing tremendous soil erosion throughout the world (Pimentel, 2006). While world agricultural systems are losing approximately 75 billion tons of fertile soil each year (Myers, 1993), more food needs to be produced to feed a growing population (Food and Agriculture of the United Nations, 2009). In addition, soil erosion is causing significant nutrient runoff, which is affecting water quality by causing harmful algal bloom (Al-Kaisi, 2002). While the government warns harmful algal bloom (HAB) can lead to toxic drinking water levels (U.S. Environmental Protection Agency, n.d), unfortunately, many have experienced this firsthand (Ho & Michalak, 2015).

SSI is arguably an ideal vehicle for positioning the critical issue of how to address soil erosion, which is related to food insecurity and HAB. While there is a lack of literature that connects agricultural education to SSI, SSI-based curriculum on soil erosion could be developed and implemented. There are a few SSI questions that need answered to address this issue. Is traditional deep plowing necessary for land cultivation? What kind of sustainable agriculture practices can be used to reduce nutrient runoff? Perhaps activities that support these types of questions could provide the context for the development of agricultural and scientific literacy while simultaneously promoting teachers' understanding and use of the SSI framework.

Methods and Procedures

This study includes the development and implementation of a piece of SSI-based curriculum, as described above. Study participants included students in an environmental science

class, which was taught by a National FFA Organization teacher. While some agricultural education students are familiar with land use issues related to crop production and nutrient management, the teacher also thought this topic would be of interest to her class. This was an important consideration, as students need to be interested in the topic for successful implementation of SSI-based curriculum (Sadler, 2011).

Participants

For this study, the curriculum was taught for one high school environmental science class of eight students. When trying to locate participants, I reached out to an Agriculture Education Program Specialist with the state department of education (From this point forward, “I” refers to the first author alone and “we” refers to both authors). This person provided me with a list of secondary school instructors who taught subject matter related to school gardens. I emailed several instructors on the list that were in my general area. The first person to respond was an agricultural education instructor and National FFA Organization advisor for a high school. This teacher managed the greenhouse at the school, where students grew flowers in the spring.

Curriculum Development

The students were asked to participate in two, 50-minute, classroom sessions on the topic of “Soil Nutrient Management in Agricultural Science.” The goal of the curriculum was to help students determine ways to minimize nutrient pollution. Therefore, the SSI under investigation was “How can crop producers cultivate the land in a way that leads to minimal nutrient runoff while maintaining maximum production yields?” While this is a controversial SSI topic, students were then prompted to use informal reasoning to develop or enhance argumentation skills. While it is advised to start SSI-based curriculum with an activity (Kortland, 1996) or controversial issue that may be of interest to students (Presley et al., 2013), participants were first shown various pictures of flooded crop land, as well as smaller scale gardens, and then asked to identify possible issues. They were asked questions such as, “How well will these submerged plants grow?” and “What do you think will happen to the submerged topsoil when the water drains?” After the opening activity, I covered various topics related to the problem of soil erosion, such as, HAB, basic biological science, and sustainable agricultural practices for crop production.

The sustainable agricultural practices component was perhaps the most pertinent, as I wanted students to realize we can reduce nutrient loads without buying expensive equipment and completely changing cultivation techniques. I discussed the importance of cover crops, crop rotation, not planting in a flood plain, and riparian buffer strips. In addition, the pros and cons of different methods of plot cultivation were discussed. While the overuse of the traditional deep plowing method can lead to soil erosion, tillage conservation practices, such as ridge till, no till, and mulch till, were discussed, as these practices can help reduce soil erosion and nutrient runoff (Al-Kaisi, 2002). I explained that these conservation tillage practices help keep the soil surface partially covered with organic matter (Al-Kaisi, 2002; Janssen & Hill, 1994) and that it is imperative to cover the bare soil as much as possible year-round, as the more residual cover the plot has, the less the soil will erode (Janssen & Hill, 1994).

Data Collection

After the final educational session, participants were asked to complete an online qualitative questionnaire, which included a brief description of terms and a scenario related to a local, relevant issue. While SBAE teachers are encouraged to teach curriculum that is based on local community needs (American Association for Agricultural Education, 2017), this seemed appropriate. At the time the curriculum was developed, a local nonprofit organization with a mission to alleviate food insecurity through the development of local food systems, was dealing with an issue related to soil erosion. Organization representatives managed a tilled community garden and the rich organic loam they had spent years developing was being heavily washed into the nearby stream. While resources were limited, leaders of the organization had a tough problem to solve: How would they deal with the soil erosion? In the questionnaire, students were asked if they thought the garden should be tilled or not. They were then asked to formulate a possible rebuttal and counter rebuttal. In addition, they were asked if they had any garden experience.

Data Analysis

The focus of this study is to explore informal reasoning, as well as argumentation skills, through discourse analysis. To investigate students' modes of reasoning, data collected from the qualitative questionnaire was inductively analyzed. As mentioned, in a SSI-curriculum based study on how to design a road, Patronis et al. (1999) found that secondary students used several qualitative modes of arguments to make a decision, including the consideration of social, ecological, economic, and practical aspects of the situation. In the present study, all the text in each submitted questionnaire was coded and themes were developed, ultimately to see if the data exhibited any of the modes of reasoning found by Patronis et al. (1999) and to explore whether new modes of reasoning would emerge. To investigate the modes of informal reasoning, inductive data analysis, as described by Lincoln & Guba (1985), was utilized. First, each author coded the data independently. After completing our coding independently, we compared our analyses to determine congruence. A third scholar reviewed our findings to ensure trustworthiness. High rates of inter-rater reliability were found. Inter-rater reliability is used to abolish any bias one individual may have while analyzing data (Creswell, 2015).

Results

The qualitative modes of reasoning found by Patronis et al. (1999), including social, ecological, and practical aspects, were also found in this study. While our data did not suggest that students utilized an economic mode of reasoning, which was found by Patronis et al. (1999), we did see an additional mode of reasoning emerge, *scientific/biological*. One author had independently coded certain text as 'scientific,' while the other author had identified the same text as 'biological.' We combined our independently found codes to adequately represent our collective findings. The categories with key concepts are shown below in Table 1, along with verbatim quotations from the qualitative questionnaire.

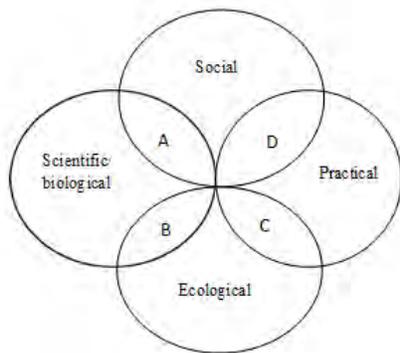
Table 1*Qualitative Modes of Reasoning Identified in Participants' Responses*

Category	Key Concepts	Example Quotes
Ecological	Reduction of soil quality and quantity, effect on the ecosystem, earth's resources	<p>"Plowing leaves soil vulnerable to wind and water erosion and the plot has a stream nearby."</p> <p>"then even more matter will go into the water when it floods."</p> <p>"then at least elevate it to prevent water contamination"</p>
Practical	Pragmatism, application of knowledge, investigating feasibility	<p>"I would say that the area doesn't have enough soil and how we should find a safe location to plant the seeds."</p> <p>"It's not a good soil plot."</p> <p>"I think that their argument would be that the soil would need to be tilled every so often to keep it from getting hard."</p> <p>"I don't think the garden should be plowed for seeding because the location isn't a good place for plants to grow healthy."</p>
Social	Impact on people, advantages and disadvantages on humanity	<p>"The garden is needed to feed some of the people in the winter"</p> <p>"This is the only we can help the people being that re-locating is not an option"</p>
Scientific/biological	Processes related to bioscience, plant needs	<p>"I would possibly tell them that an easier way would be to use the no-tilling, to allow the roots more oxygen and water to seep into them and to keep the roots from staying in one place."</p> <p>"It could cause more damage to the soil, and make it harder for the roots to take hold and grow larger."</p> <p>"I don't think the garden should be plowed for seeding because the location isn't a good place for plants to grow healthy."</p>

Some responses covered various modes of reasoning. For example, “I don't think the garden should be plowed for seeding because the location isn't a good place for plants to grow healthy.” This student is being practical in that the plot is not a good place to have a garden, however, the student is also exhibiting the scientific/biological mode of reasoning by mentioning the plants would not be “healthy” in this location. However, students did not utilize all modes of reasoning simultaneously. The Venn diagram below, Figure 2, represents the results.

Figure 2

Modes of reasoning found in the present study

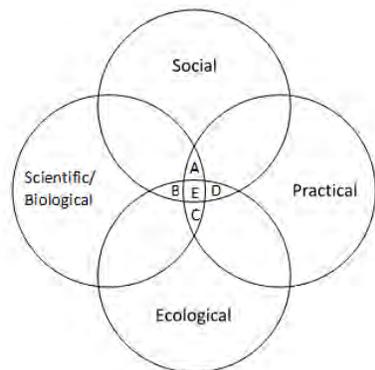


While there is overlap among the different modes of reasoning, not all modes of reasoning were exhibited simultaneously by any student regarding this SSI.

If all modes of reasoning were exhibited at the same time by students, the figure would look like the one below (Figure 3).

Figure 3

Hypothetical Modes of Reasoning for Agricultural SSI



In this figure, “E” would represent all modes of reasoning being exhibited by students during the negotiation of the agricultural SSI. Because utilizing multiple modes of reasoning may indicate stronger argumentation skills (Wu & Tsai, 2007, 2011), it would be advantageous to have results similar to Figure 3.

Discussion

While revisions would need to be made for future implementation of this curriculum, there may be potential for the SSI framework in the SBAE classroom. As discussed, there is a need to engage students in real life problem-solving activities that involves science (Zeidler, 2014). This study adds to that growing body of research and addresses gaps in the literature. There is now some insight on the informal reasoning modes utilized by agricultural education students, and this, of course, informs future curriculum. In addition, upon reflection, this study also indicates a need for critical thinking activities that encourages the development of argumentation skills.

Although various modes of reasoning were recognized in the data, many of the student responses lacked depth and breadth. Overall, the students appeared to have a challenging time providing evidence to back their arguments regarding the SSI. They seemed to lack argumentation skills, which can be common among many students (Dawson & Venville, 2008; Nussbaum, 2002). It seemed students were not used to thinking critically and developing informed arguments. In addition, during the curriculum implementation process, several students seemed confused, as it appeared as though the material was too advanced. While a lot of the curriculum was related to HAB, students may have been more prepared to answer questions regarding that issue, rather than the community garden scenario. However, for the questionnaire, we wanted to ask them about a scenario we had not discussed to see if they could navigate a complex, hypothetical SSI on their own. The community garden scenario was chosen for use on the qualitative questionnaire because it was a local issue at the time, and, as mentioned, SBAE program teachers are encouraged to facilitate curriculum based on community needs (American Association for Agricultural Education, 2017).

For future implementation of this curriculum, I would spend more time exploring the social and economic components of the agricultural SSI. As noted, the students did not seem to utilize the economic mode of reasoning and only a few students exhibited a social mode of reasoning. The latter finding is congruent with the work Wu & Tsai (2007, 2011). However, the lack of the social and economic modes of reasoning could have been due to weak social and/or economic components of the curriculum. Although students employed various modes of reasoning, they did not exhibit them simultaneously while investigating the SSI. While utilizing various modes of reasoning at the same time may exhibit strong argumentation skills (Wu & Tsai, 2007, 2011), future SSI-based curriculum should be developed and presented in a way that highlights the social, as well as economic, aspects of the problem to the same extent as other perspectives.

Specifically, more discussion surrounding the topic of how soil erosion and HAB can negatively affect people would be included. For example, educators could go into detail about how soil erosion is related to food insecurity. Another limitation of our intervention was my lack of experience in teaching SSI, as well as my unfamiliarity with the class. Research on SSI suggests that implementation is quite challenging for all teachers, including experienced ones (Hofstein et al., 2011; Kahn, 2021; Presley et al., 2013; Zeidler, 2014). Among the challenges is the propensity of teachers to be “stuck” in a traditional science discipline mindset when

implementing SSI (Lee & Yang, 2019; Sadler et al., 2006). In addition, the community garden related text in the questionnaire was likely too detailed, which turned out to be limiting.

As for other limitations, there were only eight students in the class. While depth and breadth of a qualitative study can be acquired with only one participant, in this case, more participants could have been helpful for coding purposes. Perhaps, if there were more participants and/or the capacity to repeat the study, there would be a better chance of acquiring rich data. In addition, it would have been helpful to know more about the students' experiences and content knowledge.

Recommendations for Agriculture Educators and Researchers

One critical lesson learned from this research was the importance of ensuring that students have sufficient content background to negotiate SSI. For college-level researchers working with teachers in K-12 settings, this means that effective communication with the classroom teacher(s) about expectations around student knowledge and familiarity with the curriculum are both warranted. Furthermore, it is important to ensure that the SSI question is relevant to the students and the setting. Thus, before implementing SSI-based curriculum, it may be important to investigate school resources. Time is also a particularly challenging issue in SSI implementation (Kahn, 2021); ensuring that there is sufficient time for students to gain familiarity with the scientific and agricultural concepts underlying the SSI, and to have time for argumentation and discourse, is critical yet often elusive due to rushed teaching schedules.

As for possible agricultural SSI topics related to secondary school agriscience, there are many that SBAE teachers could implement, such as: "Should agricultural producers use organic practices?," "Backyard poultry: to cage or not to cage?," "How should we address food insecurity in our community?," and "Animal Husbandry: feed lots or forage?" While some SBAE curriculum should address local community needs (Phipps et al., 2008), there are regional agricultural SSIs that could be utilized in Appalachia, such as "Autumn olive: an invasive plant to kill or to eat?" and "Multiflora rose: An invasive to spray or not to spray?" I would certainly encourage teachers to develop their own SSI questions for curriculum development and implementation. Better yet, perhaps students could be encouraged to help develop SSI questions or choose a topic from a list. This may further engage students in the content as well as help prepare them for the responsibility of land ownership and citizenship.

Conclusion

It seems imperative that teachers prioritize helping students learn how to reason effectively (Bronkhorst, 2019), as reasoning is an important aspect of problem solving and critical thinking (Battelle for Kinds, n.d.). While there are various SSIs facing the agriculture education community, perhaps this framework can be utilized to help students reason and navigate those problems. Much more research needs to be conducted to make generalizations. There are many other agricultural SSIs (e.g., climate change, land use issues related to invasive species management, and GMOs) that could be explored with a secondary agriculture education audience, along with different constructs, such as socioscientific perspective taking (see, e.g.,

Kahn & Zeidler, 2019; Newton & Zeidler, 2020), socioscientific reasoning (see, e.g., Zeidler et al., 2019), and NOS (see, e.g., Sadler & Zeidler, 2005).

These findings corroborate the notion that agricultural teachers may need curriculum and training regarding SSI (Cross & Kahn, 2018). While SSI can be challenging to implement due to a lack of curriculum (Presley et al., 2013; Sadler, 2011), Zeidler and Kahn (2014) have developed a book with thorough SSI-based lesson plans and worksheets. This is a great resource for practitioners interested in implementing SSI. A similar book with an agricultural education focus could be useful for SBAE teachers interested in teaching SSI-based curriculum. In addition, perhaps there could be a SSI framework section in the next *Handbook on Agricultural Education in Public Schools*. This may, at the very least, help to introduce the framework to students, teachers, and scholars.

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Youth Leadership Development: A Synthesis of Literature

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Youth leadership development is one-way strong adult leaders are created by preparing the leaders of tomorrow. This study aims to assess the studies published in the Journal of Leadership Education (JOLE) about youth leadership development from 2000 to 2021. A total of 33 articles were collected, assessed, and sorted into four themes and one emerging theme. The four themes included: impact of youth leadership programs, role of adults, youth leadership skill acquisition and community-based leadership. The emerging theme encompassed a growing interest in modeling youth leadership development. Studies collected highlight the importance of youth leadership development and in what settings it can occur. Understanding these studies provides insight into the current knowledge about youth leadership development. Recommendations for future research include further assessment of the youth perspective on their leadership development and adult leader interactions. Future research should also focus on modeling youth leadership with quantifiable data. Implications for future practice focuses on adult leaders understanding the impact they have on youth leadership development and should use the results from these studies to decide what are the best programs and activities to incorporate. This can aid in encouraging youth to be engaged with their community.

Introduction

Youth leadership education is the foundation of resiliency and confidence in the youth that will become the leaders of tomorrow (Kress, 2006). The agricultural sector requires youth leader involvement to maintain pace with a constantly evolving global market economy (Som et al., 2018). Strong adult leaders were once young adults and children, taught by other adult leaders how to bring change and influence in positive, reinforcing ways. Leadership training during the formative years of youth education has been considered in many journals including The Journal of Psychology (Cassel & Shafer, 1961), Journal of Applied Psychology (Hynes et al., 1978), Journal of Agricultural Education (Ricketts & Rudd, 2005; Seevers et al., 1995), Journal of Extension (Boyd, 2001), Journal of Career and Technical Education (Ricketts & Rudd, 2002), Institute for Educational Leadership (Edelman et al., 2004), Teaching Exceptional Children (Grenwelge et al., 2010), International Journal of Adolescence and Youth (Ngai et al., 2012), and Journal of Community Psychology (Mortensen et al., 2014).

To explore the state of youth leadership in agriculture today and draw insights about the future leaders of American and global agriculture, we investigate the literature on this topic in the Journal of Leadership Education (JOLE) from the year 2000 to present-day. Literature published in the Journal of Leadership Education is evidence-based and rooted in leadership theory (JOLE, 2021). Various aspects of leadership education that correlate with youth involvement in the agriculture industry include the non-exhaustive list of youth leader self-efficacy, desirable characteristics of leaders and followers in agriculture, responsible youth

leadership, and application of leadership skills to experiential learning (Cavagnaro & van der Zande 2021; Cline 2021; Coleman et al., 2021; Rehm et al., 2019). Youth education of applicable skills in general is integral to lesson plans and curricula, specifically with agricultural educators, one of the “primary goals is to foster student interest in agricultural content” (Wells et al., 2015, p. 175). Leadership theory at its core focuses on methods of integrating leaders and followers with common goals and missions to encourage and enact positive change. When we put all these concepts together, we are assessing the last 21 years of youth leadership literature in agriculture to determine common themes across a plethora of leadership theories and applications.

A great deal of research has investigated adult and young adult leadership development, unintentionally leaving leadership development of youth somewhat out of the conversation (Murphy & Johnson, 2011). While some research has taken a deeper dive into the enumeration of tasks and skills of youth leadership development and the mechanisms within, the overall amount of research into specifically youth leadership development does not match the amount of similar research into adult and young adult leadership development (Murphy & Johnson, 2011). Throughout this paper we aim to illustrate the current state of youth leadership research and identify areas of existing research that are lacking.

An important consideration from the research performed by Murphy and Johnson (2011) is their proposed model of leader development across one’s lifespan, where early development factors are listed, and their importance explained. Murphy and Johnson’s (2011) early development factors are broken down into three categories of: 1) early influences (genetics, temperament, and gender), 2) parenting styles (Authoritarian vs. Authoritative vs. Laissez Faire vs. Neglectful and Attachment Focus) and 3) early learning experiences (education, sports, practice). Considering factors from such an early age is bound to change the paradigm of leadership theories through further study and research, as was shown in this article. Their model then proceeds to consider adult-level and contextual-level factors that meld together with early developmental factors to affect adult leaders in their effectiveness and future development. This emphasizes the importance of all developmental levels of leadership learning and experience along with the leader’s context and expectations from their time as a youth.

Van Velsor and Wright (2012) point out that when leaders ask where future leaders will be sourced from, the typical method is to seek out individuals in high school and college who are naturally inclined to leadership roles or who have already sought out leadership positions in their educational experience. Current leaders have been inclined to ignore the potential benefits that focus on youth leadership could have on lifelong leadership development. Several identifying research questions were put forth by Van Velsor and Wright (2012) such as “1) the age a young person should commence his or her leadership journey, 2) whether leadership development should be part of the regular educational curriculum, 3) how widely it should be offered, 4) leadership qualities that managers want to see in young people entering the workforce, and 5) what excited managers and what concerns them about the young people they employ today” (Van Velsor & Wright, 2012, p. 2). Their findings show that an overwhelming majority (95%) of their respondents believed that leadership education should begin by age 21, with a further breakdown showing 21% think leadership development should begin by five years of age, 29% think leadership development should begin between ages 6 and 10, and 40% of respondents think

leadership development should be between ages 11 and 17 (Van Velsor & Wright, 2012). Other important data from this same study includes 84% of respondents believing opportunities for leadership development should be offered and available to all youth and 90% believed leadership development should be part of the educational experience of every student.

Conceptual Framework

The framework that guided this study stems from the National Leadership Education Research Agenda (NLERA) (Andenoro, 2013) and the National Research Agenda of the American Association for Agricultural Education (AAAE) (Roberts et al., 2016). The NLERA was designed to establish a foundation to guide Leadership Education research and development, and to form it as a discipline. The research priorities provide a framework for scholarship that will form future practices and developments of future leaders (Andenoro, 2013). The NLERA adopted seven priorities that defined the field of Leadership Education, broken into two defining areas (Andenoro, 2013). This study aligned with Priority 1 and Priority 2 in the first area: *Pedagogical Priorities*; dealing with leadership learning and usage of learning through innovative leadership education. Priority 1, *Teaching, Learning, & Curriculum Development* reflects the research and understanding of how to teach and learn leadership skills and attributes. Priority 2, *Program Assessment & Evaluation*, reflects that leadership educators understand the differences between leadership programs and the mechanisms of how these programs work in respect to leadership education (Andenoro, 2013). The application and usage of Priority 1 and Priority 2 from the NLERA as a framework for this study allows for the extensive assessment of current research regarding youth leadership development.

This study also aligns with the National Research Agenda (NRA) of the AAAE Research Priority Area 5: *Efficient and Effective Agricultural Education Programs* (Roberts et al., 2016). This research priority emphasizes the need for efficient agricultural communication, extension education, leadership education, and agricultural awareness in order to create efficient professional development programs that aid in career competency (Roberts et al., 2016). Many studies collected for this review used agriculture education as a method to teach leadership to youth, therefore using Priority 5 of the AAAE National Research Agenda helps to emphasize the role agricultural education plays in youth leadership development.

Purpose and Objectives

Literature syntheses provide a means to sift through and analyze the immense volume of data on a given subject and are considered the strongest measure of evidence (Biondi-Zoccai, 2016; Hennessy et al., 2019). The purpose of this study is to create a synthesis of literature that focuses on the examination of youth leadership development research within the Journal of Leadership Education from 2000 to 2021. Conducting a synthesis of the existing literature will help create a framework for the general process of conducting and analyzing results of youth leadership development research, as well as provide insight into the future of youth leadership development. This literature synthesis will also bolster support for the correlating AAAE National Research Agendas. The objectives of this study are to:

1. Determine the quantity of youth leadership development studies published in the Journal of Leadership Education from 2000 to present.
2. Identify major themes associated with youth leadership development research within the Journal of Leadership Education.

3. Summarize overarching trends throughout the results of youth leadership development research.

Methods

The design used for this study intends to quantify and interpret the existing research related to youth leadership development published in the Journal of Leadership Education (JOLE). The JOLE was selected for investigation due to their high regard as a journal that engages scholars and teachers while advancing leadership education and development in numerous fields (JOLE, 2021). Though there exists research regarding the topic, our study aims to include publications from the year 2000 to 2021 to identify any shifts in research styles and findings over the period. Our study design was partially developed from Kovar and Ball (2013), who established an efficient method for collecting and classifying literature. Three fundamental strategies for our precise, comprehensive research synthesis include: 1) search strategies, 2) inclusion criteria, and 3) source analysis and categorization.

Data Collection and Analysis

Strategies for collection involved an exhaustive search through the Journal of Leadership Education database for articles including key phrases. Inclusion criteria were key words and phrases such as: “youth leadership development”, “youth leadership”, “youth development”, and “leadership development”. Articles containing our criteria for youth leadership development were flagged and saved for further analysis by the researchers. Coding of the articles involved identification of article titles, research populations, study purposes, objectives, and overall research findings. Coding the articles allowed for further clarification and identification of themes across sources, as well as common research conclusions. One author was assigned the role of lead coder, responsible for categorizing all youth leadership development research. As suggested by Kovar and Ball (2013), peer debriefings served to externally review our research process. The purpose of this was to ensure reliable coding a logical order of organization in creating this synthesis of literature. Each researcher read and evaluated the literature, posed their suggestion for a theme that represented the main focuses and findings of the literature. Researchers then justified their reasoning for assigning each suggested theme. Following peer debriefings, researchers decided which of the various suggested themes best represented the existing literature. The themes were narrowed down to four main themes, with one emerging theme. Considering most literature touches on multiple themes, researchers conducted additional peer debriefings to determine, for each research article, which theme was Primarily associated, and if there are additional themes associated, they identified Secondarily associated, and in one article’s case, Tertiarily associated themes. From the results of existing literature, researchers have created conclusions regarding youth leadership development. Implications and recommendations for future youth leadership development practice and research are likewise provided.

Results

Literature findings for this study resulted in a total of 33 articles collected from the JOLE. Four main themes were identified by researchers to accurately represent existing literature

regarding youth leadership development. Those four themes are: 1) Youth leadership development programs, 2) Role of adults in youth leadership, 3) Youth leadership skill acquisition, and 4) Community-based leadership. One theme was broken into two sub-themes to enhance literature analysis and discussion. In this study, an emerging theme was identified by researchers. Due to the lack of peer-reviewed information on research modeling youth leadership development, there exists an immense gap in the research area. However, research published within the past few years has begun conceptualizing models of youth leadership development. The identified emerging theme, intended to represent cutting-edge research that addresses shortcomings in existing JOLE literature, is Modeling youth leadership development. Below, Table 1 displays the five themes and two sub-themes, corresponding example articles, article justification, and the number of articles associated with that theme specifically. This table intends to give a better understanding of how researchers coded and categorized the content of existing JOLE literature.

Table 1

Example Articles and Corresponding Theme Justifications

Theme	Sub-theme	Example article	Justification	Article #
#1. Impact of youth leadership development programs	N/A	Youth Leadership Development: A National Analysis of FFA Member Role and Activity Context (Horstmeier & Nall, 2007)	Found that FFA (a youth leadership program) helped youth gain life skills, such as leadership skills, and youth can recognize the skills they have gained	8
#2. Role of adults in youth leadership development	#2A. Adult Leader Viewpoint in Youth Leadership	The Perceived Importance of Youth Educator's Confidence in Delivering Leadership Development Programming (Brumbaugh & Cater, 2016)	The "results of this study indicate that perceived importance of youth leadership development training is predictive of youth educator's confidence level in teaching youth leadership."	8
	#2B. Youth Leader Viewpoint in Youth Leadership	Out-of-School Programming: Assessing Impact on Asset Development in Young People (Walahoski & Lodl, 2004)	Found that "4-H offers opportunities for [youth] having meaningful contact with adults that may not be as prevalent in other out-of-school offerings".	4
#3. Youth leadership skill acquisition	N/A	Assessing the Possibility of Leadership Education as Psychosocial-Based Problem Behavior Prevention for Adolescents: A Review of the Literature (Theodore L. Caputi, 2017)	Examined how engaging youth in leadership behaviors is related to preventing problem behavior. Additional results show leadership skill acquisition in youth.	7

#4. Community based leadership	N/A	Influences of Youth Leadership within a Community-Based Context (Jones, 2008)	Found that a leadership development program, that included civic engagement, exposed youth to practical skills and provided a sense of community connectedness.	5
#5. Modeling youth leadership development	N/A	Modeling Youth Leadership: An Integration of Personality Development Theories and Ethics (Sherif, 2019)	Found that by creating a model of youth leadership using existing youth leadership research and theories, which can help plan and implement effective leadership education, curriculum, and interventions.	5

*Some articles were included in multiple themes, see Appendix A for clarification.

Upon a comprehensive evaluation of the current literature regarding youth leadership development, researchers determined key findings and conclusions of those research studies. Each of the four main themes and one emerging theme are discussed independently to provide a thorough understanding of the current literature.

Impact of youth leadership development programs

In our review, we found that several studies researched the impact of youth leadership programs on youth development. Eight articles were primarily associated with this theme, and four articles were secondarily associated. Youth leadership development programs that were studied included: FFA (Future Farmers of America), 4-H, Boys & Girls Club, and leadership programs created by high schools and the community. The studies assessed the short- or long-term impacts they had on youth leadership skills and development. The short-term impacts were observed with students currently involved in leadership-based programs, finding that students gained confidence and the skills needed to be strong leaders (Bush et al., 2019; Horstmeier & Nall, 2007a; Horstmeier & Nall, 2007b; Rosser et al., 2009). Walahoski and Lodl (2004), comparing leadership skill differences between students in 4-H and students not in 4-H, found that 4-H students had stronger leadership skills. The long-term impacts were assessed through interviews with alumni, finding that the leadership skills gained were still utilized and the alumni believed these types of programs were beneficial to youth (Anderson et al., 2010; Bruce et al., 2005; Buschlen et al., 2018; Hoover & Bruce, 2006; Rosch & Nelson, 2018; Swigert & Boyd, 2010). Nestor et al. (2006) assessed the skills and current knowledge of 4-H adult leaders, concluding that the adult leaders directly impact the youth development in 4-H. These studies have continuously appeared in the past two decades, showing that research on the impacts of youth leadership development programs continues to be a research interest in youth development.

Role of adults in youth leadership

Youth leadership development generally has some level of adult aspect in the form of program leaders, community leaders, teachers, and parents, to name a few. In our review, we found research which directly quantifies the role of adults in youth leadership focuses on one of two viewpoints: 1) from the view of the adult, and 2) from the view of the youth leader. Therefore, we developed these two viewpoints into the two sub-themes for this theme.

Adult Leader Viewpoint in Youth Leadership

Youth leadership from the viewpoint of adult leaders was examined in eight of our 11 sources directly relating to the role of adults in youth leadership. Nearly all of the articles in this sub-theme focused on 4-H or FFA leaders with Voelker et al. (2019) specifically focusing on coaches in high school environments. Transformational leadership was used as a conceptual framework or as part of the research questionnaires in multiple sources (Bruce et al., 2006; Greiman & Addington, 2008; Nowak et al., 2019) where adult leaders generally self-reported transformational leadership behaviors and skills more often than transactional or laissez-faire leadership. They did, however, note that contingent reward behavior was adopted more frequently than the other least-utilized behaviors of transactional leadership. Comparing demographics to self-reported leadership outcomes found that gender and age did not affect leadership outcomes generally while leader training and education were found to have significant effects on perceived youth outcomes (Greiman & Addington, 2008; Nestor et al., 2006; Nowak et al., 2019). An overarching theme of the research in this subtheme was well stated by Brumbaugh and Cater (2016, p.1): the “perceived importance of youth leadership development training is predictive of youth educators' confidence level in teaching youth leadership.”

Youth Leader View of Adults in Youth Leadership

Four articles in this literature synthesis focused on the youth view of the adult leaders in their leadership journey. Walahoski and Lodl (2004) surveyed fifth, seventh, and ninth graders for character-building aspects of various levels and types of out-of-school leadership opportunities and involvement with adult leadership educators. The authors found that the asset-index relationship to level of out-of-school involvement was highest at the intersection of “contact with adults” and “4-H only” or “no activities” involvement levels. Walahoski and Lodl (2004, p.23) stated that “4-H offers opportunities for having meaningful contact with adults that may not be as prevalent in other out-of-school offerings” where adults are spectators and teachers instead of partners in learning. Horstmeier & Nall (2007a, p. 135) concluded that youth understood the directive roll of adults in their leadership education and “students seemed to see this as a positive, in that, without this form of encouragement they might not have participated.” The study assessing the influence of community-based leadership curricula on youth found that youth who completed a *Step Up to Leadership* program “had developed more positive perceptions of their relationships with adults” – from 3.41 pre-survey to 3.68 post-survey (Jones, 2009, p. 257). A study based on high school students in Kentucky “found that males and females who perceived their adult support more positively had more positive perceptions of their [own] leadership skills” (Hancock et al., 2012, p. 84). All four youth-centered studies displayed a positive correlation between quality interactions with adult leaders and perception of their own leadership skills at young people.

Youth leadership skill acquisition

In our study, 11 of the 33 articles displayed research that related to our identified Youth leadership skill acquisition theme. Seven articles were categorized as Primarily associated, and four articles were Secondarily associated to the theme. The articles that aligned with this theme were collected from a wide range of years, and discuss youth leadership skill acquisition, as well as provide outlines for desirable youth leader skills. Although it remains unclear as to which exact leadership traits are most valuable for youth leaders, existing literature in the JOLE

exemplify significant frameworks that aid in youth leadership skill acquisition (Bruce et al., 2006; Real & Harlin, 2006; Rehm et al., 2021; Ricketts et al., 2007). Key leadership skills identified by related articles included personal leadership beliefs, leadership self-efficacy, collaboration, direction-oriented action, independence, and service qualities, among many more (Caputi, 2017; Rehm et al., 2021; Ricketts et al., 2007). Various methods for guiding and enhancing youth leadership skill acquisition were discussed in the articles, with a heavy emphasis on involvement in developmental programs, extracurricular activities, and mentor-mentee relationships (Hoover & Bruce, 2006; Horstmeier & Nall, 2007a; Horstmeier & Nall, 2007b). No clear formula for teaching leadership skills or ensuring the skill acquisition is determined, however, existing research attempts to outline successful models.

Community-based leadership

In our review of youth leadership literature, we noticed a heavy emphasis on community-based leadership. Five articles (Harris & Beckert, 2019; Horstmeier & Ricketts, 2009; Jones, 2009; Rosser et al., 2009; Webster et al., 2006) were identified to fit within the theme of community-based leadership, which includes studies that involved service learning, civic engagement, training programs, or took place in other community-based contexts. Having community-based experiences provides youth with the opportunity to develop a sense of community connectedness and learn from their peers. Involvement in civic engagement can encourage youth leadership development via community involvement (Horstmeier & Ricketts, 2009; Jones, 2009; Rosser et al., 2009) which can aid in instilling greater confidence in youth and providing a life of continued engagement (Harris & Beckert, 2019). Similarly, service learning has been found to aid in the development of youth leadership skills (Webster et al., 2006).

Emerging Theme: Modeling youth leadership development

While examining the existing literature on youth leadership, we noticed an emergence of studies focused on various ways to model youth leadership. These studies were deemed an emerging theme based on the recency of the existing published literature as well as the novelty of this area of study. Five articles (Ahrens et al., 2015; Hastings & McElravy, 2020; Seemiller, 2018; Sherif, 2019; Rehm & Selznick, 2019) were identified to fall under this emerging theme. Modeling youth leadership is important to the field of leadership education as it provides a more conceptual and thorough understanding of the distinct components within youth leadership development. Seemiller (2018) identified a lack of existing youth leadership development models. Youth leadership development models are an effective tool to assess the effectiveness of youth leadership programs, such as FFA (Ahrens et al., 2015), and can be a resource for measuring youth leader self-efficacy (Rehm & Selznick, 2019). Additionally, by creating models that can predict youth leadership skills based on existing youth development theories and ethics (Sherif, 2019), youth program leaders can alter project outcomes and learning objectives to better support youth leadership development (Hastings & McElravy, 2020). By developing models such as these, we can achieve a better understanding of the needs and demands of youth leadership.

Discussion

The literature regarding the impact of youth leadership programs on youth leadership development shows to be an area of interest in the JOLE. With eight articles having this as the primary theme and four articles having it as the secondary theme, understanding these programs provides an insight into their importance in youth leadership. Earlier studies primarily focused on 4-H and FFA programs by assessing the leadership skills youth gain from these programs. The Walahoski and Lodl (2004) study highlights this with a comparison survey that concludes FFA members have stronger leadership skills than those who were not involved in a FFA program. It also becomes apparent how these specific programs give youth leadership skills that will translate into their adult life and will still be utilized (Hoover & Bruce, 2006). Recent studies continue to assess how 4-H and FFA impact youth leadership development but have started to assess other programs such as the Boys & Girls clubs and programs created by high schools or the community. Similar conclusions were made about the Boys & Girls Club (Swigert & Boyd, 2010) where alumni were interviewed about their experiences, and it was concluded that this program gave members the chance to grow leadership skills and seek leadership opportunities as adults. Community leadership programs similarly have positive impacts on youth leadership development by giving opportunities for youth to learn and expand their skills (Buschlen et al., 2018). Overall, these studies show that youth leadership programs have a positive, lasting impact on youth by giving them the opportunity to expand their life skills to grow as leaders.

Adult roles in youth leadership development are inherent as teachers, coaches, counselors, parents, and organization leaders are part of the youth leadership process. The majority of literature in this theme showed a preference for adult self-reported leadership skills and impacts on the youth they work with. The most common conclusions drawn from adult-view of leadership studies included continuous leadership training and education of adults relating to positive outcomes in the youth they teach (Brumbaugh & Cater, 2016; Nestor et al., 2006; Nowak et al., 2019; Voelker et al., 2019) and use of transformational leadership techniques and skills in youth leadership education (Bruce et al., 2006; Greiman & Addington, 2008; Nowak et al., 2019; Windon et al., 2021). These commonalities among the research focused on adult roles in youth leadership leads us to conclude that continuing leadership education for adult leaders along with employment of transformational leadership skills may have the most positive influence on the youth leadership educational process, regardless of type of program. Youth voices in this area were largely in the minority with only four of the twelve articles in this theme utilizing methods which directly gleaned youth impressions of adults' roles in their leadership education. Each of the four youth-centered studies found a positive correlation between adult leader interactions and youth leadership development as well as leadership skill acquisition. Horstmeier and Nall (2007) concluded similarly that students acknowledged the adult's role was as directive, guidance that many youths require during developmental periods. Involvement in community-based leadership activities was also noted as an important part of the youth leadership process where adult involvement was crucial to youth perception of their own skills and abilities (Hancock et al., 2012; Jones, 2009). These conclusions lead us to reiterate the importance of high-quality interactions between youth and adult leaders as well as utilizing continuous leadership education and training for the adult leaders in this process.

As we have discussed much in this review, there exist many ways to promote the acquisition and development of youth leadership skills. However, it is still unclear how to measure our youth's actual level of leadership skill acquisition most effectively. Related

literature we collected displayed various ways to measure and model youth leadership skill acquisition such as Leadership Skills Inventory, Multifactor Leadership Questionnaire, and more recently, Leader Self-Efficacy (Bruce et al., 2006; Real & Harlin, 2006; Rehm, 2021). As we continue to provide ways for youth to develop their leadership skills, we must also find ways to measure their development and ensure skill acquisition. Transformational and transactional leadership frameworks were highlighted as effective among youth by Bruce et al. (2006), but more recent research by Bush et al. (2019), with the Teen Excellence in Leadership Institute, showed that blending the Chickering Model of Identity Development and the 4-H Citizenship framework were impactful and successful at providing youth the leadership skill development opportunities and measuring their status. In the literature reviewed, there are mixed opinions when it comes to modeling and measuring skill acquisition. It seems, though, that leadership development programs and educators are adapting to how the youth learn and how they interact. Research shows that youth's skill development is highly affected by the youth's environment and characteristics of those they interact with (Anderson et al., 2010). Inversely, leadership skill development is not only affected by the environment, but the level of leadership skill development can also affect the leader's environment. Research by Caputi (2017) displayed how a youth's leadership skill acquisition can affect so much including management of bad behavior, academic success, and community involvement. General findings within this theme show that as youth leadership skill acquisition increases, in both quantity and quality, many other aspects benefit.

Community based leadership has been identified as an opportunity for youth to develop skills necessary to be a leader and to foster a sense of connectedness through a common goal, thus its selection as a major theme within this review. Understanding how service learning and community-based endeavors can function in youth populations to foster leadership development can be useful in creating youth leadership program curriculums. Existing literature emphasizes the importance of youth playing a role in decision making in community-based contexts. Webster et al. (2006) found that by allowing youth to take part in the planning, implementation, and evaluation of service-learning projects, a sense of involvement and connectedness within the organization or community can be fostered. Furthermore, adults should encourage youth participation to ensure a reciprocal process (Webster et al., 2006). It is important to provide youth with adequate time and accountability for their leadership experience for community development to be effective (Rosser et al., 2008). A similar study conducted by Jones (2008) concluded that when youth are directly engaged in leadership development opportunities, they have more positive perceptions towards decision making in their communities. A study by Horstmeier and Ricketts (2009) identified that through school-based civic engagement activities, the link between leadership skill acquisition and leadership skill application is created. Harris and Beckert (2019) expand upon this idea by emphasizing that youth can not only emerge as leaders through volunteerism, but also positively impact society by fostering social change. The literature within the theme of community-based leadership demonstrates that providing youth with strong leadership experiences can result in the development of strong communities.

Recent research has identified the need for models of youth leadership to quantify existing research, establishing a common baseline for future researchers. This is an important area as recent literature has indicated a lack of quantifiable results in the realm of youth leadership development. There have been five studies published in this area of interest since

2015. Modeling youth leadership can be very helpful in interpreting research results. For example, Ahrens et al. (2015) used a three-part instrument, which included the Youth Leadership Skills Development Scale (YLLSDS), to evaluate the effectiveness of youth leadership development at the 2012 Arkansas Leadership Conference. Seemiller (2018) created a theoretically grounded framework for youth leadership competency that was developed by using a meta-analysis of leadership competencies included in a professional preparation framework. Creating frameworks such as these can be helpful in developing youth leadership programs. Similarly, Sherif (2019) created a theoretically grounded conceptual model of youth leadership that involved five major youth leadership domains: cognitive, motivational, affective, behavioral, and ethical. This model can be applied to youth leadership programs targeted at encouraging the learning and practice of leadership. Measuring youth leader self-efficacy is also an important component to youth leadership development. Rehm and Selznick (2019) used an original survey instrument to measure youth leader self-efficacy to create a common youth leadership language and positive leadership experiences for all. Hastings and McElravy (2020) conducted a comparable study to Rehm and Selznick that examined youth leadership skills predictors which can help to make youth leadership development programs more effective. Modeling youth leadership development can help to make consistent methodologies within the field of youth leadership as well as aim to create a common language that ensures continuity amongst all youth leadership research.

Conclusions and Recommendations

It is critical for future research to investigate how youth can be supported through effective leadership education via youth leadership programs, as well as guidance from adults in their communities, to acquire skills necessary to become competent leaders. This literature review included 33 articles on youth leadership development in the *Journal of Leadership Education* from 2000 to 2021 and found four major themes along with one emerging theme. Articles within these themes emphasized the role of adults in youth leadership, the impact of youth leadership development programs, the acquisition of youth leadership skills, the value of community-based endeavors in developing leaders, and the need for developing succinct youth leadership models. With these themes in mind, youth program developers can provide youth with the necessary opportunities to acquire leadership skills as well as the autonomy to initiate leadership engagement within their community and one another. Additionally, the emerging theme, Modeling youth leadership, can provide an opportunity for researchers to recognize the gap in existing models to quantify youth leadership development and strive to fill this lack of knowledge.

These themes achieve the goals of Priority 1 and 2 of the NLERA and Priority 5 of the AAAE National Research Agenda by providing recommendations on how leadership development can be presented to youth and providing suggestions on how to create effective youth leadership programs. Specifically, the theme of Youth leadership skill acquisition meets the needs of Priority 1 by providing an understanding of the skills and attributes youth need to be effective leaders. The themes Role of adults in youth leadership, Impact of youth leadership development programs, and Community based leadership achieved the goals of Priority 2 and Priority 5 by highlighting how youth leadership programs (e.x. FFA) can be effective in providing leadership education to youth as well guiding adults in their role as youth educators.

With these themes and areas of interest in mind, implications were presented for future research and practice within the realm of youth leadership development.

Through this literature review, we determined that future research in this topic may benefit from a more thorough investigation of longevity of leadership skills in alumni of youth leadership programs, as well as an increased focus on the youth perspective of their own leadership development and their perceptions of adult leader interactions. Six of the eight articles in the theme Impact of youth leadership development programs covered long-term impacts of youth leadership development programs by interviewing alumni of these programs as adults (Anderson et al., 2010; Bruce et al., 2005; Buschlen et al., 2018; Hoover & Bruce, 2006; Rosch & Nelson, 2018; Swigert & Boyd, 2010). While these long-term studies included most of the articles in the theme, the quantification of long-term effects of leadership development of youth as they become adults have yet to be standardized. Further research may be necessary to identify the best fit for the quantification of youth leadership skills translating to adult leadership abilities, as three of the studies utilized semi-structured interviews (Anderson et al., 2010; Bruce et al., 2005; Hoover & Bruce, 2006), one conducted structured interviews (Swigert & Boyd, 2010), one employed transcendental phenomenology and a corresponding interview (Buschlen et al., 2018), and one using a quantitative questionnaire (Rosch & Nelson, 2018). Five of these studies had a sample size of 25 participants or less (Anderson et al., 2010; Bruce et al., 2005; Buschlen et al., 2018; Hoover & Bruce, 2006; Swigert & Boyd, 2010) while the other study had a sample size of 757 (Rosch & Nelson, 2018). The trend among these articles seems to be interview-based inquiry amongst a small number of participants, though questions used in each study were not included in the methodologies and may vary. Further research can help standardize interviews for these long-term studies on leadership skills or may show that the more quantitative approach conducted by Rosch and Nelson (2018) provided clearer conclusions.

Of the twelve articles in the Role of adults in youth leadership theme, eight articles (Bruce et al., 2006; Brumbaugh & Cater, 2016; Greiman & Addington, 2008; Nestor et al., 2006; Nowak et al., 2019; Rehm, 2014; Voelker et al., 2019; Windon et al., 2021) utilized the adult view of youth leadership while only four articles (Hancock et al., 2012; Horstmeier & Nall, 2007; Jones, 2009; Walahoski & Lodl, 2004) considered the youth view of their own leadership development. This uneven view of youth leadership which currently focuses on the adult's view of their own abilities to develop youth in their leadership skills may not provide a complete picture of the effectiveness of the programs examined. Future research should include data from both viewpoints, aiming to find correlations between the adult and youth perspective. Our emerging theme of modeling youth leadership development also highlights an area of potential research as identifying quantifiable data with regards to conceptual models of youth leadership is not well covered in existing research.

Moving forward in the practice of developing youth leaders, ample amounts of research discuss the importance and value of youth leadership development programs. These resources should be utilized when deciding which programs and activities are best suited for the targeted youth. Furthermore, research has shown that adults play a vital role in youth leadership development, thus mentors and teachers incorporating leadership development lessons should be aware of their severe impact (Voelker et al., 2019). Leadership mentors should also implore youths to acquire leadership skills at younger ages as it is proven to provide benefits in aspects of success and behavior management (Caputi, 2017). Lastly, much research has shown that

involvement in community and extracurricular activities is a great tool in developing leadership skills among youths (Hancock et al., 2012; Harris & Beckert, 2019). Youth should be encouraged to engage in their community via volunteerism, programs, workshops, or other pathways, to fully immerse themselves into situations that help them to develop leadership skills and abilities.

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Black Doctoral Women's Socialization Experiences in Agricultural Science and Education Departments

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Introduction

Marginalized doctoral students need to feel a sense of belonging and mattering in order to excel in their academic endeavors (Winkle-Wagner et al., 2010). However, Black students in STEM have reported a diminished sense of belonging. In fact, Black women have reported significantly lower sense of belonging than Black men (Strayhorn, 2011). The STEM climate can contribute to decreased sense of belonging, difficulties socializing into their discipline, or leaving their discipline altogether (Dortch & Patel, 2017; Seymour & Hewitt, 1997). Positive socialization experiences through mentoring, equitable advising, and support from doctoral students' departments can help enhance sense of belonging and mitigate barriers experienced (Azizova & Felder, 2017).

In addition to diminished sense of belonging, many Black women in doctoral education experience several barriers, including poor socialization, inadequate mentoring, negative campus and departmental climate, and gendered racial microaggressions (Jones et al., 2013; Lewis et al., 2017; Patterson-Stephens et al., 2017; Patton & Harper, 2003; Strayhorn, 2012a). Agricultural disciplines are not exempt from the challenges Black women in other disciplines have experienced, especially considering the small numbers of Black women enrolled in agricultural doctoral programs at HWIs to support each other. As more Black women enroll in doctoral programs, it will be essential for agricultural departments to examine and address the factors that influence their retention and graduation rates. However, research on Black women in the context of agriculture and doctoral education in agricultural sciences is relatively unexamined. Further, there is a lack of research regarding professional development experiences of Black women in agricultural sciences. We must continue to examine how doctoral education in agricultural sciences does or does not equitably socialize students into the discipline. Shinn et al. (2008) noted the need to re-examine doctoral student preparation for the profession. However, the study examined the "what" of doctoral agricultural education but not the "how" or "who." Discussion on "how" and "who" are needed to examine the doctoral process for agricultural students. Examining the process and doctoral student experiences will help to better address retention and inclusion for marginalized doctoral students.

Literature Review

Doctoral Socialization

Socialization is defined as the process whereby newcomers learn the knowledge, skills, behaviors, and values of a specific discipline (Taylor & Antony, 2000; Weidman, 2006). Socialization is one of the leading frameworks in the study of doctoral students (Austin, 2002, Gardner & Mendoza, 2010) and is often discussed as a set of phases or stages. Weidman et al. (2001), Lovitts (2001) and Twale et al. (2016) outlined four developmental stages of socialization: (1) the anticipatory stage, where students become aware of the behaviors, attitudes, and expectations of their department and discipline, (2) the formal stage, where students

experience mentorship, observe their advisors and other faculty members to learn from them in the classroom and/or laboratory, (3) the informal stage, where students learn from their peers, and (4) the personal stage, where students' cognitive and behavioral practices reflect those of their discipline. Scholars have criticized research around socialization due to its monolithic approach to graduate education, failing to address individual, disciplinary, or institutional differences (Antony, 2002; Gardner, 2008). Gardner's (2009) Doctoral Student Development model of socialization consists of three phases: (1) entry, which is described as the time period of admission into a doctoral program until coursework begins, (2) integration, which is the time period where coursework serves as the main sources of social and academic integration for doctoral students' experience, and (3) candidacy, where the student has passed comprehensive/preliminary examinations and is engaged in the dissertation process. Bertrand Jones and colleagues (Bertrand Jones & Osborne-Lampkin, 2013; Bertrand Jones et al., 2015; Davis-Maye et al., 2013) have posited that socialization includes three components: academic preparation, mentoring, and professional development. Doctoral students take courses that lay the foundation for dissertation research and exploration of a research agenda. Mentoring is a relationship in which a more experienced person guides a less experienced person. Mentoring relationships for doctoral student socialization can be between faculty and students, between students, and can be formal or informal. Professional development includes formal and informal opportunities that contribute to professional growth. Sites of socialization for doctoral students includes attendance at national conferences, working with advisors on publications, internships, the classroom, networking with faculty in and outside of the department, and other graduate students.

Altbach (2011) described the socialization process as being deeply rooted in the foundations and culture of the university. When universities, departments, and faculty ignore and/or shy away from conversations that may challenge inequity(ies) in the socialization process, they perpetuate the institutional status quo. Consequently, Black women must navigate institutional norms that do not represent or address their intersecting identities. Further, the lack of Black women faculty available in-department to serve as advisors, supervisors, and mentors is detrimental to Black agricultural doctoral women's success. In 2018, Black women represented 3% of full-time faculty nationwide (NCES, 2020). Harper (2013) asserts that marginalized students must see faculty and administration who share their own demographics. Black doctoral students have reported faculty advising and mentorship more readily available from Black faculty (Blockett et al., 2016). Research indicates the most important relationships doctoral students develop are with their mentors (Felder, 2010) and their advisors (Gardner, 2009; Golde, 2000). Socialization is essential to establishing a research agenda and identifying a career path, and Black women doctoral students without a formal mentor to assist with socialization are at a disadvantage (Felder, 2010).

Agricultural Departments and Socialization

While there is research concerning graduate student socialization in agricultural disciplines (Hammond & Shoemaker, 2014a, Hammond & Shoemaker, 2014b, Mars, 2016) there is a gap in research concerning racially/ethnically marginalized doctoral students and doctoral students who are marginalized in multiple ways. However, researchers have generally found that marginalized students in agriculture struggle to connect with faculty and students, integrate into

the classroom, and with the overrepresentation of whiteness in the discipline. For example, Martin & Wesolowski (2018) found that interactions students have within an agricultural department have a strong influence on their decisions and willingness to be involved in activities beyond the classroom. Many connections with other students, faculty, and potential employers happen outside the classroom at informal social activities. Black women often do not attend these social activities to avoid being microaggressed and other uncomfortable situations and consequently, may miss out on new professional connections and job opportunities.

Theoretical Framework: Critical Race Feminism

The theoretical framework that informed this study was critical race feminism (CRF). CRF is a body of scholarship evolved from the work of women of color in legal academia who were excluded by their male peers and white feminist scholars (Evans-Winters & Esposito, 2010; Few et al., 2007; Wing, 2003). Informed by scholarship from critical legal studies, critical race theory, and feminism, CRF is an explanatory tool used to understand how race and racism work with gender and sexism to play dominant roles in the treatment of Black women (Collins, 1990; Crenshaw, 1989; 1991). CRF scholars challenge the notion that there is one singular Black female experience and assert that every Black woman has a unique experience due to the multiple facets of their identity (e.g., race, gender, class) (Crenshaw, 1991). Further, CRF explains that any critique of oppressive structures is inadequate if the intersectional experiences of the oppressed are not addressed. Wing (2003) introduced the concept of “multiplicative identity,” which suggests that when multiplied together, the multiple identities of minoritized women become a “holistic One.” Multiplicative identity also states that minoritized women not only share a negative experience, but also a diverse positive experience. Delgado (2003) noted, “the world of the woman of color is unique; it is not a combination of the two worlds of Black men and white women, A plus B equals C: (p. xiv).

As a sibling theory to Critical Race Theory, CRF shares several theoretical commitments, but differs in the addition of Intersectionality to address the experiences of Black women. The tenets include: 1) Racism is normal to US society; 2) Interest convergence states the marginalized advance only when their interests converge with the interests of those in power; 3) Experiential knowledge of the marginalized is needed to understand, analyze, and teach about racial subordination; 4) Whiteness as property is the premise that the assumptions, privileges, and benefits of being white are valuable assets white people seek and protect; 5) Critique of liberalism challenges the concepts of objectivity, meritocracy, and colorblindness; and 6) Intersectionality occurs when racism intersects with other subordinated identities (e.g., sexism, classism, homophobia, etc.) to influence the lived experiences of the marginalized.

Purpose and Research Question

This study is derived from a larger narrative study which examined how intersecting oppressed identities shape the experiences of Black women doctoral candidates in Agricultural and Life Science disciplines at HWIs and how those experiences shape their journey into or away from the academy. The current study will focus specifically on the participants’ socialization experiences. The research question that guided this study was: How do intersecting marginalized identities shape Black doctoral women’s socialization experiences?

Methodology

Critical Narrative Inquiry

Narrative inquiry is the study of descriptive experiences that allow the researcher to capture the whole story and illuminate complex social problems (Clandinin & Connelly, 1987). Critical narrative inquiry seeks to question and understand how narratives intersect with power, and how individuals situate themselves (Allen & Hardin, 2001). Connecting narrative inquiry with a critical approach strengthens the ability of the researcher to identify and critique the social and cultural character of personal narratives (Squire, 2008). Moreover, the goal of narrative inquiry is to make sense of participants' personal experiences relation to the researcher's research question(s) which are derived from the researcher's theoretical framework. Lieblich et al. (1998) identified three voices that must be acknowledged to further dialogue in narrative research: the narrator (the participant), the theoretical framework (Critical Race Feminism), and the voice that emerges from self-awareness during analysis. The researcher collects the participants' stories, retells them, and becomes the narrator, paying special attention to accuracy and interpretation without "writing over" participants' stories (Clandinin & Connelly, 1990). Narrative methods are appropriate for exploring marginalized experiences because narratives on identity are "produced at cultural, institutional, organization, and individual levels of social life" (Loseke, 2007, p.662). Further, narrative inquiry amplifies the voices and stories of silenced and marginalized groups in more conventional modes of inquiry (Bowman, 2006).

Research Settings and Participants

This study is derived from a larger narrative study conducted to explore the experiences of Black doctoral women in agricultural disciplines at Historically White Institutions (HWIs)¹. The present study represents findings specific to participants' socialization experiences. I began conducting the study spring 2019. Each participant was enrolled at an 1862 land-grant university and historically white institution (HWI). Using each university's office of enrollment website, in 2018 Black women comprised no more than 8% of graduate enrollment across all institutions. Five Black women who had passed their comprehensive/preliminary examinations in agricultural disciplines participated in this study. Additionally, participants were full-time, domestic students, and self-identified as Black women. I particularly recruited doctoral candidates because they would have more graduate experiences to help develop a richer narrative and have a better understanding of departmental norms and climate. Most participants chose their own pseudonyms, and I chose one for those who did not. I also gave the universities a pseudonym to further protect the participants' anonymity. The following table presents profiles for the participants. The variation across the participants' educational training and generation of college student is noteworthy considering their similar doctoral experiences.

¹ Historically White Institution (HWI) is used instead of Predominantly White Institution (PWI) to acknowledge the percentage of white students on campus has less to do with actual numbers and more to do with the "historical and contemporary racial infrastructure that is in place, the current campus racial culture and ecology, and how these modern-day institutions still benefit Whites at the expense of Black communities and other communities of Color" (Smith et al., 2006, p. 322).

Table 1. Demographic Characteristics of Study Participants

Pseudonym	B.S.	M.S.	Ph.D.	Year in Program	Generation of College Student	Generation of Doctoral Student	Race/Gender of Advisor
Nahla	HWI; HBCU ^a	HBCU	HWI	4 th	2 nd	1 st	Black Woman
Ebony	HBCU	HBCU	HWI	4 th	1 st	1 st	White Man
Errica	HWI	HBCU	HWI	2 nd	3 rd	1 st	White Man
Jayei	MSI	HWI	HWI	4 th	2 nd	1 st	Black Man
Karla	HWI	HWI	HWI	3 rd	1 st	1 st	White Woman

^a Nahla started her Bachelor's degree at an HWI and transferred to an HBCU.

Data Collection

Each participant was interviewed in three, 60–120-minute Zoom sessions. I held three interviews with each participant to increase prolonged engagement, which enhanced credibility (Creswell, 2012). Each interview focused on a phase (i.e., Entry, Integration, and Candidacy) of the Doctoral Student Development Model, which is a model of socialization (Gardner, 2009). Phase 1, Entry, is described as the time period of admission into the doctoral program until coursework begins. Phase 2, Integration, describes the time period in which coursework serves as the main source of social academic integration of doctoral students' experiences. Phase 3, Candidacy, is the final phase in which the doctoral student has passed comprehensive/preliminary examinations and has reached candidacy status. Each interview was audio and video recorded and transcribed by a third-party service. Once interviews were transcribed, the audio, video, and transcriptions were stored on my laptop with a secured password accessible only by me, then permanently erased from the audio recorder.

Data Analysis

To begin, I printed and organized all the interview data for manual coding. For the first cycle of coding, I used initial, simultaneous, and narrative coding. Simultaneous coding allowed me to assign multiple codes to content that may have more than one meaning (Saldaña, 2013). Last, narrative coding allowed me to explore intra- and interpersonal participant experiences to understand their storied experiences. For the second cycle of coding, I used focused coding to organize data around the most salient categories (Saldaña, 2013). The categories and themes for each narrative were reviewed and compared to other narratives to create a co-narration of meanings, themes, and descriptions with the participants. To meet the criteria for trustworthiness, I used member checking to check for accuracy, engaged in prolonged engagement with my participants, established an audit trail, and obtained rich descriptions through the three interviews to allow for second decision span generalization (Patton, 2015; Kennedy, 1979).

Positionality

As a Black woman scholar, I bring with me my past experiences of growing up in a diverse city; having many Black women secondary, postsecondary, and graduate instructors;

attending a Historically Black College/University (HBCU); and attending an HWI for my doctoral program. I also acknowledge the privilege I have experienced in having a positive relationship with my doctoral advisor; having mentors to help me through the doctoral process; and working in a student-driven, majority Black research group. Understanding our shared but different experiences forced me to make careful decisions regarding the research process, including building rapport with participants, how I analyzed and interpreted data, and how I presented research to the public. Consequently, I continue to interrogate my own research decisions regarding theory, methods, and analysis to ensure I do not (re)produce oppression and trauma in my research.

Findings

Three main themes were found during analysis: 1) Trust in Advising Relationships, 2) Departmental Experiences, and 3) Conference Experiences. Overall, socialization activities consisted of receiving advising; interacting with departmental faculty and students; and attending conferences to network, present research, and professional development. Additionally, the bulk of the participants' socialization experiences occurred in their home departments.

Theme 1: Trust in Advising Relationships

A doctoral student's advisor may be a mentor, but not all advisors are mentors. For an advisor to be a student's mentor, a level of trust must be gained, established, and maintained between the mentor and the mentee. Establishing trust in cross-race mentorships has been reported as a major issue (Johnson-Bailey & Cervo, 2004). According to Smith (2010), the largest gap in cross-racial trust is between Black and white people. Trust is a vital component in any successful mentoring relationship (Chan et al., 2015; Rademaker et al., 2016). Three of five participants indicated that their advisor was not their mentor. Interestingly, all three of these participants were engaged in cross-race advising relationships and cited lack of trust as a major reason why their advisor was not their mentor. Errica explained,

When it comes time for me to start applying for jobs...he will be very helpful in that process. But, one of the things on my mind has been: if I go into academia and become a faculty member, how willing am I to join a department's faculty and be the only Black faculty? That's something I would share with a mentor. Not that I couldn't share that with him, but I don't want to. What insight can he give me?

A few years prior to our interview, Errica's advisor divulged sensitive personal information to another faculty member in the department. At the time of our interview, Errica had moved past the events that caused her mistrust and sees her advisor as a source of support. However, she mentioned that she still thinks about it. Similarly, Ebony found out that her advisor had been discussing information from their advising meetings with other faculty. Faculty would see her in the hallway and ask her about something she knew she only discussed with her advisor. In another incident, Ebony found out at a conference that her advisor was presenting research she completed. She explained,

He would ask me to complete assignments and projects, but I then I would hear nothing about it. What really upset me was I went to a conference with him where I was presenting a study related to my dissertation research. When I got there, he had submitted [my] research to the conference...but didn't tell me. He put my name on the presentation,

but I knew nothing about it. So, he's doing this whole thing with stuff I taught him, with information I've written up and given to him for review. Profiting from my labor without giving me credit.

Karla's advisor was a junior, tenure-track faculty and is not considered her mentor. Karla described being ignored by her advisor and other departmental faculty at a conference, and it took a long time for their advising relationship to recover.

Jayeri and Nahla both consider their advisor to be their mentor, and both are advised by Black faculty. Nahla mentioned feeling understood and trusting her advisor to guide her through the doctoral process. Similarly, when asked about her relationship with her advisor, she stated "I felt protected from white power, privilege, and position. I felt supported. I finally felt understood on this campus...I felt respected." Jayeri also mentioned that her advisor empowers her through opportunities to collaboratively write papers and op-eds, CV review, and other forms of career support.

Theme 2: Departmental Experiences

The department is often the main source of socialization for doctoral students. Interactions with faculty, staff, department heads, and other students shape how a doctoral student experiences socialization within the department. Three of five of my participants reported that they do not feel like a part of their department. Karla indicated that she has never felt like part of her department and has had to find psychosocial support from peers and faculty at other institutions. Specifically, she said, "I feel like I'm on an island. [College City] is a very lonely place for me." Similarly, Ebony expressed that she wished she had either never attended her doctoral institution, transferred to another institution, or changed advisors. Jayeri stated that she does not feel seen or heard in her department. In fact, she mentioned feeling "unknown" by others in her department. Relatedly, Ebony said she never felt included in her department and felt like she was "alone in a crowd" when navigating her department. Further, Ebony felt that being a Black woman in her department was like "walking on eggshells. She felt she had to simultaneously be a positive representation for Black people, correct misconceptions white people have about Black people, and protect Black students and Black culture.

Conversely, for Errica and Nahla, the department has been a place they have found a sense of belonging. Errica participated in departmental activities, volunteered to help host prospective graduate students, and served on the department's graduate committee. She also mentioned not feeling lonely because of the other doctoral students who were women of color. Nahla felt that faculty in her department were "open" and mostly available to help students. She also mentioned the faculty and student population was very diverse.

Faculty have the potential to make students feel welcome and included, serve as a mentor, serve on dissertation committees, and be a role model for students within a department. As such, I asked participants specifically about their interactions with faculty in their departments. These interactions included classroom experiences. Feelings regarding departmental faculty ranged from neutral to positive and did not have much to say. However, Jayeri, Ebony, and Karla spoke specifically about their interactions with white women in their departments. Black women have historically had a complicated relationship with white women.

White women have been described as women of color's "greatest barrier to success" (Kendall, 2012, pg. 17). In times when white women have been in positions to be allies and advocates to Black women, they may choose whiteness and/or to stay silent (Chamblee, 2012). Both options uphold, protect, and perpetuate white supremacy (Castagno, 2008). Jayei indicated that white women in her department were aggressive toward her and dismissive of her. She stated, "I try to stay under the radar. They'll make life a living hell for you by invoking their power and privilege." She indicated having very surface-level relationships with other faculty (e.g., "hi and bye"). Similarly, Karla mentioned that white women in her department exude a sense of superiority and privilege. Like Jayei, Ebony discussed trying to avoid conflict with white women. In an attempt not to upset white women faculty in her department, she minimized herself to seem "non-threatening." Errica indicated that she did not have any issues with faculty in her department, but she did not necessarily trust them. However, she did mention being microaggressed by an Asian woman faculty in her department who made offensive comments about her hair.

Theme 3: Conference Experiences

Academic and professional development conferences are another site of socialization. Students are able to interact with faculty outside of the classroom and environment, are able to engage in scholarly conversations with others in the field, and network with other students. The three conference most frequented by most of the participants was the Minorities in Agriculture Natural Resources and Related Scientists (MANRRS) conference, the American Association for Agricultural Education (AAAE), and the North American Colleges and Teachers of Agriculture (NACTA) conference. Unsurprisingly, of the three conferences, the MANRRS conference was reflected upon most favorably. Participants also enjoyed attending the NACTA conference, citing constructive feedback on research, affirmation of research, and acceptance of contemporary research as reasons why. What I did not expect was the participants' reflections on attending the Regional AAAE conferences. The participants were not in the same regions but had similar experiences. Each participant who attended AAAE conferences felt they could not be themselves at the conference, and felt they were simultaneously being ignored and surveilled. At Ebony's first Regional AAAE conference, a white woman put her hands in her hair, lifted it, and said, "Oh my god; it's so clean!" Outside of being microaggressed, Ebony was ignored at the conference and did not interact with any other faculty. Karla was ignored by faculty from her department, as well as other conference goers at her Regional AAAE. Errica saw the lack of racial/ethnic representation at AAAE as continued lip service regarding increased DEI efforts with no actual action. To that point, Ebony stated, "I don't think other Black ag faculty go because they know they're not wanted."

Discussion

The purpose of this study was to examine how intersecting oppressed identities shape the socialization experiences of Black women doctoral candidates in agricultural disciplines at HWIs. Participants received the majority of their socialization experiences in their department and at conferences. Gardner (2009) found advisors to be a critical factor in doctoral students' success during all points of their program. Further, research indicates the most important relationships doctoral students develop are with their mentors (Felder, 2010) and their advisor

(Gardner, 2009; Golde, 2000). Advisors can help mitigate challenges for Black women doctoral students by sharing information about graduate school, the academic discipline, and the department (Barnes & Austin, 2009). Unfortunately, some participants in my study reported trust issues in their advising relationships, which impeded the progression of the mentoring relationship. Due to the lack of Black women faculty, Black women doctoral students will most likely be engaged in cross-race advising relationships at HWIs. Faculty advisors must be more thoughtful about the way they treat their advisees. Advisors are supposed to help guide their students, serve as a role model, and make the unspoken rules explicit. If these advisors were able to transition from solely advisors to the mentor role, they would have been able to help mitigate their advisees' feelings of isolation.

Overall, most of the participants' departmental experiences indicated a poor departmental climate for Black women. Further, findings from this study indicate that practices that are considered the norm of the department shape departmental climate and students' sense of belonging. Scholarship from Anderson (2006) and Jordan (2011) both indicate that Black students must feel a connection with their educational environment to be successful. The climate of STEM disciplines most often reflect those of white males, which is often individualistic. This is in direct opposition to those of Black women, which tend to be cooperative and community-oriented (Ferguson, 2016). Most participants indicated not feeling like a part of the departmental environment. Gardner (2009) asserts that navigating isolation is one of the biggest challenges for doctoral students. Consequently, Black women may experience isolation on many levels: structural isolation as the only Black person or Black woman in a department, isolation from difficulty in finding community outside of the department/university, isolation in conducting independent research, and possible isolation due to their research topic focusing on diversity and inclusion. Jayei stated that faculty in her department "barely speak to us" and that her relationship with faculty was very surface-level. Departments must re-evaluate their norms to better understand the doctoral student's experience in their department. Instead of using their power and privilege to subordinate students, faculty should be using their power and privilege to help enhance students' doctoral experiences.

Conferences are sites of socialization where students can interact with other faculty, receive feedback on research, and network with other doctoral scholars. Conferences are also sites where students are socialized into the norms of the discipline regarding disciplinary practices, research, and rules of engagement. Considering most of my participants had poor relationships with their advisors, their advisors most likely did not help integrate them into the conference. One indication of this is how many of my participants indicated spending time isolated and alone during the AAAE conferences. It is not surprising that my participants had positive experiences at the MANRRS conference; however, the NACTA conference-which does not cater to marginalized populations-also received positive remarks. Socialization to research practices and engagement can happen at conferences. How does socialization at conferences occur if senior scholars and prospective colleagues ignore and microaggress up-and-coming researchers?

The normalization of whiteness in the department and at conferences diminished participants' sense of belonging. Harper and Hurtado (2007) assert that a student's sense of belonging in an environment is a direct indicator of how inclusive or exclusionary the

environment's racial climate is. Moreover, "The more exclusionary for students of Color, the more that Whiteness is the climate norm (Harper & Hurtado, 2007). The more that whiteness is the norm, the lower the sense of belonging (Gusa, 2010)" (Cabrera et al. 2017, p. 68). The sense of superiority and the privilege to ignore and exclude shows how whiteness is the norm in the participants' academic and conference spaces. This aligns with work from Cabrera et al. (2017) and Gusa (2010), who concluded that white privilege allows white people to distance themselves from non-white people and are allowed to continue to be discriminatory and microaggressive toward Black women. The overrepresentation of whiteness in a space can relay the message to Black women that the space is exclusive to white people and serves as a deterrent to participation in the discipline and at conferences. White scholars must work to dismantle white supremacy within their institutions and organizations. Failing to address racism and exclusionary practices will lead to Black women's attrition from the discipline. Effective cultural competency training will help white people in colleges of agriculture to think critically about what it means to be white, the privileges associated with being white, and how the culture of whiteness can shape the experiences for marginalized groups in the college.

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Casting a Critical Lens on Thailand's Higher Education System: A Case Study of Women's Experiences as Agricultural Extension Faculty

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The agricultural industry and higher education have traditionally been male-dominated spaces in the developing world. However, in recent decades, significant progress in female representation has been achieved in both sectors. Previous research has suggested that women in the Southeast Asian agricultural industry have been more empowered than women in other regions. However, women in Thailand's agricultural postsecondary programs have been understudied. In response, this study examined the experiences and perceptions of women agricultural extension faculty in Thailand's higher education system. Through qualitative analysis of in-depth interviews with women, three distinct themes emerged: (1) gendered disparities, (2) barriers to success in academia, (3) perceptions of self and gender in agriculture and higher education. The findings suggested that Thai female faculty in agriculture extension held positive perceptions of their careers despite persistent gender inequalities and traditional cultural norms. Moving forward, we recommend that more in-depth research be conducted to understand better how such perceptions coexist with the deeply entrenched gender inequalities.

Introduction and Review of Literature

Higher educational institutions have been shown to transform individuals and communities across the globe (Eboiyehi et al., 2016; Loots & Walker, 2015). For example, graduates who achieve a postsecondary degree can encourage economic growth, societal restructuring, and community cohesiveness (Lee, 2007). Further, a statically significant and positive relationship has been reported between baccalaureate degree completion and the development of a nation (Eboiyehi et al., 2016). As a result, the governments of developing economies have emphasized expanding access to higher education for their citizens in recent decades (Neubaur, 2019; Sakhiyya & Locke, 2019). This trend has been prevalent across Southeast Asia, especially in Thailand, where higher education has experienced extensive growth (Lee, 2007). This growth coincided with expanded access for the region's disadvantaged and underrepresented groups (Morley, 2013).

Loot and Walker (2015) noted that critical progress had been achieved globally over the past two decades regarding access to higher education for underrepresented populations, particularly for women. In 2019, women constituted approximately 67% of primary school and 54% of secondary school educators across the globe (World Bank, 2020a). However, despite the increasing number of female educators, data has indicated that females in higher education represent only 43% of faculty (World Bank, 2020b). In Thailand, a higher percentage of females teach in primary and secondary schools, however, in higher education, women remain considerably underrepresented (World Bank 2020a, 2020c). Despite this, previous evidence on this phenomenon has illuminated that the "persistence of deeper-seated inequalities between the genders in all spheres of higher education" remains despite the progress achieved globally (Loots & Walker, 2015, p. 361).

Historically, universities have been acknowledged as *highly gendered institutions* (Bird, 2011; Eboiyehi et al., 2016; Maranto & Griffin, 2011; Marchant & Wallace, 2013; Misra et al., 2012; Vu, 2018). Case in point, although a positive trend has existed regarding female's ability to obtain faculty positions, women remain marginalized in science, technology, engineering, and mathematics (STEM) fields in higher education (Christie et al., 2017; Cuthbert et al., 2019; Haeruddin, 2016; Howe-Walsh & Turnbull, 2016; Maheshwari & Nayak, 2020; Zaleniene et al., 2016). To complicate this further, previous evidence has demonstrated that higher education institutions' gender distribution among faculty has reflected a pyramid structure, i.e., more males hold leadership positions while women have been regulated to lower-level positions (Carrington & Pratt, 2003; Strachan et al., 2011; Vu, 2018).

This trend appears to extend across developed and developing regions of the world (Haeruddin, 2016; Howe-Walsh & Turnbull, 2016; Vu, 2018). For example, women have not been viewed positively in leadership roles in academia. In fact, in Southeast Asia, a statistically significant and negative relationship has been reported between higher education administrators' favorability and whether they identified as female (Mason & Smith, 2003; Morley, 2013; Sakhiyya & Locke, 2019). Mason and Smith (2003) noted that this issue was more prominent in developing countries, such as Thailand, where women in leadership roles have been rare.

On this point, Pimpa (2012) explained that this issue could be attributed to cultural norms and traditions in which women have been viewed as primary caretakers and are typically responsible for domestic tasks. As a result, "women are given fewer opportunities and underrepresented at work in many Asian countries" (Maheshwari & Nayak, 2020, p. 3). By assuming these caretaker and domestic roles, considerable burdens have been placed on women serving in more senior leadership and management roles in higher education (Cuthbert et al., 2019). As an illustration, in Thailand barriers to women serving in higher-level administrative positions in academic institutions include: (1) a historically male academic culture, (2) a lack of confidence and disinclination to self-promote, (3) underrepresentation in decision-making bodies, (4) exclusion from the political aspects of academic appointments, and (5) a lack of women in agricultural faculty positions (Luke, 2001a; Meinzen-Dick et al., 2011; Neubauer, 2019).

Despite identifying these barriers, research on gendered issues in higher educational institutions in developing nations have primarily focused on the participation rates of female students and their educational attainment (Francis et al., 2014; Phipps & Smith, 2012; Mama, 2006; Morley, 2006; Neale & Özkanli, 2010; Vaccaro, 2011). Consequently, Morley (2013) called for more attention to be placed on women faculty in Southeast Asia's institutions of higher education, particularly in Thailand. A need emerged to gain a deeper understanding of how women in Thailand navigate their professional responsibilities as agricultural faculty despite pervasive gender inequalities in the country (Cuthbert et al., 2019; Haeruddin, 2016; Luke, 2001a; Maheshwari & Nayak, 2020; Murniati, 2012; Neubauer, 2019; Toyibah, 2017; Zseleczy et al., 2013).

Philosophical Lens

We examined women agriculture faculty's experiences in Thailand through the lens of critical constructionism (Denzin & Lincoln, 2008). When using this lens, researchers position

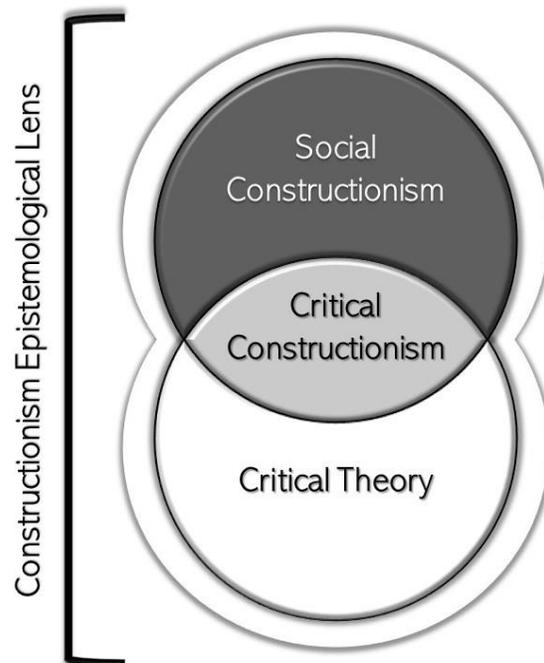
themselves “at the intersection of multiple epistemological and theoretical perspectives such as constructionism, social constructionism, and critical theory” (Richardson & Roberts, 2020, p. 10). Crotty (1998) advanced this approach to help social scientists analyze complex phenomena deeply influenced by power, privilege, and control issues. To situate this study, a discussion of the key components of critical constructionism follows.

Social constructionism, an epistemological position, is ultimately concerned with how an individual views their reality and makes meaning of the world around them (Crotty, 1998). This process involves external inputs and interactions that allow individuals to construct knowledge based on how they experience the social world (Andrews, 2012; Crotty, 1998; Schwandt, 2003). In particular, social constructionism allowed me to examine how social interactions and culture influence the construction of knowledge among the participants, their experiences, and their perceptions of the barriers that might exist in higher education.

Critical constructionism also draws on critical theory to scrutinize the experiences of underrepresented and marginalized groups (Denzin & Lincoln, 2008). Critical theory is a theoretical perspective that focuses on critiquing society based on structures of power and privilege have been upheld over time (Crotty, 1998). Through the combination of these two lenses (see Figure 1), it allowed us to examine woman’s experiences more critically in higher education. It also illuminated how the participants’ social realities have shaped power imbalances that exist in agriculture, extension, and women empowerment (Crotty, 1998).

Figure 1

A Model of Critical Constructionism



Note. Reprinted with permission from “Modern women and traditional gender stereotypes: An

examination of the roles women assume in Thailand's agricultural system" by Richardson & Roberts, 2020.

Statement of Purpose

This study aimed to examine the experiences of women agricultural extension faculty in Thailand's higher education system. Specifically, this study focused on issues related to the barriers and gendered issues women encounter. Thailand's higher education system was a compelling case because of traditional gender stereotypes reported despite the country's position as a rapidly developing economy and modernized higher education system (Lee, 2007; World Bank, 2021). Two research questions guided this study: (1) What were participants' experiences as women faculty in a historically male-dominated field in a developing country? and (2) What barriers did women agricultural extension faculty experience in Thailand's higher education system? This study aligned *Priority 7: Addressing Complex Problems* by the American Association for Agricultural Education's National Research Agenda (Andenoro et al., 2016).

Methodology

This investigation used an instrumental case study design (Stake, 1995), which helps "provide insight into an issue" (Baxter & Jack, 2008, p. 549). For that reason, this approach was appropriate for achieving an in-depth description of the phenomenon (Stake, 1995). In this study, the case was bounded by *place*, i.e., Thailand, and *participants' occupation*, i.e., women agricultural extension faculty. Therefore, every participant in this study identified as female and a Thai national.

Data Sources and Participants

We used purposive sampling to select participants (Patton, 2002). To accomplish this, we identified women extension faculty from Thai universities with a Faculty of Agriculture, i.e., a College of Agriculture. After identifying individuals who met the study's parameters, we recruited them through email. In total, four individuals agreed to participate in a virtual interview. After accepting the invitation, participants were then provided a detailed description of the study and a consent form.

The primary source of data for this investigation was in-depth, semi-structured interviews conducted virtually using Zoom video conferencing software. In accordance with Creswell and Poth (2018), we developed a semi-structured interview protocol, which was approved by the LSU AgCenter IRB. The interview protocol included five major guiding questions that focused on (1) participants' background and experiences, (2) view of women's representation in the field, (3) perceptions of women serving in their position, (4) potential challenges and barriers experienced by the participant, and (5) the future of extension and the role that women will play. To triangulate findings, we also collected photographs and written reflections submitted by the participants. The photographs represented how participants perceived women in agriculture and the ways in which they viewed their role in higher education.

Data Analysis

After collecting data, we analyzed each source using analytic coding procedures advanced by Saldaña (2021). Coding is an approach that provides structure to the analysis process and insight by illuminating the data's underlying patterns. The use of coding helps qualitative researchers construct meaning from the data (Saldaña, 2021). To accomplish this, we used a two-cycle coding approach. The first cycle of coding involved two open coding techniques: (1) initial coding and (2) values coding (Saldaña, 2021). During this cycle, initial coding helped dismantle the data corpus into discrete and manageable parts (Strauss & Corbin, 1998; Saldaña, 2021). Initial coding has been referred to as *open coding* because of its open-ended approach to data analysis. The approach allowed us to consider provisional codes as the analytic process unfolded.

Following initial coding, we used values coding to identify and understand the participants' values, beliefs, and attitudes on the phenomenon (Saldaña, 2021). Following the first coding cycle, we engaged in a second cycle of coding, which helped categorize the data and identify potential patterns and emergent themes. The second cycle coding technique used was pattern coding, which allowed us to reduce the codes from the first cycle into overarching themes (Saldaña, 2021). It should be mentioned that the data were analyzed using a critical constructionist lens (Denzin & Lincoln, 2008). As such, we sought to examine the mechanisms of power and related barriers influencing female extension academic faculty in Thailand's postsecondary agricultural programs.

Researcher Reflexivity and Positionality

Stake (1995) discussed how researchers influence findings because their interpretation of underlying trends shapes emergent themes. As such, disclosure of our backgrounds and positionality in the study was essential. To begin, during data collection, the lead researcher was a doctoral student in an agricultural and extension education program with experience traveling and conducting research in Thailand. While in Thailand, she was increasingly exposed to and observed the country's agricultural practices and higher education institutions. Additionally, she researched Thai women's experiences and perceptions of working in the agricultural industry in Thailand. This research was similarly conducted using semi-structured interviews with female agricultural workers in a variety of positions. The lead researcher also found herself uniquely positioned in this study because of her gender. The other three researchers in this investigation were faculty at Louisiana State University and have experience conducting research on marginalized populations, which was important during the analysis of data. For that reason, the intersection of our experiences and positionality shaped how we examined the data and interpreted the findings.

Ensuring Quality in Qualitative Methodology

To ensure the study imbued rigor, we embedded Lincoln and Guba's (1985) four standards of quality into the study design: (1) confirmability, (2) credibility, (3) dependability, and (4) transferability. By weaving these standards into the study, we established trustworthiness of the findings. We achieved confirmability through a combination of (a) the researcher's reflexivity statement and positionality within the study and (b) memo writing during each stage in data

analysis and later interpretation. Meanwhile, we upheld credibility through (a) data triangulation, (b) peer debriefing, and (c) prolonged engagement. Although we did not spend extensive time in the field because of the COVID-19 global pandemic, we interacted with and spoke to various individuals and developed rapport with the participants during data collection (Lincoln & Guba, 1985). The third standard, dependability was embedded in the study by discussing (a) the researcher's positionality and how their role shaped the research design and procedures and (b) an open discussion about its purpose. Finally, we upheld transferability by including detailed descriptions of the research methods, data collection, analysis procedures, and subsequent findings to uphold the fourth standard of quality.

Limitations

This study had several limitations. First, the perspectives expressed by the participants were based on their experiences. Therefore, the study's findings were not generalizable to all women working in Thailand's higher education. Second, although the interviews were conducted in English, it is likely that a language and cultural barrier existed. Language is nuanced and often includes elements of vernacular, culture, and knowledge of place (Hendrix, 2001). Because English was the participants' second language, it is possible that exact meanings, concepts, or words, could have been lost in translation. To help mitigate this issue, we spoke slowly, explained the questions, and clarified when needed.

Findings

By analyzing the experiences of four Thai women who served as extension faculty in a postsecondary agricultural program, we gained an in-depth understanding of their experiences and perceptions of their gendered barriers. Our analysis of the data revealed three themes that depict women's perspectives on Thailand's higher education: (1) gendered disparities, (2) barriers to success in academia, (3) perceptions of self and gender in agriculture and higher education.

Our interpretation of the data helped contribute to the broader narrative of gendered issues in higher education, especially those in a traditionally male-dominated field such as agricultural extension. For the confidentiality of participants, their names and potential identifiers were removed. It should also be noted that if a participant submitted a photograph of an individual's face, it was blurred to uphold the privacy of the individuals depicted.

Gendered Disparities

The first theme explored women agricultural extension faculty's experiences with societal gender inequalities. The emergence of this theme was likely because faculty in postsecondary agricultural programs have traditionally been expected to extend their work into local communities through extension programs in Thailand. Despite expressing positive self-perceptions, the women also voiced a number of traditional gender stereotypes. To this point, the participants articulated how males were more often promoted to leadership roles in higher education. Participant #2 stated: "[Thai] people accept more males than females." She further explained: "I think for agricultural extension, there were more males than females in the past,

and now females have a [place] in this career...” Despite this, Participant #1 stated: “people [still] want to talk with males more than females [in higher education].” Participant #3 also discussed how in other areas of disciplines “like agricultural sales or engineering,” there was a greater preference to hire males rather than females. As a result, views that women were not qualified for positions in higher education remained deeply entrenched in society.

On the other hand, Participant #4 articulated how she had observed women become more accepted in roles as agricultural faculty. For example, she observed greater participation in agricultural extension activities led by women in recent years. Further, more female participants were engaging in extension programming sponsored by her university. She explained: “Before, it is always a male come to join a group...but now I can say that a lot of women come [to my extension programs].” Participant #2 echoed a similar sentiment when she discussed her work with women’s groups and female cooperatives and how they “ask her, the expert, to teach them the [farming] techniques.”

Another emergent concept was the female agricultural faculty’s role in influencing women’s empowerment by encouraging greater decision-making power. Participant #1 explained that, traditionally, women in Asian cultures “do all the housework” and that “the males rarely help.” Despite this, she also explained that “[women’s] income is almost equal to males.” She further described how equal income among males and females had equated to more decision-making power:

We can see a lot more of the power...because women can make a lot of decisions...The main income has come from the male [in the past], so any decision is waiting for them, but now women also have their income. So the power is in their own hands. So for us as well in higher education, if we have our own income, any decision we make depends on what we want, not what they want.

The sentiment expressed by Participant #1 was impactful because it demonstrated that she had observed women’s empowerment increase through greater decision-making power in her career. In fact, all participants articulated that women often assumed the role of primary caretaker. However, the participants also described how advancements in technology had made it possible for women to pursue work outside of the home and contribute to household financial responsibilities. Despite their increased responsibilities and decision-making power, the expectation that women assume that primary caretaker role remained.

Barriers to Success in Academia

In the second theme, the women in this study expressed multiple barriers to their success as faculty. For example, because of expectations for women to fulfill feminine and domestic roles, they often received fewer work-related opportunities and experienced underrepresentation in their careers (Maheshwari & Nayak, 2020). On this point, participants explained how Thai women were primarily concerned with ensuring they devoted adequate time to their families. Because academic roles were often considered more flexible than other career fields, they perceived their careers promoted work-life balance. Nevertheless, Participant #2 discussed how placing more “emphasis on family” could also be viewed as a potential barrier to success for women faculty in Thailand because some administrators might view them as not prioritizing

their work. Moreover, Participant #3 explained: "...the barrier is that I have to spare some time for taking care [of the family] and my work suffers." Because the participants' discussion of challenges in their careers often focused on balancing work and life, the cultural expectation for Thai women to remain the primary caretaker of their families emerged as a barrier.

The participants also explored deeper contours regarding the barriers introduced by other individuals to their careers. For example, Participant #2 described how her friends and family were concerned about her career as an academic because they viewed agriculture as hard, physical labor. When discussing her choice to study agriculture, Participant #4 explained, "my family did not want me to study agriculture because they think it is quite hard work." In Asia, women have often been viewed as physically weaker, and careers involving hard labor and physically demanding tasks have been viewed as undesirable (Richardson & Roberts, 2020). When describing this phenomenon, Participant #4 submitted a photograph of women in higher education engaged in physical labor to prepare their field for research trials (see Figure 1). She explained that such depictions perpetuated a negative perception in Thai society and a barrier for women in higher education. As a result, this societal misperception appeared to cause job stress and served as a substantial career barrier for women in higher education.

Figure 2

Women in Higher Education Preparing Fields for Research Trails



Note. Participant #4 submitted this photograph to depict how women in agriculture were historically perceived as laborers rather than intellectuals.

Participants also articulated how career progression and upward movement was a barrier for women in higher education. For example, all participants noted that women had been excluded from high-level positions. Participant #3 noted that "males get promotion more than females"

and “they prefer to select males.” Overall, the participants also reached a consensus that upper-level administration positions were still male-dominated. On this point, Participant #1 reported that there had only been “one female for the head department” at her university. Another participant shared a similar sentiment when she stated, “when it come [sic] to the highest rankings,” the university still prefers the position to be filled by males. However, in “lecturer [positions there] is a lot of female.” “The department head [is] a woman a lot of [time], but for the really high position, like being a Dean or president, is still men,” stated participant #3 when describing the gender composition of administrative positions at her university. Participant #1 even reported: “I think if I’m male in this position, maybe I can get promotion easier.” A few of the participants also expressed the belief that the top-level positions remained out of reach.

Perceptions of Self and Gender in Agriculture and Higher Education

Despite the perceived barriers to success experienced by women agriculture faculty, the participants in this investigation reported a distinctly positive perception of self and their abilities. For example, all participants reported that females were as capable as males in higher education. Moreover, Participant #2 stated: “females can do like a man do” and “we can do the same way as a male do.” Participant #1 maintained that “most females in this department...I mean, extension department females can do...can have [same] capability as a male.” The participants also reported that they had observed more women beginning to pursue agriculture as a career. For instance, Participant #3 submitted a photograph to demonstrate how women had become more prevalent in agricultural majors. Figure 2 depicted a classroom of extension students, most of whom were female, engaged in plant propagation. Of the sixteen individuals, only three are male. Despite this, participants noted that women remained less represented in higher-level positions in academia.

Figure 3

Thai University Students Engaged Plant Propagation



Note. Image submitted by Participant #3 to demonstrate how women were becoming more prevalent in agricultural extension.

Beyond that, in multiple ways, the women of this study felt respected in their profession. Most of the women explained they were well regarded as lecturers and research scientists. “I think I get the respect from a student and from staff...we get respect from all,” said Participant #2. In Thailand, agricultural extension faculty were required to fulfill a multidimensional role that has historically included working with local farmers and the community through extension programming. When fulfilling this role, Participant #3 stated that she believed “[farmers] accept the mission of the woman” and that she has had “no problem with working with a group of farmers.” Similarly, Participant #1 submitted a photograph that showed their female extension faculty who had worked with farmers in a rural Thai community (see Figure 3). The majority of the individuals pictured were male. Participant #1’s submission of this photo showed her belief that farmers and other stakeholders respected women.

Figure 4

Depictions of Women Working with Farmers in their Communities



Note. Image submitted by Participant #1 to depict the impact of female agricultural faculty on rural Thai farmers.

Conclusions

This study explored the various ways in which women agriculture faculty positioned themselves in higher education by connecting their experiences and observations to prevalent gendered issues. Using a critical constructionist lens to analyze their experiences in agricultural higher education revealed each individual’s complex view of their unique experiences. Further, approaching the interpretation of the findings through a critical lens exposed the power

imbalances in their profession. Through this analysis, three themes surfaced: (1) gendered disparities, (2) barriers to success in academia, (3) perceptions of self and gender in agriculture and higher education. The emergence of these concepts offered a multifaceted glimpse into the women's lived experiences in their profession and their storied perspectives.

The first theme provided an in-depth look at gendered disparities in Thailand and how they could impact women faculty. Through our analysis of the data, we concluded that Thailand's agricultural sector remained a male-dominated field. Such a finding provided critical implications for women in higher education. For example, a combination of highly gendered institutions with a male-dominated agricultural industry appeared to provide significant barriers for the women extension faculty in this investigation – a finding that aligned with previous research (Bird, 2011; Eboiyehi et al., 2016; Maranto & Griffin, 2011; Marchant & Wallace, 2013; Misra et al., 2012; Vu, 2018). The study's findings also suggested that women were slowly becoming more accepted in agricultural disciplines in higher education. We triangulated this notion through participant-submitted photographs that depicted an overwhelming number of female students engaged in agricultural extension coursework (see Figure 2). We conclude that although women have achieved more representation in Thailand's higher education, gender inequalities and barriers to women faculty's success have remained.

The second theme illuminated the barriers to success that women agricultural faculty in Thailand have experienced. This finding suggested that societal expectations regarding women's role in households presented a barrier to the success of participants in this investigation. For example, the women faculty discussed the importance of family and making career sacrifices to uphold their household responsibilities, consistent with Pimpa's (2012) work that reported how, in many Asian countries, cultural norms and traditions had placed women as primary caretakers of family units. As a result, women have historically had fewer career opportunities (Maheshwari & Nayak, 2020). The participants' discussions of family responsibilities suggested that this cultural perception had remained. Another barrier to success was the lack of female representation in upper-level positions in Thailand's higher education system, especially in agriculture. Although previous research had explored this phenomenon in academia more broadly (Luke, 2001a; Meinzen-Dick et al., 2011; Neubauer, 2019), this has not been explicitly reported for women in agricultural disciplines. We conclude, therefore, that significant barriers have existed for women agricultural faculty in Thailand.

The final theme suggested that the participants had positive self-perceptions about their gender. In particular, the women extension faculty expressed that women were as capable as their male counterparts. Additionally, the participants reported they were respected by their students and farmers in rural communities that they engaged with during extension programming. We conclude that although women in Thailand have continued to experience gender inequalities and barriers to career success rooted in cultural perceptions, they have positive perceptions of their experiences in their career and their position within it – a finding not currently reflected in the broader literature.

Discussion, Implications, and Recommendations

Morley (2013) reported that there had been an overall increase in women's presence as students and faculty at higher education institutions across the globe. However, findings from this investigation complicated such a notion. For example, although the participants perceived the number of female students and women obtaining faculty positions in agricultural disciplines had increased, these positive trends did not extend to upper-level academic positions, such as department heads, deans, and university presidents. The increased presence of female students and faculty should be viewed as a positive indicator of change; however, we recommend that future research explore why women have not been allowed to ascend to upper-level administrative positions. We recommend that Thai university administrators create leadership development programs for women faculty to learn ways to successfully navigate academic culture and obtain administrative positions that could allow them to enact positive change.

We also recommend a deeper examination of Thai women's positive perceptions of self. For example, the participants in this investigation reported they felt respected and viewed positively by students and other stakeholders. Although such a finding indicated progress regarding gendered disparities, this could also lead to potential setbacks for women in the future. For example, Powell (2016) warned of the dangerousness of championing meritocracy in society for women, when individuals are valued for their performance and experience rather than "other considerations such as equality, need, rights, or seniority" (Powell, 2016, p. 29). Previous work has suggested that removing considerations of gender has resulted in unintentional discrimination for women when applying for jobs, promotions, and research funding (Morley & Crossouard, 2015; Powell, 2016). Unintentional discrimination occurs when gender inequality issues have been seemingly erased or deemed irrelevant because the culture of meritocracy, hiring or promoting based on performance, has remained dominant. As a result, if Thai women continue not to recognize the need to advocate for greater gender equality in higher education, it could stymie women's progress in the future.

Another emergent finding involved the role of the family in creating additional challenges for women agricultural extension faculty. Evidence has suggested that women have traditionally been expected to fulfill a substantial familial role; as such, women in the Asia-Pacific region have found it challenging to assume leadership positions (Cuthbert et al., 2019; Neubauer, 2019). We recommend that additional research be conducted to examine how the family dynamics might serve as a barrier for women in academia. Perhaps faculty development opportunities could also be used to create a space by which women faculty could talk more openly about this issue and gain ideas about achieving a greater sense of work-life balance that allows them to pursue administrative roles moving forward.

It is also important to note that although women in this study held a positive view of themselves and their positionality in their profession, this does not mean that gender equality has been achieved in Thailand. In fact, if the gender inequalities identified in this investigation continue to be preserved in Thai society, progress on women's rights could be hindered for future generations. Consequently, we recommend that research explore how to open women's eyes to gender-based inequalities in Thailand. For example, perhaps cultural norms and traditions have been so profoundly ingrained regarding female's position in society that women have been unable to recognize how their opportunities and voices have been regulated over time – a notion that warrants greater attention and focus.

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Female Agriculture Teachers' Lived Experiences and Perceived Professional Development Needs when Teaching Students with Special Needs

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Recent trends in the U.S. education system have demonstrated an increase in the number of students with special needs. Although previous research in agricultural education has described the professional development needs of SBAE teachers in regard to teaching with students with special needs, there has been a lack of empirical evidence on the unique needs of female teachers. Further, research has overwhelmingly used quantitative measures that have over-relied on males' perspectives. As such, the purpose of this case study was to explore the experiences and professional development needs of female SBAE instructors in Louisiana when teaching students with special needs. Qualitative data were analyzed using the Borich (1980) model, which identified emergent themes of (1) perceived importance and (2) perceived ability. Additional sub-themes were the perceived importance of identified approaches used to accommodate students and perceptions when teaching students with special needs. Within the theme of perceived relevance, participants identified prior education and professional development experiences as critical factors to success when teaching students with special needs. As a result of these findings, we recommended that female SBAE instructors develop professional development to improve how they accommodate students with special needs, specifically in laboratory settings. Further, we recommend that professional development for women SBAE teachers focus on specific disability types and inclusion strategies.

Introduction and Literature Review

In recent years, classrooms have become increasingly diverse. As a result, Hinders (1995) and Stankov et al. (2015) stressed that education should celebrate students' individuality rather than restrict opportunities based on their limitations. In the 2018-2019 school year, 14% of students were classified as individuals with special learning needs, the highest percentage reported to date (NCES, 2020). Despite this growing population of students, Aschenbrenner et al. (2010) described a need for more research on identifying successful strategies for teaching students with special needs in agricultural education, especially since this program has been reported to serve diverse learners effectively (Casale-Giannola, 2012). Specifically, agricultural education has been credited for providing students with special needs with diverse opportunities and experiential learning, which has been reported to increase students' confidence and engagement in agricultural coursework (Harvey, 2001; McLeskey & Weller, 2000). In addition to the benefits of a hands-on classroom environment, in a study conducted with North Carolina agricultural education teachers, 87% of teachers believed Supervised Agricultural Experiences (SAEs) helped students with special needs set career goals and enhance their social skills (Johnson et al., 2012). To successfully teach students with special needs in agricultural education, the facilities and the total program must be considered (Henderson, 2001). In 1996, the National FFA Organization published a guide entitled *Bridging Horizons* to provide FFA advisors with ideas for how to navigate accommodating students with special needs. The guide highlighted the

benefits of teaching students with special needs in agricultural education, including increased self-esteem and self-reliance through program involvement (National FFA Organization, 1996).

Although the benefits of teaching students with special needs have been documented, many barriers remain. For example, Cologon (2013) reported little understanding of accommodation practices, a lack of facilities and equipment, and inadequate education and professional development for teachers. Despite these deficits, practices to successfully accommodate students with special needs have increased each year in the U.S. (USDOE, 2020). As such, Pirtle (2012) called for SBAE classrooms to provide appropriate strategies and accommodations for the growing number of students with disabilities. However, Giffing et al. (2010) found that while 90% of agriculture teachers who participated in their study indicated they had a basic understanding of strategies to accommodate students, only 76.9% agreed that students with special needs should be allowed to enroll in their classes. To address this issue, Johnson et al. (2012) described how teacher preparation programs could foster more positive perceptions of teaching students with special needs by having preservice teachers implement student accommodations during early field experiences. In addition to preservice education, professional development on accommodating students with special needs has been essential to supporting SBAE instructors, especially given the disproportionately large percentage of students with special needs in SBAE (Smith & Rayfield, 2019). Professional development should provide teachers with specific opportunities to gain confidence in instructional strategies that they can use to meet their students' needs (Allinder, 1994). In particular, SBAE instructors should be prepared for and expect to work with students with a wide range of abilities. Therefore, they should also be required to engage in professional development opportunities to improve the teaching of students with diverse needs (Dormody et al., 2006). However, it should be noted that providing adequate professional development can be challenging as teachers' and students' needs change over time based on trends in the profession and additional external factors (Easterly & Myers, 2018).

Research has also suggested that teachers' professional development needs differ based on educational and demographic differences (Roberts et al., 2020). For example, data collected in 2019 revealed that 74% of license-eligible completers were female (Foster et al., 2020a). However, research (Aschenbrener et al., 2010; Dormody et al., 2006; Faulkner & Baggett, 2010; Giffing et al., 2010; Pense et al., 2012; Stair et al., 2010) on the professional development needs of SBAE teachers concerning teaching students with special needs has overwhelmingly featured data from the male perspective. Professional development has been described as a critical component to address deficiencies and emergent changes in education (Birman et al., 2000). However, effective professional development opportunities should be designed to address teachers' specific needs and help develop skills that lead to teacher success and retention. In addition to the lack of data on the professional development needs of female SBAE teachers on this phenomenon, previous studies have also overwhelmingly used quantitative measures that have over-relied on the perspectives of males. Consequently, a need emerged to examine this issue using a qualitative lens that focused on women's perspectives.

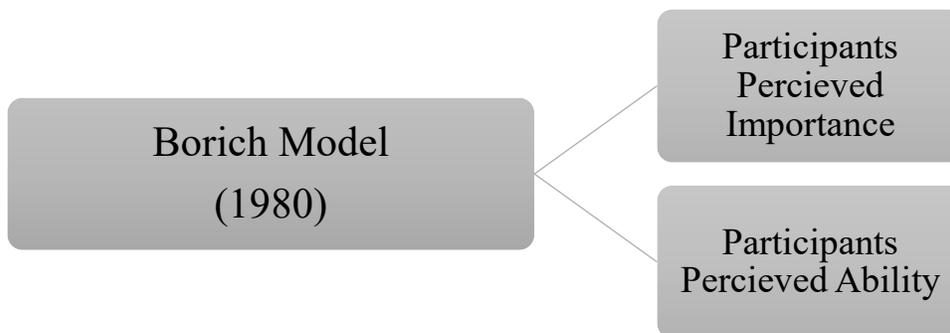
Conceptual Framework

We used the Borich (1980) needs assessment model as a lens to analyze this phenomenon. Using

this model, we investigated participants' *perceived importance* regarding accommodating students with special needs and their *perceived ability* to accommodate those students in their programs. When comparing their importance and relevance, this lens helped identify discrepancies concerning women SBAE teachers' needs in regard to accommodating students with special needs (see Figure 1).

Figure 1

Borich's (1980) Conceptual Framework



Purpose and Research Questions

The purpose of this qualitative investigation was to explore the experiences and professional development needs of female SBAE instructors in Louisiana when teaching students with special needs. This study aligned with the American Association for Agricultural Education's National *Research Priority 7: Addressing Complex Problems* (Andenero et al., 2016). Two research questions guided this investigation: (1) what were the experiences of Louisiana SBAE instructors when teaching students with special needs? and (2) what were the professional development needs of Louisiana SBAE instructors when teaching students with special needs?

Methodology

For this study, we used an instrumental case study approach (Stake, 1995). The case was bounded by *gender*, *place*, and *time*, i.e., each participant was a female SBAE instructor in Louisiana during the 2020-2021 school year. We also purposefully sampled participants based on their certification type to ensure representation from both traditionally certified as well as alternatively certified teachers (Creswell & Poth, 2018). To collect data, we conducted semi-structured interviews with participants (Stake, 1995). Data were also triangulated using a quantitative questionnaire in which participants responded to their professional development needs on a 5-point Likert-type scale; however, only qualitative data was featured in this manuscript. It should be noted that all participants identified as white females. Efforts were made to expand participant demographic range; however, our efforts were ultimately unsuccessful. In adherence to ethical and IRB stipulations, each participant was assigned a pseudo-name in the investigation (Tracy, 2010). A brief overview of each participant has been provided to illuminate their personal and professional characteristics (see Table 1).

Table 1*Overview of Qualitative Participant Personal and Professional Characteristics*

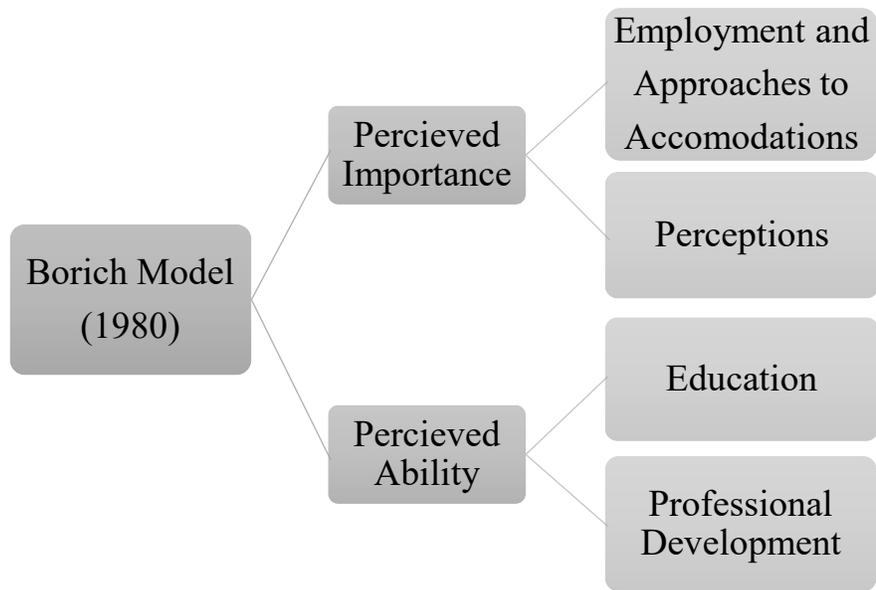
Pseudonym	Age	Previous Special Education Professional Development	Completion of Special Education Course	Gender	Highest Degree Earned	Licensure Certification	Years Teaching
Margret	28	No	Yes	Female	Bachelor	Traditional	7
Susan	31	No	No	Female	Bachelor	Alternative	4
Haley	48	No	No	Female	Master	Alternative	19
Rachel	23	No	Yes	Female	Bachelor	Traditional	3
Emma	35	Yes	Yes	Female	Master	Traditional	12
Hannah	36	Yes	Yes	Female	Bachelor	Alternative	15

Data Analysis

After data collection, we transcribed interviews verbatim. Then, we used Saldaña's (2021) coding procedures to facilitate an in-depth analysis. Through this process, codes were generated using participants' words to advance meaning. Additionally, our coding helped to "summarize, distill, [and] condense" data to accurately describe our emergent findings (Saldaña, 2021, p. 5). To accomplish this, we used first-cycle coding approaches to begin our analysis using an "open-ended approach" (Saldaña, 2021, p. 121) which consisted of in-vivo, descriptive, and structural coding. The use of in-vivo coding provided identification of verbatim words or short phrases, as stated by the participants (Saldaña, 2016). Next, descriptive coding, also known as topic coding, was used to develop direct words or phrases to summarize the topic (Saldaña, 2016, p. 102). The use of in-vivo and descriptive coding allowed the use the direct quotes of participants to provide a summation of a topic. Because of multiple participant transcripts, the final first round coding method employed was structural coding (Saldaña, 2016) in which data were organized based on the study's research questions as guiding structures. After concluding the first-round coding cycles, 554 unique codes emerged, which were then further analyzed through a second cycle coding approach (Saldaña, 2016).

Second-round coding cycle created a more profound sense of the categorical and conceptual presentation of first round codes) and resulted in a reduced list of codes connected to emergent concepts (Saldaña, 2016). The use of axial coding served as second cycle coding, which identified categories and their prominence within codes (Saldaña, 2016). After the employment of axial coding methods, four sub-themes emerged, which included (a) employment and methods of accommodations for students with special needs and (b) perceptions regarding teaching with students with special needs, (c) prior training and/or education concerning teaching with students with special needs, and (d) prior professional development focused on teaching students with special needs. Sub-themes were then interpreted through Borich's (1980) lens, which helped to bring thematic structure to the themes (Borich, 1980; see Figure 2).

Figure 2*Emergent Themes and Sub-Themes for this Investigation*



Building Quality into the Study

We established rigor and trustworthiness by following Tracy's (2010) eight criteria for upholding qualitative quality. First, we established a worthy topic by investigating a phenomenon with relevance and significance because it focused solely on female SBAE teachers' professional development needs, a study which had not previously been conducted. Additionally, the investigation achieved rich rigor and meaningful coherence by collecting and analyzing data aligned with the study's intended purpose (Tracy, 2010). Meanwhile, we ensured resonance by emphasizing the transferability of the study's findings and describing the methods in full to convey the investigation's rigor (Tracy, 2010). Bracketing, peer-debriefing, and thick descriptions were also used to uphold sincerity and credibility (Tracy, 2010). Lastly, we employed ethical practices by complying with IRB regulations to ensure the protection of participants' confidentiality by the use of pseudonyms and attention to cultural ethics for the target population's state.

Reflexivity

To further uphold the trustworthiness of this study, it was critical to identify our biases to ensure transparency. Therefore, a brief background of the researchers was warranted to reveal prior experiences and preconceptions that may have influenced this investigation. The lead researcher was graduate student in agricultural education at Louisiana State University. Through her undergraduate student teaching experience, she taught at a rural school in central Louisiana in a single teacher program. During her time student teaching, she worked with several students from diverse ethnic, socioeconomic, and cultural backgrounds. In addition, she frequently provided student accommodations, inclusion strategies, documented student progression, and behavioral responses. The other research team members previously taught secondary agriculture education in three different states and now serve as faculty in agricultural education at Louisiana State University and have conducted previous research on diversity and in inclusion agricultural

education. Each team member also implemented student accommodations, and inclusion strategies when teaching students with special needs.

Findings

Through our analysis of the data, two themes emerged: (1) perceived importance, and (2) perceived ability. Each theme also had two sub-themes that helped tell the story of female SBAE teachers' experience and professional development needs when teaching students with special needs. A narrative of the study's findings follows.

Theme #1: Perceived Importance

Participants identified their perceived importance when teaching students with special needs through two sub-themes (a) perceptions, and (b) accommodation supports.

Sub-Theme #1: Employment and Approaches to Accommodations

Overall, participants described positive perceptions and benefits for including students with special needs in SBAE classrooms. For example, Hannah discussed the desire to ensure students with special needs felt included, stating: "I never want them to feel different than anyone else... to feel like they're not achieving at the same levels as anyone else... If I have to do those things [implement accommodations or modifications], I do that behind the scenes." Margret shared how the nature of SBAE programs was incredibly beneficial for students with special needs, stating: "Our [agricultural education] classrooms naturally lend themselves to be the least restrictive environment." Because the participants perceived that SBAE classrooms were more welcoming than other courses, the participants shared the approaches they have used for students to ensure students with special needs felt supported. On this point, Susan discussed the specific strategies she implemented. She explained: "I have gone through and reformatted many notes with more pictures... more visual... to ensure that all of my students with special needs can have the resources they need to be successful."

Meanwhile, Emma shared how she completed check-ins with students with special needs as they completed an assignment to provide additional accommodations or modifications if needed. Participants also shared additional practices they used to build a positive and supportive environment for her students. For instance, Rachel explained: "because I regularly provide accommodations to students with disabilities, I decided to just give them to the rest of the students in this class, just to make my life a little bit easier, and it does not single out those students with special needs." Participants also described a willingness to modify their classroom and laborites to develop and maintain a space that was easy to navigate for students, especially students with orthopedic impairments. Haley shared her experience of teaching a student in a wheelchair and how, as a result of that experience, she began to emphasize creating a supportive environment in her classroom more purposefully. She shared: "I always try to keep in mind that [students with physical disabilities] may need to get around... and thought that other students probably need this consideration as well." Further, when providing accommodations for a student with an orthopedic impairment, Haley expressed the difficulties she experienced in

getting a desk that would accommodate a student in a wheelchair: “I had to fight to get it... since that student left, I have refused to take it out.”

For many of the female teachers in this study, accommodating students with special needs was not a practice that came naturally or from previous training. Instead, it had to be consciously incorporated into their daily routines. Rachel shared a goal she had set to become more aware and intentional when providing accommodations and modifications for students. As a new teacher, she identified that she had not spent enough time working to implement students’ accommodations or modifications in her first year. Therefore, she explained: “I have made it a goal of mine... to try to become more aware and modify my lessons to include students with special needs, but like, my whole first year teaching, I did not do that.”

When accommodating students, participants described the unique environments of agricultural mechanics and greenhouse laboratories as an added challenge. As Hannah explained: “those accommodations do not always fit our setting... you have to be flexible.” Haley echoed the sentiment, explaining her experiences when teaching students in the greenhouse: “Often times we’re [the SBAE instructors] working off the cuff, I really wish it wouldn’t be that way and that I could provide the resources my students need.” Emma also identified this as a difficulty, sharing that at her school, she perceived the agricultural mechanics laboratory as “hard to maneuver” in areas such as welding booths where a student would work with hot metal. Emma also identified her concerns with the safety of the agricultural mechanics laboratory setting for some students with special needs, but additionally expressed her concerns that students might not be given many opportunities to continue coursework after an initial introduction course. She shared: “even though you [a student with special needs] might be able to take an Ag 1 class, after that, there’s pretty much not good options for you.” Hannah agreed that shop safety was a concern, and she shared her experiences with modifying the agricultural mechanics laboratory environment for a student with a mobility impairment. She described a student who was experiencing difficulties navigating the shop and being able to lift or transport materials to his workstation. Because of this, she gathered materials for him prior to class and once his materials were in front of him, he was able to successfully participate in class and perform the task. Hannah described the experience: “he struggled a lot in the shop with moving materials and wood and once we got everything cut and laid out and put in front of him, he was fine.”

Participants also shared concerns related to the shop setting where students are often tasked with completing projects that require multiple steps and complicated instruction. On this point, Margret shared: “particularly in the shop... they [students with special needs] can only take one-step directions and the shop is one of those places that you [the instructor] give multi step directions... I had to find some alternatives to that.” Susan shared methods she used to accommodate students in which she used proximity in the shop to keep students with special needs closer to her, allowing her to be able to implement accommodations and adjust as needed while being able to monitor the safety of the student. She also described a partnering system she used in the agricultural mechanics laboratory to support students with special needs:

I have another student help them [the student with special needs] versus me... I try to have the young boys help those kids [students with special needs] and they’re [both general education students and students with special needs] generally very receptive to

that help, the other kids [general education students] are more willing to help, really more than I ever expected. (Susan)

Participants also shared their experiences regarding enlisting external supports to successfully implement a student's accommodations or modifications. Case in point, multiple participants articulated their challenge to navigate having a paraprofessional who assisted a student with special needs in their classroom. In particular, Emma described her experiences with paraprofessionals as often being a distraction to the students rather than a benefit. She shared: "[the paraprofessional] is well known for coming up in the middle of my lessons to show me something on his phone that relates and I'm like, the lesson is not for you." Participants also shared the importance of support from the special education department and teachers at their schools when accommodating students with special needs, especially in regard to scheduling students into their classes and implementing students' accommodations. All participants described having a positive relationship with the special education department at their schools. On this point, Susan described a positive working relationship with the special education teachers in her school and how she often communicated with them to get their opinion on a student's ability to operate machinery so she can better provide the appropriate accommodations. As she explained: "they're [the special education teachers] very good at helping me decide on whether those kids [students with special needs] are OK to do that or if it might be a safety issue." Haley agreed that relationships were key and shared how much she learned from a student's paraprofessional and the special education department at her school during her time teaching a student in a wheelchair: "I learned a lot from his [paraprofessional], and the SPED teacher was excellent at keeping me abreast."

Sub-Theme #2: Perceptions

The second sub-theme focused on the participants' personal perceptions regarding teaching students with special needs. Participants described how personal views influenced the inclusion of students with special needs in the FFA organization, and how personal relationships with family or friends with special needs influenced their overall perceptions. They maintained that agricultural education should consist of more than just classroom interactions for students with special needs. As such, participants discussed the importance of student involvement in FFA, the leadership component of agricultural education's three-circle model. Although all participants shared a positive perception of involving students with special needs in the program, only three of the six participants had personal experience involving these learners in FFA competitions or trips. Margret shared the unique situation of having a student with autism compete in the FFA State Land Judging Contest. Even though the student did very well in the competition, it was often difficult to navigate portions of the contest as the student became overwhelmed when surrounded by a large group of people. Through her reflection of the experience, she shared: "You [the instructor] just have to kind of need to know what you're working with, so I think that there's times that I just didn't think enough about how to provide those needs."

Emma also shared her experiences teaching one student who was in a wheelchair and another student with Down Syndrome who both showed livestock. Emma described the experience as positive: "they loved it... they were a part of it." When Emma was asked if she experienced any difficulties in accommodating these students at livestock shows she explained: "His sister

showed, so she was out their kind of helping him push his chair along and they had a special set-up for him.” Susan shared her experiences with coaching a student with special needs for a contest, however, the student ultimately did not attend. Susan explained: “I was going to put him on a team by himself... my theory is if you [the student with special needs] come to practice and [are] putting forth the effort ... I’m not going to not let them not come.”

Of the participants, Margaret was the only one to share an experience traveling with a student with special needs on an overnight trip as she took a student with cerebral palsy to the National FFA Convention to receive her American Degree. Before leaving for their trip, Margret submitted accommodations to National FFA to ensure the student was able to sit on the floor with the other degree recipients. However, despite submitting the accommodations in advance, they were not put in place. Margaret expressed her frustration that when they arrived to National FFA Convention, “she was not able to sit on the floor with the rest of the degree recipients, and so that was a major issue.” Margret continued: “that was my first time I had to make a request for accommodations, so it just makes me that much more aware that I need to make contact more than once...and also continue to follow up.” Through this experience, she also shared how she became more aware of accommodations she may need to provide when hosting her own events as an SBAE teacher and how important it was to keep accommodations in mind persistently.

In addition to FFA experiences, participants also identified how personal relationships with family and friends further supported the importance of accommodating students with special needs. Margret shared her experience of realizing her father had dyslexia after she taught students in her classroom who also had the disability. She reflected on her experience as a child when she would work with her father weighing show pigs, she explained: “he wasn’t the one reading the scale... he was the one writing it down.” It was not until she became a teacher that she realized her father was uncomfortable reading the weight aloud due to his dyslexia. She further reflected: “I thought I was just learning how to do the things he already knew, but it was actually because my dad has dyslexia, and I did not know.”

Hannah shared an attachment to students with Down Syndrome due to her personal relationship with her best friend’s daughter who shares the same disability, as well as interactions with four teachers from her previous school who had children with Down syndrome. Hannah shared her confidence when teaching students with Down syndrome was ultimately due to her prior experiences, however other disabilities remained difficult to accommodate, she explained:

My personal experience with that [students with Down syndrome] is a little different, I personally feel that the campus that I’m at right now, students with autism is the one that gets me, because I don’t necessarily understand all the things behind it.

Haley shared how her time spent with a cousin who was deaf influenced her teaching career: “I have a first cousin who is deaf, and I made it a point as a child to learn Sign Language because it just breaks my heart that he would sit by himself at our family gatherings.” She continued: “I need to go back and do a refresher course on my Sign Language... I worry that I’ll encounter a student who needs it... I’m losing the skill because I’m not using it.”

Theme #2: Perceived Ability

Participants expressed their perceived ability through two sub-themes: (a) participant's prior education, and (b) participants prior professional development centered on teaching exceptional students.

Ability Sub-Theme 1: Education

Three participants of the investigation completed their certification through traditional licensure coursework at the university level, of these participants, each completed one, three-credit hour course dedicated to teaching students with special needs. Emma and Margret both discussed that while they did take the course, they did not take away much from the experience. For example, Margret shared: "Really, I didn't receive much [education related to teaching exceptional students] other than one hour of undergrad [college courses]." This was echoed by Emma who explained: "All I can really remember is when I was doing my teacher preparation, we had to take one class on special populations." Rachel, however, constructed more meaning from her experiences as a result of tutoring students with special needs as part of completing the required course. She described how the tutoring experience allowed her to develop a deeper understanding of differences among students since she did not have any prior experience with students with special needs before the course. Rachel explained: "I never really struggled, like, I didn't have a learning disability or anything else, so it was eye opening in the sense it made me realize, oh, everyone's not like me."

Sub-Theme #2: Professional Development

The last sub-theme of the investigation described participants' perceived abilities that were supported by their experiences through professional development. As participants shared their professional development experiences, they also indicated additional areas needed for further to improve their ability to teach students with special needs. None of the participants attended prior professional development focused on special education for agricultural education. However, participants did indicate participation in annual training provided through their local school district. As participants shared their experiences with school district professional development events, many described the events as being targeted toward general education teachers. For example, Rachel explained: "[the professional development] my local school district puts on... they're never really gauged for ag teachers, it's more like traditional math and English." Hannah shared her frustration with her school district's professional development trainings since it is: "typically a PowerPoint that somebody gets up there and reads, and it's the same PowerPoint that they've been using since that person took the position, they just updated the numbers." In addition to perceiving the training to be targeted primarily to general education teachers, participants also described their experiences in school district trainings as more of a blanket session to ensure teachers were upholding the legal requirements when teaching with students with special needs without providing in-depth information. Additionally, participants did not feel as though the information was presented effectively. Emma stated they just kept reminding her to "don't forget to fill out this paperwork."

Despite dissatisfaction with professional development events, they had participated in previously, all participants indicated they would attend professional development events focused

on students with special needs if available. When asked if she would attend training related to the inclusion of special education students, Susan said: “definitely, especially with the number [of students with special needs] that I see in this area, definitely yeah, I probably honestly need it.” Participants also discussed that they would be more likely to attend the events if offered through the Louisiana Agriscience Teacher Association. For example, Emma explained: “If it [professional development focused on students with special needs] was at the ag teacher conference, I would go to one.” Continued by Susan who shared: “I find I get more out of the conversation out of our [SBAE teachers] professional development from LATA things.” Two participants expressed the desire to receive training through LATA as it was normally held during the summer months, therefore they would not have to schedule additional time off. Haley explained: “I just feel if it’s during the year, it’s so much more difficult because it feels like you’re taking away from the time you would have had with a child [in the classroom].” Emma agreed with this sentiment: “I don’t know that they [school officials] would let me take time off of school to go.”

When discussing their perceived professional development needs, participants expressed that such should be presented based on disability types, along with skills they could directly apply to their classroom and teaching practices. Margret shared: “I think there needs to be maybe a specialized professional development, you know... how to categorize them [students with special needs] and then how to approach them. Following the need for specific professional development sessions, participants also shared the disability types they felt the least prepared to teach. In particular, three participants identified a desire for training on students with autism to better understand difficulties regarding this disability type. Participants shared that many students with autism may not be immediately identifiable until exposed to certain situations. As Haley reflected: “I mean I have one young man I didn’t even realize he had autistic behavior till he blurted something inappropriate to another student.” Participants also identified challenges when teaching students with emotional disorders or behavioral impairments, blindness or visual impairments, and deafness or hearing impairments. Hannah shared her difficulties about not feeling prepared enough to know what “triggers” may be associated with students. Emma also agreed that: “a behavior disorders can be a little bit unnerving.” In contrast, Rachael revealed she did not feel the need for professional development focused on disorders such as ADHD, but instead, had difficulties with: “students who are in a wheelchair or have bad vision... like a vision impairment or hearing impairment.” Rachel also shared her experience with a student who had a visual impairment, but being unsure how to assist the student, she explained: “I had a student earlier this year that she [the student with a blindness or visual impairment] would have to hold her textbook to her face to be able to see it... I was very confused.”

Conclusions, Discussion, Implications, and Recommendations

The purpose of this investigation was to describe the experiences of female SBAE instructors in Louisiana when teaching students with special needs while also describing their professional development needs. As a result, we concluded that female SBAE instructors in Louisiana experienced a discrepancy between relevance and ability when teaching students with special needs – a finding that has not been previously explored in the literature. Of the four participants that reported taking a course focused on exceptional students, all reported the course was a requirement of their degree program. This investigation also found the women believed most of

their professional development experiences on special education was inadequate because they were fast-paced, repetitive, and not specific to SBAE. This conclusion is consistent with prior research, which has indicated preservice courses focused on students with special needs have often not been extensive enough to help SBAE teachers feel prepared to teach students with special needs in their programs (Aschenbrener et al., 2010; Faulkner & Baggett, 2010; Kessell, 2009; Ruhland & Bremer, 2002; Ramage et al., 2021; Stair et al., 2019). It was further concluded that even if participants received preservice education on teaching students with special needs, the limited extent of the course failed to provide adequate time for interpretation and to develop positive perceptions when accommodating students with special needs. In addition, because of the time required to influence teachers' perceptions, preservice education serves as a vital time when strategies can be developed that can help them gain the self-efficacy and skills needed to be successful once they enter the field (Savolainen et al., 2020).

Based on these results, professional development should be offered based on specific disability types. Specifically, participants indicated a greater need to accommodate students with physical disabilities in laboratory settings. Because a gap may exist in content knowledge about specific disability categories and strategies when teaching students with special needs, is it possible that further marginalization of students with special needs may be occurring in classrooms? For example, if women SBAE teachers perceive students to be of low ability or are unaware of how to effectively teach certain students, they may unintentionally reduce experiences and opportunities for those learners (Aschenbrener et al., 2010; Faulkner & Baggett, 2010; Jobling & Moni, 2004; Johnson et al., 2012; Kessell, 2009; Ruhland & Bremer, 2002; Stair et al., 2019).

Involvement in FFA has been shown to have positive impact on students' self-identity, employability after graduation, and soft skill development (Bowling & Ball, 2020; Hansen et al., 2003; Lundry et al., 2015; NAAE, 2021). However, how is SBAE serving all, if students with special needs have not been routinely encouraged to participate in FFA events? For example, one participant in this investigation shared her experience traveling with a student to the National FFA Convention. Upon arrival, the student's accommodations were not met for an award ceremony, and they were unable to participate. To serve all students, SBAE must increase the self-efficacy of female instructors to involve this population in the total program while also ensuring that, once included, they can participate at the same level as their peers. We also recommended that the results of this investigation be shared with state SBAE staff, university faculty, and Louisiana Agriculture Teachers Associations. These groups should then work collaboratively to use the findings of this investigation to provide professional development events for women SBAE instructors on special education. Professional development events should not be general special education trainings. Instead, they should focus on specific disability types and/or specific skill competencies. Finally, professional development should present contemporary approaches to accommodating students with special needs that are directly applicable to women SBAE instructors in their classrooms as well as during SAE and FFA advisement (Johnson et al., 2012).

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The Intersection of Gender, Media, And Policy: A Qualitative Analysis on Thai Newspaper Coverage of Women in Agriculture

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Women empowerment and gender equality have been found to be statistically significant and positive predictors of global agricultural development. Therefore, reducing gender disparities can encourage economic progress and growth in developing nations. As such, determining effective ways to stimulate social progress and women's empowerment has emerged as a critical need. One strategy used to raise the public's consciousness about gendered issues in Thailand has been through mass media. In response, this study aimed to (1) determine to what extent Thailand's newspaper coverage focused on topics related to women and the agricultural industry; and (2) describe how women in agriculture have been portrayed in newspaper coverage since the introduction of Thailand 4.0's policy in 2016. Using qualitative content analysis of Thailand's newspaper coverage of women in the agricultural sector, four themes emerged: (1) economic policy implications for Thailand's agricultural system; (2) human rights; (3) women entrepreneurship and leadership; and (4) agricultural development. Therefore, this study concluded that newspaper coverage of women in agriculture was diverse and conflicting – a finding not previously reported. The findings also revealed that women in agriculture have been underrepresented in newspaper publications historically. Moving forward, we provided critical implications for how future research, theory, and practice can depict women in agriculture more positively in the newspaper media.

Introduction and Review of Literature

Addressing gender inequalities and furthering women's empowerment is crucial to global agricultural development. Previous research has found that reducing gender inequalities can help advance agriculture and rural communities (FAO, 2011; Seymour, 2017; World Bank, 2012). Women empowerment efforts have also been shown to lead to greater economic freedom and reduce barriers for women, which has inspired sustainable economic growth at the community level (Anderson et al., 2021; Duflo, 2012; Gates, 2014; Kabeer & Natali, 2013; Klasen, 2018). Consequently, gendered issues have become closely intertwined with global development efforts (Seymour, 2017; Yaya et al., 2018). As an illustration, women's empowerment efforts have been repeatedly ranked as a high priority on the United Nation's (UN) policy agenda because of its potential to create transformative outcomes for global development (UN Women, 2018). As a result, the UN adopted its Sustainable Development Goals with an entire priority area dedicated to the empowerment of women (United Nations, 2017). Moreover, evidence has suggested that improving women's welfare and reducing gender disparities can lead to better childhood nutrition, decreased childhood mortality, increased educational attainment, improved maternal health and mortality, and support the management of natural resources better (Agarwala & Lynch, 2006; Fisher & Naidoo, 2016; Malhotra & Schuler, 2005; Mason, 2005; Osborn et al., 2015; Yaya et al., 2018; Yount et al., 2019).

Promoting gender equality in agriculture has also encouraged economic growth in developing nations (Ansari & Khan, 2018). Case in point, Alkire et al. (2013) argued that by addressing gender inequalities in agriculture, developing nations could “increas[e] agricultural productivity, achiev[e] food security, and reduc[e] hunger” (p. 1), resulting in an increased focus for developing nations in providing more opportunities for women to gain technical knowledge and skills (Akter et al., 2017; UN Women, 2018). For instance, Ansari and Khan (2018) reported statistically significant and positive relationships existed among technical training for women, agricultural development, and national growth in Thailand.

Many rural areas in Thailand rely on agriculture as their primary source of income (Agard & Roberts, 2020). Because of this, agriculture and agricultural products continue to be a critical aspect of the country’s economy (Win, 2017). It should be noted that women in this region provide a critical contribution to agricultural labor and productivity (Nguyen et al., 2019). As such, the empowerment of women in agriculture has been vital to growth and development. For instance, existing research has shown that women’s empowerment in Thailand and Southeast Asia have progressed more than in other developing areas of the world, such as Sub-Saharan Africa (Akter et al., 2017; Richardson & Roberts, 2020; Roberts & Edwards, 2017). Despite this, significant impediments to gender equality remain for Thailand’s agricultural sector. On this point, Nguyen et al. (2019) advanced four barriers to Thailand’s women empowerment: (1) women being considered secondary farm labor, (2) lack of access to legal resources, (3) confinement to lower-level and less lucrative roles, and (4) failure to incorporate gender equality into agricultural policy.

One strategy used to raise the public’s consciousness about gendered issues in Thailand has been mass media (Dominick, 2002; Oosthuizen, 2012). Mass media can influence the public because it reaches a diverse range of populations as well as the frequent exposure that many individuals have to these sources of information (Hassanzadeh, 2018; Sharda, 2014). Newspapers, in particular, provide coverage of local and community events as well as reporting on global happenings. Therefore, they can function as gatekeepers for information for communities, especially in rural spaces (Oosthuizen, 2012). In addition to basic information, newspapers also inform the public on issues that influence their worldviews (Oosthuizen, 2012). Consequently, newspapers can influence the public’s perceptions and promote stereotypes in society. However, this power can also change views and perceptions positively (Dominick, 2002; Oosthuizen, 2012; Simon & Hoyt, 2013).

Sharda (2014) argued that the mass media’s influence was substantial enough to serve as a reference point upon which individuals base beliefs, opinions, and self-perceptions. For instance, because gender inequalities and stereotypes have been predominantly social constructs that remain deeply entrenched in the public consciousness, the media can give voice to women who lack agency, power, and resources. And in turn, it inspires more empathy and understanding (Sharda, 2014). Hassanzadeh (2018) reported four primary ways in which the media can encourage social change concerning gender inequality: (1) featuring male change agents with records of positive influences on females lives, (2) condemnation of gender discrimination and disparities, (3) depicting women in leadership and key positions, and (4) reporting research that focuses on gender issues. Therefore, representing women in the media as “strong, independent,

educated, and working in high-level positions” can shift societal perceptions of gendered roles and stereotypes (Hassanzadeh, 2018, p. 5).

The fourth Global Media Monitoring Project (GMMP) was created to be “most extensive research on gender bias and subsequent initiatives in the news media” from 2009 to 2010 (Sharda, 2014, p. 44). The project demonstrated that only a quarter of individuals represented in the news media were female. This was only a 7% increase in female representation in the 15-years since the GMMP published its initial report. To complicate this issue further, lead female news subjects were even less prevalent in media reports (Sharda, 2014). Nevertheless, global strides have improved gender equality and women’s lives, despite being under-portrayed in the media (Ross & Carter, 2011). In fact, previous research has shown that men and women have been predominantly represented in ways that adhere to traditional gender roles (Coltrane & Adams, 1997; Davis, 2003; Ganahl et al., 2003; Reichert & Carpenter, 2004; Rouner et al., 2003; Simon & Hoyt, 2013). Depicting men and women in such ways could further perpetuate traditional gender stereotypes and roles in society and influence government policy. Consequently, a need emerged to examine how gender, media, and policy have intersected in developing nations such as Thailand.

Thailand 4.0

In May 2016, the Thai government introduced a development initiative called Thailand 4.0. This initiative promoted sustainable agricultural, economic, and social development (Puncreobutr, 2017). The intent of Thailand 4.0 was to lead the country into an innovative and technologically advanced future (Puncreobutr, 2017). The policy emerged after several similar initiatives were successfully implemented in other Asian countries. Under the policy, each ministry, i.e., a department of the Thai government, created and implemented procedures to uphold the aims of the initiative. For example, Thailand’s Ministry of Agriculture introduced Agriculture 4.0, a policy focused on advancing new technology and smart innovations to the agricultural industry. As a result of the policy, new research and development funding was allocated to advance drones, precision agriculture, and other technological innovations for the industry (Bhandhubanyong & Sirirangsi, 2019). Ultimately, Thailand 4.0 marked a new development phase and increased focus on social issues such as the effects of policy on women in the agricultural industry. Because of the policy’s far-reaching implications, Thailand 4.0 served as an appropriate frame to bound our examination of the intersection of gender, media, and policy for women in agriculture.

Epistemological and Theoretical Perspective

For this investigation, we used the epistemological position of constructionism to understand and analyze the study’s findings (Crotty, 1998). Constructionism involves an individual’s view of their reality and their process of making meaning of the world. In particular, individuals who use this epistemological lens maintain their interactions in the social world shape how they construct knowledge and, ultimately, their unique worldview (Andrews, 2012; Schwandt, 2003). Therefore, this lens allowed us to examine how external inputs, such as media and news articles, shape how knowledge has been constructed regarding media coverage of women in agriculture. This study also drew upon a critical theory perspective (Denzin & Lincoln, 2008). Critical theory

allows researchers to understand how issues of power, such as gendered norms and traditions, influence culture, economics, and society. Therefore, using this lens allowed us to examine how power might have influenced representations of Thai women in agriculture. Using these two lenses, we were uniquely positioned to investigate how women have been portrayed in the media and whether power imbalances might have influenced this depiction.

Statement of Purpose

This study's purpose was twofold: (1) determine to what extent Thailand's newspaper coverage focused on topics related to women and the agricultural industry; and (2) describe how women in agriculture have been portrayed in newspaper coverage of Thailand 4.0 from 2016 to 2020. As a result, this study aligned *Priority 7: Addressing Complex Problems* by the American Association for Agricultural Education's National Research Agenda (Andenoro et al., 2016).

Methodology

To investigate how women have been portrayed, we used a qualitative content analysis approach (Elo et al., 2014; Schreier, 2012). Content analyses provide a systematic approach to examine textual, visual, and other forms of qualitative data (Elo & Kyngäs, 2008; Glenn et al., 2012; Oosthuizen, 2012; Saldaña, 2021). The approach also allows for quality inferences to be drawn from the qualitative sources analyzed (Elo & Kyngäs, 2008; Krippendorff, 1980). Ultimately, the purpose of content analysis is to “provide knowledge, new insights, and a representation of facts” (Krippendorff, 1980; Oosthuizen, 2012, p. 52). Content analyses have also been used as a quantitative research approach; however, its popularity in the qualitative paradigm has grown in recent decades (Saldaña, 2021). As a result, researchers have advanced it to help interpret meaning of documents and other sources of qualitative data (Hsieh & Shannon, 2005; Murphrey et al., 2018). It is also important to note that content analyses have been used extensively in media studies (Graneheim & Lundman, 2004; Oosthuizen, 2012; Schreier, 2012). Schreier (2012) advanced three defining characteristics of qualitative content analysis: (a) a reduction of large data sets, (b) conducted systematically, and (c) flexible. Further, qualitative content analyses can be conducted inductively or deductively. We used an inductive approach for this investigation, which was appropriate because little was known about the phenomenon (Oosthuizen, 2012). This approach allowed categories and themes to emerge from the data (Glenn et al., 2012). To accomplish this, we bounded the analysis by *place*, i.e., Thailand, and *time*, i.e., 2016 to April 2021.

Researcher Reflexivity

Before discussing the analytic approach used, it is important to address our background, relevant experiences, and interpretive lens. First, this study used a qualitative research approach. As such, our interpretation of the data was likely influenced by our biases, experiences, and perceptions. Stake (1995) claimed this influence stemmed from the fact that qualitative researchers “examine meaning and redirect observation[s] to refine and substantiate those meanings” (p. 9). Therefore, it is important to acknowledge that the leader researcher was an American female graduate student with agricultural experience in Thailand. The other researchers were faculty at Louisiana State University. We each have conducted research both on and with Thai women in the

agricultural industry. Therefore, our lived experiences influenced the analysis, interpretation, and presentation of the data.

Data Sources and Analysis

For this investigation, we used newspaper articles as the primary source of data because they have been advanced as the most often reliable source of media content (Rosenstiel et al., 2011; Ruth & Rumble, 2016). Additionally, newspapers have shown to be “effective in promoting knowledge gain to rural populations” (Ruth & Rumble, 2016, p. 27). In this investigation, we analyzed newspapers articles from May 2016 to April 2021 using a qualitative content analysis approach. Both English and Thai-language newspapers circulated in Thailand were included in the study. To accomplish this, we used *Nexis Uni*, an online database, to collect online and in print newspaper articles in English. We used the primary search term “agriculture,” with “women OR woman” as the secondary search term. Additional parameters included: (a) location of publication (Thailand), (b) geography by document (Thailand), (c) publication type (newspapers), and (d) date parameters (2016 to 2021). In total, there were 8,105 matches for the primary search term, “agriculture,” and “Thailand 4.0” as well as 352 matches that included “agriculture,” “women OR woman,” and “Thailand 4.0”

During our review, duplicate and irrelevant articles were not included for further analysis. Regarding Thai language newspapers, we analyzed newspaper articles from two representative Thai newspapers. These included the *Thai Rath* and *Matichon Online*. We translated each page using Google® Page Translation. The primary search terms used on each media source’s search engine was “farm,” and “Thailand 4.0” which was used rather than “agriculture” because of a lack of results. *Thai Rath* yielded 131 agricultural articles, of which 53 depicted women. Meanwhile, *Matichon Online* yielded 55 agricultural-related articles, with 22 representing women. After narrowing the population from a combined 538 (English- and Thai-language newspaper articles using the search terms “agriculture” or “farm”), there were a total of 204 ($N = 204$) articles depicting women in agriculture regarding the Thailand 4.0 initiative. After data collection, we analyzed each source using Saldaña’s (2021) coding process outlined in *The Coding Manual for Qualitative Researchers*. Coding is a “research-generated construct” that helps researchers ascribe meaning to data, which can be later analyzed to determine patterns and categories (Saldaña, 2021, p. 4). The coding strategy employed in this study involved first and second-cycle coding. The first cycle of coding was an *elemental method* called concept coding (Saldaña, 2021). Concept coding has been used for labeling “big picture” ideas, and as a result, it allows the resulting codes to capture the meaning of the overarching topic of each newspaper article (Saldaña, 2021, p. 97). After completing the first round of coding, the initial codes were reviewed and adjusted, where necessary, to reflect better the fluid and cyclical nature of coding (Rogers, 2012). After finalizing the first cycle code list, we employed pattern coding to reduce the first cycle codes into categories (Saldaña, 2021). Finally, we used a thematic coding approach to reduce the categories identified in the second coding cycle and emerge the study’s themes (Saldaña, 2021).

Ensuring the Study’s Quality

Ensuring the quality of qualitative research is particularly critical. In this study, we embedded Lincoln and Guba's (1985) four quality standards into its design. These four standards include (1) credibility, (2) confirmability, (3) transferability, and (4) dependability. To achieve credibility, we used peer debriefing (Lincoln & Guba, 1985; Nowell et al., 2017; Spall, 1998). For example, we met as a team to debrief emergent findings. We met multiple times throughout the research process to discuss and review the methodology, interpretation of codes, and appropriateness of themes and categories. Confirmability was ensured through extensive memo writing after every stage of the research project, including the preparation, data collection, analysis, and interpretation stages. Memo writing allowed me to gain a deeper understanding of the data and the decisions made, as well as to reveal any potential biases. The third standard, transferability, was established by providing complete, rich descriptions of the study's research methodology and analysis procedures. We accomplished the final standard, dependability, through the use of an inquiry audit that involved an examination of the research process and the findings by an external auditor (Lincoln & Guba, 1985).

Findings

Through our analysis of the data, four themes emerged. The themes included: (1) economic policy implications for Thailand's agricultural system; (2) human rights; (3) women entrepreneurship and leadership; and (4) agricultural development. The themes represented positive portrayals of women in the agricultural industry and representations of how they were situated after adopting the Thailand 4.0 policy.

Theme 1: Economic Policy Implications for Thailand's Agricultural System

The first theme depicted the economic issues published on Thailand's 4.0 policy. Among the articles, the general trend in this theme spoke to the negative economic impacts of the policy at the domestic and international levels. In particular, financial troubles and unemployment issues that impacted women were often featured. Another emergent concept was the role of economic problems that surfaced during the COVID-19 global pandemic. The pandemic was widely discussed as the reason for agricultural-related economic issues in the news regarding women's economic empowerment (Banchongduang, 2021; Bangkok Post, 2021; Chongcharoen and Sihawong, 2021; Gomez and Talpur, 2021; Kuentak, 2021; Thairath Online, 2021). Scattered among the general discussion of the pandemic were topics on agricultural issues such as an increase in food prices, lack of work opportunities, and fear of long-term personal debt for farmers and agricultural industry workers. In an article published by the Bangkok Post (2021), a single mother of two discussed how she was "heavily indebted" to the Bank of Agriculture and Agricultural Cooperatives because of coronavirus lockdowns that occurred in Thailand (para. 2). Additionally, multiple articles reported on the shrinking of agricultural exports and agritourism, as well as a reduction in prices for agricultural goods (Chongcharoen & Sihawong, 2021; Thairath Online, 2021). In one example, Chongcharoen and Sihawong (2021), a female farmer discussed how rambutan (a local fruit crop) prices dropped during the pandemic. Consequently, she incurred debt and was forced to reduce the number of farmworkers she employed to save her business. Tourism was also halted, which had far-reaching impacts on the agricultural industry.

Another frequently mentioned topic that surfaced in the media's coverage of Thailand 4.0 was women's concerns about the repayment of loans and debt to the Bank for Agriculture and Agricultural Cooperatives (BAAC). Because Thailand had many women-owned agricultural businesses and farms, they were often impacted by economic downturns. In a discussion of such concerns, Chongcharoen and Sihawong (2020) chronicled a female farmer who explained, "We [women] have faced many troubles this year including severe drought and a drop in prices...we do not have money to repay the Bank for Agriculture and Agricultural Cooperatives" (p. 18-19). Another critical issue in newspaper publications was the role of Thailand 4.0's domestic and international policies on women economically. Case in point, news coverage primarily focused on how international trade and policy affected the work of Thai women at the local level. Specifically, women's unemployment issues and unsafe work conditions were featured as well as other work-based inequalities and were linked, ultimately, to trade and policy issues (Ghosh, 2020; Jagan, 2018; Sabharwal, 2020; Smith, 2017; Thairath Online, 2021). When highlighting women's unemployment issues and unsafe work conditions, the discussion illuminated women's financial contributions to household incomes and how unemployment rates in the agricultural industry have hampered these efforts (Jagan, 2018). Domestic economic issues and their resulting implications for the country's agricultural policy were also topics of interest. Regarding domestic concerns, topics included economic initiatives, committee formations, and the drafting of new agricultural policies to supplement Thailand 4.0 (The Nation Thailand, 2016b; Bangkok Post, 2020). For example, an article from the Bangkok Post (2020) addressed how economic policy changes impacted women working in Thailand's agricultural industry:

Open market access in RCEP [Regional Comprehensive Economic Partnership] that drastically cuts tariffs of agriculture products will have terrible consequences for small-scale producers in developing countries. It is particularly detrimental for women in subsistence and small-scale farming'... Yet such deals can also lead to job losses, the closure of small businesses, diluted labor rights, and increased degradation of natural resources including forests and land. (para. 7-9)

Finally, of the newspaper articles analyzed, a critical concept was the role of economic empowerment efforts and their impacts on women. These undertakings were operationalized in the newspapers at the macro and micro levels. For example, on a macro-scale, economic empowerment included global women empowerment efforts, the need for greater engagement of women, and international organization events (Jitcharoenkul, 2017). In 2017, Jitcharoenkul called for greater engagement of women in agricultural and environmental services. He explained: "the sections are growing micro, small, and medium enterprises (MSMEs), enabling financial inclusion, supporting small farms, building human capital, greater engagement of women in services and promoting green growth" (Jitcharoenkul, 2017, p. 6). Conversely, domestic coverage primarily featured financial assistance, economic partnerships with corporations, and growth of small and medium enterprises (The Nation Thailand, 2016c; Piniyarakarn, 2016; Termariyabuit, 2018). For example, one article discussed empowering women in agriculture through partnerships with large corporations such as Coca-Cola by "boosting the economic performance of 600 Thai female sugarcane growers" (The Nation Thailand, 2016c, p. 4). Therefore, the concept of economic empowerment provided critical insight and commentary on economic issues and frequently featured the initiatives, policies, and voices that influenced women's lived experiences under the Thailand 4.0 initiative.

Theme 2: Human Rights

The second theme, human rights, exposed how gender inequalities and marginalized populations, such as indigenous groups and migrants, were influenced by Thailand 4.0. Accordingly, two subthemes emerged: (1) gender inequalities and (2) indigenous and migrant worker rights.

Gender Inequalities

The first subtheme focused on the gender inequalities that emerged because of Thailand 4.0 on the global, national, and local levels. The newspaper media depicted this phenomenon using stories from women who articulated the realities of gender inequalities, barriers to better opportunities, and violence (Akhtar, 2017; Giri, 2019; Kuentak, 2021; Sukkumnoed, 2018). Additionally, several feature articles illuminated the importance of women to the agricultural sector and advanced discussion about persistent gender inequalities and the subjugated position of women in the agricultural industry (Clarke, 2016; Giri, 2019; Pisuthipan 2018). However, it is important to note that multiple articles touted the critical progress made in the country (Chan-o-cha, 2016; The Nation Thailand, 2016b; Sukphisit, 2016; Wiriyapong, 2018). As an illustration, some work featured the region's progress regarding women's issues despite persistent disparities in gender equality and pay (Akhtar, 2017).

Another gender inequality that surfaced after the implementation of the Thailand 4.0 policy was labor rights. On this point, Charoensuthipan (2019) described how Thai women had to work harder because agricultural companies more frequently hired their male counterparts. Other labor rights issues that were reported included human rights abuses by international companies and increased sexual harassment claims raised by women (Charoensuthipan, 2017; Kongrut, 2017; Laping, 2017). The newspaper media also provided exposés and issued warnings to women in agriculture to help bring awareness to these issues (Kongrut, 2017; Laping, 2017). As such, labor rights represented a primarily negative sentiment linked to Thailand 4.0. Finally, multiple articles also featured the critical role of women in furthering the development of the agricultural sector while also calling for equal opportunities (Chan-o-cha, 2016; The Nation Thailand, 2016b). In fact, in one article, Prayut Chano-o-cha, the Prime Minister of Thailand, penned an op-ed that stressed the importance of women having equal opportunities. Further, he suggested that Thailand "...should boost [the] education and the wellbeing of citizens to maximize potential...[including] sensitive groups such as juveniles, the elderly, women and migrants..." (The Nation Thailand, 2016b, para. 7). Other articles detailed proposed legislation that focused on promoting gender equality and women's rights.

Indigenous and Migrant Worker Rights

Women were often the subject of articles focused on indigenous and migrant worker rights after the implementation of the Thailand 4.0 initiative. Case in point, reports on this phenomenon focused heavily on the importance of consulting indigenous populations when making agricultural decisions, the lack of migrant worker rights, and the poor attitudes and perceptions directed at female migrant workers (Duangmee, 2016; Meyer & Niratisayakul, 2020). It is critical to note that women were often the focus of these stories because of the importance of

indigenous and migrant women to Thailand's agricultural industry. For example, indigenous and migrant workers often exhibit a high level of local knowledge about the environmental factors that influence the growing conditions of local crops (Duangmee, 2016). Duangmee (2016) described how multiple efforts were established, such as creating a rice bank, to improve the lives of indigenous populations. On this point, Duangmee (2016) explained:

The rice bank was a life-changing project...not only did it save the children from going hungry, but it also helped the villagers to stand on their own feet...We have enough rice, says one Lawa woman, smiling as she hands us glasses of throat-burning rice wine. (para. 7-9)

Another emergent concept was the newspaper media's attention to women migrant workers' rights, including the public's perception of migrant workers and working conditions, after Thailand 4.0's adoption. Because many migrant workers in Thailand were female (Bharathi et al., 2019; Graber Ladek, 2018; Khmer Times, 2017), a significant concern was addressing the poor attitudes and perceptions directed toward women migrant workers. In particular, newspapers featured perceptions that Thai nationals held about women when viewed as secondary labor – a marginalized group historically paid a lower wage than males (Chia, 2017; Graber Ladek, 2017). It was, however, reported that Thailand had a more positive and progressive view of providing women migrants with equal pay, better opportunities, and citizenship compared to other Asian countries (The Nation Thailand, 2016a). The newspaper press also featured illegal migrant arrests and deportation (Khmer Times, 2017; Pakkawan, 2019). Despite this, the depiction of indigenous and migrant workers' rights was positive and called for better conditions, especially for female agricultural workers.

Theme 3: Women Entrepreneurship and Leadership

Featuring women as entrepreneurs and leaders in high-level positions was a common theme in newspaper coverage of Thailand 4.0. The spectrum of coverage ranged from highlighting women farmers and small business owners to depicting Thai women serving in high-level leadership roles locally, regionally, and globally. Therefore, the portrayal of women in these roles was distinctly positive. Accordingly, women-owned businesses were often showcased. Articles featured successful women-owned fisheries, organic farms, fruit farms, and floriculture businesses (Matichon Online, 2018a, 2018b; Thairath Online, 2017a, 2018b, 2020a, 2020f). Panyaarvudh (2016) described how women entrepreneurs helped usher in innovative ideas and designs that helped move the agricultural sector into the digital age. Reporting on women entrepreneurs also frequently mentioned how women in executive-level positions had increased by more than 10% in Thai corporations over the past decade – a trend that significantly exceeded other nations in Southeast Asia (Hendricks, 2018; Narula, 2016). Women have also been depicted as competitors at agricultural entrepreneurship competitions and in various keynote speaker roles for agricultural-based conventions (Karnkanatawe, 2019; Panyaarvudh, 2016; Thairath Online, 2019a). One article discussed Thailand's Women Entrepreneurs Startup Competition and featured a female winner that created “a device and smartphone application that helps fish and shrimp farmers monitor water quality” (Panyaarvudh, 2016, para. 1).

Women were often depicted as serving in official capacities for the Thailand 4.0 initiative in roles such as program delegates, spokeswomen, and advisers (Matichon Online, 2017, 2018b; Thairath Online, 2020e). Many women in newspaper articles on Thailand 4.0 were often considered global leaders. These included foreign dignitaries or Thai women serving in international positions such as the Consul-General of Shanghai (Thairath Online, 2017a, 2017b). A substantial number of newspapers also mentioned women in national or local leadership roles. These included women in key positions that were serving on various agricultural-related committees, departments in the Ministry of Agriculture, and divisions focused on land and farmer development (Thairath Online, 2018a, 2019b). Women leaders in those positions often served as keynote speakers at agricultural events and development board meetings (Thairath Online, 2017c). Females were also often mentioned as having consulting roles to assist in creating agricultural and nutrition policies. In fact, women were more likely to be featured in newspaper articles in these leadership roles for the Thailand 4.0 initiative than males.

Theme 4: Agricultural Development

Agricultural and rural development represented the critical theme in the newspaper media analyzed. Two distinct subthemes emerged from the analysis of these topics: (1) agricultural development and (2) agricultural innovations and technology.

Agricultural Development

The first subtheme focused primarily on women's roles in the development of Thailand's agricultural sector. Newspaper articles reported on programs and initiatives designed to provide training and assistance across multiple sectors. These programs included professional development on agricultural practices and techniques, budgeting, fiscal responsibility, multi-cropping, and STEM integration (The Nation Thailand, 2016c; Treerutkuarkul, 2017). For example, one program focused on empowering women by teaching them "agricultural and handicraft skill development" (Yongcharoenchai, 2017, para. 7). Other newspaper media examined instances of government relief under the Thailand 4.0 initiative that focused on providing financial assistance and agricultural resources. However, education and professional development opportunities were often delivered. Newspaper coverage also focused on agricultural development efforts that had more indirect benefits to women. For example, under the Thailand 4.0 initiative, new educational programs and legislation were designed to address harmful chemical exposure, food security, and malnutrition (Kadiresan, 2019; Mortensen & Resurreccion, 2019; Treerutkuarkul, 2021). Additionally, articles investigated local opposition to various industrial developments in traditional agricultural areas. Sutthavong (2017) reported how women in the fisheries industry would be negatively affected in Laem Sak, located in Krabi Province, if a coal-fired power station was built. He expanded: "most importantly, the [seafood-processing] shed gives employment and a steady income to the local women." (Sutthavong, 2017, para. 29). Therefore, Thai communities appeared to consider the impacts that innovations could have on women in agriculture after implementing the Thailand 4.0 initiative.

Agricultural Innovations and Technology

Another critical concept that emerged from the analysis of newspaper articles was depictions of women using and developing agricultural innovations technologies. Topics reported included: (1) demonstrations and professional development on smart farming, (2) digital farming initiatives (3) examples of smart farming applications, and (4) women-owned smart farms (Matichon Online, 2019; Thairath Online, 2019b, 2020c, 2020d). In addition to depictions of women engaging in smart farming practices, various articles featured the successes of women innovators, creators, and entrepreneurs in the agricultural sector (e.g. Matichon Online, 2018c; Thairath Online, 2020b). Women were also represented as consumers of agricultural innovations and technologies. For example, female telecommunication experts were used by newspapers to demonstrate how women were assisting underserved populations by increasing information sharing approaches that could help address food security, productivity, and profitability (Pornwasin, 2019). As a consequence, the newspaper media appeared to depict women in agriculture as a way to encourage the continued development of Thailand's agricultural industry.

Conclusions

This study examined the intersection of gender, media, and policy by examining newspaper coverage of Thailand 4.0 from 2016 to 2020. Through an analysis of the data, we identified four emergent themes: (1) economic policy implications for Thailand's agricultural system, (2) human rights, (3) women entrepreneurship and leadership, and (4) agricultural development. As a result, we conclude that newspaper coverage of women in agriculture was diverse and conflicting – a finding not previously reported regarding Thai women in agriculture. To describe the study's findings further, a discussion of the conclusions derived from each theme follows.

The first theme illustrated how women often experience negative economic impacts when faced with changes in agricultural policy. We conclude that the newspaper media reported these negative repercussions in response to periods of an economic downturn that surfaced after the COVID-19 global pandemic, a findings that has not been explored in the literature on women's issues in the region. Because of their position in a male-dominated society, women were particularly susceptible to changes in economic and agricultural policies as well as economic downturns. Previous research has suggested that women in this region have been secondary or unpaid labor (Nguyen et al., 2019). Because of this, newspaper coverage on negative economic impacts for women in the agricultural sector were likely under-portrayed. However, despite the discussion of negative impacts and likelihood of under-portrayal, the newspaper media provided glimpses of progress in the form of financial assistance, partnerships with corporations, and the establishment of new enterprises for women before the pandemic affected the region (Pinijparakarn, 2016; Termariyabuit, 2018). Consequently, we concluded that the global pandemic negatively affected progress made to economically empower Thai women in agriculture. Nevertheless, a more positive perspective regarding the advancement of human rights emerged in the second theme. In particular, this theme described the advancement of global women empowerment and gender inequality issues and reported on progress to indigenous women and migrant workers. As a result, we concluded that, in some ways, the Thailand 4.0 initiative fostered critical progress for local Thai women and agricultural development in the region. This finding aligned Ansari and Khan (2018), who argued that Thailand 4.0 advanced gender rights and equality in the agricultural industry, especially concerning economic growth, which has historically been used as a benchmark for development.

The positive depiction of women in agriculture in Thailand's newspapers was further illustrated in the final two themes. Such a representation of women is critical because newspapers have historically been used as a primary source of knowledge in Thai society. As a result, the depiction of women can play a prominent role in influencing societal perceptions and attitudes on gendered issues (Oosthuizen, 2012). Because knowledge is created through an interaction with one's environment, positive portrayals in the media is particularly important. These positive portrayals of women will likely lead to them having an increase in positive self-perceptions, especially for women working in the agricultural sector. To this end, we conclude that newspaper coverage of since Thailand 4.0 depicted women positively by portraying them as entrepreneurs, innovators, and leaders in the agricultural industry – a finding not previously explored. Because previous evidence has stressed the critical role of media on women's empowerment, this finding provided critical implications that could influence, shape, and potentially challenge deeply ingrained gender stereotypes (Simon & Hoyt, 2013; Sharda, 2014).

Discussion, Implications, and Recommendations

Thailand has historically been portrayed as a country whose women experience greater equality and empowerment (Mason & Smith, 2003; Akter et al., 2017). For example, Akter et al. (2017) found that Thai women often have greater economic freedom and control of their finances. In this investigation, however, the media coverage on women in agriculture after the implementation of the Thailand 4.0 initiative demonstrated critical points of contrast. As an illustration, some newspaper media has continued to feature women as engaging in traditional roles that have historically been relegated to women. Although depicting women in such roles was not intended to be harmful, continuing this reporting could perpetuate gender stereotypes and provide obstacles to further women's empowerment efforts.

It is also important to note that in many of the articles, especially in the Thai language papers, women were featured in an incidental manner. For instance, in a large portion of the media coverage, women were represented using an illustrative photograph that appeared to be published to stimulate interest in the article. On this point, Sharda (2014) argued that women had been underrepresented as subjects in media portrayals in Asia. Instead, they have been often used as sexual objects. Consequently, we recommend that future research explore this phenomenon and provide implications for navigating this sexist behavior in the media focused on issues affecting the agricultural industry. Although the underrepresentation of women in newspaper media persists, the representation of females as agricultural entrepreneurs, innovators, and leaders could create a powerful and positive depiction for future generations. Despite this, the frequency of newspaper coverage on such topics was inadequate. Moving forward, we recommend that research examine ways to increase the positive depiction of women in such roles. Future work could also explore whether new sources, including print, radio, television, and web-based media, could be developed that more positively promote Thai women in agriculture.

Understanding how women in the agricultural industry have been portrayed in the newspaper media was critical to understanding gender equality and women empowerment efforts in Thailand. It is essential to note, however, that there were several limitations to this investigation. First, we were limited by a language barrier and relied on Google® Page Translation. Efforts

were made to secure a native Thai speaker to assist with translations. However, because the COVID-19 pandemic proved to be an additional barrier, we could not find an individual who could commit to this process because of the additional responsibilities they endured during this period. Consequently, some of the translations could not have been accurate and may have resulted in our misinterpretation. In the future, we recommend that follow-up studies consult Thai national or language speakers to understand better the narrative reported by Thai media. A final limitation was that during our analysis, some differences emerged concerning the media coverage of women between English and Thai language media. As such, we recommend that studies analyze differences between how each media source portrays women in agriculture.

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The One-Way (Agri)Cultural Mirror: A Case Study of How Young Agricultural Leaders Understand and Experience Culture

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As the global economy continues to advance, cultural competence has become a buzzword in education, professional development, and research. Despite this, little research has been devoted to understanding cultural competence in agriculture. Thus, a need emerged to describe the cultural competence of young agricultural leaders in Louisiana. Through data analysis, four themes emerged: (a) cultural anxiety, (b) cultural pressure, (c) the one-way (agri)cultural mirror, and (d) cultural lens expansion. The participants expressed anxiety about discussing cultural issues because of a fear of negative social ramifications. As a result, this yielded to pressure to adopt a culturally competent mindset to be successful. Additionally, the agricultural profession was recognized as having a unique cultural identity, producing a one-way cultural mirror whereby consumers and producers cannot understand one another. Because of this cultural barrier, participants recognized a need to expand their cultural lens through domestic and international experiences to serve diverse populations better. Therefore, we recommend that future research explore strategies that can cultivate cultural competence at earlier ages. For example, perhaps professional development opportunities that feature cultural concepts could be offered through 4-H, FFA, and Agriculture in the Classroom.

Introduction and Review of Literature

Literature across various fields, including agriculture, has described the motivations for culturally competent individuals (Gallus et al., 2014; Horvat et al., 2014; Moncloa et al., 2019; Suh, 2004). However, empirical evidence on this phenomenon has remained scant. Cultural competence or cross-cultural competence (3C) has varying definitions depending on its use and context (Gay, 1994). Despite this, the most accepted definition of cultural competence has been “a set of congruent behaviors, attitudes, and policies that come together in a system, agency, or among professionals and enable that system, agency, or those professionals to work effectively in cross-cultural situations” (Cross et al., 1989, p. 13). Although terminology for cultural competence has been vague and disputed, literature across various fields has cited an emergent need for the development of culturally competent individuals (Gallus et al., 2014). Nevertheless, few studies have been devoted to understanding cultural competence for the diverse and globally integrated industry of agriculture (Alston et al., 2020). Nevertheless, the economic, political, and social implications of globalization have pressured agriculture to evolve into an industry that has a more profound connection to the global economy (MacDonald et al., 2015; Robinson, 2018). Therefore, the agricultural industry has been called on to improve its cultural competence throughout the industry’s workforce (Farm Aid, 2019).

Because of the scope and influence of globalization in agriculture, many industry-based organizations have advocated for the development of cultural competence in their membership and the industry as a whole (Deen et al., 2014, Farm Aid, 2019; Moncloa et al., 2019). For agricultural producers, an emphasis on marketing and advertising has helped reach a new

generation of consumers with vast informational resources available through the increased use of technology (Mahaliyanaarachchi & Bandara, 2006). However, shifts in organizational culture can be challenging to implement and have been dependent on the organization's ability to create an environment whereby desirable behaviors and attitudes can be fostered and accommodated (Chambers, 2005). Further, widespread industry shifts have been primarily dependent on an organization's ability to strategically communicate sufficient information to those in the industry (Chambers, 2005; Glisson, 2007; Sun, 2009). One avenue poised to improve the agricultural industry's cultural competence has been to begin at the source of the problem – the education of agriculturalists.

Because of this, agricultural education in the U.S. public education system has begun to recognize the need for culturally competent high school graduates (Grant, 2020; Vincent & Torres, 2015; Woods, 2004). The shifting demographics of the agricultural industry have introduced a variety of cultural diversity issues such as ethnocentrism and cultural exclusion through educational policy, in which secondary agricultural education struggles to foster culturally competent graduates that have been prepared to operate in a globalized agricultural workforce (Grant, 2020; Vincent & Torres, 2015; Woods, 2004). For instance, Vincent and Torres (2015) discovered FFA chapter advisors who have a larger range of cultural diversity in their student organizations have been found to be more aware, knowledgeable, and prepared to accommodate students from diverse cultural backgrounds. Therefore, Vincent and Torres (2015) expressed a need for higher education institutions to better prepare preservice secondary agricultural educators to incorporate culturally competent teaching practices and perspectives in their curricula.

Although significant improvements have been made to expand educational opportunities in formal education, non-formal educational programs in various agricultural organizations have emerged to help educate professionals in the industry. In particular, the Cooperative Extension Service (CES), an organization that promotes agricultural literacy, research, and training for youth and adults, has developed programs and offerings to improve the focus on globalization and cultural competence (Deen et al., 2014; Herndon et al., 2013; Monocloa et al., 2019; Roberts & Edwards, 2016)). As an illustration, the systemic integration of culture through professional development opportunities has been shown to increase the cultural competence of agricultural systems (Braverman et al., 2012; Monocloa et al., 2019). Further, agriculturalists who were considered culturally competent have also been found to be better prepared to address the needs of diverse populations (Monocloa et al., 2019). To improve existing educational programs and inspire new professional development, a need existed to understand the status of cultural competence in the agricultural industry. Therefore, this investigation aimed to address this deficiency in knowledge by exploring the cultural competence of young agricultural leaders.

Conceptual Framework

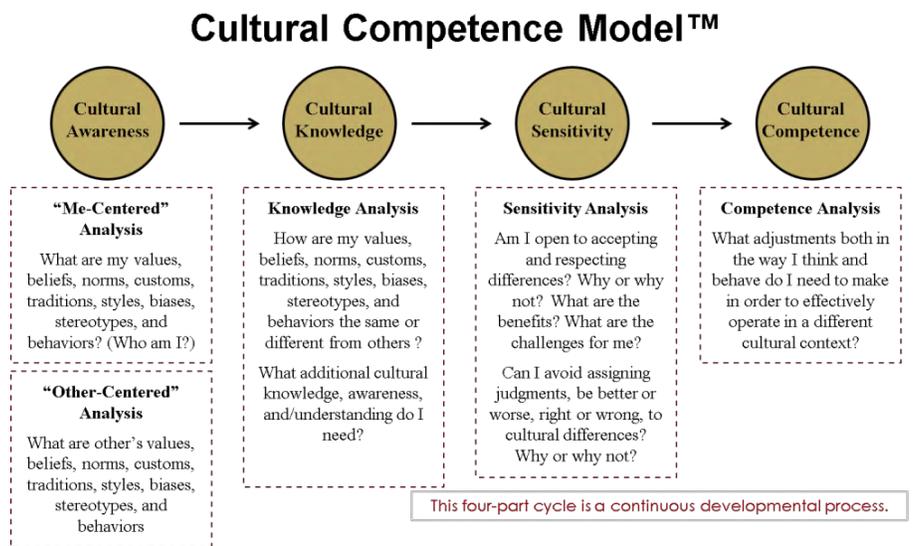
The Winters Group (n.d.) cultural competence model™ described the stages an individual should undergo to reach and maintain cultural competence. The four components of this model are (a) cultural awareness, (b) cultural knowledge, (c) cultural sensitivity, and (d) cultural competence (Winters Group, n.d.). It is vital to note that progression through this model is consequential and

dependent on the individual’s advancement through each phase. For example, an individual cannot progress to the next phase without completing all phases preceding it.

During the first stage of cultural awareness, an individual begins to question their beliefs, values, and cultural norms, as well as the beliefs, values, and cultural norms of other cultures (Bunch et al., 2018; Rampold et al., 2020, Winters Group, n.d). During cultural knowledge, an individual begins to analyze the differences between their culture and the culture of others (Bunch et al., 2018; Winters Group, n.d). Further, through this analysis, an individual begins to realize what subsequent knowledge and understanding is needed to better comprehend cultures they do not identify with, as well as their own cultural identity (Bunch et al., 2018; Winters Group, n.d). In the cultural sensitivity phase, an individual begins to analyze his or her own personal abilities to be accepting, open-minded, and tolerant of others’ cultural beliefs, values, and norms (Bunch et al., 2018; Winters Group, n.d.). During the final phase of cultural competence, an individual determines that ongoing modifications are required to maintain a culturally competent personal and professional lifestyle (Bunch et al., 2018; Winters Group, n.d). Once an individual reaches the phase of cultural competence, they will maintain this stage if a continual analysis has been conducted regarding their awareness, knowledge, and sensitivity toward other cultures (Bunch et al., 2018; Winters Group, n.d). Figure 1 provides a visual description of the model.

Figure 1

Winters Group’s Cultural Competence Model



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Statement of Purpose

The purpose of this study was to understand how young agricultural leaders understood and experienced culture in Louisiana. Therefore, this investigation aligned with the American Association for Agricultural Education’s *Research Priority 7: Addressing Complex Problems*

(Andenero et al., 2016). One research question guided this investigation: What was the cultural competence of young agricultural leaders in Louisiana?

Methodology

This qualitative investigation was grounded in Stake’s (1995) instrumental case study approach. To accomplish this, we examined the case of leaders of the Louisiana Farm Bureau Federation Young Farmers and Ranchers (LBFYFR) program to provide insight into the phenomenon. In accordance with Stake’s (1995) approach, this investigation was bound by program, place, and time. For example, the participants in this study were members of the Young Farmers and Ranchers Program in Louisiana from 2020 to 2021.

Case Selection and Description

We selected the population of interest because of their engagement in production agriculture in Louisiana. The state has an economically and culturally vibrant agricultural industry with over 27,400 farms in operation in 2019 (United States Department of Agriculture [USDA], n.d.). In Louisiana, the agricultural population has been more culturally diverse than the national average (USDA, 2014a). Although the statewide racial diversity is higher than the national average, Louisiana struggles with diversity in other aspects of culture, such as inclusivity of gender. For example, gender diversity in principal farm operators in Louisiana is well below the national average, with females making up 12.3% and males 87.7% (USDA NASS, 2014b). In this investigation, the Louisiana Farm Bureau Federation Young Farmers and Ranchers (LBFYFR) members were highly connected socially, professionally, and politically to the agricultural industry in Louisiana. As such, this was an ideal population to understand better the cultural competence of young agricultural leaders in Louisiana. This study’s population included the young agriculturalists who were members of the LBFYFR. Eligibility for membership included: (a) leaders who were age 18 to 35, (b) a Louisiana Farm Bureau Federation member, and (c) actively engaged in agriculture. Because of a lack of organizational record-keeping, the total number of individual program participants was unknown; however, approximately 100 individuals annually attend the LBFYFR Leadership Conference. The participant pseudonyms, demographics, and personal and professional characteristics have been provided in Table 1.

Table 1

Participants’ Personal and Professional Characteristics

Pseudonym	Gender	Age	Ethnicity	Job Title	Industry
Amy	Female	34	Caucasian	Extension Agent	Non-formal Education
Paul	Male	34	Caucasian	Farm Owner and Manager	Crop Production
Tom	Male	27	Hispanic	Loan Officer	Agriculture Finance

Pseudonym	Gender	Age	Ethnicity	Job Title	Industry
Mary	Female	28	Caucasian	Secondary Agricultural Educator	Formal Public Education
John	Male	23	Caucasian	Cattle Herdsman	Cattle Production

Data Collection

To reach the target population, we contacted the LFBYFR to recruit participants using a criterion-based sampling procedure (Creswell & Poth, 2018). Through an organizational liaison, we contacted members via email to solicit their participation in the study. Additionally, we utilized a snowball sampling method, in which participants then nominated other individuals in LFBYFR who might fit the study's population parameters (Creswell & Poth, 2018). In total, five volunteers agreed to participate. Because of the COVID-19 global pandemic, face-to-face interviews were conducted through Zoom video conferencing software. Using email correspondence, we sought participants' informed consent. Once consent was obtained, individual interviews were scheduled with each participant based their availability. During the interview, participants were asked, "What does culture mean to you?" "What are your experiences professionally with other cultures?" "From your perspective, what are the attributes of a culturally competent individual in the agricultural industry?" Each interview was less than one hour in duration. However, it should be noted that each participant engaged in follow-up interviews to clarify their statements and provide greater detail. The interviews were audio-recorded on a separate, password-protected device, transcribed verbatim via Descript transcription software, and reviewed to ensure congruence and accuracy. During the collection of the data, interview notes regarding the setting and emotions of participants were also captured.

Data Analysis

To analyze the data, three rounds of coding were implemented to emerge the findings. We utilized first and second cycle coding methods as well as thematic analysis to emerge four themes and three subthemes describing the cultural competence and cultural experiences of participants (Saldaña, 2021). For the first cycle coding approach, we used *values coding* (Saldaña, 2021). According to Saldaña (2021), values coding allows participants' underlying worldviews and perspectives to emerge. To utilize this approach, we read each source of data to derive the intrinsic attitudes, values, and beliefs expressed by the participants when discussing cultural competence of the agricultural industry in Louisiana. We also employed an InVivo coding approach to describe the data using the exact words of participants (Saldaña, 2021). InVivo coding has often been used to research topics such as culture because of the description of data through culture-specific vocabulary (Saldaña, 2021). Through this coding cycle, 1,147 unique codes emerged. Finally, descriptive coding was implemented because of the approach's versatility to analyze different forms of data (Saldaña, 2021). Using the descriptive coding approach, 391 codes emerged. Examples of the descriptive codes included: "diversity presence in Louisiana," "share a professional culture of agriculture," "advocacy for agriculture," "domestic travel influences professional skill," and "apprehension of the topic."

During the second cycle of coding, we used axial coding to reduce the open codes into categories. Through this coding approach, axial codes were then patterned into relevant categories. Nine axial code categories were developed through this process. Examples of axial codes included: “travel influence,” “cultural competence progression,” and “diversity in Louisiana agricultural production.” After the first and second cycle coding process, we used thematic analysis to story the data and interpret the axial codes into emergent themes. To accomplish this, we met as a team to negotiate axial codes into a coherent story of the data. As a result of this process, four themes and three subthemes emerged that were interpreted through the Winters Group (n.d.) cultural competence model.

Reflexivity and Qualitative Quality

To accurately represent the research findings, an explanation of our biases and experiences regarding cultural competency and the data should be addressed. We are advocates of culturally competent systems and the progression of culturally competent ideals in agriculture, including education, production, and business. It is critical to understand that these factors may have influenced the interpretation of data to favor the establishment and progression of cultural competence in agricultural industry. To reduce these influences, Tracy’s (2010) model for excellent qualitative research was employed at all stages of the research process. Tracy (2010) stated that the following must be present in a qualitative study to be considered excellent research: (a) worthy topic; (b) rich rigor; (c) sincerity; (d) credibility; (e) resonance; (f) significant contribution; (g) ethics; and (h) meaningful coherence. Through the meticulous adherence to Tracy’s (2010) qualitative quality standards, this investigation achieved its purpose by maintaining rigorous and ethical decision-making.

Findings

Through our analysis, four themes emerged that represented how the culture was understood and experienced by young agricultural leaders in Louisiana: (a) cultural anxiety, (b) cultural pressure, (c) the one-way (agri)cultural mirror, and (d) cultural lens expansion.

Theme #1: Cultural Anxiety

Throughout this investigation, the participants expressed apprehension and cultural anxiety when articulating differences regarding the cultural competence of professionals in the agricultural industry. This cultural anxiety appeared to be a result of a perceived social risk associated with the discussion of cultural topics. For example, participants noted their own and others’ hesitancy to discuss culture because they feared social ramifications. One concerned participant, Mary, was initially worried about the “angle” of the research. Further, she was visibly closed off in the beginning of the interview. She explained that this behavior had to do with the uncertainty of social perception from others. Mary explained: “I brought it up to my friends outside of YF&R [Young Farmers and Ranchers], and unfortunately, in today’s social media culture, it’s just not something that anyone wants to touch with a ten-foot pole.”

This perceived anxiety surrounding culturally focused conversations appeared to surface as participants hoped to avoid discussing the topic. Mary further explained: “I feel like a lot of

people don't know how to ask or how to approach a topic because they don't want to be perceived as insensitive or ignorant." Participants appeared to prefer avoidance of the topic of cultural differences to mitigate the risk of offending others of a different cultural identity. Another participant, Paul, argued: "You can offend somebody... You can upset a person through their culture very easily over one little thing." This sentiment was echoed by other participants who, when asked what they do when cultural differences do not align with their personal beliefs, explained they usually avoided the culture all together. Amy explained that when operating in a culturally diverse setting: "I'm not going to preach that your culture is wrong, I usually just avoid it." Tom agreed with this belief: "I try my best to avoid the subject [of cultural differences] with the person... differences... stay away from them." As a consequence, anxiety and avoidance to discuss cultural topics for fear of the negative ramifications weighed heavily on participant's minds, actions, and beliefs when considering their interactions with other cultures.

Theme #2 – Cultural Pressure

The young agricultural leaders in this study noted that extrinsic motivation and professional pressure to be a culturally competent individual existed in the agricultural industry in Louisiana. For example, all five young agriculturalists in this investigation noted the indisputable presence of different forms of cultural diversity, including nationality, gender, age, sexual orientation, and native language in the industry. As John explained: "Every farm is culturally diverse... all across the state of Louisiana. I don't think it matters what community you go to."

The young agricultural leaders also desired cultural competence largely because of social pressure to adapt to this standard. For example, agriculturalists perceived not being culturally competent could negatively affect their reputation, decrease employee job satisfaction, and decrease their potential revenues. As a result of this extrinsic pressure, the participants expressed a desire to achieve a culturally competent mindset and began to value different perspectives, attitudes, and behaviors in other agricultural professionals and organizations. John pensively explained: "You need to be more accepting sometimes and ask some questions or try to think about it from their perspective... I try to be accepting of everybody... If I'm not familiar with their customs, I want to talk to them about it and just learn more." This sentiment was echoed by Amy, who explained, "You try to research as much as possible and try to adapt to their cultures, as much as possible." Tom distinctly added, "I've never thought any different of anybody due to what their beliefs are." When asked if others in the agricultural industry value cultural competence, Tom explained, "I know wholeheartedly they believe the same way I do." Throughout data collection, the participants described the importance of learning to navigate a culturally diverse industry, such as agriculture, because of the increased quantity of foreign labor sources. The young agricultural leaders also noted that a lack of cultural competence would only damage personal business revenue, social standing, and the agricultural industry. Mary expressively stated that cultural competence was "just basic human decency." She added that if an agriculturalist in Louisiana did not value cultural competence, they would keep their opinions of such matters private. Mary freely explained: "I feel like if they don't [value cultural competence], that's something that would be said behind closed doors... They would at least fake it. That's not socially acceptable." With a large percentage of immigrant labor in the agricultural industry, cultural competence in the industry seemed to be fostered by an extrinsic motivation to optimize personal and financial gain. The young agricultural leaders also were

professionally pressured into the acceptance of other cultures. As John maintained: “I think that if a farmer, or any employer for that matter, did not respect the people who work for them, they wouldn’t be employers. Nobody would want to work for somebody who is just a derogatory all the time.” Despite this, the young agricultural leaders primarily valued cultural competence when it directly influenced their businesses. This sentiment was expressed by Amy, who stated:

Being knowledgeable about other cultures, will help them [agricultural employers] in the long run. Whether it is making their job easier or better for the bottom line. I mean, it does someone no good to be culturally illiterate if you have to work with foreign workers all the time.

Therefore, the participants recognized that cultural competence was critical to them professionally, personally, and financially in the agricultural industry in Louisiana. While expressing verbal and visible hesitance, anxiety, and avoidance to discuss topics related to culture, participants, although not internally driven, expressed a motivation and willingness to learn more about other cultures and discuss cultural differences. With a motivation for cultural competence in the agricultural industry in Louisiana present, these young agricultural leaders expressed their cultural attitudes, behaviors, and perspectives in the agricultural industry were primarily extrinsically influenced because of cultural pressure.

Theme #3 – The One-Way (Agri)Cultural Mirror

Although the participants reported feeling pressure, they also argued that agriculture was a separate and distinct cultural group, and they believed the public should make a greater effort to understand their unique intricacies rather than adapting to the expectations of others. As a result, the third theme emerged in the form of a metaphor: *The One-Way Cultural Mirror*. Therefore, when consumers look through the one-sided mirror, they observe agriculturalists from afar and make judgments based on sociocultural norms. However, when the young agriculturalists in this study looked through the mirror, they could only see themselves and were blocked from understanding the values and traditions of others. As a result, a disconnect emerged by which agriculturalists and the general public struggled to understand one another, which has greatly hindered agricultural literacy efforts. For example, when discussing the culture of agriculture, the young agricultural leaders in this study expressed pride and reverence for the industry because they perceived it upheld family, religion, and shared professional values. As John proudly described: “I find agriculture is its own culture of people... We might not have the same skin color and the same beliefs, but we're all a really underappreciated group of people.” Tom effortlessly described the culture and lifestyle of agriculture as “family-oriented,” “religious,” and “caring.” He explained, “family values and religion melt really good with agriculture.” Because participants in this study identified agriculture as a unique cultural group, they also acknowledged that the profession has experienced challenges connecting with their consumers. For example, the young agricultural leaders in this investigation did not understand the perspectives of their consumers. Mary noted that this one-way cultural view can often be identified through the public perceptions of labor practices in agricultural production. She described her frustration by explaining: “people [who are] not in agriculture assume that when we have immigrant labor, that they’re illegal Mexicans and we're paying them under the table. And that just could not be further from the truth in any form around here.” Aggravated at the

perceived ignorance of consumers, the young agricultural leaders also noted that the one-sided cultural mirror exacerbated existing challenges regarding communication with the public. Further, the participants perceived that their consumers were unable to understand the professional culture of the industry. This dichotomy further contributed to participants of this investigation believing that consumers have difficulty expressing their desires and expectations about agriculture because of their consumers' inability to turn the mirror around and see through their perspective.

Despite this, several of the participants did articulate a way forward. For instance, Tom explained that as an agriculturalist, he aimed "to be more of an advocate for what [he] believes in and what [he] sees day to day." He further illuminated: "I can help to bridge that gap." Tom clarified that as a part of his agricultural finance position, he gets the opportunity to help educate consumers during informational agricultural events. He enlightened his distress at the lack of agricultural literacy in his community by arguing: "I have kids come in and not know what rough rice looks like... And not just kids, grown adults don't know what it is." Participants in this study also expressed a necessity for the different sides – producers, and consumers – to be competent of one another to foster more understanding collectively. Paul explained that when operating in a culturally diverse setting, effort to progress cultural competence must be, unequivocally, "on both sides." Additionally, he believed that it must be a reciprocal effort to cross language, communication, and cultural perspective barriers. He explained, "we [as producers] got to know a little bit [about consumers]." Because of the lack of cultural competence on both sides, it has led to the establishment of a one-way agricultural mirror that hinders the ability of production agriculturalists to market commodities to a consumer population, who lack agricultural literacy. As Tom optimistically explained: "I think we can do a better job. I think we need to be more aware when we come out with a product and how to represent that to the public or spread that message to the public because we know what we're talking about."

Although there was a desire for producers to advocate for their way of life, as consumers shifted further from their agrarian roots, agriculturalists were left to speculate how to best relay commodity information and professional perspectives across this cultural barrier to effectively market agricultural products. Tom described how the agricultural industry has made efforts to improve the agricultural literacy, the cultural understanding of consumers, and mitigating the misconceptions of agricultural practices. Tom felt strongly that agriculture has been actively trying to break the one-way cultural mirror between agriculturalists and consumers. In a hopeful tone, he explained: "they're [American Farm Bureau Federation] taking massive strides and trying to teach and reach out and trying to be involved with the community, as much as they can." As a result, participants in this study believed the agricultural industry had its own unique, professional culture that was distinctly different from the culture of consumers. Nevertheless, the young agricultural leaders realized there was a need to illuminate this one-way cultural mirror by bridging the communication, knowledge, and cultural barriers between the two groups. Because of this, agriculturalists were expanding their cultural lens to accommodate a new consumer demographic that had been largely removed from agricultural production.

Theme #4 – Cultural Lens Expansion

In the final theme, cultural lens expansion, the young agricultural leaders reported making strides to expand their cultural lens and alter their perspectives of other cultures through three emergent subthemes: (a) education, (b) domestic experiences, and (c) international experiences. Each culturally diverse experience, although varying in contextual applicability, allowed young agriculturalists to progress their cultural lens further. Participants noted how vastly culturally and educationally distinctive each experience was, compared to one another.

Subtheme 1 - Cultural Lens Expansion Through Education. From an educational perspective, agriculturalists in this study described how their cultural lens was initially developed and expanded through their formal educational experiences. As John gratefully described, “growing up in schools where other ethnicities are present, they [the school] did a good job of trying to get them [individuals of other cultures] to share information about their culture.” This cultural exposure was further extended as agriculturalists advanced their education in higher educational institutions. Amy noted that she never realized that she possessed her own cultural identity before beginning her collegiate educational career. She explained: “I guess college is probably when I started learning about other people’s traditions and learning that I had traditions I had no idea about.” Participants in this investigation appeared grateful that their formal education cultural experiences allowed them to elevate their cultural awareness and knowledge through exposure to cultural diversity from a young age. With a foundation of cultural awareness and knowledge through education, young agricultural leaders entered the workforce prepared to further expand their cultural lens.

Subtheme 2 - Cultural Lens Expansion Through Domestic Experiences. From a professional standpoint, the participants began to develop their cultural perspectives as they entered the agricultural workforce. In particular, the young agricultural leaders described how domestic and international travel experiences were equally advantageous yet varied in applicability, depending on the context. When asked if domestic or international experiences were more beneficial, Tom reflected: “Both have been influential in my life. They have been influential differently, but to the same magnitude for me.” Additionally, the young agricultural leaders noted that domestic experiences were more impactful to their agricultural businesses because of the direct applicability of agricultural knowledge they gained in their respective industries. Mary, a high school agricultural educator, explained that her domestic experiences in agriculture allowed her to gain insight for her career in the public education system. She explained: “Professionally, domestic trips [were more beneficial] because as a teacher...it means more is relatable and more teachable when I have experiences in the country.” This sentiment for domestic experiences possessing the ability to increase agricultural content knowledge was echoed among participants. Paul noted the professional significance of domestic travel experiences by explaining, “The United States trips is where, in my line of work, I see more benefit, because I will have more interaction and more sales conversations that go back and forth and sharing information.”

Subtheme 3 - Cultural Lens Expansion Through International Experience. Although domestic travel experiences were beneficial for gaining direct agricultural knowledge, participants noted that international-based experiences were more beneficial on a personal level to cultivate cultural awareness, knowledge, sensitivity, and competence. Paul enthusiastically explained: “The international trips gave me so much more perspective on life...But I don't know

at this point how much it will benefit me in my business world.” Participants saw profound value in experiencing other cultures, even though the experiences were applied to their daily life differently based on the domestic or international context. Domestic experiences were seen as more critical for business, whereas international experiences were seen as more valuable for the personal development of cultural competence. However, all participants in this investigation had intentionally strived to increase their cultural competence to develop themselves as professionals in the agricultural industry in Louisiana.

Conclusions, Discussion, Implications, and Recommendations

The purpose of this study was to understand how young agricultural leaders understood and experienced culture in Louisiana. Through our analysis of data, our findings generated several important conclusions, implications, and recommendations for the future. First, we conclude that participants considered cultural competence integrated, vital, and valued in Louisiana’s agricultural industry. This finding does not appear to have previously been reported in the literature. We also conclude that the participants perceived extrinsic pressure to adopt a culturally competent mindset to succeed professionally, financially, and socially – a sentiment not currently reflected in the broader literature. Because of this, we conclude that the young agricultural leaders were in the cultural awareness and cultural knowledge phases of the Winters Group (n.d.) cultural competence model. Therefore, although externally motivated, participants recognized the need for cultural competence. As such, we recommend that future research explore ways to motivate young agriculturalists to become more culturally competent intrinsically. Additionally, we conclude that participants first initiate their journey to cultural competence through exposure to cultural diversity, and subsequent cultural awareness, in secondary and collegiate educational systems. This finding aligned with the work of Grant (2020) and Woods (2004).

Although participants in this investigation valued cultural competence, we conclude that cultural anxiety existed because of a perceived social risk of discussing cultural concepts – a view that has not previously been explored in the literature on cultural competence in agricultural leadership. This phenomenon appeared to materialize as avoidance to discuss the topic of culture altogether. Consequently, this finding further substantiated that participants operated in the cultural awareness and knowledge phase of cultural competence (Winters Group, n.d.). However, it should be noted that the young agricultural leaders seemed aware and possessed a rudimentary knowledge of diverse cultures, yet they did not seek to become culturally sensitive (Rampold et al, 2020). Additionally, we conclude that participants believed that the agricultural industry was a unique cultural group that desired greater understanding by consumers. For example, the participants viewed themselves as a separate cultural group and recognized that agricultural commodity consumers were unaware and unable to understand their professional culture. Further, the participants noted that this barrier presented challenges when communicating and marketing agricultural products to consumers who did not appreciate agricultural production. This finding does not appear to have been previously reported. As such, we recommend that future research explore how to bridge the chasm between agricultural producers and consumers. We further recommend that social media campaigns be developed to provide greater insight into the unique perspective of each group.

On this point, the participants did note that professional development was available regarding cultural competence in Louisiana through organizations such as Cooperative Extension and the Louisiana Farm Bureau Federation. However, they believed that programming should be tailored and offered to a younger audience through 4-H and FFA. Lastly, we conclude that domestic travel experiences were impactful for knowledge expansion. In contrast, international experiences were beneficial when cultivating and progressing cultural competence in professionals in Louisiana. Although the participants valued domestic and international travel opportunities equally, they found more professional applicability in domestic experiences and more personal cultural competence development through international experiences. Moving forward, we recommend that professional development programs use domestic and international travel opportunities strategically to cultivate cultural competence outcomes (Winters Group, n.d.). For instance, domestic experiences could be used when the desired outcome is to expand knowledge and awareness about culture (Winters Group, n.d.). Alternatively, international experiences could help when the desired outcome is the development of cultural sensitivity and progression of cultural competence for participants (Winters Group, n.d.). We also recommend that a cultural competence program be developed and implemented for agricultural youth to introduce cultural diversity and cultural exploration at an earlier age. The young agricultural leaders in this study recognized efforts in the agricultural industry to progress cultural competence; however, they believed that beginning this education at a young age could foster culturally competent adults as they enter the agricultural workforce.

Regarding recommendations for research, we recommend using a similar qualitative methodology to pursue this inquiry in various states, regions, and countries to investigate the influence of local context. Further, scholars should conduct additional research to describe better the motivations, levels, and expectations of cultural competence in the industry of agriculture. There is a lack of literature surrounding cultural competence in agriculture; therefore, pursuing additional investigations could further substantiate the findings and implications of the present study and build the knowledge base in this area. Additionally, supplemental research should be conducted with the purpose of investigating cultural avoidance, anxiety, and pressure in the agricultural industry to discern personal, organizational, and social approaches to counteract these barriers and promote culturally competent discussions. Lastly, additional research should be conducted regarding the one-way (agri)cultural mirror that participants in this investigation perceived existed between consumers and agriculturalists to discern possible strategies and programs to illuminate this barrier and promote cultural competence.

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Attitudes and Professional Development Needs of School-Based Agricultural Education Teachers Related to Inclusion, Diversity, and Equity

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The purpose of this study was to describe the attitudes of SBAE teachers on inclusion, diversity & equity (IDE) and prioritize the need for IDE-related professional development. A series of survey questions were used to describe the sample of SBAE teachers and their attitudes towards IDE and culturally responsive teaching. The majority of participants agreed that their programs should be an inclusive environment where all students could benefit from their program, have equal opportunities, and demographically mirror the school's student population. Though, the profession remains split on whether there are problems with IDE in the profession and if any changes need to be made. This is likely the result of today's polarized culture. The Borich Needs Assessment Model was used to determine the perceived level of importance and ability of SBAE teachers regarding 11 professional development statements related to IDE. All professional development needs were assessed and ranked using mean weighted discrepancy scores (MWDS). The top three IDE-related professional development need areas among SBAE teachers were: (a) tapping into students' lived experiences (cultural capital) when teaching; (b) identifying curriculum resources to enhance inclusivity; and (c) advocating for minority students.

Introduction and Need for the Study

According to the National Association of Agricultural Educators (NAAE) Strategic Plan, three strategies were identified in 2013 to help address concerns facing the profession surrounding inclusion, diversity, and equity (IDE) (NAAE, 2013). First, NAAE identified a "need to increase teacher recruitment efforts to meet the demand for new and expanding programs" (p. 2). Specifically, an action plan was formulated to "increase recruitment efforts to reach traditional, non-traditional and diverse audiences to enter the profession" (p. 2). Their second strategy was to "collaborate with agricultural education organizations" specifically, with Minorities in Agriculture, Natural Resources and Related Sciences (MANNRS) to foster "growing professional relationships" (p. 5). Finally, their third strategy was to "increase diversity of NAAE membership" specifically by "working with state affiliates to communicate the importance of diversity" (p. 5).

Though efforts have identified a need for change within the profession, thus far, diversity in agricultural education remains slow to change. According to data collected from a 2020 American Association for Agricultural Education (AAAE) National Supply and Demand study, demographic information of school-based agricultural education (SBAE) teachers in the United States was 80.5% Caucasian, 3.3% Hispanic/Latino(a), 1.3% African American and the remaining 14.9% representing Asian, multi-race, other and those who chose not to identify/disclose their race (Foster et al., 2020). Additionally, the data reported that African-American SBAE teachers have rapidly declined, from 541 in 2017 to 176 in 2020 (Foster et al., 2020). Comparing this data to a 2019 report, the National FFA Organization (2019) reported that FFA membership was 64.3% White, 15.2% Hispanic, 5.3% African-American, and 15.2% Other

or Undisclosed. This data alone is enough evidence to suggest that agricultural education and FFA membership mirror SBAE teachers' demographics. For minority students, not having representation within SBAE is one of the greatest hindrances (Talbert & Larke, 1995). If minority students can't identify with the program, they will be less inclined to participate (Bowen, 1987). Knowing this, greater efforts need to be made in creating a profession and future agricultural workforce that is representative of the demographics of the United States.

With diversity in the profession remaining slow to change, it is important to understand how student enrollment in SBAE programs has been affected. A variety of factors must be considered when determining why a student chooses or does not choose to participate in the SBAE program. According to research, minority students are less likely to pursue SBAE programs due to preconceived notions that such programs are directly targeted toward individuals with previous background experience in agriculture (Fraze et al., 2011). Moreover, "specific student characteristics and external influences [can] affect [student] choices" (Herren et al., 2011, p.54). When individuals from similar backgrounds form a community of shared interests and characteristics, it can cause resistance from outsiders (Little, 2014). This is important to note because various factors can impact whether a student chooses to participate in the SBAE program, and those factors must be considered for a change to occur.

In addition to student characteristics and external influences, if SBAE program do not foster a climate of inclusion, minority students will feel less inclined to participate. Aside from the long-term ramifications of exclusion, the adverse effects will be felt throughout the profession and workforce for years to come. An average of nearly 60,000 high-skilled agriculture and related job openings are expected annually in the United States over the next five years, with only about 35,000 graduates in food, agriculture, renewable resources or the environment graduating each year to fill them" (Daniels, 2015, pp.1-2). Talented and skilled workers are needed within agriculture to help offset this global demand. According to Goecker et al., (2015) shortages of skilled workers can be fixed with more diverse students entering the workforce.

Researchers have stated, "agricultural education teachers' attitudes about the perceptions of diversity and inclusion in their programs are variables that may have a strong influence on the number of students that enroll in agricultural education" (LaVergne, et al., 2012, p.84). Therefore, for recruitment strategies to be effective, it is important to understand the attitudes and professional development needs of SBAE teachers regarding IDE.

Theoretical Framework

The theoretical frameworks of this study were communities of practice (Wenger, 1998) and Knowles' (1980) framework of Andragogy. Andragogy is devised by six principles: (a) the learner's need to know, (b) self-concept of the learner, (c) prior experiences of the learner, (d) readiness to learn, (e) orientation to learning, and (f) motivation to learn (Knowles et al., 2015). Based upon this theory, adult learners are more apt or motivated to learn when there is value to what they are learning, and they are able to gain information and grow from the learning activity (Knowles et al., 2015). Further, an individual's willingness to learn is enhanced when the adult learner has a personal stake in the learning process, such as aiding in planning activities.

Aside from having a personal stake in the learning process, an individual's willingness to learn is also enhanced when the adult learner can learn from a community of peers or like-minded individuals. Communities of practice are formed by people who engage in a collective learning process. For learning to occur, the individual learner must identify with each of the six principles of andragogy and connect with a learning community. Domain, community, and practice are three key characteristics in building a community of practice (Wenger, 1998).

A community of practice is not just a network of connections between people, but rather defined by a shared domain of interest. Membership or participation implies a commitment to the domain and distinguishes members from others. In pursuing their interest in the domain, members engage in joint activities, discussions, professional development, and sharing information. They build relationships with one another, enabling them to trust and learn from each other. Through time and sustained interaction, the members of the community become practitioners. They develop a shared repertoire of resources that are used to address recurring problems—in short, creating a shared practice (Wenger, 1998).

For this study, a teacher's attitude towards IDE, including resource utilization and their professional development needs, is influenced by andragogy and the community in which they participate. A teacher's ability to learn and desire to change is influenced by the six principles of andragogy and the domain, community, and practice with which they identify.

Review of Literature

Participation in SBAE remains at an all-time high. With an influx in participation, concern has continued to grow on how agricultural educators can create a learning environment that is welcoming to all students. Currently, SBAE does not represent the demographic profile of the rest of the population. In 2019, FFA membership was 64.3% White, 15.2% Hispanic, 5.3% African American, and 15.2% other or undisclosed (National FFA, 2019). In contrast, public school enrollment numbers indicate greater diversity. The National Center for Education Statistics (2020) reported public school enrollment as 46.2% White, 27.6% Hispanic, 14.9% African American, and 11.3% as other or undisclosed. These demographics illuminate the disparities that exist between public school enrollment and minority enrollment within SBAE and FFA. According to McKim et al. (2018), “a higher proportion of SBAE programs [are] in rural, largely white communities” and “when Black and Asian students have the option to enroll in SBAE, they do so at a lower rate” (p. 80). Prior research has expounded on the need to make agricultural education a more inclusive environment so that SBAE programs can recruit and retain diverse students (Alston et al., 2011). To ensure SBAE programs continue to produce college and career-ready students for the 21st century, it is paramount for educators to create a culture that promotes inclusion, diversity, and equity.

The greatest impact is at the local level when looking at the scope of agricultural education (Martin & Kitchel, 2020). Therefore, to foster inclusion within SBAE programs, educators' influence and perspectives can be crucial in establishing an inclusive culture. Whent (1994) stated, "agricultural educators need to make greater strides toward acknowledging their unconscious biases toward people of diverse populations" (p.11). Additionally, Bowen (1995) stated that "...gender and ethnic diversity must be pursued more aggressively if agricultural

educators wish to be major players in America's educational enterprise [in the coming years]" (p.8). These perspectives ultimately recruit like-minded students and discourage the participation of diverse students. For example, a case study conducted in ten different schools revealed that students perceived FFA members and agricultural education students as *hicks*, *hillbillies*, and *farmers* (Phelps et al., 2012). These perceptions can create challenges for recruiting diverse students. If a student cannot identify with an organization or a group of people, they become less inclined to participate (Larson, 1994).

In recent years, limited research has been conducted related to diversity and inclusion in SBAE. Research has found that agriculture teachers face many barriers associated with recruiting diverse students because of the existence of prejudices and stereotypes, including the general perceptions of agriculture (Warren & Alston, 2007). The portrayal of the agricultural industry is one of the largest factors influencing whether a student decides to pursue agricultural education (Fizer, 2013). Previously, minorities in high school tended to not enroll in agriculture courses due to historical significance. For minorities, food consumption was one of the only connections made to the agriculture industry (Wiley et al., 1997). Due to their complicated, complex relationship with the history of agriculture, many minorities sought other career pathways mainly because of the stigma attached to agriculture. Negative images of agriculture were seen as overriding barriers to minorities in pursuing enrollment in agricultural education programs (Scanlon et al., 1989). Images of agricultural education tend to project a profession primarily based on vocational skill building, FFA, and teaching production agriculture methods which are dominated by White males. Due to this, many minorities equate agriculture to food production rather than biotechnology, business, or science, which has resulted in a negative perception of the industry (Orthel et al., 1989). Since minorities and many other individuals have this perception of the agricultural industry, SBAE programs, and agricultural educators must understand how students may perceive the local SBAE program, learn to deconstruct any biases they may have, and incorporate practices that promote IDE within the classroom. As a driving force, teachers set the tone for the local program, which includes the recruitment and retention of students, establishing a rapport with students, encouraging peer collaboration, and creating a positive classroom culture that fosters learning and acceptance (Austin et al., 2021).

Due to biases and a lack of education on integrating inclusion practices into the classroom, the need for increased awareness and specialized training around IDE within the agriculture classroom is great. It was noted that "vocational teachers need training in multicultural education because America is a culturally pluralistic society, and cultural and ethnic diversity in the United States is a fact of life" (Sheppard, 1983, as cited in Warren & Alston, 2007, p.67). Moreover, in a self-reported study, agricultural educators reported the likelihood of integrating a series of practices into their classroom. Some of the practices agricultural educators rated as "least likely" to incorporate into the classroom consisted of: "recruiting ethnic minorities to participate in the FFA chapter," "discuss the role of ethnic minorities have played in the history of agriculture," "discuss ethnic and cultural diversity and public policies related to agriculture, and "recruit ethnic minorities to enroll in agriculture classes" (Luft, 1996, p.70). If educators are not creating a welcoming space for diverse students, actively recruiting diverse students to their programs, and/or implementing practices to show the importance of diversity, inclusion, and equity within their programs and in agriculture, then educators are driving a bigger wedge into the existing issue around IDE in SBAE programs.

Previous research has continually pointed to ways that marginalized and underrepresented students experience agricultural education compared to their peers, and the critical need of advancing equity and inclusion (Murray et al., 2020). SBAE teachers can expect minority students and students with special needs to represent a portion of their enrolled student population. Since these underrepresented students represent a sizable portion of the population, teachers no longer can isolate or overlook diversity within their classrooms. "For teachers to recruit and retain [minority] students and students with [special needs], the trials, concerns, and opportunities related to these groups must be assessed" (LaVergne et al., 2012, p.84).

Currently, there is limited research on SBAE teachers' attitudes toward inclusive education, though research exists on SBAE teachers' attitudes toward including students with disabilities. When asked their ability and attitudes toward including students with disabilities in the SBAE classroom, about 90% of teachers agreed that they understood what inclusion was, yet only 61% felt students with disabilities belonged in the classroom (Giffing et al., 2010). Moreover, when examining teacher attitudes toward sexual orientation, Swinehart's (2013) and Austin's (2018) studies identify a real need for inclusive education. Murray et al. (2020) stated the findings of Swinehart (2013) and Austin's (2018) studies identifying "barriers preventing the full inclusion of LGBTQ students" (p.303). Additionally, Murray et al. (2020) found that LGBTQ students in agricultural education often encounter "teachers who are uncomfortable working with them and peers that believe in inclusion 'in general' or in theory but are less likely to embrace LGBTQ peers or FFA leaders" (p.303).

In a 2001 study, Michigan agriscience teachers were surveyed on their attitudes toward diversity. Participants reported varied levels of comfortability when working with diverse students and colleagues. More specifically, the research showed that "65% of agriscience teachers said they would not like to work with students with a different sexual orientation, and 57% would not be comfortable talking to someone with a different sexual orientation" (Moore et al., 2001, p.34). Other factors such as race, religion, and ethnicity reported similar results. While teachers' attitudes may have changed over time, there has been no published research on this topic since. Understanding the attitudes of SBAE teachers is important to determine the training/professional development needs related to IDE. While learning how to foster an inclusive classroom should be addressed in teacher education programs, Webster (2014) identifies some strategies to create a welcoming classroom environment. For example, "leading open conversations about differences, backgrounds, and abilities is crucial in developing student confidence and comfort in the classroom environment" (p.23). Additionally, Webster states that there needs to be inclusion education for teachers. Providing teachers with resources and staff training leads to an understanding of inclusive practices. She concluded by stating, "when teachers learn to become confident about inclusion, they create an environment that respects diversity and naturally includes all students" (p.24).

It is ideal for teachers to learn about teaching students of diverse backgrounds prior to them entering the profession. Zeichner (1995) found that teacher education programs prepared students to teach in a multicultural society either through an infusion or segregated approach. In an infusion approach, "diversity is integrated throughout the courses and the field experiences of the teacher education program." In contrast, a segregated approach "uses a stand-alone diversity

course or field experience while other courses or parts of the program are left untouched by a diversity emphasis" (Talbert & Edwin, 2008, p.52). Zeichner (1995) concluded that though the infusion approach is educationally preferred, the segregated approach was the most common. Additionally, Zeichner stated five curricular and instructional approaches to use in teacher education programs for teaching in a multicultural society: (1) attitude change to help students examine their attitudes, assumptions, and beliefs; (2) countering low expectations for public school students by exposing teacher education students to research and examples of successful teaching; (3) cultural knowledge including history, characteristics, and learning styles of various cultures; (4) field experience to sensitize students to cultural differences and provide them experiences in cultural-diverse settings; and (5) a biography to help the teacher education students better understand their own culture.

As IDE continues to be a concern in SBAE programs, Zeichner's (1995) approach should be considered when identifying the training needs of teachers, including the methods of implementation. Doing so will encourage teachers to grow from IDE-specialized training and apply learned practices to their programs to create an inclusive environment for all students.

Purpose and Objectives

The purpose of this study was to identify the classroom-based training, resource, and professional development needs related to inclusion, diversity, and equity for SBAE teachers. This research supports the AAEE National Research Agenda Priority 3: Sufficient Scientific and Professional Workforce that addresses the challenges of the 21st Century (Roberts et al., 2016). Specifically, this research aims to address research priority question one, "What strategies are effective in recruiting diverse populations into agriculture and natural resources?", question two, "What methods, models and practices are effective in recruiting agricultural leadership, education, and communication practitioners and supporting their success at all stages of their career?" and question six, "What competencies are needed to effectively educate, communicate, and lead?" (p. 31). The following research objectives guided this study:

1. Describe the sample of SBAE teachers.
2. Describe the attitudes of SBAE teachers towards IDE and culturally responsive teaching.
3. Describe the professional development needs of SBAE teachers related to IDE.
4. Describe the utilization of IDE training resources among SBAE teachers.

Methods and Procedures

The target population of this quantitative descriptive study was all Delaware and Utah agricultural educators actively teaching during the 2021-2022 school year ($N = 335$). We obtained the names and contact information of the agriculture educators using the 2021-2022 Delaware and Utah Agriculture Teacher Directories. As this was an attempted census in two different states, we make no attempt to generalize beyond the population of this study.

We utilized survey methods to collect data from the SBAE teachers. We administered the survey instrument and collected data in November and December of 2021 using the online survey program Qualtrics. Utilizing principles from Dillman's (2007) tailored design method, we made three points of contact with participants to elicit responses. The first point of contact was a

notification email introducing the study, providing information, and requesting participation in the research study. The subsequent points of contact were sent at one-week intervals, thanking those who completed the survey and encouraging those who had yet to participate to do so. A total of 110 usable responses were collected, yielding a 32.8% response rate.

The instrument we utilized consisted of four sections: (1) IDE attitudes of SBAE teachers, (2) professional development needs related to culturally responsive teaching methods and IDE-specific programmatic practices, (3) IDE resources, and (4) demographics. The IDE attitudes section of the instrument was developed by the researchers and consisted of seven statements related to IDE and SBAE practices on a five-point Likert-type scale ranging from 1 "strongly disagree" to 5 "strongly agree." This section of the instrument also asked participants to select between one of five statements related to their beliefs about the problem with IDE in the profession and the need for change. Items were listed on a continuum from "I am unaware there are individuals who believe agricultural education has a problem with inclusion, diversity, and equity" to "I believe there is a problem with inclusion, diversity, and equity in agricultural education; therefore, I would support large-scale changes to agricultural education to make it more inclusive, diverse and equitable." The professional development section of the instrument was developed based on culturally responsive teaching practices and the Borich (1980) needs assessment model to assess the perceived competence and importance of each of the practices. Teachers were asked to rate their perceived importance and perceived competence for each of the 11 practices using a five-point Likert-type scale ranging from 1 "very low" to 5 "very high." Topics were derived from research related to culturally responsive teaching practices and developed by the researchers. The demographic section of the instrument elicited both personal and programmatic information and was developed by the researchers. The survey instrument was reviewed for content and face validity by a panel of experts consisting of faculty and graduate students familiar with research design, SBAE, and IDE. We conducted a pilot test with SBAE teachers in Delaware and Utah to ensure reliability and validity.

Results

A total of 110 individuals participated in this study, 67.7% from Utah and 32.3% from Delaware. Since Utah has more SBAE programs and educators, study participation reflected as such. Of the respondents, 60.9% indicated being female and 39.1% being male. The majority of the respondents indicated being White (95.2%) and non-Hispanic (96.6%) for race and ethnicity. The majority of participants in this study were from suburban programs (62.5%), followed by rural (21.6%) and urban (15.9%). The average respondent's age was 36 years old ($SD = 11.12$), with a range from 22 to 63 years. On average, respondents had 10.55 years of agriculture teaching experience ($SD = 8.50$) with a range of 1-year experience to 32.

When asked to compare the percentage of students within their agricultural program to the demographics of students enrolled in the school, respondents indicated minority groups were represented at about the same proportion as the school population for race, gender, religion, and agricultural backgrounds (Table 1). The majority of respondents indicated being unsure about the percentage of students' sexual orientation. Regarding race, one-third of respondents indicated minority groups were represented more in the school than in their agriculture program. While slightly over half of the respondents indicated the agriculture program and school demographics

were the same in terms of agricultural background, nearly one-third indicated agricultural background minorities were represented more in the agriculture program than in the school.

Table 1
Minority Representation within the SBAE Program (n = 87)

	Race	Gender	Sexual Orientation	Religion	Agriculture Background
	%	%	%	%	%
Minority groups are represented more in my Ag program than in the school	6.9	10.5	4.7	2.3	30.6
Minority groups are represented at about the same proportion as the school population	54.0	76.7	32.9	57.0	50.6
Minority groups are represented more in the school than in my Ag program	33.3	5.8	27.1	2.3	11.8
Unsure	5.7	7.0	35.3	38.4	7.1

The second research objective was to describe the attitudes of SBAE teachers towards IDE and culturally responsive teaching. We sought to determine the participants' attitudes related to SBAE practices for the first part of this objective. Participants had very positive attitudes towards IDE specific to SBAE practices, and they overwhelmingly agreed or strongly agreed with each statement related to inclusion and diversity in SBAE (Table 2); for each item, we found between 75.6% - 94.0% agreement (strongly agree or agree). The statement with the highest overall agreement ($M = 4.58, SD = 0.89$) was "every student at my school, regardless of background, could benefit from my agricultural education program" while the statement with the least overall agreement ($M = 4.15, SD = 0.99$), with 20.7% responding "Neutral" to the statement was, "I want my agriculture program to reflect the demographics of the school."

Table 2
Attitudes towards IDE and Culturally Responsive Teaching (n = 83)

	SA	A	N	D	SD
	%	%	%	%	%
Every student at my school, regardless of background could benefit from my agricultural education program.	72.3	21.7	1.2	1.2	3.6
It is important to give every student in my agricultural education program a chance to fully participate in FFA.	65.1	27.7	2.4	1.2	3.6
It is important to give every student in my agricultural education program a chance to fully participate in SAE.	47.6	31.7	17.1	3.7	0
Students with little background in traditional or production agriculture should be given equal opportunities for participation in FFA and SAE activities as others.	72.3	20.5	2.4	4.8	0

Agriculture teachers should try to integrate FFA and SAE within the classroom in order to provide more opportunities for all students to participate.	50.6	36.1	6.0	3.6	3.6
Students within my agricultural education program should feel comfortable sharing differing or opposing viewpoints.	69.9	24.1	1.2	1.2	3.6
I want my agriculture program to reflect the demographics of the school.	46.3	29.3	20.7	3.7	0

Note. SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree.

For the second part of this research objective, we sought to determine the beliefs of agriculture teachers regarding inclusion and diversity within the SBAE profession. Participants were asked to describe which statement best described their belief. The beliefs of these participants seem to indicate a division of two major thoughts. For example, the belief statement most commonly shared by agriculture teachers was, "I believe there is a problem with inclusion, diversity, and equity in agricultural education; therefore, I would support small-scale changes to agricultural education to make it more inclusive, diverse, and equitable" followed closely by, "I am aware there are individuals who believe agricultural education has a problem with inclusion, diversity, and equity; however, I do not believe there is a problem with inclusion, diversity, and equity in agricultural education" (Table 3). Conversely, the belief statement least commonly shared by the participants was, "I believe there is a problem with inclusion, diversity, and equity in agricultural education; however, I do not support changing anything about agricultural education to make it more inclusive, diverse, and equitable."

Table 3
IDE Beliefs of SBAE Teachers (n = 82)

Belief Statement	<i>f</i>	Response rate (%)
I am unaware there are individuals who believe agricultural education has a problem with inclusion, diversity, and equity.	16	19.5
I am aware there are individuals who believe agricultural education has a problem with inclusion, diversity, and equity; however, I do not believe there is a problem with inclusion, diversity, and equity in agricultural education.	27	32.9
I believe there is a problem with inclusion, diversity, and equity in agricultural education; however, I do not support changing anything about agricultural education to make it more inclusive, diverse, and equitable	1	1.2
I believe there is a problem with inclusion, diversity, and equity in agricultural education; therefore, I would support small-scale changes to agricultural education to make it more inclusive, diverse, and equitable.	30	36.6
I believe there is a problem with inclusion, diversity, and equity in agricultural education; therefore, I would support large-scale changes to agricultural education to make it more inclusive, diverse, and equitable.	8	9.8

The third research objective sought to describe the professional development needs of SBAE teachers related to IDE. We calculated the Mean Weighted Discrepancy Scores (MWDS) for each item using the Borich Needs Assessment model. Items with larger MWDS indicate a greater need for professional development than items with smaller MWDS. All items yielded positive MWDS, indicating a need for training for all professional development items (Table 4).

Table 4

Professional Development Needs of SBAE Teachers Related to IDE (n = 67)

IDE Professional Development Topic	MWDS	Rank
Tapping into students' lived experiences (cultural capital) when teaching	3.76	1
Identifying curriculum resources to enhance inclusivity	3.16	2
Advocating for minority students	3.07	3
Engaging students in difficult conversations about diversity	2.90	4
Engaging students in FFA who differ from the majority	2.87	5
Understanding the multiple dimensions of diversity (e.g., race, SES, gender, disability status, sexual orientation, religion, etc.) within education	2.83	6
Creating lessons that enable students to share their differing points of view in a positive way	2.64	7
Recruiting students from diverse backgrounds into my Ag program	2.56	8
Engaging students in an SAE who differ from the majority	2.44	9
Implementing practices which support an inclusive classroom	2.42	10
Building rapport with students who have different views than me	2.07	11

For the final research objective, we sought to describe the utilization of IDE training resources among SBAE teachers. When asked about being aware of any resources available for learning about IDE, 68.1% indicated being unsure or not aware of any resources, while 31.9% indicated they were aware of resources. Thirty-eight percent of the respondents indicated they had accessed resources in the past 24 months to learn more about inclusion, diversity, and equity, while 41.4% indicated they had not, and 20% indicated being unsure. The participants' most utilized resources to learn more about inclusion, diversity, and equity included attending training (28.2%) followed by accessing online resources (27.3%). Nearly 21% of respondents indicated they had not used any resources to learn about IDE. Speaking with experts (10.9%), reading books (7.3%), and personal experience or research (1.8%) were other resources participants utilized to learn more about IDE.

Conclusions and Recommendations

The purpose of this study was to determine the attitudes and professional development needs of SBAE related to inclusion, diversity, and equity. Our objectives were achieved by collecting data from SBAE teachers in two states. As a result, we have drawn three major interrelated themes in which to frame the findings and conclusions of this study which include: (1) two distinct sub-groups within the profession; (2) contextualizing IDE in SBAE; and (3) meaningful professional development related to IDE.

Two distinct subgroups within the profession

The first theme surrounds the idea that there are two major groups within the profession in terms of attitudes towards IDE. This research showed the vast majority of participants were in either one of two camps in terms of their beliefs about IDE in SBAE. One large group recognizes a problem with IDE and would like to foster a gradual change, while the other group does not believe there is a problem. This dichotomy in belief seems to mirror the socio-political atmosphere of the day; a culture divided into two political ideologies moving further and further apart. Inclusion, diversity, and equity has unfortunately become a politicized topic when, at the end of the day, SBAE teachers, regardless of political ideology, want each of their students to be successful. Evidence of this is found in the fact that over 90% of the participants strongly agreed or agreed with statements like, "every student at my school, regardless of background, could benefit from my agricultural education program," "it is important to give every student in my agricultural education program a chance to fully participate in FFA," "students with little background in traditional or production agriculture should be given equal opportunities for participation in FFA and SAE activities as others," and "students within my agricultural education program should feel comfortable sharing differing or opposing viewpoints." There is a unified voice clamoring for inclusion, diversity, and equity for students from the responses to these SBAE-specific elements of teaching agriculture. Yet, from a less myopic perspective, participants in this study reported two very distinct beliefs about inclusion, diversity, and equity as it relates to the SBAE teaching profession.

Contextualizing IDE in SBAE

Interrelated to the previous theme is the idea that concepts and terms related to IDE need to be contextualized in the SBAE profession. Our findings clearly show when SBAE activities are the context, teachers overwhelmingly agree with IDE and culturally responsive teaching practices for their students. Yet, a large sub-group of teachers indicated they do not believe there is a problem with IDE in the SBAE profession. This finding is perhaps a direct result of using the words inclusion, diversity, and equity in the survey versus describing inclusion, diversity, and equity in the context of SBAE activities. It seems because of the ultra-sensitive socio-political climate in which we all live, those who do not embrace the political ideology attached to the official terms related to IDE may not look favorably upon any association with it. Terms associated with IDE have almost become taboo due to today's polarized culture; therefore, IDE should be addressed in ways teachers can make sense of and can agree with. For example, focusing on how to get every student in the school, regardless of their background, to benefit from the SBAE program would resonate well with SBAE teachers instead of professional development related to helping students benefit from culturally responsive teaching strategies. SBAE teachers in this study overwhelmingly agreed that SBAE, including FFA and SAE, is for all students regardless of their background, and all students should feel comfortable with their different perspectives. Perhaps, instead of focusing attention on common educational perspectives and definitions related to IDE, discussion and professional development needs to be in the context of "SBAE for All," much like the already implemented SAE for All initiative. IDE discussions, changes, and activities within SBAE might also include the context of recruiting and retaining diverse students in the SBAE program, not just providing programming for those already registered for SBAE classes.

Meaningful professional development for all

While the majority of teachers indicated a need for small changes, very few in this study suggested large-scale changes to SBAE to make it more inclusive, diverse, and equitable. Therefore, IDE professional development activities with these SBAE teachers should not be developed and delivered centered on radical viewpoints or sweeping changes. Rather, professional development activities should focus on SBAE as the context for IDE practices.

Interrelated to the idea that there are two distinct subgroups of teachers, professional development activities related to IDE should perhaps be developed with differentiation in mind. Like is done in classrooms with different types of students, differentiating professional development for SBAE teachers can provide a more meaningful experience. For example, teachers who are reluctant to engage with professional development topics related to IDE might find more value in discussing a more comprehensive approach to recruitment and retention to impact more students for good. In contrast, other teachers might look forward to topics specific to IDE and culturally responsive teaching strategies. The idea of differentiation is supported by Knowles' model (1980) of andragogy, which suggests adults are more motivated to learn when there is relevant context and value to their learning. Furthermore, the andragogy framework suggests SBAE teachers would be most willing to engage in activities when others in their group (e.g., community of practice) share similar perspectives and ideas (Wenger, 1998). Therefore, providing teachers with options and opportunities to engage in activities to improve IDE in the SBAE profession with like-minded individuals can certainly be beneficial. The question should be asked, how does one provide training on IDE for a diverse group of teachers in a practical way? Perhaps the universal design of learning framework could be a beneficial model in designing inclusive options for professional development activities related to IDE and other polarizing topics for SBAE teachers. More research should be conducted to determine how to best deliver polarizing topics for professional development to teachers.

Each of the IDE professional development need statements yielded a positive MWDS, indicating a need for professional development related to all areas of IDE. As a result, we recommend state staff and university faculty integrate IDE-related professional development when appropriate. Training in Delaware and Utah should focus first on tapping into lived experiences when teaching, identifying curriculum resources to enhance inclusivity, and advocating for minority students. Related to providing IDE training for all, state leaders should consider providing online resources for teachers related to IDE. Easily-accessible resources related to IDE and culturally responsive teaching practices can encourage greater participation in professional development among SBAE teachers. The findings of this study indicated that over two-thirds of the participants were unsure where to find any resources related to IDE. Possible reasons for this include limited resources, lack of promotion or awareness, and inability to easily access these resources. For instance, National FFA's website might be difficult for some to navigate when finding resources related to IDE. Since online resources were a common place teachers reported finding resources, state leaders should consider developing online materials related to IDE for teachers within their states.

In recent years, the National Teach Ag Campaign provided funding to states through the STAR program to implement activities to promote the idea of agricultural education for all.

However, in 2022, funding for activities specific to IDE ceased. Our findings indicate a need for professional development related to IDE, and we recommend the National Teach Ag Campaign reinstitute funding to states for professional development activities related to IDE.

While this study's findings and conclusions are not generalizable beyond the two states that participated in this study, we feel this study has yielded potentially valuable information concerning IDE in the SBAE teaching profession. Therefore, we recommend replicating this study in other states to determine if and how the attitudes and professional development needs of SBAE teachers might differ or remain consistent across states and regions.

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A Philosophical Approach to Obtaining Multicultural Autonomy as an Agricultural Educator

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A lot goes into the development of an individual's identity. Cultural beliefs and the cultural milieu of one's story-lined upbringing establish the foundation that allows for the unique development of an individual and to whom that individual can naturally connect. The learner receives positive, negative, or stagnant growth based on their teacher's cultural development. The purpose of this philosophical manuscript is to synthesize the development of self by the provenances that define an educator's comfortability level and an approach to expanding provenances to reach a homogenous learning community that can positively outturn the agriculture industry and the education profession. A concept coined Multicultural Autonomy and Multicultural Autonomous Agricultural Educator is introduced to provide a foundation for assisting post-secondary students in obtaining the necessary skills to teach a growing population of diverse learners.

Introduction

As far back as 1969, scholars in agricultural education recognized the need to (a) determine how to prepare educators for underrepresented populations and (b) that it would be a difficult task to prepare teachers for populations who may live a life different from their educator (Boykin, 1969). The profession waited 35 years for a philosophical perspective to assist agricultural education in a growing diverse society as Bowen (2002) provided his reflections to the profession as the Distinguished Lecturer at the American Association for Agricultural Education in which he introduced the ITAP model of progression: Intolerance, Tolerance, Appreciation, and Proactive Behavior. Unfortunately, the profession has allowed gaps in appreciation and proactive behavior as reflected in the demographics of post-secondary enrollment since the 2002 charge.

Since 1965, the American Association for Agricultural Education has continued to monitor the supply and demand of students pursuing a degree in agricultural education and entering careers as teachers in secondary agricultural classrooms. Throughout the duration of the supply and demand studies (Lawver, et al., 2018; Kantrovich, 2010; Camp, 2000), a continual theme emerges; a homogenous population of teachers that does not reflect the expanding population of diverse learners (Boser, 2014). In fact, according to the National Center for Educational Statistics (2020), 2020 is the first year that most public school students are ethnic minorities. Lehman (2017) determined that the growing homogenous teacher education students continue to increase the lack of connectivity to the ever-increasing heterogenous student population.

Racial heterogeneity is only one of the many cultural differences that agricultural educators experience with their students. According to a Pew Research Study (2020), the religious landscape in the United States is more diverse now than at any point in the country's history. While the religious landscape has changed minimally in rural America, other cultural differences exist. For example, while divorced rural homes were once considered abnormal, now over a 50-year period, rural families have surpassed that of families in urban communities (Pew, 2016).

And, as communities expand in industry and global opportunities, language barriers rapidly exist in rural secondary schools (Tancredi, 2018). Furthermore, as societies become more familiar with cultural identity, youth become more open and comfortable identifying their sexual orientation, gender identity, and gender expression (Godin, 2020; Polderman et al., 2018).

Within agricultural education, LaVergne et al. (2012) identified barriers that teachers perceived toward an inclusive classroom environment and recommended that strategies and/or solutions be proposed and implemented that will assist in nurturing inclusive learning. Today, teachers are entering a multicultural classroom which comes with challenges in connecting to each student. Alsubaie (2015) recognized the added responsibility of leading a diverse class of students through a new curriculum and uncharted territories; thus, posits that specialized learning techniques, practice, and education are all needed to lead a diverse class of students through contemporary curriculum and uncharted territories of the learning experience. As a result, specialized learning techniques, training, and education are needed to educate a broader, multicultural classroom effectively.

A teacher of good intent desires to make a positive difference. Although this intent is noble, it is limited in the ability of an individual to bring a positive impact to a broad, diverse learning environment because it does not assure action. Simply providing details for learning a particular task does not seem to reflect a methodology that inherently creates a positive life-long effort to make change.

Conceptual/Theoretical Framework

In 1973 counseling psychologists met in Vail, Colorado, to explore patterns and levels of training in professional psychology. From the meeting, recommendations and decisions were made that changed the way institutions trained counseling psychologists (Fretz, 1974). The intent was to explore how the profession could reach a broader audience while improving the impact among underrepresented patients. Today, counseling psychologists consider the Vail conference as a philosophical revolution in the profession. Among the revolutionaries was a professor by the name of Derald Wing Sue, who led a movement in defining a term coined as cultural competence.

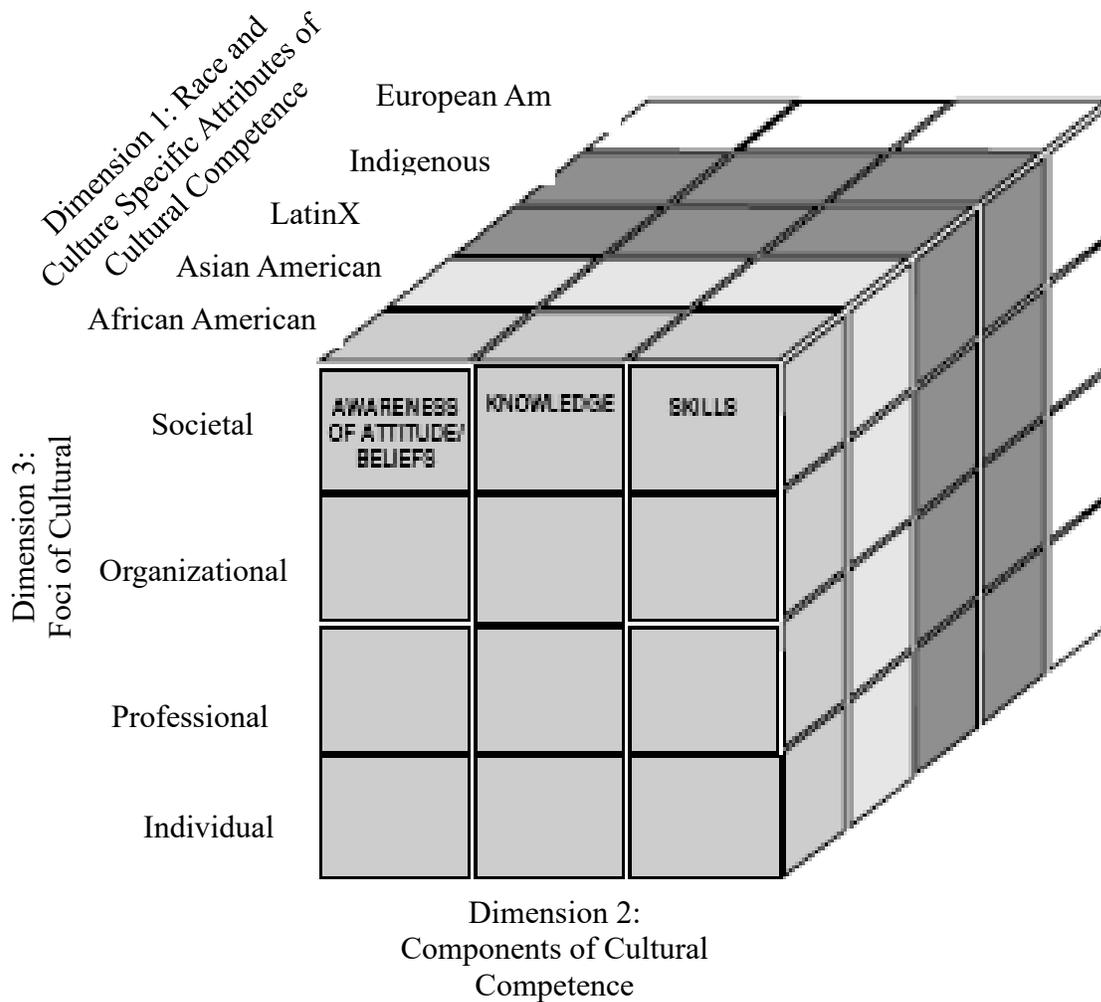
Multicultural Competence is the ability to engage in actions or create conditions that maximize the optimal development of individuals or individual systems (Sue & Sue, 2008). This change is developed through an individual's acquisition of awareness, knowledge, and skills needed to function effectively in a pluralistic society; and on an organizational/societal level, advocating effectively for the development of new theories, practices, policies, and organizational structures that are more responsive to all groups (Sue, 2001).

Banks (1995) explains the importance of education in the form of the three constructs of multicultural competence. The first construct, awareness, describes ethnic pluralism as a growing societal reality that influences the lives of young people. In contrast, the second, knowledge, states that in one way or another, individuals receive knowledge or beliefs, sometimes invalid, about ethnic and cultural groups. Finally, the skills reflect the beliefs and knowledge about ethnic

and cultural groups and can either limit the perspectives of many or make a positive difference in the opportunities available to individuals.

Sue (2001) developed the multidimensional Model for Developing Cultural Competence (MDCC). The MDCC consists of three primary dimensions of multicultural competence: specific racial/cultural group perspectives, components of cultural competence, and foci of cultural competence (Figure 1). Each cell in the model represents a combination of the three major dimensions. Dimension one pertains to acknowledging race or culture, while dimension two is composed of the constructs from the multicultural counseling competencies: knowledge, beliefs, and skills (Sue et al., 1998). The focus of dimension three examines the person versus the organizational systems of analysis. The work on multicultural competence begins and typically focuses on the individual level (Bingham et al., 2002) then gradually moves from individual to the individual in their professional setting. If the individual, as a professional, gains competence within the selected cultural dimension, it is only then that they can begin to focus on change within the organization, followed by the community.

Figure 1 Multidimensional Model for Developing Cultural Competence (Sue & Sue, 2008)



Within agricultural education, the model assisted Vincent and Torres (2015) in identifying student perceptions of their teacher's multicultural competence levels. Within the study, they determined that even in classrooms that were not culturally diverse, students could identify the personal and professional level of their teacher's multicultural competence, which inadvertently reflected the diversity of their classroom enrollment.

Purpose

In response to the desegregation of public schools, Dr. Henry Schmitt (1971) asked the Agricultural Education profession, "How do teacher education institutions prepare and nurture in a vocational agriculture teacher the energy, sensitivity, enthusiasm, intellectual competence, and empathy necessary to teach minority youth and adults?" (p 20). Today, Schmitt's question still lingers as the profession seeks a model for equipping a homogenous population of graduates for a heterogeneous population of learners. Therefore, the purpose of this study is to propose a model for developing Multicultural Autonomy that will balance theory and practice for the agricultural educator who will teach youth and adults from multiculturally different identities.

Philosophical Foundations and Methodology

From an epistemological approach, the research utilized a social constructivist philosophical worldview. Social constructivists hold assumptions that individuals seek to understand the world in which they live and work (Creswell, 2017). Social constructivists base their decisions on social interactions and occur within the zone of proximal development rather than in the biology of cognitive structures, which proceeds learning.

As the researchers began to formulate an approach toward the purpose, important terms were established in the philosophical underpinnings. Terms such as *provenance* was developed to represent the origin of one's social development. An individual *provenance* is based upon the environment one surrounds themselves, by choice and by chance (e.g., topography, geography, religious affiliation, community, socio-economic, racial/ethnic surrounding, social groups, etc.), to develop boundaries and solidity; a sense of feeling protected and safe (Harris, 2001). Often one's provenance is formed over a childhood of living in an environment, obtaining comfortability with a defined normal, which inadvertently provides a measure of relationship building skills.

Additionally, the term *Multicultural Autonomy* (MA) is an identity that is not static, continues to be open to new information and ongoing self-examination with a multicultural lens (Helms, 2014). At the peak of MA, the agricultural educator has the unique skill to gain trust, express empathy, and provide cultural content examples to learners from various provenances without dissimilating from a single cultural element of their own provenance. At this point in the teacher's pedagogy, they are considered a *Multicultural Autonomous Agricultural Educator*.

Multicultural Autonomy Growth Model

The vision of who one may deliver content to and how one delivers content is biased toward only what has been seen, exposed to, and experienced. However, it is never a bias, rather a similarity

in provenances toward a distinct cultural subset of individuals. The comfortability allows the individual to begin conversations that relate to individuals who they know and individuals with whom they subconsciously profile to be similar. In the art of teaching, a positive impact is assured among students who have homophilic provenance to that of their instructor. The provenance allows the teacher to have already a multicultural lens to work with, as it relates to the cultural elements within their provenance.

A problem occurs when the cultural elements of the student's provenance begin to differ from that of the teacher. As the differences increase, the vulnerability for the teacher to disengage, alienate, and create distance becomes a deep concern. Teachers are giving in to the vulnerabilities as students with different distinct provenances struggle to obtain academic success (Kets & Sandroni, 2019) unless approaches, primarily taken by the student, occur, such as assimilation (Yinger, 1981).

But what if the teacher's awareness, behavior, and skill level were strong among multiple provenances? One could infer the more knowledge and awareness the teacher has within provenances, the larger their skillset is to educate and connect to a broader set of learners. Psychology refers to this expanded knowledge, awareness, and skillset as multicultural competence (Johannes & Erwing, 2004), while educators consider this Culturally Responsive Pedagogy (Gay, 2002). As a result, the teacher has a distinct gift to connect individuals from diverse provenances, which creates a plethora of engagement opportunities. In this essence, the educator is reaching a level of Multicultural Autonomy (MA).

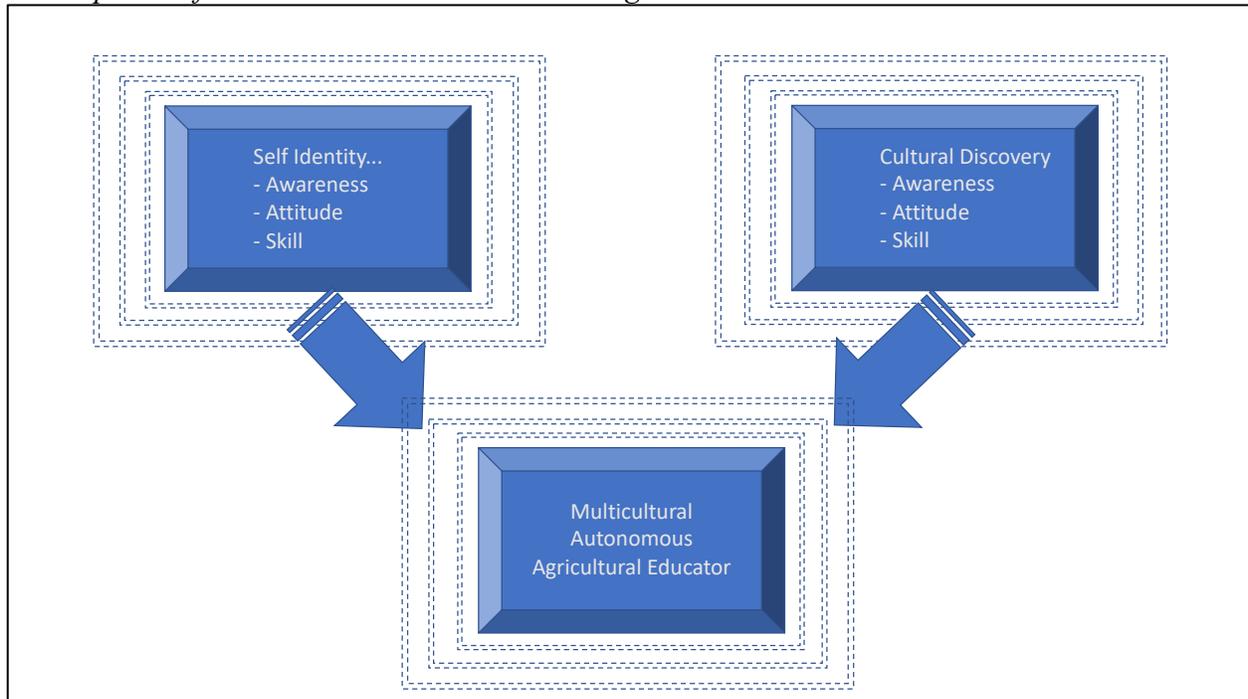
A Multicultural Autonomous educator doesn't simply engage themselves in cultural elements different from their own; rather, they immerse themselves within culturally different communities free of anxiety and judgment. When an individual competently works and communicates with multiple cultural groups and is accepted within the two different groups as their own identity of self, it is called Multicultural Autonomy. To fully obtain MA, the individual, or in the essence of this manuscript, the agricultural educator, would not change the core cultural elements that identify who they are or, more importantly, their life-long developed cultural provenance.

An individual cannot simply decide they are multicultural autonomous, nor can they maintain the status and then disengage from cultural elements of the provenances that assisted in their arrival of MA. The impression takes work, patience and is on-going. To begin a possibility of autonomy, an agricultural educator must continue in engaged self-reflection of a) awareness, b) attitude, and c) skills, then begin the same process toward the newly discovered cultural elements within different provenances. For a visual of the reflective elements necessary to gain MA, see Figure 2. Within the figure, perforated lines around each construct constitute the cognitive expansion as the educator reflects upon their own identity and newly immersed cultural discovery. This continued reflection results in growth/cognitive expansion of their self-provenance. As the educator's self-provenance expands, so does the ability to empathize among a more diverse group of individuals; hence skill development (Sue, 2001). Simultaneously, an increase interest should begin to form in the educator with the desire to learn more about the new provenance through a variety of approaches (e.g. cultural immersion, readings, interviews, and storytelling)

which is grows/expands the educator's cultural discovery provenance; resulting in the overall cognitive growth of the educator's Multicultural Autonomy expands as well.

Figure 2.

Development of the Multicultural Autonomous Agricultural Educator



Self-Identity vs. Cultural Discovery

Growing as a Multicultural Autonomous Agricultural Education cannot occur unless growth occurs first within the self-identity and Cultural Discovery domains. Similar to Sue and Sue (2008) recommendations, in order to grow multiculturally, an educator must begin with self before they begin to gain autonomy toward an individual, in this case a learner, with a cultural provenance different from their own. Once the self-evaluation and reflection begins the educator will proceed in expanding their Cultural Discovery of the newly identified provenance with similar approaches (awareness building, attitude reflection, and skill building).

Awareness

Harris (2001) recognized that a lot goes into the identity of self. An individual labels and identifies the identity of others (Layder, 2004), whether it is correct or not, through *social identifiers* (i.e., race/ethnicity, language/dialect, religion, age, sexual orientation, educational level, body type, socioeconomics, ability, family structure, geographic location, etc.). Social identifiers can be helpful and harmful in the perceptions of those around us. However, our self-identity also encapsulates an area that many individuals never see or value, known as *personal identity* (Layder, 2004). Personal identity (i.e., talents, likes, peculiarities, personality, political beliefs, ways of doing things, introvert/extrovert, skills, uniqueness, etc.) plays a major role in defining the individual and truly reflects the group to whom they resonate, acknowledge, and gravitate.

As a teenager, youth grow in their self-awareness (Erikson & Erikson, 1981), which creates a strange dynamic in one's attitude. Gay and Kirkland (2010) believed it was crucial to self-reflect on perspective during critical cultural moments. These critical moments often occur in the presence of major global events or simply the environment that individuals are surrounded by (i.e. friends, places of workshop, home, social media, etc.). Each creates critical moments of self-reflection in our growth area of awareness. The same reflection must occur when experiencing anger, sadness, excitement, happiness, and disappointment (Vincent & Drape, 2019). It is important to note that the reflection of these attitudes is explicit awareness and should not be confused with implicit attitudes (Benaji & Greenwald, 2016).

Attitude

It is not difficult to determine attitude by simply taking a stroll through one's social media outlets and examining what the likes, shares, posts, and follows during an era of debate arises. In the absence of social media, humans spar and chum with colleagues on occasional discussions. In these instances, an educator may find themselves experiencing a plethora of emotional stimuli that reflects the attitude they have within or among a defined cultural element.

Attitude is crucial in how one is perceived and in the interpreted perception in another individual's perspective. Subconsciously, our attitude toward others is driven by our provenance; thus, playing a role in our interpretation and decision-making toward someone else. The attitude is led by thin slicing (Croskerry, 2006), a form of critical thinking that the brain completes when only provided minimal information. Among students with similar provenance, a teacher establishes thin-sliced decisions, often in the form of discipline, that is more accurate and interpreted more accurately. Unfortunately, gaps exist in the action and decision making when provenances differ – creating issues such as microaggressions and systemic racism (Crutchfield et al., 2020; Anderson, 2003).

Skill

Within teacher education programs, students begin to determine and define their style of teaching that works effectively among the cultural elements they are exposed. This pedagogical approach comes into question when the methods that worked in previous situations become ineffective among learners from different cultural elements. At that moment a teacher begins to reestablish the pedagogical skill set and expand from what worked among learners of similar provenances to learners who reflect the newly discovered cultural provenances. Skill is necessary to identify among ourselves and what works among other cultural identities; however, skill development toward Multicultural Autonomy cannot occur until knowledge and awareness are addressed (Sue, 2001).

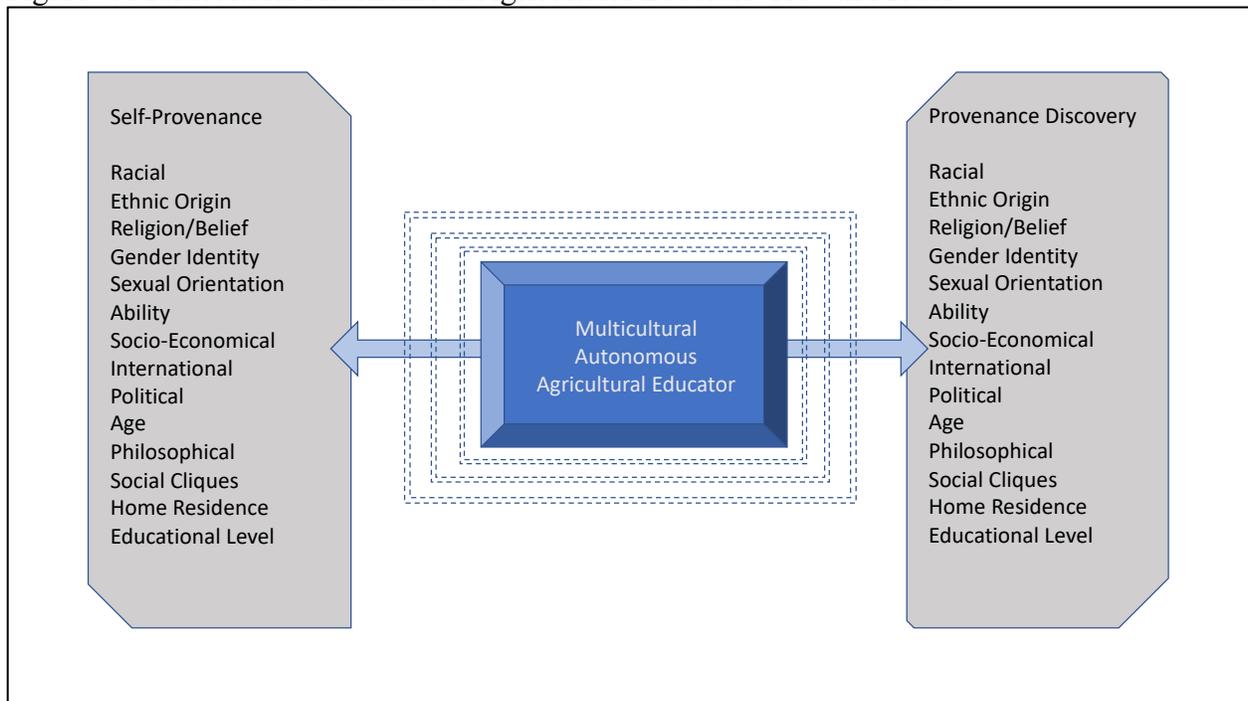
Growth within the Self-Identity domain is important and is a positive improvement to the individual; however, if Cultural Discovery (CD) domain is not addressed and growth doesn't occur, growth in MA cannot be obtained. To mirror the growth areas of the self-identity domain, the teacher should work toward expanding their CD through awareness, attitude, and skill.

Conclusions

Multicultural Autonomy, as Constantine and Sue (2005) posit, counselors and educators may see growth in their multicultural competence, yet never fully reach a pinnacle; the same can be said toward one's Multicultural Autonomy. The development and the progression of the Multiculturally Autonomous Agricultural Educator (MAAE) is based upon the time committed by the educator. Each learner who enters an educator's environment brings with them a new set of provenances. Within seconds of entering the classroom, the individual learner begins scoping for similar provenances in order to determine the level of likeness. Without having conversations, the learners look for *social identifiers* in an effort to establish a form of critical mass (Ball, 2004) to maintain a level of safety and security. It is the educator's responsibility to help learners identify common *personal identifiers* to establish a larger critical mass that will result in ownership of the curriculum, the interest of their colleagues, an expanded mindset, and the learning environment.

By seeking a classroom that contains a broad diversity of provenances, an educator is inadvertently increasing inquiry, creativity, and workforce preparedness within the classroom environment (Wells et al., 2016). Unfortunately, the learner does not gain access to the benefits of a diverse set of provenances unless a Multicultural Autonomous Agricultural Educator (MAAE) is present and finds pedagogical approaches to exposing the value to each provenance. The MAAE creates paths to reveal provenances; thus, taking initial steps in gaining personal awareness and knowledge (Sue, 2001) not only for themselves but also young multiculturally autonomous students. As the agricultural educator continues to refine their teaching skills (Sue et al., 1998) to work with the newly discovered provenances, their autonomy expands, as illustrated in Figure 3.

Figure 3. Multicultural Autonomous Agricultural Educator Growth Model



Bias toward one particular identity occurs when the provenances present are minimal and likeness prevails. In 2008, McKown and Weinstein found that when a bias toward one or more racial group of students exist, it has significant impact on academic achievement. The author(s) posit that MA and Sue's (2001) multicultural competency model could positively impact academic achievement gaps as teacher expectancy bias are minimized.

Discussion & Proposed Recommendations

Dr. Henry Schmitt (1971) asked, "How do teacher education institutions prepare and nurture in a vocational agriculture teacher the energy, sensitivity, enthusiasm, intellectual competence, and empathy necessary to teach minority youth and adults?" (p. 20) Fifty years later, agricultural education continues to ask questions regarding teacher effectiveness, connectivity, and impact to learners that do not reflect similar provenances. In an ever-changing global society, it is imperative that an industry that feeds, clothes, educates, and advocates seeks multiple approaches for assuring the occurrence of learning.

Just as Paulo Freire (1996) admitted to the flaws in the philosophical development of *Critical Pedagogy*, the scholar(s) here identify that the concept presented should serve as a foundational tool for future amendments and refining. The development of philosophy to conception and from conception to theory comes from utilizing research to model, search for limitations, and seek further explanation. Thus, it is recommended that scholars utilize the concepts for discussions, tools for research, incorporate into teaching as a beginning platform, and encourage others to seek the next steps for an intersectionality growth mindset within agricultural education.

Multicultural Autonomy is to be gained rather than to be attained. Provenances continue to change, emerge and originate; thus, pushing for continued engagement and skill development. To identify whether an educator is at the point where they can consider themselves autonomously competent within a provenance different from their own, they must experience immersion that creates memorable thought/life-provoking experiences. Janet Helm (1990) coined the immersion experience as the pseudo-independent phase within her six phases of identity development. Helm posits that once pseudo-independence occurs, the individual would seek to gain more knowledge and find themselves desiring to immerse in the group. Faculty at post-secondary institutions who seek to develop Multicultural Autonomy among their students should create assignments that encourage immersion experiences and individual global travels, which foster opportunities for pseudo-independence to occur. As a result, provenances are expanded, cultural knowledge is gained, behavior is transformed, biases are held in check, and skills to connect multicultural audiences are tested and valued.

Later in 1971, Schmitt and Bender challenged the secondary Agricultural Education profession with a charge of "will middle-class White Anglo Saxon Protestant vocational agriculture teachers accept minority youth and adults enrolled in vocational education in agriculture?" (p. 282). Agricultural education, for over half a century, has allowed gaps to exist between marginalized and unmarginalized communities (Barajas et al., 2020; Croom & Alston, 2009; Talbert et al., 1999; Jones & Bowen, 1998; Schmitt, 1971) with minimal effort to develop paths for closing the achievement gaps. As an MAAE, opportunities exist for successful pedagogical and andragogical practices that open opportunities for underrepresented populations and connect groups of diverse

philosophical differences. By doing so, the MAAE becomes a leader in school reform, community education, agricultural literacy, and non-profit leadership; thus, assisting populations of socio-economic struggle, racial minorities, gender differences, topographic diversity, varied religious beliefs, and other communities of differences.

Unfortunately, Self-Identity and Cultural Discovery rarely occur when it comes to a multicultural growth mindset which creates unnecessary resistance and anxiety for dialogue between a teacher and student (Carter, 2005). The opportunities for dialogue are important and the missed opportunities further divide opposing provenances as social, familial, environmental, physical, geographical, and philosophical issues are never discussed and confronted. Nevertheless, Sue and Sue (2008) posit that many minority groups believe that including individuals, whom have never addressed their own [provenances], in multicultural dialogue will enable the individual to never deal with the hard issues related to an “ism”.

To believe that one can fully become multiculturally autonomous makes the concept meaningless as the concept deserves a commitment that extends an entire lifetime. And to believe that all teachers are multicultural perpetuates a continual mindset that equates all differences with individual differences.

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An Evaluation of Social Semiotics Within Secondary Agriculture Textbooks

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Textbooks have the unique ability to provide snapshots of industry norms, including biases that may be present, through real-world applications and depictions of concepts for various subjects defining the individuals, values, concepts, and skills that are considered legitimate in a discipline (Becker & Nilsson, 2021). Using a cross-sectional descriptive study researchers used social semiotics to identify and examine sex and race within secondary agriculture education textbooks from the largest US textbook publishers. The researchers evaluated 34,161 pages, 4,603 photos, and 585 case studies from 58 textbooks. Students of color currently in the secondary agricultural education classroom are not seeing themselves represented in agriculture textbooks as it relates to the enrollment in public schools. The absence of females is present among various disciplines in the agriculture field as well. The lack of diversity and representation present in the textbooks is blatant and may send unintended messages to female and BIPOC students within secondary agricultural education classrooms. Further research is needed that explores gender nonconformities, colorism, and intersectionality of race and gender representation in secondary agriculture textbooks.

Introduction

Within the classroom, both students and teachers interact, and depend heavily on textbooks. Textbooks can be used to show students in classrooms real-world application of concepts for various subjects and define the individuals, values, concepts, and skills that are considered legitimate in a discipline (Becker & Nilsson, 2021). Textbooks are used as a classroom resource and can be in a physical form or an online e-book media. The curriculum within each, aids both students and teachers and may be used as a singular tool or alongside other educational resources (Hajdin & Divjak 2016). Alongside the text are various images, illustrations, and case studies to assist in giving students a well-rounded glimpse into the discipline and concepts associated with the topic. Included with each image in the textbook are hidden values, biases, and ideologies which students may make their own inferences and judgments about, impacting their sense of belonging (Benattabou, 2021). This hidden curriculum could send the incorrect message of only a certain demographic can be successful and accepted within a field.

Textbooks have a positive impact on student success and performance (Van den Ham & Heinze, 2018) while providing a snapshot of industry norms, including biases which may be present. These snapshots should introduce students toward a sense of belonging within a field, through representation of various points of interest, including likeness. If a student does not feel belonging within an industry at the secondary level, it can be difficult for the student to pursue a career in the field (Bush & Mattox, 2018; Taboas-Pais & Rey-Cao, 2015). The issue of representation in textbooks has been explored across various disciplines within education (Sánchez, 2019; Cassese & Bos, 2013). When a student feels a sense of belonging within a discipline they are studying, they will gain a desire to succeed in the discipline (Earl, 2020).

Most textbook authors, teachers, administration, and school staff are white (Matias, 2016). Within college textbooks a discrepancy was determined as the vast representation of white male

figures, while women and racial and ethnic minority groups do not have proper representation (Becker & Nilsson, 2021; Simpson et. al., 2021; Brandle, 2020; Bush & Mattox, 2020). This missing representation of *all* students can be discouraging to underrepresented students who already face issues like solo status, especially in STEM courses (Hurtado et. al., 2010). Additionally, students within science disciplines can feel implications of stereotype threat by image intake, even though this may not be the intention of the authors or publishing companies (Good et. al., 2010).

Analyzing textbooks to determine demographics and representation reveals what students are being exposed to throughout their educational career, and the implicit messaging being placed within young developing minds. Although it may not be the intent of the author, textbooks can impact student intake of information beyond the scope of the content written. Issues regarding demographics and representation in textbooks and school resources are not a problem specific to only secondary agricultural education. Unfortunately, there has been incredibly limited research regarding secondary agricultural education textbooks.

Theoretical Framework

Semiotics is the study of signs and symbols, the way they are used, and the meaning associated with each sign (Bezemer & Kress, 2008). For example, a red octagon does not inherently mean stop and red octagons are not produced in nature to mean stop; however, the use of the stop sign has made the red octagon meaning become an immediate thought in an individual's mind. Peirce (1955) explains every symbol or image has three parts: the image itself, its object, and its interpretant; the producer of the sign is referred to as the *sign maker*. The sign maker gives intended meanings to using elements from the sign by meaning and form to show relationships (2008). As for the stop sign, the sign itself is the stop sign, the object is stopping, and the interpretant is the intended relationship between the two.

Social semiotics is the interpretation of semiotic resources, signs or any observable characteristics, and the meanings associated with the semiotic resources as it pertains to the culture of society. Although the sign maker may have certain intentions for how a sign is to be interpreted, "the plural 'meanings' is crucial here, because just as dictionaries cannot predict the meaning which a word will have in a specific context, so other kinds of semiotic inventories cannot predict the meaning" (van Leeuwen, 2005, p. 4). A sign can be interpreted in many ways, and context of signs is dependent on the interpretant. Every individual who observes a sign plays the role of interpretant, and everyone has their own unique lived experience which impacts the context of a sign (Rightler-McDaniels & Hendrickson, 2014). It may not be the intent of the author, but a lack of representation within school textbooks can lead to student feelings of isolation. The first use of social semiotics is seen in the works of Michael Halliday (1978), who argues against the separation of linguistics and society, and whose sole focus was to view linguistics as a societal and cultural medium. However, the scholarly works of Hodge, Kress, and van Leeuwen focus social semiotics in societal practice, specifically critical perspectives on society and those who hold power (Hodge & Kress, 1988; van Leeuwen, 2005). Kress and van Leeuwen (2002) posit there is no group large enough to justify a true shared meaning of colors, the same can be applied to any semiotic mode. Large groups have power which smaller groups lack, this power imbalance is why the same image may present two different conclusions from different groups.

This study focuses on social power and using a critical lens to view the environment in which Black, Indigenous, and people of color (BIPOC) and female are represented within agricultural education. Representation within textbook and their various activities may show various aspects of the educational system and the society in which it operates within. Power imbalances may occur in spaces which contain very little diversity, as one may not feel comfortable doing things outside of the determined norm. Observing race and gender and the representation within agricultural education textbooks using principles of social semiotics may show ways textbook authors could improve or increase representation.

Studying demographics of textbook images and case studies is important to pinpoint what students may perceive as with every photo, “there is another second order of meaning which carries by and large hidden ideological messages not obvious to a non-alerted eye” this second meaning of photographs may send unintended messages to students (Benattabou, 2021, p. 3). An example of this “non-alerted eye” are in the contextual use of emojis and the intention of the user and the perception of the one receiving the emoji. In the case of textbooks, the “non-alerted eye” would be in reference to imagery utilized and how different lived experiences play a different receiving role between the viewers. This is important as demographics of textbooks cannot be used to prove author intent but instead allows researchers to describe with a critical lens what students may be gathering and interpreting as they turn the pages of their textbooks.

Research surrounding social semiotics and analyzing several different aspects of culture in education began roughly around 2010 in the fields of STEM, language learning, study abroad programs, and early elementary and the research focuses on the “hidden curriculum” associated with school resources, specifically textbooks (Knain et. al., 2021; Eriksson et. al., 2020; Michelson & Valencia, 2016; Nabifar, 2015; Granly & Maagerø 2012; de Freitas & Zolkower, 2009). However, domestic research surrounding social semiotics and education is minimal. Analyzing textbooks using a social semiotic lens is important to pinpoint the possible messages students are obtaining through textbooks. Additionally, using social semiotics to uncover the societal imbalances of power can aid in In the field of agricultural education, studies in both social semiotics and textbooks analysis are not present.

Purpose

The purpose of this descriptive study was to identify the social semiotics of sex and race within images and case studies of the secondary agriculture education textbooks published from the largest publishing companies in the United States. The following objectives sought to assist in the solving the study’s purpose:

Objective 1: Describe the overall demographics present in the secondary agriculture textbooks.

Objective 1: Describe the demographics present in the secondary agriculture textbooks by agricultural discipline.

Objective 2: Describe the demographics present in the secondary agriculture textbooks by textbook publisher.

To determine if the demographics found are a significant difference to the cultural norms within US public schools, the following research hypothesis were developed:

Ho1: There will be no difference between observed sex (male and female) and expected (public school enrollment) values of the textbooks by discipline.

Ho2: There will be no difference between observed sex (male and female) and expected values (public school enrollment) of the textbooks by publisher.

Ho3: There will be no difference between observed race (white and BIPOC) and expected (public school enrollment) values of the textbooks by discipline.

Ho4: There will be no difference between observed race (white and BIPOC) and expected values (public school enrollment) of the textbooks by publisher.

Methods

This study utilized a descriptive cross-sectional research design. Cross-sectional research design studies are descriptive in nature and take place at a single moment in time and are used to determine prevalence of an outcome in a population (Levin, 2006). This study observed textbook images, illustrations, and case studies to capture the demographics present in secondary agricultural education textbooks that were available for teachers during the 2021 academic school year by the leading textbook publishers. Using descriptive cross-sectional research is useful in social sciences, as it allows researchers to observe a cross-section of the population within a short amount of time, allowing research to show current trends (Lunenburg & Irby 2007). The researchers conducted this study with a transformative lens in which the researchers are interested in underrepresented minority populations, gender, and the power relationships present in society (Creswell, 2017).

Currently, the United States has 33 secondary textbook publishers (Hickey & Jones, 2012). This population was chosen as researchers wanted to determine differences, if any, were present among publishing companies. To create a fair sample which may be more representative of the current agricultural science classroom, researchers utilized textbooks published between 2011-2021 from the top five publishing companies: Cengage Learning, Houghton Mifflin Harcourt, McGraw-Hill Education, Pearson Education, and Scholastic (Book Scouter, 2020). Within these companies, three of the five publishers had textbooks related to the agriculture, food, and natural resources: Cengage, Pearson, and McGraw-Hill. A total of 58 books were obtained from the publishers through a variety of options: loan book program from publisher; online view subscription, purchase, and publisher provided copy.

A scholar not associated with the study, but competent in the guiding theory and methodology, served as a reviewer. Random samples were drawn by the reviewer to maintain the integrity of the evaluation (Kisorio & Langley 2015; Miller, 1997; Lincoln & Guba, 1985). Every page of the textbook was reviewed and within each page, the researchers examined the photos, chapter information, tables, charts, figures, examples, review questions, and case studies. If a name was given within a case studies or review question, the researchers utilized a name search engine to determine the most common ethnicity and/or gender associated with the name.

For photos where a face was not present, but a person's hands were a focal point, only race was captured. Focal points of photos were determined by a photo's caption or lack thereof. In instances without a caption, the person within the photo would need to be in at least two-thirds of the photo. In the presence of multiple individuals in the same photo, the researchers agreed on

the following guidelines to secure inter- and intra-rater reliability: if at least one of each category was represented it would account for one instance of each category. For example, a group of students were working together with the captions explaining, and there was at least one Black, Indigenous, People of Color (BIPOC) student, one white student, one male, and one female; each of the four variables would receive a count. When a photo was used multiple times throughout a textbook, only the first instance of the same photo would be considered. A reflective journal was maintained by the primary researcher to assist in describing images that either did not reflect the theme of the chapter or a trend of marginalization was occurring. The reflective journal was updated for every book and the results were coded first by discipline then by textbook publisher. At the conclusion of the review, the researchers evaluated 34,161 pages, 4,603 photos, and 585 case studies.

The data was spread across two workbooks. One of the workbooks the textbooks were classified and separated into the following disciplines of agriculture: agricultural mechanics, animal science, business, horticulture, introduction to agriculture, agricultural science, natural resources/environment, food science, and veterinary science. In the second workbook, the textbooks were separated by their publisher. The data were recorded on Microsoft Excel to determine both frequencies and percentages of the variables observed within the textbooks. Chi-square Goodness of Fit evaluation determined differences and an online calculator assisted in the analysis. To conduct a goodness of fit, the researchers compared the observed value to the expected value (Sprinthall, 2007). In this study, the expected value was set based upon student enrollment in public schools as set by the National Center for Educational Statistics (2020). Such analysis was appropriate for the size and research objectives in a descriptive study (Foster, 2021).

Results

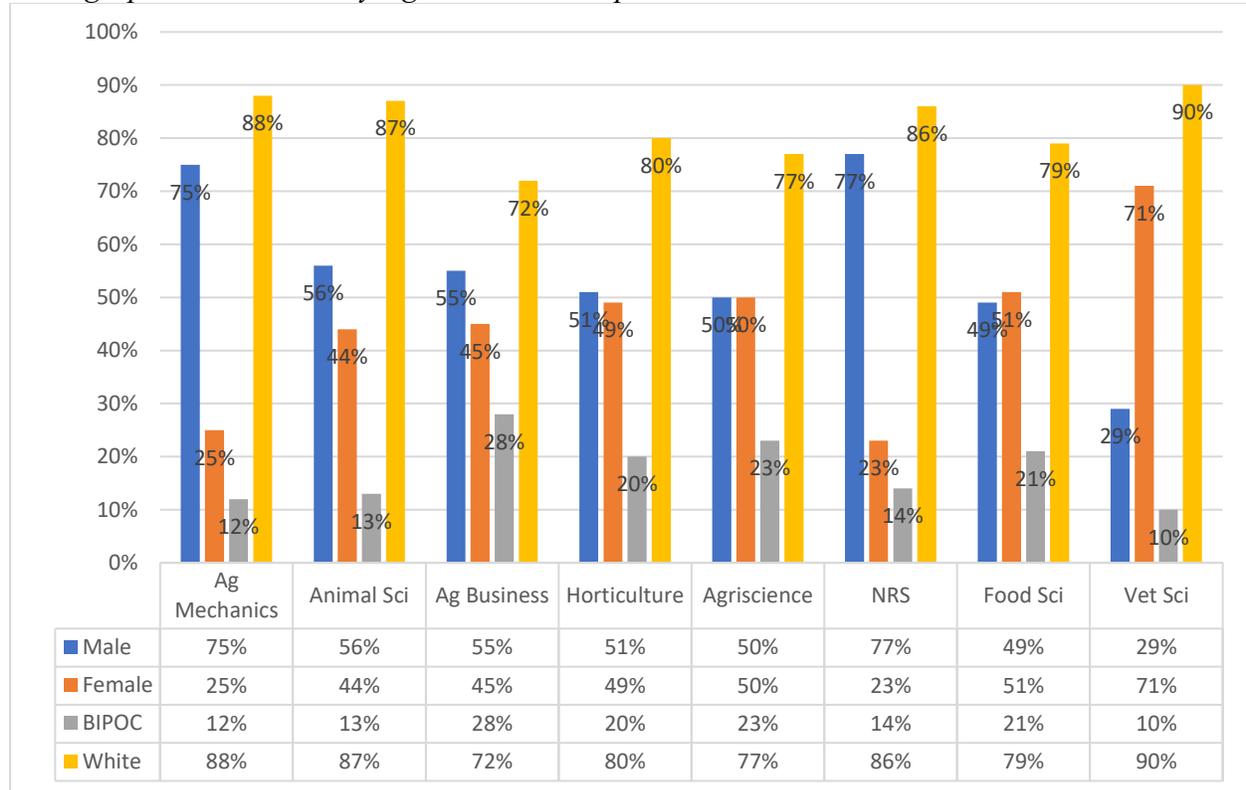
Across all 58 textbooks, gender representation was 52% ($f = 2,796$) male and 48% ($f = 2,622$) female. The racial composition for all textbooks were 81% ($f = 5,581$) white and 19% BIPOC ($f = 1,297$). Research objective two sought to describe the demographics found by agriculture discipline (see Figure 1). Natural Resources had the highest presence of males ($f = 106$; 77%), followed by Agricultural Mechanics textbooks ($f = 84$; 75%), Animal Science ($f = 298$; 44%), Agricultural Business ($f = 731$; 55%), Horticulture ($f = 469$; 51%), agriscience ($f = 1,002$; 50%), food science ($f = 20$; 49%), and Veterinary Medicine ($f = 185$; 30%).

Veterinary Medicine textbooks had the highest presence of females ($f = 450$; 71%), followed by Food Science ($f = 21$; 51%), Agriscience ($f = 397$; 50%), Horticulture ($f = 454$; 49%), Agricultural Business ($f = 591$; 45%), Animal Science ($f = 298$; 44%), Agricultural Mechanics ($f = 28$; 25%), and Natural Resources ($f = 31$; 23%).

Agricultural Business textbooks had the highest presence of BIPOC ($f = 367$; 28%), followed by Agriscience textbooks ($f = 500$; 23%), Food Science ($f = 10$; 21%), Horticulture ($f = 248$; 20%), Natural Resources ($f = 26$; 14%), Animal Science ($f = 124$; 13%), Agricultural Mechanics ($f = 38$; 12%) and Veterinary Medicine ($f = 98$; 10%). Finally, Veterinary Medicine textbooks had the highest presence of white individuals ($f = 907$; 90%), followed by Agricultural Mechanics ($f = 280$; 88%), Animal Science ($f = 823$; 87%), Natural Resources ($f = 156$; 86%), Horticulture ($f =$

248; 80%) and Food Science ($f = 38$; 80%), Agriscience ($f = 1,667$; 77%), and Agricultural Business ($f = 956$; 72%).

Figure 1.
Demographic Breakdown by Agricultural Discipline



For each publisher present in the study, demographics of ethnicity and gender representations were calculated by percentages as well. Cengage textbooks had 52% ($f = 2,208$) male representation, 48% ($f = 2,075$) female; 19% ($f = 1,027$) BIPOC representation and 81% ($f = 4,488$) white representation. Pearson reflected 52% ($f = 571$) male representation and 48% ($f = 537$) female and 20% ($f = 262$) BIPOC and 80% ($f = 1073$) white representation. McGraw-Hill agriculture textbook reflected a 63% ($f = 17$) male representation and 37% ($f = 10$) female, and 29% ($f = 8$) BIPOC and 71% ($f = 20$) white representation.

A Chi-Square Goodness of Fit Test was conducted to determine whether the proportion of gender representation present was equal between the textbooks by discipline and the national average for public school enrollment (National Center, 2021). In the agricultural mechanics textbooks, there was a significant relationship between textbook representation of females and public-school enrollment [$X^2(1, 58) = 22.11, p < .01$]. Regarding the animal science textbooks, there was not a significant relationship between gender represented within the textbooks and public-school enrollment [$X^2(1, 58) = .81, p = .37$]. Within the horticulture textbooks, there was not a significant relationship between gender and public-school enrollment, [$X^2(1,58) = .01, p = .92$]. In the agricultural business textbooks, there was not a significant relationship between the gender represented within the textbooks and public-school enrollment [$X^2(1, 58) = .49, p = .48$]. Regarding agriscience textbooks, there is not a significant relationship between gender

representation and public-school enrollment [$X^2(1,58) = .09, p = .76$]. Within the food science textbooks, there was not a significant relationship between the genders represented within the textbooks and public-school enrollment [$X^2(1,58) = .01, p = .92$]. Regarding natural resources textbooks, there was a significant relationship between female representation and public-school enrollment [$X^2(1,58) = 26.03, p < .01$]. There was a significant relationship within the veterinary medicine textbooks between gender representation and public-school enrollment [$X^2(1,58) = 20.27, p < .01$]. Overall, within all the secondary agricultural education textbooks studied, there was not a significant relationship between gender representation and public-school enrollment [$X^2(1,58) = .01, p = .92$].

A Chi-Square Goodness of Fit Test was conducted to determine whether the proportion of racial representation present was equal between the textbooks by discipline and the national average for public school enrollment. Within the agricultural mechanics textbooks, there was a significant relationship between racial representation present and public-school enrollment, [$X^2(1,58) = 67.48, p < .01$]. Regarding the animal science textbooks, there was a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 64.23, p < .01$]. Within the horticulture textbooks, there was a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 43.71, p < .01$]. Regarding the agriculture business textbooks, there was a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 25.09, p < .01$]. Within the realm of agriscience, there was a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 67.48, p < .01$]. Within food science textbooks, there was a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 41.11, p < .01$]. Regarding natural resources textbooks, there was a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 61.06, p < .01$]. Within veterinary medicine textbooks, there was a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 74.23, p < .01$]. Overall, throughout all the secondary agricultural education textbooks, there was a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 46.41, p < .01$]. The results of the Chi-Square Goodness of Fit Test across the disciplines within agriculture can be found in Table 1.

Table 1.
Differences among demographics by agriculture textbook disciplines

Discipline (# of books)	Category	Observed	Expected	Contribution to Chi ²	Chi ²	<i>p</i>		
Ag Mech (<i>n</i> = 2)	Female	75	48.5	10.72	22.11	.01		
	Male	25	51.5	11.39				
	BIPOC	12	53.0	31.72			67.48	.01
	White	88	47.0	35.77				
Animal Science (<i>n</i> = 12)	Female	44	48.5	0.42	0.81	.37		
	Male	56	51.5	0.39				
	BIPOC	13	53.0	30.19			64.23	.01
	White	87	47.0	34.04				
Horticulture (<i>n</i> = 15)	Female	49	48.5	0.01	0.01	.92		
	Male	51	51.5	0.0				

	BIPOC	20	53.0	20.55	43.71	.01
	White	80	47.0	23.17		
Ag Business (<i>n</i> = 8)	Female	45	48.5	0.25	0.49	.48
	Male	55	51.5	0.24		
	BIPOC	28	53.0	11.79	25.09	.01
	White	72	47.0	13.3		
Agriscience (<i>n</i> = 7)	Female	50	48.5	0.05	0.09	.76
	Male	50	51.5	0.04		
	BIPOC	21	53.0	19.32	41.11	.01
	White	79	47.0	21.79		
Food Science (<i>n</i> = 1)	Female	49	48.5	0.01	0.01	.92
	Male	51	51.5	0.0		
	BIPOC	21	53.0	19.32	41.11	.01
	White	79	47.0	21.79		
Natural Resources (<i>n</i> = 5)	Female	23	48.5	13.41	26.03	.01
	Male	77	51.5	12.63		
	BIPOC	14	53.0	28.7	61.06	.01
	White	86	47.0	32.36		
Veterinary Science (<i>n</i> = 8)	Female	71	48.5	10.44	20.27	.01
	Male	29	51.5	9.83		
	BIPOC	10	53.0	34.89	74.23	.01
	White	90	47.0	39.34		
Overall (<i>N</i> = 58)	Female	48	48.5	0.01	0.01	.92
	Male	52	51.5	0.00		
	BIPOC	19	53.0	21.81	46.41	.01
	White	81	47.0	24.6		

A Chi-Square Goodness of Fit Test was conducted to determine whether the proportion of gender representation present was equal between the textbooks by publisher and the national average for public school enrollment. Regarding Cengage textbooks, there was no significant relationship between gender in textbooks and the public-school enrollment [$X^2(1,58) = .01, p = .92$]. Within the Pearson textbooks, there was no significant relationship between gender in textbooks and the public-school enrollment [$X^2(1,58) = .01, p = .92$]. Within the McGraw-Hill textbook, there was no significant relationship between gender in textbooks and the public-school enrollment [$X^2(1,58) = 5.30, p = .02$].

Similarly, a Chi-Square Goodness of Fit Test was conducted to determine whether the proportion of racial representation present was equal between the textbooks by publisher and the national average for public school enrollment (see Table 2). Within the Cengage textbooks, there was a significant relationship between racial representation and the public-school enrollment [$X^2(1,58) = 40.41, p = < .01$]. Throughout the Pearson textbooks, there was a significant relationship between racial representation present and the public-school enrollment [$X^2(1,58) = 43.72, p = < .01$]. Regarding the McGraw-Hill textbook, there is a significant relationship between racial representation present and public-school enrollment [$X^2(1,58) = 23.12, p = < .01$].

Table 2.

Differences among demographics by agriculture textbook publishers

Publisher	Category	Observed %	Expected %	Contribution to Chi ²	Chi ²	p-value
Cengage	Female	48	48.5	0.01	46.41	.01
	Male	52	51.5	0.00		
	BIPOC	19	53	21.81		
	White	81	47	24.60		
Pearson	Female	48	48.5	0.01	43.72	.01
	Male	52	51.5	0.00		
	BIPOC	20	53	20.55		
	White	80	47	23.17		
McGraw-Hill	Female	37	48.5	2.73	23.12	.01
	Male	63	51.5	2.57		
	BIPOC	29	53	10.87		
	White	71	47	12.26		

Conclusions, Implications, & Recommendations

The demographics of each discipline and publisher do not match the expected values set by the national public-school enrollment. In every discipline and publisher, people of color are represented in textbooks less than 30% of the overall data collected. The demographic percentages of each discipline and the low percentages of people of color represented in the textbooks show that for agricultural education students of color, representation within textbooks images, illustrations, and case studies were low. Considering people of color were observed all together, rather than each specific ethnicity or race, an individual student may see little to no representation of their own race within their preferred discipline of agriculture.

Agricultural mechanics, natural resources, and veterinary medicine have a significant difference between gender representation and public-school enrollment. While agricultural mechanics and natural resources have more males represented in the textbooks than public-school enrollment, veterinary medicine textbooks have more females present. These significant relationships which currently exist throughout agricultural education textbooks may impact students and their sense of belonging within the given fields of agriculture. The missing representation may lead to inaccurate conclusions about various fields.

The social semiotics present within the textbooks can provide subconscious messages for gender roles in particular professions. What one may expect to see represented, based on stereotypes, is seen. These semiotic references that youth see may create difficult sociological battles that teachers must overcome while striving for fair representation among all disciplines. This significant relationship in demographics may push a stereotype to students if conclusions are drawn regarding representation. Although pushing gender roles may not be intent of the authors, having a higher rate of diversity within the textbooks could reduce these feelings of isolation. These images may not convey gender roles to every interpretant; however, being cognizant of the different interpretations of images may assist authors in providing culturally relevant educational materials for the modern classroom which encourages belonging. Knain et. al. (2021) uses a lens of social semiotics to suggest, students rely on resources, images, and social interactions to fully grasp abstract concepts, specifically gas exchanges within a greenhouse.

The Chi-Square Goodness of Fit Test exposes the presence of significant relationships regarding racial representation. All the agricultural education textbooks expose a significant gap in BIPOC representation as compared to the student enrollment in public schools. The overwhelming discrepancy in racial presence negatively impact feelings of belonging among BIPOC youth (Villegas et al., 2012). It is recommended that authors and publishers become more cognizant of the racial demographics present in the textbooks and the positioning of the images so that BIPOC individuals are a focal point or that names within examples and case studies reflect names of diverse racial groups.

Among the publishing companies, none exposed a significant relationship between gender representation. This is incredible as overall, among the publishers, there is a fairly even representation of males and females compared to what one may see within the average high school classroom within the United States. Considering some of the stereotypes which may be associated with agriculture or agricultural education, this equal representation of both males and females shows where textbooks within agricultural education excel in representation. This representation could be mirrored in the representation of people of color to further increase representation of students.

While it is important to have proper gender representation, it was not the only variable studied and only represents certain aspects of current and future agricultural education students. All the publishing companies present within the study had a significant relationship between racial representation present within secondary agricultural education textbooks and the national public-school enrollment. Meaning, within three of the largest educational publishing companies, not a single company has a representation of people of color like what is seen within the average classroom in the United States. This gap reflects the textbooks by agricultural discipline, as not a single discipline had a fair representation of people of color compared to the average United States classroom. Students of color currently enrolled in secondary agricultural education classroom are not seeing themselves represented in textbooks at the same rate as their white peers, rather they are seeing primarily white people. This lack of diversity and representation present in the textbooks is blatant and may send unintended messages to the students of color within agricultural education, even if there is no intention of excluding students of color. The lack of supplemental resources for teachers, including textbooks, which show a true representation of both the agricultural industry and public education enrollment could be detrimental to underrepresented students.

Teachers may do all they can to incorporate pedagogies such as culturally relevant pedagogy, and it is being undermined by the textbooks and resources used within the classroom. In present day, “both School/pedagogue[s] remain the agent of culture and society . . . The pedagogic institution has the task to . . . navigational aids’ The students’ task in response is to make use of the resources that have been made available for further semiotic work,” students are tasked with critical thinking and there is a possibility fully engaging with agricultural education textbooks could lead to students drawing false conclusions about the field (Kress, 2007, p. 264). It important to note there must be more than teacher effort, school effort of inclusivity is equally necessary. This lack of representation should be considered while choosing which textbooks would be best for the classroom, by textbook authors, and by educational publishing companies.

Addressing the homogeneity of individuals within the textbooks should be placed to accurately represent race both within the industry of agriculture and the workforce within the United States.

Within each discipline several repetitions and visual trends in images, illustrations, and case studies were observed. Farnia and Gerami (2019) state, “both drawings and photos are utilized in reading comprehension texts with a balanced trend” which further emphasizes the importance of being intentional with images in text. Across all disciplines, many illustrations and case study examples were primarily white people. Particularly within author made examples such as illustrations, there is the opportunity to supplement the representation currently lacking among images. Textbook authors could analyze the representation present within images of a textbook prior to including illustrations to the text. Illustrations are an easy way to increase the number of different cultures in the textbook.

In animal science textbooks, most scientists pictured were white males, while people of color were typically pictured in global perspectives, especially in cases of less developed countries or hunger and poverty. Additionally, within animal science textbooks people of color were seen working in manual labor, used for examples of zoonotic diseases, and when explaining implications and strategies of urban agriculture. When analyzing veterinary medicine textbooks, the number of people of color increased in examples of rodent care and exotic animals. In the food science textbook, the images of people of color increased when explaining world issues surrounding food insecurity.

In horticulture textbooks there were few BIPOC in photos, primarily doing intensive manual labor, people of color were missing entirely from select chapters, and several group photos of FFA officer teams and members were all white students with no people of color. In general agriculture science textbooks, white students were referred to “young leaders” while students of color were referred to as high schoolers or people. Examples of neat appearance were only depicted by white people and people of color were primarily seen serving white people or participating in manual labor. In agriculture business textbooks, people of color were the examples of non-verbal communication in sad or angry situations, African American leaders were shown as strict, and quotes given about leadership were all quotes from white people.

Overall, across all disciplines, the number of people of color increased in talking about global conditions and perspective, poverty, and unfavorable situation. Additionally, in all the textbooks used in the study, there was an incredibly limited presence of differently abled individuals, those who use assistive devices, and those in religious clothing such as head coverings. While the mere presence of these trends within the images of the textbooks cannot show student perception, there should not be a trend present among any facet of culture. If trends cannot be drawn from representation present within the agricultural education textbooks, there may be an increased sense of belonging among underrepresented students in agricultural education.

Considering the limited studies regarding previous studies of textbooks and textbook demographics within secondary agricultural education, it is almost impossible to determine if these relationships between gender and racial representation have improved throughout the years of agricultural education textbooks production. However, considering trends of FFA membership demographics, it is important to note the organization is becoming more diverse than ever before.

It is imperative for student resources to be inclusive and diverse to increase sense of belonging among minority both FFA members and secondary agricultural education students.

Limitations of this study include the researcher's own biases and experiences about gender and sex. Gender is beyond a male-female binary although throughout the study individuals are classified as one gender or the other. Names and phenotype of an individual do not entirely represent ethnicity or race present. However, this exploratory study can be a starting point for important conversation regarding the issues present with the homogeneity of agricultural education. There is an uneven number of books within each publisher, McGraw-Hill only had one secondary agricultural education textbook produced in the last eleven years, while Cengage had 48 and Pearson had eight. Finally, the researchers utilized current public-school enrollment data for both elementary and secondary education. However, observing both elementary and secondary enrollment is useful as textbooks have a generally long shelf-life and textbooks currently in secondary education classrooms will soon be used by elementary students. Additionally, in areas with limited resources and educational funding, the assessment of textbooks has a longer period of relevancy as school resources can be very costly.

Need for Additional Research

The current study observed both race and gender as two different variables and did not consider an individual's intersectionality by observing both race and gender. Future research pertaining to textbook demographics should recognize intersectionality and the impact of various aspects of culture. These different identities combined can impact an individual's experiences differently and should be observed. Analyzing both gender and race and the intersection will give a more detailed assessment of the representation present within the agricultural education textbooks.

Further research is needed to address gender nonconformities, if any, are present in secondary agricultural education textbooks as the current study solely observed gender on a binary. Research regarding agricultural education textbook representation among specific ethnicities could explain what representation is present for specific racial minority groups as the current study places a very broad lens on representation BIPOC. Observing colorism which may be present among the people of color present would give more insight on specifically the representation present in the textbooks. Utilizing a lens of critical whiteness studies when observing skin tones of those pictured in agricultural education textbooks may show a more complex relationship present.

Finally, qualitative research considering student perception of textbook images could give interesting perspectives about belonging within agricultural education. Further research could address if underrepresented students feel there is a difference between teacher effort of inclusion and how much resources impact feelings of inclusion. Overall, there is limited research regarding the sense of belonging among underrepresented students in agricultural education. In research regarding student belonging and perceptions of teachers, future work should include a lens of Critical Race Theory or critical whiteness studies, as the demographics of textbooks show the white able body at the center of the images, illustrations, and case studies. Utilizing these frameworks may result in research which more fully describes the way education is impacted by the larger society to which it belongs

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EFNEP Program Characteristics by Region in the United States

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Obesity is one of the most prevalent issues in the nation. According to the Centers for Disease Control and Prevention (CDC) (2018), obesity affected about 93.3 million adults in the United States in 2015-2016. The Expanded Food and Nutrition Education Program (EFNEP) was established by the United States Department of Agriculture (USDA) and the National Institute of Food and Agriculture (NIFA) in 1969 to combat the health problems spreading across the nation (NIFA, 2018). EFNEP is taught in a series of lessons focusing on healthy eating, shopping on a budget, physical activity, food safety, and cooking. EFNEP is taught by program assistants across the U.S. Program assistants choose the program delivery methods and recruitment methods that best suits the situation in their communities. A need exists to provide a resource for EFNEP program assistants to increase participant recruitment and engagement for EFNEP across the U.S. Data were collected from 346 EFNEP program assistants across the US. This is the first study of this scale and scope conducted to collect data from program assistants across the U.S. Educators can use the findings to expand programming opportunities and teaching strategies with the goal of creating lasting impacts on communities nationwide.

Introduction

Obesity is one of the most prevalent issues in the nation. According to the Centers for Disease Control and Prevention (CDC) (2018), obesity affected about 93.3 million United States adults in 2015-2016. “Obesity-related conditions include heart disease, stroke, type 2 diabetes and certain types of cancer that are some of the leading causes of preventable, premature death” (CDC, 2018, para. 2). To combat this problem, the United States Department of Agriculture (USDA) and National Institute of Food and Agriculture (NIFA) have funded programs to promote healthy living (NIFA, 2014). The Expanded Food and Nutrition Education Program (EFNEP) “is the only program designed specifically to provide nutrition education, whereas the others [SNAP-ED and WIC] combine nutrition education together with nutrition assistance programs” (Baral et al., 2013, para. 1). EFNEP is one of the largest programs funded by the USDA and NIFA with nearly 68 million dollars spent annually across 50 states to promote healthy living (NIFA, & USDA, 2018; Baral et al., 2013). According to NIFA (2018), “EFNEP has directly impacted economic, obesity, and food insecurity challenges that hinder the health and wellbeing of this nation” (para. 1).

EFNEP uses a peer-education model to conduct lessons (NIFA, 2018). “Paraprofessionals [program assistants] deliver a series of hands-on, interactive lessons to program participants” (NIFA, 2018, para. 3). EFNEP program assistants teach adults and/or youth. There is not a standard curriculum for adult and youth education programs. EFNEP lessons are based on four priority areas: diet quality and physical activity, food resource management, food safety, and food security (NIFA, 2018). One curriculum, Eating Smart, Being Active created by Colorado State University contains nine lessons that focus on healthy eating, incorporating physical activity, and saving money while shopping (Auld et al., 2015). The youth curriculum, Kids in the Kitchen, was developed by University of Missouri Extension and consists of seven lessons

covering topics such as cooking skills, healthy eating, food safety, and physical activity (SNAP-Ed Connection, 2014). No specific teaching methods are required as part of curricula, but studies have shown “participants prefer simple and practical information about nutrition” (Benavente et al., 2009, para. 3). Participants enjoy the interactive method of teaching to “learn by doing” and to share experiences with other limited-income families (Benavente et al., 2009, para. 3). A need exists for a resource that identifies teaching techniques used by program assistants across the nation to increase program reach and retention of participants.

Conceptual Framework: Teaching Techniques

EFNEP was established in 1969 “to encourage more healthful habits in low-income Americans” (Elmer et al., 2016, para. 23). EFNEP is a non-formal educational program meaning that it takes place in public venues such as homes, churches, community centers, and libraries. “Learning takes place in formal and non-formal settings, and informally as part of an adult’s everyday life” (Merriam & Bierema, 2013, p. 23). Non-formal settings allowed the leader of the program to alter the environment, lesson, or materials to fit the needs of the participant. For example, one-on-one versus group instruction, using online materials, hands-on activities, or lectures could be utilized. When EFNEP was established, programs were conducted using a one-on-one approach primarily in the homes of participants (Dollahite & Scott-Pierce, 2003). It was discovered that the one-on-one delivery method was too costly, so EFNEP program assistants began moving toward a small group format (Dollahite & Scott-Pierce, 2003). EFNEP program assistants chose the program delivery method that best suited the situation in that community. “Typically, urban areas deliver education in groups, while rural areas chose both one-on-one and groups, and were more likely to make this choice based on the needs of the individual participant” (Dollahite & Scott-Pierce, 2003, Methods Section para. 5). Previous studies on recruiting and educational strategies used by EFNEP have been limited in scope and have typically focused on specific counties in a few states. Currently, there is not a resource that identifies national EFNEP program characteristics. A list of national EFNEP program characteristics has the potential to increase program reach, participant engagement, and retention.

Purpose and Objectives

EFNEP program assistants need a resource that identifies effective teaching strategies used to increase participant engagement that can be applied in states across the nation. This study was designed to collect and analyze data from EFNEP programs across the U.S. to report program characteristics. The U.S. are broken into four regions: North Central, Northeast, Southern, and Western. This was part of a larger study (McLeod et al., 2021). This portion of the study was guided by the research objective to describe EFNEP program characteristics for each region.

Methodology

Instrument Development

The design of the study was a quantitative cross-sectional survey method. Cross-sectional surveys are used to study a population at one point in time to identify attitudes and practices, community needs, or evaluate programs (Creswell, 2008). The instrument was researcher-developed based on the literature available about educational strategies and current technologies. The instrument was comprised of 30 closed-ended questions formatted as matrix questions using

Likert scales and multiple-choice questions and five open-response questions. Seven of the 35 items in the survey instrument were relevant to the objective of this portion of the study. The topics of the questions included program characteristics and program assistant demographic data. Additionally, the self-perceived communication competence scale created by McCroskey and McCroskey (1988) was modified for this study ($\alpha = 0.92$). The purpose of this scale is to measure self-perceived competence in 12 communication situations. The questions included in the instrument were reviewed for reliability and credibility by a panel of experts including: an expert in EFNEP, a statistics expert, a survey research expert, and an expert in communication. Cognitive interviews were conducted with six individuals with extension and nutrition education experience to evaluate the instrument and insure validity and reliability (Elliot et al., 2016). These cognitive interview participants did not complete the final survey.

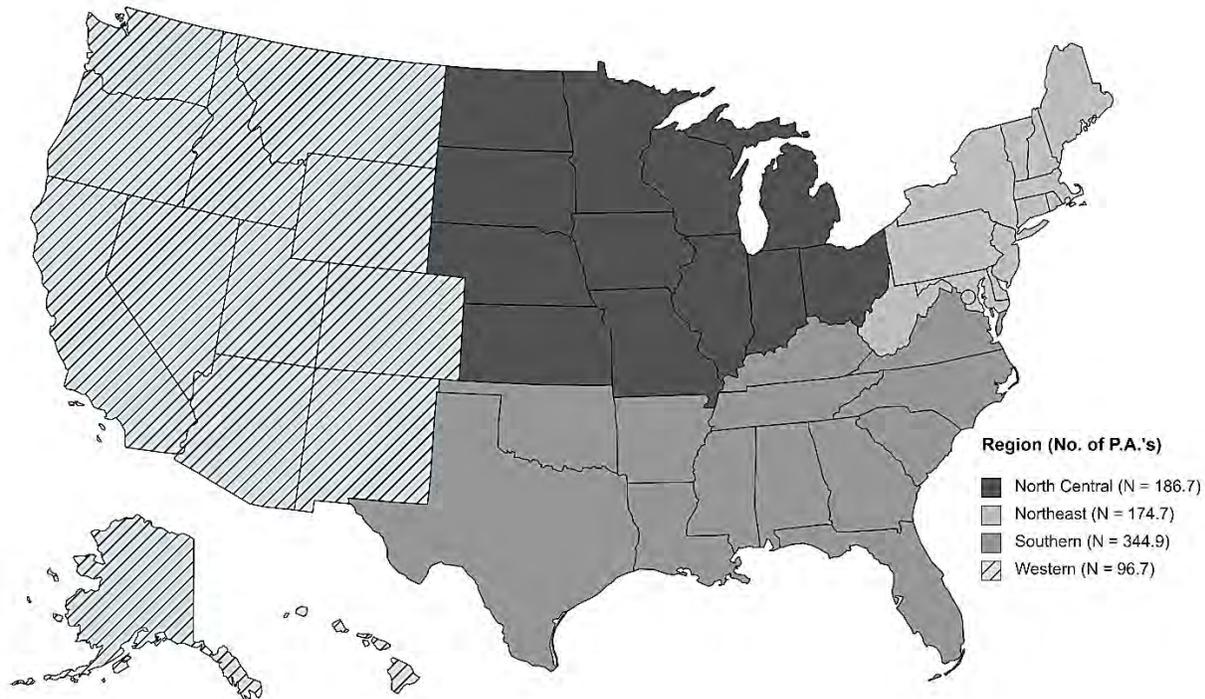
The survey was pilot tested using a test-retest reliability method. This method uses one instrument administered twice to the same people to determine the reliability of questions that make up the instrument. EFNEP coordinators were asked if they would be willing to take part in the pilot test using the National EFNEP coordinators listserv. The initial request was sent on April 24, 2020. Ten EFNEP coordinators agreed to participate in the pilot testing process. The pilot test was conducted via Qualtrics and the initial test was sent on May 19, 2020, to the ten coordinators. Reminder emails were sent each week for two weeks to the coordinators who did not complete the survey. Three weeks after each coordinator completed the initial test survey, the retest was sent out. Qualtrics links were sent between June 12, 2020 – June 19, 2020 for the retest portion of the pilot testing process. Six coordinators completed both the test and retest portion of the pilot testing process. Using the data from the six coordinators who completed the test-retest process, the reliability coefficient was calculated using all of the non-Likert scale questions. The coefficient of stability was 0.83, which is considered good reliability (APA, 2020). Internal consistency was calculated for each Likert scale question to ensure the questions were only focusing on one construct. A Cronbach's alpha score of .70 or greater is considered acceptable internal consistency. The modified self-perceived communication competence scale had a Cronbach's Alpha of 0.96, which is considered excellent (Gliem & Gliem, 2003).

Subject Selection

The population who was targeted for this study was EFNEP program assistants from across the U.S. to identify educational strategies and technology used to increase participant engagement. This population was chosen because the program assistants could self-report the educational strategies and technologies used in the facilitation of their programs. A census approach was used because the entire population in the U.S. was surveyed. This census method allowed conclusions to be drawn about the entire population (Creswell, 2008). To establish a confidence level of 95 percent, at least 267 respondents were needed (Israel, 2013). EFNEP is broken up into four regions: Western, North Central, Northeast, and Southern. The Western region had 96.7 program assistants in 13 states with each state having one institution. The North Central region had 186.7 program assistants in 12 states housing 14 institutions. The Northeast region had 174.7 program assistants in 12 states with 15 institutions. The Southern region had 344.9 program assistants in 13 states with 27 institutions. As shown in Figure 1, the Southern region had the most program assistants, followed by the North Central, Northeast, and Western regions (NIFA, 2020).

Figure 1

U.S. Divided into Regions



Note. Created using MapChart.net. Regional map based on “EFNEP Where You Live: Partner Websites,” by the National Institute of Food and Agriculture, 2018, USDA.

Data Collection

Initially the researcher attempted to use the National Coordinator listserv to acquire program assistant contact information. However, the COVID-19 pandemic had caused many to shift to remote work and some coordinators indicated they were overloaded at work and unable to provide names and contacts at the time of the request. Thus, the researcher used the public county extension directories across the U.S. to collect the contact information for every EFNEP program assistant at the 69 institutions offering EFNEP. The Qualtrics link for the survey instrument was sent via email to all EFNEP program assistants between July 23, 2020 to July 28, 2020. Three-weeks later reminder emails were sent to all program assistants that did not complete the survey. Reminder emails were sent between August 12, 2020 to August 19, 2020. Reminder emails were sent three weeks after the initial request in order to not irritate the program assistants. A modified timeline for survey distribution was used for this audience because Dillman et al. (2014) emphasized optimal timing for web-based surveys “varies considerably depending on the goals and needs of the study, as well as the population being surveyed” (p. 336). To spite data being collected during the COVID-19 pandemic, there was a 43.1% response rate for this study. Of the 346 usable survey responses, the Southern region had the highest response rate (52.2%), followed by the Western region (44.5%), the North Central region (34.8%), and the Northeast region (33.2%).

Data Analysis

Survey data was converted into an Excel spreadsheet to be used for analysis. The data was analyzed using SAS 9.4. Descriptive statistics were analyzed through frequencies and percentages.

Results & Findings

To collect data on EFNEP characteristics, participants were asked questions about demographic characteristics, number of meetings during a series, length of a typical class, curricula used, and confidence communicating in various situations. The first variable was EFNEP educator demographics including gender, highest education level, and length of employment. As shown in Table 1, 82.1% of the respondents were female ($n = 284$), 30.4% had a bachelor's degree ($n = 105$), 29.5% had some college ($n = 102$), and 31.2% have worked for EFNEP for 2-5 years ($n = 108$).

Table 1

Demographic Characteristics of Program Assistants by Region

Characteristics	North Central Region ($n = 65$)		Northeast Region ($n = 58$)		Southern Region ($n = 180$)		Western Region ($n = 43$)		Total ($N = 346$)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender										
Female	57	87.7	50	86.2	142	78.9	35	81.4	284	82.1
Male	3	4.6	3	5.2	7	3.9	-	-	13	3.8
Other	-	-	-	-	5	2.8	1	2.3	6	1.7
Highest educational level										
High school graduate	6	9.2	3	5.2	12	6.7	2	4.7	23	6.7
Some college	13	20.0	18	31.0	61	33.9	10	23.3	102	29.5
Associates degree	11	16.9	18	31.0	36	20.0	6	14.0	71	20.5
Bachelor's degree	24	36.9	8	13.8	55	30.6	18	41.9	105	30.4
Master's degree	9	13.9	8	13.8	13	7.2	6	14.0	36	10.4
Professional degree	-	-	2	3.5	-	-	-	-	2	0.6
Length of employment										
1 year or less	6	9.2	6	10.3	31	17.2	6	14.0	49	14.2
2-5 years	31	47.7	10	17.2	54	30.0	13	30.2	108	31.2
6-10 years	8	12.3	13	22.4	29	16.1	9	20.9	59	17.1
11-15 years	9	13.9	8	13.8	36	20.0	5	11.6	58	16.8
16-20 years	6	9.2	8	13.8	16	8.9	5	11.6	35	10.1

Over 20 years 5 7.7 13 22.4 13 7.2 4 9.3 35 10.1

Note. Participants were allowed to skip questions.

Participants were asked to identify the curricula used during adult program facilitation. Program assistants could select more than one adult curriculum from this list: Eating Smart, Being Active; Families Eating Smart, Moving More; Healthier Body for Everyone; Today’s Mom; Being Smart, Being Active; and, Other. As shown in Table 2, 53.2% of the program assistants reported using Eating Smart, Being Active during program facilitation ($n = 184$).

Table 2

Frequency and Percentage of Adult Curricula Used by Region

Adult Curricula	North Central Region ($n = 65$)		Northeast Region ($n = 58$)		Southern Region ($n = 180$)		Western Region ($n = 43$)		Total ($N = 346$)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Eating Smart, Being Active	34	52.3	38	65.5	76	42.2	36	83.7	184	53.2
Families Eating Smart, Moving More	8	12.3	8	13.8	20	11.1	2	4.7	38	10.9
Healthier Body for Everyone	-	-	-	-	6	3.3	-	-	6	1.7
Eat Smart, Move More	20	31.8	14	24.1	33	18.3	3	6.9	70	20.2
Today’s Mom	3	4.6	1	1.7	37	20.6	-	-	41	11.8
Being Smart, Being Active	1	1.5	3	5.2	3	1.7	2	4.7	9	2.6
Other	19	29.2	20	34.5	79	43.9	4	9.3	122	35.3

Note. $N = 346$. Participants could select more than one option.

In the Southern region, 43.9% of the program assistants indicated using “other” adult curricula to teach EFNEP ($n = 79$), followed by 42.2% using Eating Smart, Being Active ($n = 76$), and 20.6% using Today’s Mom ($n = 37$). The most common curricula used in the North Central region included: Eating Smart, Being Active ($n = 34$); Eat Smart, Move More ($n = 20$); and “other” ($n = 19$). In the Northeast region, the most common curricula included: Eating Smart, Being Active ($n = 38$); “other” ($n = 20$); and Eat Smart, Move More ($n = 14$). The most common curricula used in the Western region included: Eating Smart, Being Active ($n = 36$);

“other” ($n = 4$); and Eat Smart, Move More ($n = 3$). Participants had the option to identify “other” curricula used during program facilitation. There were 40 “other” curricula being used by program assistants across the U.S. The top three “other” curricula being used by program assistants were: Healthy Bites, Healthy Moves ($n = 12$); Cooking Matters for Adults ($n = 11$); and Food Talk ($n = 10$).

Program assistants were asked to identify the number of times their participants typically met for instruction during an EFNEP series. Program assistants could select the number of meetings from the following options: 1-3 times, 4-6 times, 7-9 times, and more than 9 times. As shown in Table 3, during a typical EFNEP adult series groups met 7-9 times (50.4%). Program assistants were least likely to teach a series in 1-3 meetings (8.2%) and more than 9 meetings (4.6%).

Table 3

Frequency and Percentage of Class Meetings by Region

Number of Meetings	North Central Region ($n = 65$)		Northeast Region ($n = 58$)		Southern Region ($n = 180$)		Western Region ($n = 42$)		Total ($N = 345$)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
1-3 times	4	6.1	4	6.9	17	9.4	3	7.1	28	8.2
4-6 times	25	38.5	31	53.4	59	32.8	12	28.6	127	36.8
7-9 times	33	50.8	23	39.7	92	51.1	26	61.9	174	50.4
More than 9 times	3	4.6	-	-	12	6.7	1	2.4	16	4.6

Note. $N = 345$. Participants were allowed to skip questions. This question had a response rate of 99.7%.

In the North Central region, 50.8% of respondents reported meeting 7-9 times during a series ($n = 33$), followed by 38.5% meeting 4-6 times during a series ($n = 25$). The Southern region followed the same trend with 51.1% reported meeting 7-9 times ($n = 92$), followed by 32.8% reported meeting 4-6 times during a series ($n = 59$). The Western region also followed the same trend as the North Central and Southern regions with 61.9% reported meeting 7-9 times during a series ($n = 26$) and 28.6% reported meeting 4-6 times during a series ($n = 12$). The Northeast region was unique in that 53.4% reported meeting 4-6 times during a series ($n = 31$), followed by 39.7% reported meeting 7-9 times during a series ($n = 23$).

Program assistants were asked to identify the length of their typical class including the food demonstration, instruction, and physical activity. Program assistants could select the class length from 30 minutes, 45 minutes, 60 minutes, one hour and 30 minutes, two hours, and “other.” As shown in Table 4, the EFNEP classes were typically one hour long (38.7%).

Table 4*Frequency and Percentage of Class Length by Region*

Class Length	North Central Region (<i>n</i> = 65)		Northeast Region (<i>n</i> = 58)		Southern Region (<i>n</i> = 179)		Western Region (<i>n</i> = 42)		Total (<i>N</i> = 344)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
30 Minutes	4	6.2	-	-	7	3.9	1	2.4	12	3.5
45 Minutes	16	24.6	6	10.3	30	16.8	1	2.4	53	15.4
60 Minutes	19	29.2	17	29.3	88	49.2	9	21.4	133	38.7
1 Hour and 30 Minutes	17	26.2	19	32.8	32	17.9	22	52.4	90	26.2
2 Hours	9	13.8	14	24.1	17	9.5	8	19.0	48	13.9
Other	-	-	2	3.5	5	2.7	1	2.4	8	2.3

Note. *N* = 344. Participants were allowed to skip questions. This question had a response rate of 99.4%.

The North Central region reported primarily conducting classes for 60 minutes with 29.2% (*n* = 19), followed by one hour and 30 minutes with 26.2% (*n* = 17), and 45 minutes with 24.6% (*n* = 16). The Southern region reported primarily conducting classes for 60 minutes with 49.2% (*n* = 88), followed by one hour and 30 minutes with 17.9% (*n* = 32), and 45 minutes with 16.8% (*n* = 30). The Northeast region reported primarily conducting classes for one hour and 30 minutes with 32.8% (*n* = 19), followed by 60 minutes with 29.3% (*n* = 17), and two hours with 24.1% (*n* = 14). The Western region reported primarily conducting classes for one hour and 30 minutes with 52.4% (*n* = 22), followed by 60 minutes with 21.4% (*n* = 9), and two hours with 19.0% (*n* = 8).

Program assistants were asked to indicate their level of confidence communicating in 12 situations based on McCroskey and McCroskey's (1988) instrument. Self-perceived level of confidence during the situations was measured on a five-point Likert-type scale where 1 = *Not at all confident*, 2 = *Slightly confident*, 3 = *Somewhat confident*, 4 = *Moderately confident*, and 5 = *Extremely confident*. As shown in Table 5, the mean confidence levels ranged from 4.28 (*SD* = 0.60) to 4.38 (*SD* = 0.69).

Table 5*Confidence Communicating by Region*

Region	<i>M</i>	<i>SD</i>
North Central (<i>n</i> = 65)	4.28	0.60
Northeast (<i>n</i> = 58)	4.30	1.04
Southern (<i>n</i> = 180)	4.38	0.69
Western (<i>n</i> = 43)	4.29	0.86

Note. *N* = 346. Data were collected using a modified self-perceived communication competence scale created by McCroskey and McCroskey (1988).

The Southern region had the highest mean level of confidence ($M = 4.38, SD = 0.69$), followed by the Northeastern region ($M = 4.30, SD = 1.04$), the Western region ($M = 4.29, SD = 0.86$), and the North Central region ($M = 4.28, SD = 0.60$). Overall, the average self-perceived confidence level was 4.34.

As shown in Table 6, overall program assistants feel the least confident when talking in a large meeting of strangers ($M = 3.99, SD = 1.07$) and the most confident when talking with a friend ($M = 4.72, SD = 0.74$). Communications confidence was measured on a five-point Likert-type scale where 1 = *Not at all confident*, 2 = *Slightly confident*, 3 = *Somewhat confident*, 4 = *Moderately confident*, and 5 = *Extremely confident*.

Table 6

Means and Standard Deviations of Self-Perceived Confidence Communicating in Different Situations by Region

Situation	North Central Region (<i>n</i> = 65)	Northeast Region (<i>n</i> = 58)	Southern Region (<i>n</i> = 180)	Western Region (<i>n</i> = 43)	Total (<i>N</i> = 346)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Present a talk to a group of strangers.	4.05 (0.89)	4.19 (1.18)	4.29 (0.82)	4.19 (1.01)	4.21 (0.93)
Talk in a large meeting of strangers.	3.77 (1.04)	4.00 (1.26)	4.09 (0.97)	3.86 (1.21)	3.99 (1.07)
Talk in a small group of strangers.	4.31 (0.79)	4.33 (1.13)	4.39 (0.88)	4.35 (1.02)	4.36 (0.93)
Talk with a stranger.	4.34 (0.78)	4.28 (1.10)	4.31 (0.83)	4.21 (1.10)	4.29 (0.90)
Present a talk to a group of acquaintances.	4.18 (0.79)	4.28 (1.09)	4.28 (0.92)	4.16 (1.02)	4.25 (0.94)

Talk in a large meeting of acquaintances.	3.92 (0.92)	4.14 (1.15)	4.13 (1.02)	3.98 (1.08)	4.07 (1.03)
Talk in a small group of acquaintances.	4.29 (0.82)	4.33 (1.13)	4.38 (0.90)	4.37 (1.02)	4.36 (0.94)
Talk with an acquaintance.	4.60 (0.88)	4.45 (1.11)	4.45 (0.94)	4.53 (0.91)	4.49 (0.95)
Present a talk to a group of friends.	4.35 (0.82)	4.31 (1.23)	4.49 (0.84)	4.42 (1.01)	4.42 (0.93)
Talk in a large group of friends.	4.23 (0.82)	4.33 (1.15)	4.41 (0.88)	4.26 (1.09)	4.34 (0.95)
Talk in a small group of friends.	4.55 (0.71)	4.40 (1.27)	4.58 (0.73)	4.49 (0.94)	4.53 (0.86)
Talk with a friend.	4.74 (0.64)	4.60 (1.06)	4.75 (0.61)	4.70 (0.86)	4.72 (0.74)

Note. $N = 346$. Confidence in communicating was measured on a five-point Likert-type scale where 1 = *Not at all confident*, 2 = *Slightly confident*, 3 = *Somewhat confident*, 4 = *Moderately confident*, and 5 = *Extremely confident*. Data were collected using a modified self-perceived communication competence scale created by McCroskey and McCroskey (1988).

According to the reported self-perceived confidence levels, program assistants felt least confident when talking in a large meeting of strangers in the North Central ($M = 3.77$, $SD = 1.04$), Northeast ($M = 4.00$, $SD = 1.26$), Southern ($M = 4.09$, $SD = 0.97$), and the Western ($M = 3.86$, $SD = 1.21$) regions. Program assistants felt most confident when talking with a friend in the North Central ($M = 4.74$, $SD = 0.64$), Northeast ($M = 4.60$, $SD = 1.06$), Southern ($M = 4.75$, $SD = 0.61$), and the Western ($M = 4.70$, $SD = 0.86$) regions.

Conclusions

This is the first study of this scale and scope conducted to collect data from program assistants across the U.S. There were 346 program assistants who completed the survey instrument. EFNEP is broken up into four regions: North Central, Northeast, Southern, and Western. To approach objective one, describe EFNEP program characteristics for each region, the objective was met through collecting data on the following topics: demographic characteristics, number of meetings during a series, length of a typical class, curricula used, and confidence communicating in various situations. Since the purpose of this objective was to collect data for each region, conclusions are presented by region.

North Central Region

During the 2018-2019 program year, there were 186.7 program assistants in the North Central region (NIFA, 2020). Of those 186.7 program assistants, 34.8% participated in the study

($n = 65$). Eighty-seven percent of the program assistants were female ($n = 57$), 36.9% had a bachelor's degree ($n = 24$), and 47.7% had been working for EFNEP for 2-5 years ($n = 31$). The primary curriculum used in the North Central region was: Eating Smart, Being Active (52.3%), followed by Eat Smart, Move More (31.8%), and "other" (29.25%). Program assistants typically structured their classes to meet 7-9 times during a series (50.8%, $n = 33$). The majority of respondents indicated classes lasting 60 minutes (29.2%), followed by one hour and 30 minutes (26.2%), and 45 minutes (24.6%). The final program characteristic data collected focused on the self-perceived level of confidence during different situations. Program assistants in the North Central region reported feeling the most confident when talking with a friend ($M = 4.74$, $SD = 0.64$), followed by talking with an acquaintance ($M = 4.60$, $SD = 0.88$), and talking in a small group of friends ($M = 4.55$, $SD = 0.71$). Program assistants reported feeling the least confident when talking in a large meeting of strangers ($M = 3.77$, $SD = 1.04$), followed by talking in a large meeting of acquaintances ($M = 3.92$, $SD = 0.92$), and presenting a talk to a group of strangers ($M = 4.05$, $SD = 0.89$). This was an interesting find because program assistants were the least confident when talking in presentation settings regardless of the audience being acquaintances or strangers. Program assistants lead discussions and teach strangers in their communities as part of their positions as EFNEP program assistants.

Northeast Region

During the 2018-2019 program year, there were 174.7 program assistants in the Northeast region (NIFA, 2020). Of those 174.7 program assistants, 33.2% participated in the study ($n = 58$). Eighty-six percent of the program assistants were female ($n = 50$), 62.1% had either some college or an associate's degree ($n = 36$), 22.4% had been working for EFNEP for 6-10 years ($n = 13$), and 22.4% had been working for EFNEP for over 20 years ($n = 13$). The primary curriculum used in the Northeast region was: Eating Smart, Being Active (65.5%), followed by "other" (34.5%), and Eat Smart, Move More (24.1%). Program assistants typically structured their classes to meet 4-6 times during a series (53.4%, $n = 31$). The majority of respondents indicated classes lasting one hour and 30 minutes (32.8%), followed by 60 minutes (29.3%), and two hours (24.1%). The final program characteristic data collected focused on the self-perceived level of confidence during different situations. Program assistants in the Northeast region reported feeling the most confident when talking with a friend ($M = 4.60$, $SD = 1.06$), followed by talking with an acquaintance ($M = 4.45$, $SD = 1.11$), and talking in a small group of friends ($M = 4.40$, $SD = 1.27$). Program assistants reported feeling the least confident when talking in a large meeting of strangers ($M = 4.00$, $SD = 1.26$), followed by talking in a large meeting of acquaintances ($M = 4.14$, $SD = 1.15$), and presenting a talk to a group of strangers ($M = 4.19$, $SD = 1.18$). This was an interesting find because these program assistants had been working for 6-10 years or over 20 years and had the same self-perceived confidence level talking to acquaintances and strangers as those in other regions with 2-5 years of experience.

Southern Region

During the 2018-2019 program year, 344.9 program assistants were in the Southern region (NIFA, 2020). Of those 344.9, 52.2% participated in the study ($n = 180$). Seventy-nine percent of the program assistants were female ($n = 142$), 33.9% had some college ($n = 61$), and 30.0% had been working for EFNEP 2-5 years ($n = 54$). The primary curriculum used in the Southern region was: "other" (43.9%), followed by Eating Smart, Being Active (42.2%), and Today's Mom (20.6%). This was the only region that did not rank Eating Smart, Being Active as

the primary curriculum. Program assistants typically structured their classes to meet 7-9 times during a series (51.1%, $n = 92$). The majority of respondents indicated classes lasting 60 minutes (49.2%), followed by one hour and 30 minutes (17.9%), and 45 minutes (16.8%). The final program characteristic data collected focused on the self-perceived level of confidence during different communication situations. Program assistants in the Southern region reported feeling the most confident when talking with a friend ($M = 4.75$, $SD = 0.61$), followed by talking in a small group of friends ($M = 4.58$, $SD = 0.73$), and presenting a talk to a group of friends ($M = 4.49$, $SD = 0.84$). Program assistants reported feeling the least confident when talking in a large meeting of strangers ($M = 4.09$, $SD = 0.97$), followed by talking in a large meeting of acquaintances ($M = 4.13$, $SD = 1.02$), and presenting a talk to a group of acquaintances ($M = 4.28$, $SD = 0.92$).

Western Region

During the 2018-2019 program year, 96.7 program assistants were in the Western region (NIFA, 2020). Of those 96.7 program assistants, 44.5% participated in the study ($n = 43$). Eighty-one percent of the program assistants were female ($n = 35$), 41.9% had a bachelor's degree ($n = 18$), and 30.2% had been working for EFNEP for 2-5 years ($n = 13$). The primary curriculum used in the Western region was: Eating Smart, Being Active (83.7%), followed by "other" (9.3%), and Eat Smart, Move More (6.9%). Program assistants typically structured their classes to meet 7-9 times during a series (61.9%, $n = 26$). The majority of respondents indicated classes lasting one hour and 30 minutes (52.4%), followed by 60 minutes (21.4%), and two hours (19.0%). The final program characteristic data collected focused on the self-perceived level of confidence during different situations. Program assistants in the Western region reported feeling the most confident when talking with a friend ($M = 4.70$, $SD = 0.86$), followed by talking with an acquaintance ($M = 4.53$, $SD = 0.91$), and talking in a small group of friends ($M = 4.49$, $SD = 0.94$). Program assistants reported feeling the least confident when talking in a large meeting of strangers ($M = 3.86$, $SD = 1.21$), followed by talking in a large meeting of acquaintances ($M = 3.98$, $SD = 1.08$), and presenting a talk to a group of acquaintances ($M = 4.16$, $SD = 1.02$).

Recommendations

This study successfully reported program characteristics for each region in the U.S. The data collected about the regional program characteristics should guide program assistants and program coordinators. When looking at the self-reported confidence levels in the four regions, the situation in which program assistants report feeling the least confident is talking in a large meeting of strangers indicates EFNEP program assistants need additional training and support to improve confidence when teaching in large groups. The primary job of EFNEP program assistants is to teach strangers, so it is vital that the program assistants feel confident in that situation.

Further research should be conducted to understand regional differences in curriculum use and program structure. While regional cultural differences were not identified in the literature, it is recognized as a potential influence on curriculum choice. Thus, further research on the factors influencing curriculum choice by region is needed.

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A Historical Examination of Food Labeling Policies and Practices in the United States: Implications for Agricultural Communications

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Knowledge of agricultural practices has declined in recent years, resulting in consumers becoming uncertain of where and how their food has been produced and the marketing tactics used to promote the product. Historically, the U.S. population's rich agricultural heritage coincided with higher levels of agricultural literacy. Some scholars, however, have maintained that U.S. culture has begun to lose touch with its agricultural foundations. More recent evidence has demonstrated that consumers acquire knowledge about their food from various media, notably the Internet and social media. Often these sources use incorrect information and promote food and agricultural marketing trends that may not be grounded in scientific data. In response, this historical narrative analyzed a reform effort that occurred in U.S. food labeling policy and practice in the 1900s, which contributed to food labeling issues and consumer distrust in the agricultural industry. Based on the findings of this investigation, we concluded that food labels were initially intended to provide consumers with more profound knowledge of the food they purchased. However, key legislative acts such as the Fair Packaging and Labeling Act and the Nutrition Labeling and Education Act shifted the food labeling movement into a branding device to differentiate products and brands. We recommend that agricultural practitioners explore new ways to communicate their message more effectively. We also call for producers to incorporate more personal and emotional appeals when marketing agricultural products to better compete with third-party branding efforts.

Introduction

“Now that I know how supermarket meat is made, I regard eating it as a somewhat risky proposition...so I don't buy industrial meat” (Pollan, 2004, para. 6).

The excerpt above from Michael Pollan's (2004) book, *The Omnivore's Dilemma*, has become more relevant as uncertainty among consumers mounts about how animal agriculture production practices occur in the U.S. (DeGregori, 2003; Hughner et al., 2007). Consequently, consumers have become increasingly invested in learning where their food comes from, how it is harvested or processed, and the ingredients that compose the product (Bharat Helkar & Sahoo, 2016). Despite this, knowledge and understanding of agricultural practices have declined in recent years, resulting in consumers becoming more uncertain of where and how their food has been produced and wearier of food product marketing and branding (Heerwagen et al., 2014).

Historically, the U.S.'s rich agricultural heritage coincided with higher levels of agricultural literacy (Specht et al., 2014b). However, as urban sprawl has increased across the U.S., consumers' connection to agriculture has become more distant (Specht et al., 2014a). For example, Powell et al. (2018) described the public's misunderstanding of agricultural issues as *apathy* or a lack of interest, and as a result, the deficiency in agricultural literacy among U.S. citizens has intensified (Powell et al., 2008). On this point, Russell et al. (1990) maintained that U.S. culture has begun to lose touch with its agricultural foundations: “The role that agriculture

plays in the history of the United States, in the quality of life for the nation's citizens and the economic well-being of the nation and its states is poorly understood by youth and the general public” (Russell et al., 1990, pp. 13-14).

The concept of agricultural literacy has become a significant theme in the literature over the past three decades (Frick et al., 1991; Hatesohl, 1971; Powell et al., 2008; Specht et al., 2014a). Agricultural literacy is a subset of science literacy that refers to the public's level of knowledge about agriculture (Mercier, 2015). Spurred by the work of the National Research Council (NRC) (1988), an agriculturally literate person has been defined as someone who “...would understand the food and fiber system, and this would include its history and its current economic, social, and environmental significance to all Americans” (NRC, 1988, p. 8). The average U.S. consumer lacks both agricultural literacy and scientific attentiveness, which, in turn, could have serious implications for the future of the agriculture industry (Duncan & Broyles, 2006; Miller, 2004; Olper & Swinnen, 2013).

As a result, communication about agricultural production has become urgent as society has experienced an increased need for knowledge about science and technologies (National Academies of Sciences, Engineering, and Medicine, 2017). However, accomplishing such has been more difficult today than in the 20th Century (Burns et al., 2003). As an illustration, since the turn of the 21st Century, advancements in digital communication have provided not only key opportunities but also challenges for science communicators (McLeod-Morin et al., 2020). The goal of science communication has been to share research results, cultivate an appreciation for science, improve understandings of scientific issues, and inform policy decisions for the public (National Academies of Sciences, Engineering, and Medicine, 2017). Case in point, Metag (2020) demonstrated that most individuals obtain their science information, including agricultural science, from various mediums, most notably, the Internet and social media (Metag, 2020). Often these sources use incorrect information and promote food and agricultural marketing trends that may not be grounded in scientific data. This consumer distance from agriculture has resulted in today's media having “more sports reporters than professionals looking out for the safety of our food” (Zumalt, 2003, p. 27).

Despite this, consumers have remained inundated by agricultural products (Muratore & Zarbà, 2011). Therefore, consumers' relationship with the food they consume has become increasingly intricate (Jeong & Lundy, 2017). For example, consumer interest in food has surpassed taste alone and now includes concerns regarding the social and ethical issues underlying food production (Briggeman & Lusk, 2011; Unnevehr et al., 2010; Zander & Hamm, 2010). It is also important to note that food companies have historically used labels to promote product differentiation (Ares et al., 2013). In response, the FDA has required most food products to include nutrition labeling to describe the nutrients and health claims to ensure they meet federal requirements (FDA, 2013). Beyond mandatory labeling, some manufacturers of food products have voluntarily included other claims such as carbon neutral, certified humane, and non-GMO on their labels to appeal to consumers and market their product better (FDA, 2018).

Food labels have been defined as “any words, particulars, trademarks, brand names, pictorial matter or symbols on any packaging, document, notice, board or collar accompanying or referring to a product” (Dubreuil & Agatiello, 2007, p. 41). However, for a label to be

informative, consumers must have prior knowledge (Powers et al., 2020). On this point, Kumar and Kapoor (2017) reported that a statistically significant and positive relationship existed between consumers' demand for information regarding food production and their willingness to purchase packaged food. Therefore, a food label has been found to be an effective approach to communicating the production methods, ethics, and sustainability of a food product to consumers (Kumar & Kapoor, 2017). This factor has also encouraged consumers to decide whether to purchase a product based on the information provided on the label. Consequently, detailed and well-informed food labels have become essential to the modern food marketing industry (Singla, 2010). In response, some advocates, including agricultural marketing and communications experts, have made significant efforts to revise and regulate food labeling policies and practices (Shen et al., 2018). However, because of a plethora of food label jargon displayed on food packaging, uncertainty among consumers has persisted (Shen et al., 2018).

On this point, Nestle (2010) reported that food products display more symbols and verbiage to indicate nutrition and health benefits than before. Further, increased consumer demand for healthier, more sustainable, and ethically sourced food products has made food labeling necessary (Jeong & Lundy, 2017). For example, credible labels indicate the presence of desirable product attributes while simultaneously creating the potential for brands to charge premium prices (McCluskey & Loureiro, 2003). The Pure Food and Drug Act (1906) prohibited companies from labeling their products with statements that were "false or misleading in any particular" (Pure Food and Drug Act, 1906, para. 3). However, after the bill's adoption, food manufacturers successfully challenged the notion that food labels could not display health claims in court. In 1911, the Supreme Court ruled on *The United States of America v. Johnson* that the Food and Drugs Act (1906) did not prohibit health claims but instead only prohibited false and misleading statements about the ingredients or the presence of pharmaceutical drugs. In response, in 1912, Congress passed the Sherley Amendment that overturned *The United States of America v. Johnson* and permitted legal actions against false and fraudulent health claims (FSIS, 2015). For decades, the FDA interpreted any indication of health benefit on food labels as meeting the criteria outlined in the Food and Drugs Act (1906), which opened producers and processors up to legal challenges. Eventually, food companies began to use symbols and terminology to communicate unique nutritional qualities (FSIS, 2015).

Perhaps the most prominent food label symbol that endorsed nutritional quality appeared in 1995 when the American Heart Association introduced a symbol of a heart that represented heart-healthy products (Nestle, 2010). Nutritional quality symbols have also been used by companies such as PepsiCo and Kraft, which created self-endorsement labeling systems. Self-endorsement labels, also known as Front-of-Package Labels, presented condensed nutritional information on the front of the package in varied forms that were often aesthetically pleasing (Becker et al., 2015). Self-endorsement symbols have been used so frequently that the Consumers Union funded a service to track them (Consumer Reports, 2010). However, with the marketing potential of this food labeling strategy, stringent regulations soon followed.

Because of the critical changes to food labeling, this investigation analyzed a reform effort in U.S. food labeling policy and practice in the 1900s, which dramatically contributed to the current food labeling issues and overall consumer distrust in the agriculture industry. Although each brand, company, and regulating entity has a unique approach and independent responsibilities for

the labeling of food products, they also have fundamental commonalities. Describing how these trends have evolved motivated the current study.

Purpose and Research Questions

This study aimed to document the history of food labeling in the U.S since the adoption of the Food and Drugs Act (1906). As such, this investigation aligned with the American Association of Agricultural Education *Research Priority Area 1: Public and Policy Maker Understanding of Agricultural and Natural Resources* (Enns et al., 2016) and could provide agricultural communicators an understanding of how legislation and practices have influenced the public’s understanding of food labeling. Two research questions guided the larger investigation:

1. What legislation and federal rulings have shaped food labeling in the U.S.?
2. What practices have shaped food labeling in the U.S.?

Methods and Procedures

This study used a historical approach (Salevourious & Furay, 2015). “Historical research is the study of events, what people said or wrote, and trends that emerged. Such matters cannot be changed, but the evidence of them varies widely, and their description and interpretation are often revised” (Brooks, 1969, p. 2). In historical research, artifacts from the past can help advance new knowledge productively and practically (Salevourious & Furay, 2015).

Data Collection and Analysis

To accomplish this investigation’s purpose, we collected primary and secondary sources (see Table 1) to ensure representation from a range of databases (McDowell, 2002). Finding multiple sources of data to triangulate our findings helped improve the study’s credibility (Tracy, 2010). The sources were also exposed to internal and external critique by the researchers (McDowell, 2002). To analyze the data, we created a detailed outline to reveal the interconnectedness of data sources and their relationships to the study’s guiding research questions (McDowell, 2002). After documenting important themes and concepts, sources were placed into the outline and further scrutinized to unearth a deeper understanding of the historical foundations of food labeling policy and legislation in the U.S. Further, the study’s detailed outline provided a method to chronologically organize findings and ultimately gain an understanding of past food labeling regulations and compare to current consumer knowledge and awareness.

Table 1

Primary and Secondary Sources used in this Investigation

Type	Sources
Primary	<ul style="list-style-type: none">• Legislative Acts• Congressional Reports• Judicial Decisions
	<ul style="list-style-type: none">• United States Department of Agriculture National Agricultural Library

Type	Sources
	<ul style="list-style-type: none"> • Correspondence between Congress and food companies during the creation of early regulations. • Pure Food and Drug Act (1906) • Nutrition Labeling and Education Act (1990) • Sherley Amendment (1912)
Secondary	<ul style="list-style-type: none"> • Peer-refereed journal articles • Peer-reviewed magazine articles • Books about well-known philosophers • Books about the history of consumer choice • Books about mass communication • Upton Sinclair's <i>The Jungle</i>

Reflexivity

The lead researcher was a doctoral student at Louisiana State University. She also has previous research experience and an industry background in nutrition and food labeling. For example, she grew up on family farm and has regularly communicated with industry and government officials about the importance of food labeling and creating new marketing opportunities for family farmers. Because of these experiences, she was uniquely positioned to have access to a range of artifacts and industry insight that helped illuminate the historical context of this investigation. The second researcher was a faculty member at Louisiana State University with a background in historical research. Therefore, he assisted with the analysis of data. It is critical to note that these experiences and biases likely influenced our interpretation of the data.

Rigor and Trustworthiness

To ensure trustworthiness in this investigation, Lincoln's and Guba's (1985) four standards for rigor: (1) confirmability, (2) dependability, (3) credibility, and (4) transferability. Confirmability calls for researchers to be clear about the influences that shaped the investigation. In this study, we provided insight into our background and biases while also describe the methods and procedures employed. Meanwhile, dependability reflects the extent to which researchers maintain consistency while conducting a study. As such, we conducted a thorough audit of our data collection and analysis procedures to ensure they were accurate. Credibility, the third standard, speaks to whether a study's findings *ring true* in their given context. To uphold this criterion, we triangulated our findings using multiple sources. Finally, transferability represents if the findings could be transferred across contexts. To accomplish this, we described our data collection and analysis procedures and revealed the biases that likely influenced our interpretation of the findings.

Findings

Research Question #1: What Legislation and Federal Rulings Shaped Food Labeling in the U.S.?

Since the early beginnings of food labeling, the U.S. government has sought to intervene to improve human health and safety (NALC, 2013). In the U.S., food labeling has historically been supervised by the United States Department of Agriculture (USDA), the United States Food and Drug Administration (FDA), and the United States Federal Trade Commission (FTC) (NALC, 2013). Housed within the USDA, the Food Safety and Inspection Service (FSIS) has been the public health agency responsible for enforcing accurate labeling regulations regarding the country's commercial supply of meat, poultry, and egg products (FSIS, 2015).

Following Upton Sinclair's book, *The Jungle*, the Food and Drugs Act (1906) was passed as a reaction to public outrage. This bill outlawed interstate commerce of misidentified or contaminated food items. Sinclair's vivid descriptions of unsanitary conditions in meat-packing plants coupled with depictions of spoiled meat shocked the U.S. public. Because of its bold description of low food safety and quality standards, *The Jungle* inspired the first of many policies that would aim to ensure a safe food supply. The novel's plot followed a Lithuanian immigrant who sought the American dream but found work in a filthy, unsanitary meat processing facility. The novel was intended to raise awareness of the unfair working, living, and economic conditions that immigrants to the U.S. faced (Sinclair, 1906). To much surprise, the public was outraged about the unsanitary and mislabeled meat and food safety-related issues presented in the novel. The unsanitary working conditions, poorly ventilated plants, and meager wages that were vividly described had previously received little attention from the public. Before writing *The Jungle*, Sinclair was known for examining and writing about economic and social injustices. However, he became an accidental muckraker because of his vivid account of the deficiencies in U.S. meat-packing plants.

To discuss his work and shed light on his experiences in a U.S. slaughterhouse, President Roosevelt invited Sinclair to the White House (Constitutional Rights Foundation, 2008). The President then appointed a team of commissioners to conduct a comprehensive investigation of the five slaughterhouses in Chicago. After inspecting meat-packing facilities, the special commission issued its report. The report corroborated nearly all of the conditions that Sinclair had written about to much public dismay. The commissioners recommended that inspections occur at slaughter to ensure animal health at every stage of meat processing. Further, the commission called for the Secretary of Agriculture to create a policy that required "cleanliness and wholesomeness of animal products" (Constitutional Rights Foundation, 2008, pp. 16-17).

Despite opposition from meatpackers, Roosevelt enacted the Meat Inspection Act (1906). The policy authorized inspectors from the U.S. Department of Agriculture to intervene in interstate and foreign commerce and ensure that misbranded or spoiled meat did not enter the food supply (USDA, 1906). After the passage of the Meat Inspection Act (1906), Congress also passed laws that regulated the sale of most other foods and drugs. In fact, President Roosevelt concurrently enacted the Pure Food and Drug Act (1906) and the Meat Inspection Act (1906). The Pure Food and Drug Act (1906) provided regulation of food additives and prohibited labeling that could be misinterpreted or deceptive. Consequently, the Pure Food and Drug Act (1906) created a need for a regulating agency and led to the development of the federal Food and Drug Administration (FDA) (Constitutional Rights Foundation, 2008). The two laws passed in 1906 ultimately increased consumer confidence in the foods they purchased (Wakefield et al., 2012).

However, after the bill's adoption, food manufacturers successfully challenged the notion that food labels could not display health claims in court. In 1911, the Supreme Court ruled on *The United States of America v. Johnson* that the Food and Drugs Act (1906) did not prohibit health claims but instead only prohibited false and misleading statements about the ingredients or the presence of pharmaceutical drugs. In response, in 1912, Congress passed the Sherley Amendment that overturned *The United States of America v. Johnson* and permitted legal actions against false and fraudulent health claims (FSIS, 2015). For decades, the FDA interpreted any indication of health benefit on food labels as meeting the criteria outlined in the Food and Drugs Act (1906), which opened producers and processors up to legal challenges.

After the passage of the Sherley Amendment in 1912, no significant legislative or judicial rulings influenced the food industry for nearly half a century (FSIS, 2015). However, in the 1960s, a debate about the importance of communicating potential food allergens on labels began to emerge in the public sphere (Nestle, 2010). In response, Congress passed The Fair Packaging and Labeling Act (1967), which applied to the labeling of foods regulated by the FDA, including "poultry, most meats, certain egg products, and most alcoholic beverages regulated by other Federal agencies" (FDA, 2013, p. 2). This legislation required food companies to identify any ingredients considered significant food allergens or that contained proteins derived from a food allergen clearly on their label. According to the FDA, more than 160 foods have been identified that can cause adverse effects for individuals who have food allergies. The eight major food allergens identified by the law were milk, eggs, fish (e.g., bass, flounder, cod), crustacean shellfish (e.g., crab, lobster, shrimp), tree nuts (e.g., almonds, walnuts, pecans), peanuts, wheat, and soybeans (FDA, 2013).

Despite the risk of legal ramifications, food companies continued to list nutrient contents and claims of health benefits. Manufacturers understood the marketing potential by identifying loopholes in legislation and began advertising foods with high levels of vitamins and nutrients to imply added health benefits (Nestle, 2010). Although the FDA attempted to limit this practice, companies lobbied for the right to market their products freely. In 1969, President Nixon assembled the *White House Conference on Food, Nutrition, and Health* to investigate ending hunger and malnutrition. As a result of the work achieved at this conference, leaders recommended nutrient information be displayed for wheat, corn, rice, snack foods, and chocolate (Conference on Food, 1969). To address growing public health concerns, the FDA permitted food packages to indicate "contains [seven] essential nutrients" but continued to prohibit any indication that food products could prevent or remedy disease (FDA, 2018). The FDA maintained that such statements involved pharmaceutical claims that required scientific data for verification (FDA, 2018).

By 1984, Kellogg's collaborated with the National Cancer Institute to launch a campaign that endorsed health-related claims regarding All-Bran cereal. Within six months of the collaboration, the sales of All-Bran cereal increased by 47%, which suggested that health claims appealed to consumers (Levy, 1987). As a result of this success, Kellogg's argued a legal basis for health claims and filed a petition with the FDA (Kellogg, 1985). When the Nutrition Labeling and Education Act (1990) was passed, the U.S. Congress incorporated the petition's suggestions and instructed the FDA to authorize health claims on foods that were accompanied by scientific

evidence. Then, four years later, Congress enacted the Dietary Supplement Health and Education Act (1994). This policy allowed food supplement labels to include claims of improving the function of the body. When dietary supplements received this clearance, food companies soon demanded similar approval. However, the FDA's Modernization Act (1997) and federal litigation during the early 2000s under the George W. Bush administration weakened the FDA's power to prevent such actions.

For decades, food packages have included indicative labels and nutrition messages to help consumers differentiate products and provide information about nutrition (Kees et al., 2014). However, some lines have been blurred in recent years regarding whether some information provided on labels should be considered essential or unnecessary (Ikonen et al., 2020). In response, The Nutrition Labeling and Education Act (1990) amended the Federal Food, Drug, and Cosmetic Act (1938). This amendment instated the requirement that most packaged food labels include a standardized nutrition label. Food manufacturers were also required to disclose nutritional attributes on labels and undergo more stringent regulation by the FDA. For example, food companies could not make nutrient content claims if they had not met federal labeling criteria (Wartella et al., 2010). However, it should be noted that this statute did not regulate the labeling of meat and poultry products. By the mid-1990s, Food and Drug Administration (FDA) pushed for greater food labeling transparency, which eventually led to the adoption of the Food Allergen Labeling and Consumer Protection Act (2004). The bill's intent was twofold regarding food labeling: (1) encourage heart health through nutritional transparency, and (2) help Americans prevent health risks associated with food allergies. Since the bill's enactment, the FDA has enforced regulations to ensure that foods produced and sold, i.e., domestically and globally, have remained safe, properly labeled, and of the highest quality (FDA, 2013).

Research Question #2: What Practices have Shaped Food Labeling in the U.S.?

Although laws and regulations have shaped the criteria that must be included on food packages regarding allergens and other health-related information, there has been little stipulation about what can be printed on labels (Wartella et al., 2010). As such, many third-party food brands have opted out of traditional USDA regulations and developed independent criteria and practices. Because of this, Wartella et al. (2010) reported that most third-party U.S. food companies had used unverified nutritional information, jargon, and aesthetically pleasing symbols that have led to confusion among consumers.

One example of such a company has been Vital Farms. This food company has been one of several brands emphasizing animal husbandry and novelty rearing environments, such as pasture-raised poultry and egg products. Vital Farms began by providing customers with shell eggs and expanded their product base to butter and ghee, and more recently, they created a popular breakfast and snack item called egg bites (Vital Farms, 2020). Vital Farms has operated under the mission of bringing "ethically produced food to the table by coordinating a collection of family farms to operate under a well-defined set of organic agricultural practices that includes the humane treatment of farm animals as a central tenet" (Vital Farms, 2020, para. 2). Through the marketing of this agricultural production approach, Vital Farms has encouraged consumers to adopt alternative egg choices rather than products from what they consider harmful industrial practices (Vital Farms, 2020). The claims found on Vital Farms' packaging have been

emotionally driven and encouraged the consumer to form a mental image of the environment in which their products have originated (see Figure 1). In addition to the claims on this brand's package, this product used a Certified Humane Raised and Handled® label. As of 2021, the USDA has not regulated any of Vital Farms' products (Vital Farms, 2021). However, questions have emerged about Vital Farms' and similar brands' choice to bypass government regulation, especially regarding how they raise, harvest, and market their products (Britwum et al., 2021). As such, Vital Farms has continued to market its products as superior.

Figure 1

Vital Farms Pasture-Raised Egg Carton



Note. Image used with permission from Vital Farms.

Before the turn of the 21st century in the U.S., a significant need for food labeling reform emerged. A group of advocates, known as *progressives*, led the reform that aimed to address economic and social issues caused by the rapid growth of food manufacturing factories (Constitutional Rights Foundation, 2008). During this time, the progressives attacked corporations such as Standard Oil, U.S. Steel, and the Armour meat-packing companies for what they described as unjust practices (Constitutional Rights Foundation, 2008). The progressives argued that corporate food manufacturing companies destroyed free enterprise, controlled market prices, and treated workers fairly (Constitutional Rights Foundation, 2008). However, their core mission was to inspire better food labeling practices by U.S. food companies (Constitutional Rights Foundation, 2008).

In response to progressives' calls, U.S. food manufacturing companies began using an advertising strategy called Front-of-Package Nutrition Labeling to include nutrient content and health claims (FDA, 2009). As a part of its authority over labeling, the FDA oversaw food Front-of-Package labeling regarding the following key areas: (1) ingredients (listed in order of prominence), and (2) nutrition facts such as serving size, calories, fat, carbohydrates, sodium, protein, nutritional content (e.g., low fat, high fiber, high fiber), health claims, raw fruits, vegetables, fish, and allergy information (FDA, 2009). Because of their authority over Front-of-Package Nutrition Labeling, the FDA (2009) began to examine the effects of the practice on consumer confidence.

The FDA (2009) concluded in an extensive report that Front-of-Package Nutrition Labeling led to consumer misinformation and reduced confidence regarding a food’s health attributes. Further, the practice has also made it “less likely that consumers will read the complete nutrition facts information on the back of the package” (FDA, 2009, p. 1). These findings also led to the release of the *Point of Purchase Food Labeling Standards* (FDA, 2009). Further, the Center for Food Safety and Applied Nutrition released an industry letter in which they addressed the role that this practice had on the food and agricultural industries and how they planned to address issues moving forward (FDA, 2009). Highlights from the letter included:

It is...essential that both the criteria and symbols used in front-of-package and shelf-labeling systems be nutritionally sound, well-designed to help consumers make informed and healthy food choices, and not be false or misleading. The agency is currently analyzing Food of Purchase labels that appear to be misleading. The agency is also looking for symbols that either expressly or by implication are nutrient content claims. We are assessing the criteria established by food manufacturers for such symbols and comparing them to our regulatory criteria. (FDA, 2009, para. 3)

Despite addressing these concerns, which promised more thoughtful and stringent regulation, Britwum et al. (2021) argued that governing agencies have done little to provide guidance to third-party food companies on standards to promote transparency through food labeling. As a result, creating more stringent food labeling symbols and terms regulations has been more challenging than initially anticipated (Britwum et al., 2021). Nevertheless, some progress appears to have been made. For example, the FDA (2016) modified the guidelines for Nutrition Fact labels to promote consumer education. In addition to marketing tactics for food products, another practice that emerged after the turn of the 21st Century was the rise of value-added product attribute labels and terms (Batte et al., 2007; Gadema & Oglethorpe, 2011; Loureiro & Umberger, 2007). These labels (see Figure 2) have included terms that have indicated superior production, e.g., Organic and Certified Naturally Grown, the absence of additives, e.g., Non-GMO and Gluten-Free, as well as indicators of social and high animal welfare standards, e.g., Carbon Trust, Fair Trade, and Certified Humane.

Figure 2

Examples of Value-Added Food Labels



Note. Images of common value-added food labels. ¹USDA-Organic Label (Left-Top), ²Certified Naturally Grown Label (Top-Center), ³Non-GMO Verified Label (Top-Right), ⁴Gluten Free Label (Bottom-Left), ⁵Carbon Neutral Label (Bottom-Center), and ⁶Certified Humane Label (Bottom-Right).

This branding device intended to inspire greater consumer confidence and expand niche markets; however, Ben-Shahar (2016) reported that value-added product attribute labels and terms had been limited in their effectiveness because consumers have interpreted them as unclear. In response, independent companies have explored the power of displaying labels as a multidimensional component of food marketing in which they offer products in a variety of unique formats to inform consumers about more than just food quality attributes (Hieke & Taylor, 2012; Kiesel et al., 2011). Further, Shen et al. (2018) also explained that food companies had begun to invest more vigorously in food label elements such as graphic design, colors, and font choice to gain consumers' trust. Consequently, agricultural communicators could play a pivotal role in shaping the food labeling movement in the future (Shen et al., 2018).

Conclusions, Discussion, Implications, and Recommendations

Today our world demands sustainability and transparency from the agricultural industry (Food and Agriculture Organization of the United Nations, 2017, p. 3). Consumers have been reported to be more concerned about the production, manufacturing, and marketing of their food than ever before (Food and Agriculture Organization of the United Nations, 2017). However, the public's opinion of production agriculture has primarily hinged on media's depictions of animal husbandry, biotechnology, pesticides, herbicides, and hormones (OECD, 2012). Based on the findings of this investigation, we conclude that food labels were initially intended to provide consumers with a deeper knowledge of the food they purchased. However, key legislative acts such as the Fair Packaging and Labeling Act (1967) and the Nutrition Labeling and Education Act (1990) shifted the food labeling movement into a branding device to differentiate products and brands from one another – a finding that aligns with previous research (Dubreuil & Agatiello, 2007; Nestle, 2010).

The overwhelming amount of information on food labels appears to have contributed to consumer confusion (Britwum et al., 2021). Although third-party brands, such as Vital Farms, have developed their own standards for food labels, we conclude that their efforts to educate consumers have been negligible. Further, we also conclude that third-party labels' consumer education programs have not benefitted the agricultural industry – a finding that has not been reflected in the broader literature. Despite this, Kumar and Kapoor (2017) reported that consumers have been concerned about methods of food production and raising environments of livestock. Because protein consumption has been a significant component of Americans' diets in the last decade (Kumar & Kapoor, 2017), it is vital to evaluate and understand consumers' perceptions of animal agriculture as well as the conventional and modern raising standards by which livestock have been raised. As such, we recommended that agricultural practitioners explore new ways to communicate this message more effectively. Previous research has shown that consumers trust producers as sources of information (Pew Research Center, 2016). In

response, we recommend that producers incorporate more personal and emotional appeals when marketing agricultural products to better compete with third-party branding efforts. This historical examination also illuminated an important implication for the food industry going forward – that consumers desire food brands’ values and meanings to be communicated more explicitly. For instance, Muratore and Zarbà (2011) found that the package design of food products has also been a critical factor in purchasing decisions. As such, we call for marketers of agricultural products to develop modern branding strategies for traditional food products. We also concluded that the findings of this study contributed to knowledge regarding the need to reevaluate and possibly amend food label laws and regulations. Therefore, agricultural advocates and community groups should begin to reexamine food labeling policy to determine the necessary changes that could be made to create a more transparent future. Another important conclusion from this investigation was that notable differences existed between the past and the present regarding food labeling and consumer concerns (Wakefield et al., 2012). For example, in the early 1900s, consumers had little access to information. When consumers learned about food production practices through Sinclair’s (1906) novel, *The Jungle*, they were repulsed and disappointed. In contrast, the modern consumer has been presented with so much information that it has made it difficult to distinguish between truth and fallacies. Moving forward, we recommend that future research explore how food companies can better establish trust with consumers through the food labels they encounter.

Based on the findings of this investigation, future research should analyze the branding strategies of third-party labels and how they have affected the brand’s efforts. Such a change could shift the focus to consumers’ and producers’ reactions regarding marketing efforts to determine the most effective communication for each brand. For example, Vital Farms has developed innate, distinguishable packaging for their products and developed labels such as *Certified Happy*, *Freedom to Forage Outdoors Year - Round*, *Ethical Eggs*, *Hens Loving Life Outdoors*, and other non-regulated, value-added claims. In the future, research should explore the marketing and branding strategies used by companies that have created their own standards for agriculture products with a niche brand.

A large portion of consumers in the U.S. have been disconnected from agriculture and farming (Wakefield et al., 2012). Packaging and labeling have fundamental roles in ensuring the safe delivery of goods through a supply chain to the end consumer that adequately informs them of the product’s contents (Hurley et al., 2013). The evidence presented in this historical investigation illuminated a disconnect between food manufacturers and governing agencies’ labeling policies. Therefore, industry professionals should advocate for agricultural literacy among youth to encourage better-educated consumers. Consumers deserve to know what they are buying, where it comes from, the nutrients of each product, and to be assured it has met USDA quality and safety standards. Currently, loopholes in food labeling policy have made it possible for misleading labels to be used on a variety of food products. Food labels have historically been often one of consumers’ only connections to agricultural producers (Nestle, 2010). Consequently, food labeling warrants greater attention by agricultural communicators moving forward.

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Consumer Evaluation of Functional Foods: A Conceptual Framework for Understanding Consumer Acceptance of Food Health Innovations

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The process of consumers' acceptance of food health innovations is complex. Functional foods, one of the most popular food health innovations, have been developed to improve human health and reduce the risk of certain chronic diseases. To date, many studies have investigated factors that influence consumers' acceptance of functional foods. This study aims to synthesize these factors and propose a conceptual framework by conducting a systematic literature review. We developed the conceptual framework by summarizing 47 studies published in four databases from 2000 to 2020. It integrates seven factors—knowledge, value, health consciousness, subjective norm, attitude, self-efficacy, and purchase intentions—based on the theory of planned behavior and the value-attitude-behavior model. The conceptual framework can be used as a roadmap and provide direction for research and practice for functional food researchers and industry experts because it displays key factors, and the relationships between them, that shape consumer acceptance. By using the framework to inform their work, these professionals can help improve consumer perceptions of food health innovations, increase their purchase intention and, ultimately, improve public health. In addition to the seven factors, consumers' social demographic characteristics should be considered when evaluating consumer acceptance of food health innovations.

Introduction

Food is the fundamental necessity in human daily life. However, consumers modern fast-moving lifestyle has increased the risk of diet-related chronic diseases caused by unbalanced and inadequate nutrition intake (Sun-Waterhouse, 2011). Consumers are becoming more aware of the importance of having a balanced diet with adequate nutrition to prevent or slow diet-related chronic diseases (Szakály, et al., 2019). Due to increasing concerns of contracting these diseases, food with adequate nutritional functions intended to improve consumers' well-being have been popularized. Functional foods are an innovative variety of foods (e.g., fruit juices fortified with vitamin C, milk fortified with vitamin D, eggs enriched with omega 3) that provide health benefits beyond basic nutrition to improve consumers' health and well-being and reduce the risk of diet-related chronic diseases (Diplock et al., 2009; Urala & Lahteenmäki, 2004).

The enriched or fortified functional ingredients in functional foods are developed by innovative technologies. However, consumers are often skeptical about these unfamiliar technologies and uncertain about their perceived negative health effects (Frewer et al., 2003). Results from previous studies indicate that consumer acceptance of food health innovations is a slow and complex process (Frewer et al., 2003; Szakály, et al., 2019). Many studies have investigated the factors that influence consumer acceptance of functional foods (Ares & Gámbaro, 2007; Bekoglu et al., 2016; Chang et al., 2020). However, the findings reported in these studies vary significantly, which makes it difficult to determine which factors are most influential and the

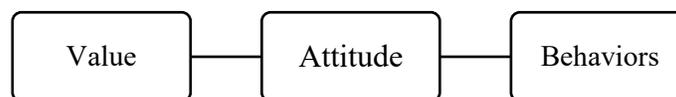
relationships between influential factors. Therefore, these varied findings pose challenges for functional foods manufacturers, researchers, policymakers, and marketing specialists to comprehensively and accurately understand consumers' behaviors toward functional foods (Baker et al., 2022). Understanding consumers' behavior in this context is critical for experts to effectively develop, launch, and promote functional foods to increase consumer acceptance (Baker et al., 2020; Karelakis et al., 2020). Thus, it is critical to provide experts a model displaying comprehensive, generalizable information about the key factors that influence consumer acceptance of functional foods and the relationships between key factors that can be used as a blueprint to guide future research and practice.

Theoretical Framework

The value-attitude-behavior (VAB) model (see Figure 1) and the theory of planned behavior (TPB) (see Figure 2) were used to guide the development of a conceptual framework. Homer and Kahle developed the VAB model in 1988 by testing the relationships between consumers' value, attitude, and behavior. The VAB model emphasizes that value influences behavior and the relationship between value and behavior is mediated by attitude (Homer & Kahle, 1988). Specifically, attitude is reflected by value and leads to a specific subsequent behavior (Homer & Kahle, 1988). The VAB model has been extensively implemented in previous studies to better understand consumers' behavior toward food attributes (Chang et al., 2020; Jung et al., 2020). One study conducted by Chang et al. (2020) found Taiwanese consumers' health value plays an important role in cultivating their positive attitude and, ultimately, increasing their purchase intention of functional beverages. Besides, Jung et al. (2020) used the VAB model to identify determinates of American college students' purchase intention of antioxidant-infused functional foods. They found perceived taste, health consciousness, and attitude could predict students' functional food purchase intention (Jung et al., 2020).

Figure 1

Homer and Kahle's (1988) Value-Attitude-Behavior (VAB) Model

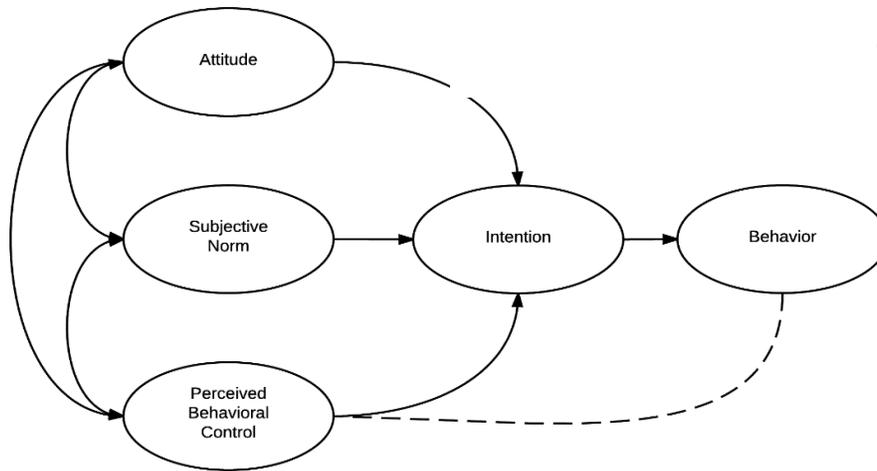


The TPB, proposed by Ajzen and Madden in 1986, describes consumer behavior. According to the TPB, consumers' purchase behavior is determined by their attitude, subjective norm, and perceived behavioral control (Ajzen & Madden, 1986). Previous studies have adopted the TPB as a theoretical framework to investigate consumers' purchase intentions of functional foods (Bakti et al., 2020; Salmani et al., 2020; Nystrand & Olsen, 2020). For example, Salmani et al. (2020) applied the TPB and found that attitude and subjective norm are significant predictors of Iranian consumers' consumption of vitamin-enriched foods. Bakti et al. (2020) also found that attitude and subjective norm significantly affect young Indonesian consumers' purchase intention of functional foods. In addition, Nystrand and Olsen (2020) explored Norwegian consumers'

functional foods purchase intentions by using an extended version of the TPB in which self-efficacy, descriptive norm, and eating values were added as additional predictors. They found that attitude, subjective norm, descriptive norm, and self-efficacy were significant predictors of consumers' functional foods purchase intentions (Nystrand & Olsen, 2020).

Figure 2

Ajzen and Madden's (1986) Theory of Planned Behavior (TPB)



Purpose

The purpose of this study was to integrate the key factors influencing consumer acceptance of functional foods and propose a novel conceptual framework depicting these key factors and their relationships. By integrating the VAB model and the TPB in the context of functional foods acceptance through a thorough review and synthesis of existing literature, the framework proposed herein can provide experts a comprehensive understanding of consumer acceptance of functional foods. The framework may also be relevant to other food health innovations.

Our study aligns with the American Association for Agricultural Education's National Research Agenda's Research Priority Seven: *Addressing Complex Problems* (Roberts et al., 2016). Priority Seven highlights the need to address complex agricultural problems to produce healthy and nutritious food and combat obesity. Because this study investigated consumers' complex functional foods acceptance process, it contributes to Priority Seven by deciphering consumers' healthy food choice behaviors, knowledge of which can inform food and agricultural research, practice, and policy.

Methods

Our study was performed by conducting a systematic literature review, a method used to synthesize empirical evidence in an unbiased way by integrating published studies (Petticrew & Roberts, 2008). The process of conducting a systematic review includes searching for literature, screening relevant studies, extracting relevant findings, and interpreting findings to generate new

frameworks and perspectives (Torraco, 2005). Our study is part of a larger study; therefore, similar methods may appear elsewhere.

Literature Search

To gather relevant literature, we conducted systematic searches across four databases—Web of Science Core Collection, Medline (OVID), CAB abstracts, and Google Scholar. We began by using Google Scholar and reviewed the first 200 search results that the search engine identified as most relevant due to the search terms we input. Based on the accuracy and relevance of the first 200 search results, we identified appropriate search terms to input into the other three databases. We input two sets of search terms in each database: 1) “functional food*” OR “functional product*” OR “enriched food*” OR “enriched product*” OR “fortified product*”; and 2) “consumer accept*” OR “consumer purchase behavior*” OR “consumer attitude*” OR “consumer perception*” OR “consumer willingness to pay” OR “consumer willingness to buy”. Altogether, 1,663 studies were generated from four databases, 322 of which were duplicates.

Inclusion Criteria

Before reviewing the 1,341 non-duplicates studies, we established our inclusion criteria. First, we only included quantitative studies investigating factors that influenced consumer acceptance of functional foods. Second, we only included studies that investigated modified functional foods—foods that are technologically enhanced and, therefore, more controversial to consumers. Third, we only included studies that gathered responses from a sample of consumers at least 18 years of age, as they are more likely to make independent food choice decisions. Fourth, we only included studies written in English and those published between 2000 and 2020 in peer-reviewed journals.

Article Screening and Synthesis

Two authors independently reviewed the 1,341 studies, 47 of which were deemed relevant based on our inclusion criteria. Therefore, 47 studies were included in our systematic review. To begin our synthesis, the same two authors extracted key findings relating to factors that influence consumer acceptance of functional foods from each of the included studies. Then, we used open coding procedures (Corbin & Strauss, 2008) to group like factors together into categories. Through this process, we identified seven key factors, and integrated them with the VAB model and the TPB.

Findings

We synthesized the findings from 47 studies and identified seven key factors that influence consumer acceptance of functional foods (i.e., knowledge, value, health consciousness, subjective norm, attitude, self-efficacy, purchase intentions; see Table 1).

Table 1

Seven Key Factors Influencing Consumer Acceptance of Functional Foods Identified Through

the Systematic Review and the Included Studies that Investigated Each.

Factors	Included studies ($N = 47$)
Knowledge ($n = 14$)	Barreiro-Hurlé et al. (2008)*; Bimbo et al. (2018); Brečić et al. (2014); Corso et al. (2018); Dean et al. (2012); LaBarbera et al. (2016); Labrecque et al. (2006)*; Lu. (2015)*; Sandmann et al. (2015)*; Schnettler et al (2015); Szakály et al. (2019)*; Verbeke (2005); Xin & Seo (2019)*; Verneau et al. (2019)
Value ($n = 24$)	<p><i>Perceived price</i> Huang et al. (2019)*; Nguyen et al. (2020)*; Stojanovic et al. (2013)</p> <p><i>Perceived taste</i> Marina et al. (2014)*; Urala & Lähteenmäki (2004)*</p> <p><i>Perceived risk</i> Moons et al. (2018)*; Siegrist et al. (2008)*; Urala & Lähteenmäki (2004)*</p> <p><i>Beliefs</i> Bui et al. (2015)*; Jezewska-Zychowicz (2009)*; Labrecque et al. (2006)*; Landström et al. (2007); Pappalardo & Lusk (2016)*; Urala & Lähteenmäki (2004)*; Vecchio et al. (2016)*</p> <p><i>Motives</i> Ares & Gámbaro (2007); Chang et al. (2020)*; Kraus (2015); Miroso & Mangan-Walker (2018); Siegrist et al. (2015)*; Szakály et al. (2019)*; Tudoran et al. (2009); Vassallo et al. (2009); Vorage et al. (2000)*</p>
Health Consciousness ($n = 15$)	Barreiro-Hurlé et al. (2008)*; Bui et al. (2015)*; Chen (2011a); Cox & Bastiaans (2007)*; Devcich et al. (2007); Huang et al. (2019)*; Jahn et al. (2019)*; Jung et al. (2020)*; Kavooosi-Kalashami et al. (2017)*; Krutulyte et al. (2011)*; Moons et al. (2018)*; Nguyen et al. (2020)*; Pappalardo & Lusk (2016)*; Sandmann et al. (2015)*; Xin & Seo (2019)*
Subjective norm ($n = 3$)	Huang et al. (2019)*; Nguyen et al. (2020)*; Rezai et al. (2014)*
Attitude ($n = 18$)	Bechtold & Abdulai (2014); Chen, (2011b); Jahn et al. (2019)*; Jezewska-Zychowicz & Królak (2015); Jezewska-Zychowicz (2009)*; Jung et al. (2020)*; Kavooosi-Kalashami et al. (2017)*; Krutulyte et al. (2011)*; Labrecque et al. (2006)*; Marina et al. (2014)*; Markovina et al. (2011); Nystrand & Olsen (2020)*; Patch et al. (2005); Phuong & Dat (2017); Szakály et al. (2019)*; Urala & Lähteenmäki (2004)*; Vorage et al. (2020)*; Xin & Seo (2019)*
Self-efficacy ($n = 4$)	Chang et al. (2020)*; Cox & Bastiaans (2007)*; Nystrand & Olsen (2020)*; Vecchio et al. (2016)*

Purchase Intention ($n = 10$) Chang et al. (2020)*; Huang et al. (2019)*; Jahn et al. (2019)*; Krutulyte et al. (2011)*; Lu. (2015)*; Nguyen et al. (2020)*; Nystrand & Olsen (2020)*; Phuong & Dat (2017); Rezai et al. (2014)*; Xin & Seo (2019)*

Note. * indicates study investigated more than one factor.

Value

According to the VAB model, value influences consumer behavior indirectly through their attitudes (Homer & Kahle, 1988). Kang et al. (2015) found that health value was the most important factor motivating consumers' interest in healthy eating and purchasing healthy food. In addition, Tudoran et al. (2009) included consumers' expectations of healthiness as a part of *value* in the VAB model. Specifically, expectations regarding how valuable foods are to consumers influence their purchasing behavior (Kang et al., 2015). Consumers' expectations of functional foods also include their beliefs about specific functional foods attributes (e.g., health benefits, health risks, taste, price; Kim et al., 2013; Roininen et al., 1999). Value provides the foundation for consumers to make healthy food choices (Kang et al., 2015).

Twenty-four studies ($n = 24$) in our review investigated the influence of value on consumers' acceptance of functional foods. Among the 24 studies, results from nine ($n = 9$) indicate that consumers' value plays a critical role in motivating them to choose functional foods. For example, Kraus (2015) found that consumers who were more motivated to improve their health were more inclined to consume functional foods. Results from four additional studies indicate that consumers' perceived price of functional foods significantly influences their acceptance. For example, Nguyen et al. (2020) found that consumers' perceived price of functional yogurts negatively influenced their purchase intentions. Moreover, Pappalardo and Lusk (2016) found that consumers who believed functional foods benefited their personal health were more likely to accept such products.

Attitude

Attitude is also a key predictor of consumers' food choice behavior (Tuorila, 1997). Eagly and Chaiken (1993) defined attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (p. 1). Understanding the factors that influence consumer attitude can help researchers explain the decision-making behind their food choices (Voss et al., 2003). Eighteen studies ($n = 18$) in our review investigated the influence of attitude on consumers' functional food acceptance. Among these, results from six studies ($n = 6$) indicate that consumers who had a positive attitude toward functional foods were willing to buy them (Chen, 2011b; Jezewska-Zychowicz, 2009; 2015; Krutulyte et al., 2011; Phuong & Dat, 2014; Szakály et al., 2019; Xin & Seo, 2019). In addition, Bekoglu et al. (2016) found that consumers' attitudes toward the necessity of functional foods positively influenced their functional food consumption. Results from five studies ($n = 5$) indicate that consumers who perceived more reward from consuming functional foods believed functional foods were necessary, were confident in functional foods, had a positive attitude toward functional foods, and perceived higher safety of functional foods (Bekoglu et al., 2016; Carrillo et al, 2013; Chen, 2011a; Jezewska-Zychowicz, 2009; Urala & Lähteenmäki, 2004). Furthermore, Chen (2011b)

found that Taiwanese consumers' attitude was influenced by their health consciousness, and Markovina et al. (2011) found that young Croatia consumers' attitudes toward functional foods were influenced by health awareness, trust, and perceived price.

Subjective Norms

Subjective norms are defined as “a person's belief about whether others feel that he or she should perform the target behavior” (Hale et al., 2002, p. 260). They refer to perceptions resulting from social pressures or influences (Hale et al., 2002). Previous research found that subjective norms significantly influence consumers' attitudes about food consumption (Nguyen et al., 2019; Tarkiainen & Sundqvist, 2005). Three studies ($n = 3$) in our review investigated the influence of subjective norms on consumer acceptance of functional foods. For example, Nguyen et al. (2020) found that subjective norms positively influenced Vietnamese consumers' attitudes toward purchasing functional yogurts, and Rezai et al. (2014) found that subjective norms positively influenced consumers' acceptance of synthetic functional foods.

Knowledge

Nutrition knowledge is “a scientific construct that nutrition educators have created to represent individuals cognitive process related to information about food and nutrition” (Axelson & Brinberg, 1992, p. 239). Adequate nutrition knowledge can change dietary attitudes and habits, and ultimately influence consumer acceptance (Bhaskaran & Hardley, 2002; Labrecque et al., 2006). Nutrition knowledge has been identified as the most important factor influencing consumer acceptance of functional foods (Topolska et al., 2021). Fourteen studies ($n = 14$) in our review investigated the influence of knowledge on consumers' functional foods acceptance. For example, Stojanovic et al. (2013) found that consumers who had a higher level of knowledge about health information more frequently consumed functional foods. In addition, La Barbera et al. (2016) found that consumers who had a higher level of knowledge about functional foods tended to pay higher premium prices for them. Several other studies also confirmed the positive effect of knowledge on consumers' functional foods acceptance (Brečić et al., 2014; Corso et al., 2018; Schnettler et al., 2015; Xin & Seo, 2019).

Importantly, Verneau et al. (2019) identified knowledge as a moderator between information shock and willingness to purchase functional foods. Specifically, after consumers who had less knowledge about functional foods received information about the health benefits of functional foods, their likelihood of purchasing functional foods increased. Similarly, Lu (2015) found that consumers' level of knowledge moderated their perception of the carrier-ingredient fit (or perceived 'naturalness' of the carrier-ingredient) and purchase intentions. Therefore, further research investigating this relationship is warranted.

Health Consciousness

Health consciousness has been described as the degree to which individuals are aware of their health and tend to pursue health behaviors to maintain or improve their health status (Mai & Hoffmann, 2015). Fifteen studies ($n = 15$) in our review identified a positive relationship between consumers' health consciousness and functional food purchase intention. Specifically,

the higher consumers' level of health consciousness or health concern, the stronger their intentions are to consume functional foods (Huang et al., 2019; Jung et al., 2020; Krutulyte et al., 2011; Moons et al., 2018; Sandmann et al., 2015). For example, consumers who cared more about their health status and diet tended to consume functional foods (Chen, 2011a; Barreiro-Hurlé et al., 2008). Similarly, consumers who expressed fear of cancer were more likely to purchase selenium-enriched functional foods compared to those who were not fearful of cancer (Cox & Bastiaans, 2007). Kavooosi-Kalashami et al. (2017) also found that consumers who had family members diagnosed with diabetes were inclined to pay higher prices for functional foods, including dietary sugar. Furthermore, Devcich et al. (2007) found that consumers who had more modern health worries (e.g., worrying about health risks from food additives, worrying about antibiotics in food) were willing to buy functional foods. Results from other studies suggest that consumers who were concerned about their family members' health status were interested in consuming functional foods. For example, Bui et al. (2015) and Verbeke (2005) found that having ill family member(s) or sick relative(s) may increase consumers' functional food consumption.

Self-Efficacy

Self-efficacy “centers on people's sense of personal efficacy to produce and to regulate events in their lives” (Bandura, 1982, p. 122). It refers to individuals' internal control to perform specific behaviors (Terry & O'Leary, 1995), such as dietary behavior (McEachan et al., 2011). Nystrand and Olsen (2020) measured individuals' self-efficacy as one's ability or confidence to eat functional foods regularly. Specifically, consumers could be motivated to eat functional foods if they feel confident in their ability to do so (Cox & Bastiaans, 2007). Four studies ($n = 4$) in our review identified self-efficacy as an important factor influencing consumers' functional food acceptance. For example, Nystrand and Olsen (2020) found that consumers' self-efficacy is the most important explanatory factor influencing their functional foods purchase intention, and Cox and Bastiaans (2007) found that self-efficacy is a significant predictor of consumers' likelihood to consume Se-enriched functional foods.

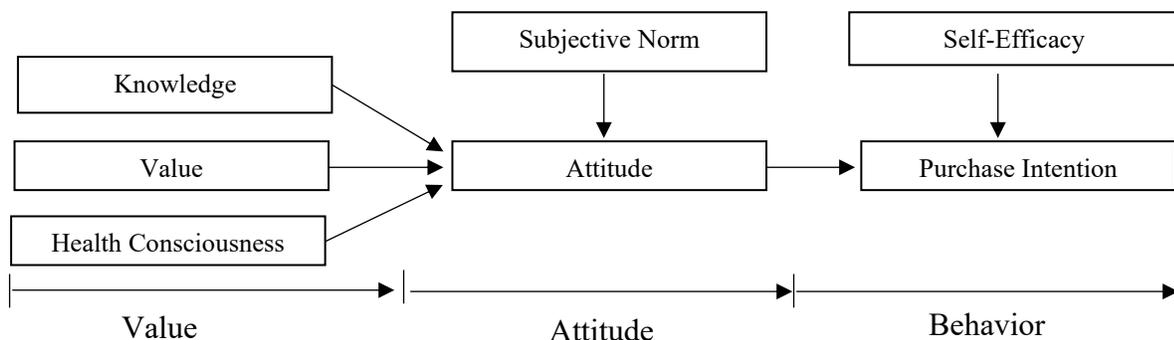
Purchase Intention

Purchase Intention has been identified as an important factor or an outcome variable to understand consumers' food decisions (Chang et al., 2020; Huang et al., 2019; Jahn et al., 2019). Purchase intention is an operational measurement for consumers' extent of food purchase behavior (i.e., low, moderate, high; Huang et al., 2019; Jahn et al., 2019). Ten studies ($n = 10$) in our review examined consumers functional foods purchase intention. For example, Huang et al. (2019) found that Chinese consumers have moderate functional foods. In addition, results from six ($n = 6$) of the 10 studies indicated that consumers' attitude is an important factor influencing their functional foods purchase intention. For example, Jahn et al. (2019) found that consumers' attitude toward functional Vitamin D fortified foods directly influenced their purchase intention, and Huang et al. (2019) found that consumers' attitude is a mediator between their health consciousness and purchase intention. In addition, Chang et al. (2020) explored critical factors influencing Taiwanese college students' functional foods purchase intention and identified interest in healthy food and health orientation as influential factors.

At the end, we proposed a conceptual framework by integrating the VAB model and the TPB and adding three factors (i.e., knowledge, self-efficacy, health consciousness) we identified that were commonly examined in the literature. Our conceptual framework is displayed in Figure 3.

Figure 3

The Conceptual Model of U.S. Consumers' Purchase Intentions of Functional Food



Conclusions, Discussion, and Recommendations

Given the complex process of consumers' accepting novel healthy foods, an understanding of the key factors that influence their acceptance and the relationships between these factors is important (Frewer et al., 2003; Szakály, et al., 2019). By conducting a systematic review, we identified and synthesized seven key factors that may predict consumers' acceptance of functional foods (i.e., knowledge, value, health consciousness, subjective norm, self-efficacy, attitude, purchase intentions). Using Homer and Kahle's (1988) VAB model and Ajzen and Madden's (1986) TPB as a guide, we proposed a conceptual framework that integrates the seven factors. The conceptual framework proposed herein should serve as a blueprint for researchers, practitioners, and policymakers who want to understand, or further investigate, the complex process that is consumer acceptance.

A precise understanding of the key factors that influence consumer acceptance of functional foods can inform the delivery of effective educational interventions and communication strategies designed to increase consumer acceptance. Therefore, this conceptual framework would be valuable for functional foods marketing and communication specialists as they develop promotional materials. For example, functional foods marketing and communications specialists should carefully consider the design of product labels, as this is a prime opportunity to increase consumers' nutritional knowledge, thereby improving their attitudes and increasing their purchase intentions (Brečić et al., 2014; Corso et al., 2018; Schnettler et al., 2015; Stojanovic et al., 2013; Xin & Seo, 2019). Specifically, health information provided on product labels should emphasize health benefits and decrease perceived health risks.

Agricultural communications scholars who study persuasive messaging and strategic framing should investigate how various message frames influence consumer responses to functional

foods health information. For example, comparing consumer responses to health information using a logical-scientific frame (e.g., scientific, passive voice, impersonal language) and health information using a narrative frame (e.g., lively, active voice, personal language) would be helpful. Similarly, comparing consumer responses to health information using a gain frame (e.g., focus on acquiring something like health rewards) and health information using a loss frame (e.g., focus on reducing something like the risk of diet-related chronic diseases) would also provide insight into most effective health or nutrition-related communications to include on product labels.

Furthermore, functional foods marketing and communication specialists should design visual aids that promote functional foods by emphasizing familial health and social environments. This strategy may help consumers link their personal health to that of family members and possibly increase their health consciousness, thereby improving their attitudes toward functional foods and increasing their purchase intention (Bui et al., 2015; Kavoosi-Kalashami et al., 2017; Verbeke, 2005). In addition, displaying social environments in visual aids may improve consumers' subjective norms by helping them envision other people (e.g., friends, coworkers) consume functional foods and be accepting of them consuming functional foods (Nguyen et al., 2019; Rezai et al., 2014; Tarkiainen & Sundqvist, 2005).

Although these marketing and communications examples and recommendations, informed by our framework, can be implemented broadly on functional foods product labels and in functional foods advertisings, they can also inform community-based public health interventions and be customized for specific audiences. For example, functional foods consumption is relevant to public health interventions designed to mitigate obesity, improve nutritional intake, or reduce the risk of diet-related chronic diseases. By understanding the demographic and psychographic characteristics of a specific community in which one of these public health interventions is being implemented, the framework can help design audience specific educational objectives. For example, if a group severely lacks control of their diet and food purchasing behaviors, an objective of the program should be to increase their self-efficacy (Cox & Bastiaans, 2007; Nystrand & Olsen, 2020).

It should be noted that the seven key factors we identified may interact with other influential factors. Thus, there may be other important factors influencing consumer acceptance of functional foods that were not included in our conceptual framework. In addition to the seven factors, consumers' socio-demographic characteristics should be considered when evaluating consumer acceptance of functional foods, and other food health innovations. Through this study, we attempted to provide a clear depiction of general trends describing consumer acceptance of functional foods by identifying and integrating common, generalizable factors that have emerged in previous research. Therefore, we recommend future research investigate the accuracy of the relationships between key factors we identified that can predict consumer acceptance of functional foods. Specifically, food and agricultural communications scholars should test this framework using experimental research designs. As part of these experiments, scholars should prioritize determining if consumers' socio-demographic characteristics affect the accuracy of these factors and their ability to predict consumer acceptance, as well as the accuracy of the relationships between them. Perhaps, this framework describes certain sub-populations of consumers better than others. Thus, the framework we developed should be continuously

modified and refined based on empirical results.

We further recommend scholars conduct similar systematic reviews that identify and synthesize evidence pertaining to consumer acceptance of other food health innovations (e.g., meat alternatives). Using our framework as a baseline, they can adapt it, if necessary, to describe consumer behavior in response to other food health innovations. More research in this area would help scientists and practitioners determine if outreach about food health innovations can be designed using a one-size-fits-all approach, or if different food health innovations require customized targeted educational interventions and communications to increase consumer acceptance. Until then, the conceptual framework we developed can enable scientists and practitioners to better predict consumer acceptance toward functional foods and, as a result, provide insight into the development of effective promotional materials that, ultimately, can increase consumer acceptance and improve public health.

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Scarce Water in Site: A Content Analysis of News Coverage of the Sites Reservoir Project

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Plagued by recent and historic drought, the need for water storage and management solutions in California is apparent. As a potential solution, the Sites Reservoir project offers an opportunity to a state eager to conserve and better manage water. The Sites Reservoir project involves complexities from a variety of standpoints and stakeholder perspectives. This study investigated the frames and sources used by The Sacramento Bee to communicate about the Sites Reservoir project over a 10-year period. The most frequently used frames throughout the dataset were “policy and government” and “water conscious,” and the sources most frequently utilized for information about the project in the articles were elected officials, government agency representatives, and nonprofit representatives. The findings suggest water management is linked with political activities and supports the assertion that the media tend to focus on the role of policy and political opinion in water management issues. At the same time, the findings suggest the need for water solutions is evident, given the prominence of the “water conscious” frame. Future studies should evaluate frames over time, and investigate the potential nuance between frames used to communicate about water management in different areas of the United States facing water management issues.

Introduction and Theoretical Framework

For some states water management, use, and rights have long been topics of controversy and debate. In California, multiple flooding disasters in the 1800s led to legislation that aimed to improve the state’s ability to most effectively use water resources (Water Education Foundation, 2021). Since the early part of the twentieth century, the federal government and state of California have implemented policies to construct a vast grid of canals, dams, pipelines, and reservoirs to store and transport the nearly 200 million acre-feet of water from north to south (California Department of Water Resources 2021; Stokstad, 2020). California has nearly 1,500 reservoirs, 240 of which account for 60% of the state's water storage capacity (Escriva-Bou et al., 2021). The state takes water management seriously; however, a drought that began in 2011 and ended in early 2019 revealed the state's water storage and management capacities were in need of review (National Integrated Drought Information System, 2021). A reprieve from the drought lasted sixteen months, returning in early 2020 (National Integrated Drought Information System, 2021). The need for more water storage in California through reservoirs and other surface water supplies has been established (Yates et al., 2009). Faced with a dwindling fresh water supply, Californians seek water storage solutions such as the proposed Sites Reservoir (Kasler & Sabalow, 2019).

The Sites Reservoir project is not a new idea or unfamiliar proposal to the state of California. In fact, it was first suggested four decades ago to address growing need and concern for water resources (Water Education Foundation, 2021). For the most part, however, the project was put on hold until 2010 when Sites Project Authority formed to lead and advance the project (Municipal Water Leader, 2021). The project is a multibillion-dollar proposal partly funded by

bonds issued through the Water Quality Supply and Infrastructure Improvement Act of 2014, which authorized more than \$7 billion to fund water supply infrastructure and other water management and protection projects (California Natural Resources Agency, 2015). For its purpose, the reservoir's function is to collect water during high flood periods and store the collected water for future uses (Northern California Water Association, 2019). The Sites Reservoir project offers potential solutions to a state eager to conserve and better manage water by increasing flexibility, reliability, and resiliency in the water supply during drought years (Sites Reservoir Authority, 2021). In total, the reservoir will be able to hold enough water to cover between 1.2 and 1.8 million acres of land (Kasler, 2017). The water is earmarked for uses related to agriculture, ecosystem improvement, drought preparedness, and statewide water system improvement (California Natural Resources Agency, 2015). Although much of the project is still in the planning phase and under design, the Sites Reservoir project is slated for completion in 2030 (Municipal Water Leader, 2021).

Given the nature and scope of the proposal, the Sites Reservoir project involves complexities from a variety of standpoints and stakeholder perspectives. Various societal groups including industrialists, scientists, politicians, members of the public, non-governmental organizations, and water managers are concerned with sustainable water management (Gooch & Stalnacke, 2010) and may seek to influence the ways in which the issue is communicated via the media (Nisbet & Huge, 2006). As is sometimes common with high-stakes, controversial issues, political activities are intertwined with water management (Greenhut, 2021) and the media communicate to the public the role of policy and political opinion in water management (Sheeler, 2020). From another standpoint for science issues such as water conservation, elected officials and others utilize media platforms to advocate for the audiences' preexisting interests (Weigold, 2001). Scientists working to address factors within these kinds of issues in science and natural resources can also engage in media efforts, but find challenges when seeking to explain unfamiliar and complex concepts, potentially contributing to misinterpretation (Liang et al., 2014).

To better understand the ways in which this issue is being communicated, framing theory was used to guide this study. Gamson and Modigliani (1989) argued that framing is the "central organizing idea or storyline that provides meaning" (p. 143). Framing further encompasses the notion that emphasis on certain issue elements over others creates potential to impact the ways in which the public views the issue (Chong & Druckman, 2007; Scheufele & Tewksbury, 2007). This selection of particular aspects of an issue can promote certain issue interpretations (Entman, 1993), which can play a role in the construction of peoples' perspectives of the situation or matter at hand (Scheufele, 1999). When an issue is complex, frames help make sense of relevant events (Gamson & Modigliani, 1989) and make complicated information more understandable (Scheufele & Tewksbury, 2007). In turn, frames help to communicate information about an issue by defining problems, diagnosing causes, and suggesting remedies (Entman, 1993). The way an issue is framed by the media can also influence an individual's way of thinking about the issue (Kim et al., 2002), and their beliefs about its importance (Nelson & Oxley, 1999). An exploration of frames used to communicate about the water issues in California can help shed light on this complex topic as frame analysis can lend insight to how an issue was communicated to an audience, and how that audience might perceive the issue (Scheufele & Tewksbury, 2007).

Overall, few studies have researched communication and media involvement surrounding water concerns (VanDyke & Callison, 2018), but some scholarship has yielded varying insights. For example, Dobelbower (2018) examined how the future of the Ogallala Aquifer, the largest aquifer in the United States, was framed in both agricultural and mainstream media publications in the southern and midwestern regions of the United States. In this study, Dobelbower (2018) found the mainstream media implemented frames associated with policy and the environment, and for government officials and farmers to be common sources. From a different perspective, another study explored media representations of water issues in relation to issues of public health risk and found little evidence of water-related health impacts in newspapers in the western United States (Mayeda et al., 2019). Finally, a study that investigated the reporting of water issues in Nebraska revealed a lack of coverage except when issues were of immediate concern to the public (Altaweel & Bone, 2012). However, when water issues were reported, the relationship of water to agriculture was the most prevalent topic reported upon (Altaweel & Bone, 2012).

For those directly involved in agriculture and food production, the growing population and increased demand for food is made further complicated by growing competition for water resources (Pereira, 2017). Those involved in agriculture cannot address issues of water management alone. As water scarcity awareness and concerns increase on a national level, so does the need to generate constituents' support for water issues (VanDyke & Callison, 2018). To generate this needed support, information from the media may be helpful. Individuals who are not involved in agriculture or natural resources commonly use mainstream news publications such as newspapers, magazines, and social media to information regarding current policies, weather, events, technology, and more (Dobelbower, 2018). The media display information which influences the public's perceptions of what important issues are in their worlds. Additionally, in some cases the mass media may be the only contact many people have with certain topics, which can shape their opinions on these topics depending on how the topic is framed (McCombs & Shaw, 1991).

Monitoring the coverage of long-term events can indicate the salience and understanding of those events to the public (Scheufele, 1999). Past studies regarding the Sites Reservoir project have lacked analysis from a social science perspective and have largely focused on physical and environmental assessments involving water, sediment, and mercury levels (Rytuba et al., 2015; Suchanek et al., 2010). A review of literature revealed an absence of research regarding how the Sites Reservoir and any similar projects were framed in terms of media coverage. When analyzing frames used in news media coverage, it is important to consider the framing influence in how the public understands the issue (Ruth et al., 2005). In the case of the Sites Reservoir project, the frames employed and sources relied upon by *The Sacramento Bee* newspaper from 2010 to 2020 can provide insights regarding the nature of this complex issue and the media's role in communicating about it. This research also seeks to advance the American Association for Agricultural Education's National Research Agenda's Research Priority Seven: *Addressing Complex Problems*, as it explores a key issue of natural resource management and climate change in need of a viable (Andenoro et al., 2016).

Purpose and Research Objectives

When complex issues arise, the media promote frames that are influenced by a variety of factors – from unfolding events to involvement from stakeholders. As issues with California’s water resources continue to unfold, a range of media frames to communicate about the issue are possible. The purpose of this study was to investigate how *The Sacramento Bee* framed the Sites Reservoir project from January 1, 2010 to December 31, 2020. The following research objectives guided this study:

- 1) Identify and compare news frames used in media coverage pertaining to the Sites Reservoir project.
- 2) Determine the frequency of news media coverage pertaining to the Sites Reservoir project.
- 3) Compare the frames used within the types of articles about the Sites Reservoir project.
- 4) Determine the sources used for information about the Sites Reservoir project.

Methodology

Quantitative content analysis was used to determine how the Sites Reservoir project was framed in *The Sacramento Bee* from January 1, 2010 to December 31, 2020. Quantitative content analysis refers to “the systematic assignment of communication content to categories according to rules, and the analysis of relationships involving those categories using statistical methods” (Riffe et al., 2014, p. 3). Content analysis involves objective, systematic analysis of message characteristics (Neuendorf, 2002). Newspaper articles were selected as the source of data for this project. An analysis of newspaper articles was appropriate given that traditional news coverage is convenient for readers and has been linked to gains in trust (Baranowski, 2019). While the Sites Reservoir project affects communities outside of Sacramento, *The Sacramento Bee* was selected for this study given its status as a top newspaper by circulation in the state of California (Agility PR Solutions, 2021), its location in the state capital, and its proximity to the proposed project site.

Articles were collected via the NewsBank Database using the term “Sites Reservoir” and date range between January 1, 2010 to December 31, 2020. This timeframe was selected in order to compare frames over the period of time in which California faced its longest, and one of its most extreme, drought periods. A total of 79 articles were initially collected, but a final sample of 64 articles were subsequently analyzed after the removal of duplicate articles and articles unrelated to the issue. The primary instrument for this study was a researcher-developed codebook and code sheet. Using the emerging coding method, the categories were established after some initial data observations (Stemler, 2000). Sections in the codebook included 1) general article information, 2) frame, and 3) sources.

General article information collected prior to coding for frame and sources included publication date, article title, and type of article (news, opinion, or feature). The codebook included a detailed definition for each frame in order to assist the researchers in identifying the frame present within each article. Frames were coded as 1 = *present*, and 0 = *not present*. Codes and descriptions for the following frames were included in the codebook (Table 1): “economic,” “environmental impacts,” “policy / government,” “legal,” “advocacy / awareness,” and “other.” Sources were coded when an individual, organization, or other entity was quoted or mentioned as

the originator of information. Ten source types were included in the codebook, including: “non-profit representative,” “elected officials and representatives,” “Sites Reservoir project representative,” “governmental agency representative,” “community member,” “farmer / agriculturalist,” “attorney,” “university representative,” and “other.”

Table 1

Frames Used by The Sacramento Bee to Communicate About the Sites Reservoir Project

Frame	Description
Economic	Refers to financial or economic aspects as a result of Sites Reservoir such as job creation, cost of the project, future financial benefits or taxes.
Environmental Impacts	Refers to Sites Reservoir’s impacts on the ecosystem, wildlife, water quality, or other environmental elements.
Policy/Government	Refers to government or elected official involvement on the issue such as a new policy, program, initiative, law, bond, regulation, or other measure regarding Sites Reservoir.
Legal	Refers to focus on a lawsuit or court hearings regarding the Sites Reservoir.
Advocacy/Awareness	Refers to non-government groups working to share information, for or against, Sites Reservoir through stakeholder involvement.
Water Conscious	Refers to arguments expressing the need for more water supply and storage.
Other	Frame of article does not fit any of the frame descriptions listed above.

After the codebook was developed, two instructors were trained to utilize the codebook, verify its clarity, and determine reliability. Intercoder reliability is used to evaluate the validity of data and aid in future replication of a study (Riffe et al., 2014). A pilot study using similar articles from a different newspaper was completed prior to the evaluation of the articles collected for the study. While no standard for subsample size in reliability assessments has been established (Neuendorf, 2002), 10% to 25% of the sample has been recommended (Wimmer & Dominick, 2011). With this recommendation in mind, the coders analyzed 16 articles independently. The results between coders were visually analyzed and inconsistencies justified further discussion and revisions to the codebook to better refine and reach a stronger comfort level with the strategy for coding (Neuendorf, 2002). A new frame code, “water conscious,” was

added to the codebook in order to better capture distinctive characteristics between similar frames. A second coder training was held to discuss inconsistencies and revisions to the codebook. Following the second coder training and a new coding sample, acceptable Krippendorff's alpha levels were achieved with scores ranging from 0.70 to 1.0 across frames (Riffe et al., 2014). The researcher coded the remaining 32 articles.

Findings

Objective one sought to identify and compare news frames used in media coverage pertaining to the Sites Reservoir project. Table 2 details the frequency of each frame. Despite the potential for a variety and multitude of frames, the articles within the sample had one of four frames present. Newspaper articles discussed the Sites Reservoir primarily through the “policy/government” frame (32.8%, $n = 21$). This frame focused on elected and government officials’ involvement in the project in terms of new policy, programs, initiatives, law, bonds, regulations, or other policy or government-related measures. Example headlines for the “policy/government” frame included, “Voters OK’d billions for new reservoirs in 2014,” and “Government red tape holds up water supply.”

The newspaper’s second most frequently used frame was “water conscious” (28.1%, $n = 18$), which typically focused upon the dwindling water supply and need for better and more water storage. Example headlines for articles that featured the “water conscious” frame included, “Drought and storms prove again California needs more storage,” and “Farms are growing in the Valley, but they need water to thrive.” The “economic” frame was the next most frequently used frame present in the dataset (23.4%, $n = 15$). An example of an article with the “economic” frame was “Don’t be rushed in awarding water storage billions.” The least frequently occurring frame was “advocacy/awareness” (15.6%, $n = 10$), which was featured in articles with headlines such as “State needs to invest in Sites Reservoir – Sites Reservoir would help commerce, farming, and the environment.”

Table 2

Frequency of Frames Used in Articles About Sites Reservoir (N = 64)

Frame	<i>n</i>	%
Policy / Government	21	32.8
Water Conscious	18	28.1
Economic	15	23.4
Advocacy / Awareness	10	15.6
Total	64	100.0

Objective two sought to determine the frequency of news media coverage pertaining to the Sites Reservoir project (Table 3). The number of articles appearing in the dataset varied each year with the majority of articles being published in 2016 (23.4%, $n = 15$), followed by 2015 (21.9%, $n = 14$), and 2018 (20.3%, $n = 13$). There were no articles published regarding the Sites Reservoir project in 2020, and only one article appeared in the years 2012 and 2019, respectively.

Table 3

Frequency of Coverage per Year Articles Referred to Sites Reservoir (N = 64)

Year	n	%
2010	2	3.1
2011	2	3.1
2012	1	1.6
2013	2	3.1
2014	8	12.5
2015	14	21.9
2016	15	23.4
2017	6	9.4
2018	13	20.3
2019	1	1.6
2020	0	0.0
Total	64	100.0

The third research objective sought to compare the frames used within the types of articles about the Sites Reservoir project (Table 4). The most frequently occurring article type in the dataset was news stories (50%, $n = 32$), which tended to use the “policy/government” frame (18.8%, $n = 12$) the most frequently, followed by the “economic” frame (14.1%, $n = 9$). In opinion articles (29.7%, $n = 19$), such as editorials and op-ed pieces, the frame that appeared the most frequently was “water conscious” (10.9%, $n = 7$). In feature story articles (20.3%, $n = 13$), the “policy/government” and “water conscious” frames (6.3%, $n = 4$) were equally the most frequent frame type present.

Table 4*Comparison of Frames by Article Type (N = 64)*

Frame	News		Opinion		Feature	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Policy/Government	12	18.8	5	7.8	4	6.3
Water Conscious	6	9.4	7	10.9	4	6.3
Economic	9	14.1	4	6.3	3	4.7
Advocacy/Awareness	5	7.8	3	4.7	2	3.1
Total	32	50.0	19	29.7	13	20.3

Objective four sought to explore the sources used for information about the Sites Reservoir project. A total of 115 sources were used throughout the 64 articles in the dataset. As outlined in Table 5, the most referenced source was elected officials (33.0%, $n = 38$), which included officials, or their spokespersons, at the local, state, or national level. This category of sources included persons such as U.S. and state senators, representatives, commissioners, and attorneys general. Other highly-referenced sources were government agency representatives (27.8%, $n = 32$). These sources were from organizations including the U.S. Environmental Protection Agency, Department of Fish and Wildlife, and county water boards. Non-profit representatives also appeared as sources within the dataset (19.1%, $n = 22$), representing advocacy groups such as the Sierra Club, Planning and Conservation League, Natural Resources Defense Council, Northern California Water Association and others. The least frequently-occurring sources included farmers (2.6%, $n = 3$) and attorneys not associated with any of the other source types (1.7%, $n = 2$).

Table 5*Source Types Referenced in Articles of Sites Reservoir (N = 115)*

Source	<i>n</i>	%
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Elected Official	38	33.0
Government Agency Representative	32	27.8
Nonprofit Representative	22	19.1
Sites Reservoir Representative	8	7.0
Community Member	5	4.3
University Representative	5	4.3
Farmer	3	2.6
Attorney	2	1.7

Conclusions and Recommendations

Given a lack of studies focused on communicating water concerns (VanDyke & Callison, 2018), this study sought to determine how a top state newspaper framed a potential solution for a complex water issue facing California. As the water crisis and extreme weather conditions persist, studies such as this should be conducted again in the future to determine any changes in frames over time and as future related events unfold. Although water conservation is not a new topic the findings lend insights to stakeholder involvement and specific areas of concern within this issue. In this study, elected officials and government agencies were the most referenced sources, and the most prominent frame was policy / government. These findings support the argument that political activities are linked with water management (Greenhut, 2021) and that the media tend to focus upon the role of policy and political opinion in water management issues (Sheeler, 2020). Further, the prevalence of the water conscious frame suggests a potential attempt to advocate for audience interests (Weigold, 2001), especially given the prevalent use of this frame in opinion articles. It is possible, given the nature of these frames, that one influences the other as policy makers seek to address issues facing their constituents through policy and legislation.

Also interesting to note is that the frame for each article in the dataset was coded into one of four categories despite the potential for greater variety as was suggested by the issue's complexity and numbers of groups of individuals involved (Gooch & Stalnacke, 2010). This finding suggests water and other climate issues may have a tendency to be framed in a certain way depending upon timing and other influences. Future students should seek to compare specific events in relation to the media's use of frames to determine any potential influences or characteristics that may impact how media organizations frame the issue.

The volume of articles appearing between 2014 and 2018 coincided not only with some of California's most devastating drought years, but also significant election years which suggests the potential for the promotion of water topics as political issues at the forefront of policy

decisions. The year 2016 saw the largest number of articles in this study, and also occurred simultaneously with a national election. It is possible this peak in articles was observed due to the potential for federal aid to address water conservation issues. While issues with drought continue to plague California, and an increase in articles in the years 2019 and 2020 were expected due to another drought, the increased winter precipitation at that time and likely dominance with coverage regarding the Coronavirus pandemic explain the absence of coverage. Despite similar findings in terms of common frames, unlike the Dobelbower (2018) study, this research found little evidence of a first-hand farmer voice promoted in a popular mainstream newspaper. Other studies, too, have found evidence of the relationship between water and agriculture in the media (Altaweel & Bone, 2012). The missing farmer voice in this study could be due to regional differences in reporting preferences or, given the complicated nature of water conservation, there may be nuance within frames between regions that affect the sources media outlets look to for information. As such, future studies should more closely investigate distinctions in frames presented by media outlets between different regions afflicted with water conservation issues.

Addressing issues with water conservation will take the involvement from stakeholders of all sectors. As effects of climate change continue to evolve, solutions to manage future needs must be developed. For California, addressing the water crisis is key to maintaining the economy, agriculture production, and community health. Long-term plans are required in order to reduce reactive responses. When communicating on the topic of water conservation, journalists and reporters should look beyond politicians and those involved from a policy-driven standpoint and focus on stakeholders such as farmers, ranchers, community members, environmentalists, and scientists for longer-term solutions and different perspectives. To capture the degree of severity on the issue, local leaders within areas highly impacted by the issue should also be relied upon by journalists. The Sites Reservoir project offers potential to aid California in its efforts to conserve water, but support from constituents will be needed (VanDyke & Callison, 2018). To encourage greater constituent support for water issues, journalists should consider framing messages that focus on the potential negative impacts of food supply and prices if California does not have proper water allocation for high food-producing regions (VanDyke & Callison, 2018). As the world population increases and the need for more food grows along with it, it will be necessary to effectively communicate about water matters, especially in areas that produce a high volume of agricultural products, which may rely on specific water sources and practices (Dobelbower, 2018). Media outlets such as *The Sacramento Bee* can be used to provide information and updates on complex issues in agriculture and natural resources given their potential to shape and influence public opinion (McCombs & Shaw, 1991).

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HEARING: Hearing Education in Agriculture: Re-evaluating Interest, Needs, and Growth

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Safety in agricultural laboratories is the highest of concern for teachers and instructors. While there is a known safety concern with hearing in agriculture, it has been identified that there is a deficiency in the perception and output of decibels of tools in agricultural laboratory settings. This research focused on hearing and noise levels in an agricultural mechanics laboratory. Utilizing literature review and Bandura's theory, we collected pre- and post-data relating to university students' perception of noise level outputs and willingness to wear hearing protection. This study exposed students directly and indirectly to noise levels through project-based learning and informational posters throughout the laboratory. Pre-course responses showed a disconnect between perceptions of noise levels and the given threshold for wearing hearing protection. This perception gap closed over the semester as post-course responses showed an increase in correct tool to threshold responses. The frequency of responses aligned with the National Institute for Occupational Safety and Health's recommended hearing protection threshold also showed growth. While there was still a knowledge gap needing to be addressed, we feel that the exposure through both direct and indirect instruction led to knowledge gained and perception changed.

Introduction

Agricultural education often utilizes experiential laboratory learning in greenhouses, functional farms, agricultural mechanics laboratories, or other teaching spaces (Phipps & Reynolds, 1990). Student safety in these laboratory settings is of the utmost importance (Dyer & Andreasen, 1999; Langley et al., 2018; Saucier et al., 2014). When working with students, there are multiple safety concerns that arise (Dyer & Andreasen, 1999). Hearing loss and noise levels in agricultural laboratories have been discussed and documented for many years (Bunch, 1937; Woodford et al., 1993). Many studies focused on the high noise level in many agricultural fields (Matthews, 1968; Miller, 1989) and have shown levels well above the National Institute for Occupational Safety and Health (NIOSH) recommendation of 85dB (NIOSH, 2018a; NIOSH, 2018b). While hearing safety is a known concern, anecdotal evidence points toward a disconnect between students' understanding of decibel readings and the long-term hearing effects working in agricultural environments can cause.

It has been shown that hearing and hearing safety has been an issue in the agricultural mechanics laboratory for decades (Dyer & Andreasen, 1999). It has been reported that agriculture teachers have a higher instance of hearing loss than comparable groups (Burke, 1987 as cited in Dyer & Andreasen, 1999). Langley et al. (2018) has shown that hearing safety, while necessary, is not highlighted to the same degree as other forms of safety. Langley et al. continue by indicating that hearing and breathing personal protective equipment (PPE) are not as available or prevalent as PPE for eye safety. Langley et al. also mention that more than 33% of the Missouri agricultural mechanics laboratories examined did not have hearing safety PPE available for student use (Langley et al., 2018). Due to the hearing safety gap seen in agricultural mechanics classrooms, this research focuses on the understanding of noise levels by students in a

university level preparatory course on teaching agriculture mechanics and their attitudes towards hearing safety in the agricultural mechanics laboratory.

Conceptual Framework and Perspective

Utilizing Dyer and Andreasen's (1999) study on industrial safety among organizations, we framed our research focusing on safety deficiencies within agricultural education. Dyer and Andreasen (1999) identified fifteen safety deficiencies in agricultural laboratories ranging from ventilation to noise levels. Building further on this study, Langley et al. (2018) evaluated influences and perceptions relating to personal protective equipment (PPE) in agricultural mechanics laboratories. Their focus on the use and perception of PPE, along with Dyer and Andreasen's focus on safety deficiencies, provided the framework for our direct study on hearing safety concerns in the agricultural mechanics laboratory.

While agricultural educators have many responsibilities both in and outside the classroom, student safety in the laboratory is of the utmost importance (Chumbley et al., 2018; Roberts & Dyer, 2004; Saucier et al., 2014). Across agricultural education, laboratory instruction has been utilized by most programs (Franklin, 2008). With a focus on laboratory instruction in agricultural mechanics (Harren, 2014), how agricultural educators engage with safety should be at the forefront of their minds.

When engaging in hands-on learning opportunities in agricultural mechanics, there is a need to focus on the safety aspects associated with the lessons presented. Roberts and Dyer (2004) discuss the importance of proper management of a laboratory in agricultural education. Their study determined that out of forty characteristics, care of students is the most important to be an effective educator. When active learning opportunities are presented in an engaging and safe manner, students' attitude positively changes on the subject (Osborne & Dyer, 2000).

Clarke (2010) identified that one's perception is motivated by multiple aspects of the safety climate. There is a gap in the perception of one's occupational safety climate and their perception of safety concerns (Clarke, 2006). One of the critical aspects of a healthy and safe environment is the competency of students and workers (Flin et al., 2000). When safety is our main concern for agricultural educators, identifying and measuring a program's safety climate leads to educational success.

With the witnessing of a renewed focus on hands-on learning (Akkermans et al., 2020), agricultural educators must remember the importance of safety in agricultural mechanics curricula (Johnson & Schumacher, 1989). With the return to agricultural mechanics laboratories, ensuring students are engaging in safe and meaningful activities (Langley et al., 2018) is exceptionally prevalent for today's agricultural educators.

Bandura (1971) theorizes that learning occurs through cognitive processes in a social setting. Learning happens both through observational and direct instruction and is shaped through exposure to both positive and negative stimuli. He further theorizes that students will have varying levels of conditioned cognitive responses depending on how these stimuli were designed (Bandura, 1978). He calls these conditioned cognitive responses learning and describes

the learning process as a reciprocal interaction between the individual's environment and their understanding of that environment. Within this reciprocal relationship, there is a connected relationship of behavior (B), environment (E), and cognition (P), and any change in E will theoretically result in changes to B and/or P, or any combination thereof (Figure 1). Further, the use of social learning theory allows researchers to predict that any change in the environment should result in a change in cognition.

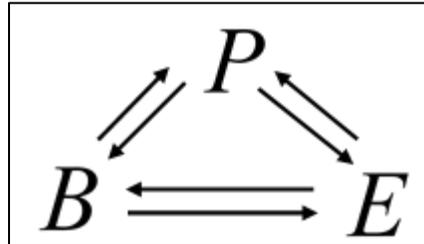


Figure 1. Graphic representation of the reciprocal triadic relationship of Bandura's social learning theory. B represents behavior, P cognition, and E environment. Reprinted from (Bandura, 1978).

Using Bandura's model, we focused on the purposeful change of authenticity (E), measuring the resulting change in cognition or perception (P) while using guided behaviors (B) within the framework of experiential learning projects. This study partially aims to give credence to the purposeful positioning of educational experiences (B) alongside relevant visual instructional material (E) would result in changes in the cognition and perception of the participants on hearing safety concerns (P), as suggested by Bandura (1978).

Purpose and Objectives

The purpose of this study is to assess and identify student understanding and perceptions of hearing related concerns in an agricultural mechanics setting. Understanding that hearing safety is a major concern across agricultural education, this study assesses student population in an education focused agricultural mechanics course. To better promote hearing safety for Auburn University's Agriscience Education courses, this study aims to evaluate current perceptions of university students.

The following objectives guided this study:

1. Determine the willingness to wear hearing protection while in an agricultural laboratory/workspace.
2. Establish the perception of decibel output of power tools used in an agricultural laboratory/workspace.
3. Identify understanding of safety concerns relating to hearing perceptions and noise levels outputs in an agricultural laboratory/workspace.

Methods

This research aims to identify the perception and understanding of noise levels and impairments by students who are actively involved in agricultural mechanics educational courses at the university level. Perception and understanding growths are shown through a pre- and post-questionnaire taken at the beginning and end of the semester. This research first documents

students' willingness to wear hearing protection for specific selected power tools used in the laboratory. Participants then identified their decibel output threshold for wearing hearing protection.

Instruction of the class then focuses on projects that promote and utilize these tools throughout the semester. While no tools are specifically required for project completion, the direct and indirect use of the specified tools for this study provides environmental exposure to their decibel output. Students are also indirectly exposed to printed informational material by posters (Fig. 2) hung throughout the laboratory.



Figure 2. Poster used in laboratory indicating NIOSH recommended exposure limit and tools with decibel output.

At the end of the semester, participants complete the post-course questionnaire where they re-identify their noise level threshold for wearing hearing protection alongside indicating which tools they would or not wear hearing protection while in use.

By examining students' perceived decibel threshold and willingness to wear hearing protection per specific tool use, we then evaluated participant understanding of noise levels in an agricultural mechanics laboratory for the pre- and post-questionnaire. Correct response rates groupings are created based on taking the participants decibel threshold and then assessing their responses to their willingness to wear hearing protection. A participant's decibel threshold is used as the correct response limit and their individual responses were compared to this limit for

accuracy. With six specified tools, there are seven groupings (zero through six correct responses) that participants are sorted into.

Participant population was selected due to the nature of the course that was instructed. This sample population provides insight to both former agricultural students at the secondary level and potential future agricultural science instructors. This population also provides insight into future course updates for Auburn University. For our pre-course evaluation, we evaluated students across four sections of an introductory level career and technical education agricultural mechanics course (N = 40) at Auburn University during the fall 2021 semester through an anonymous questionnaire. At the end of the course, the same instrument was utilized to capture change in perception and knowledge relating to hearing health concerns. Due to changes in student population over the course of the semester, the total participant count slightly declined (N = 35). As both instruments were collected anonymously, the frequency in responses across the study were not a point of focus. Due to the low number of responses for this study, a statistical analysis was not conducted.

Instrument

Both the pre- and post- instruments used for the collection of data was based on CDC-NIOSH guidelines. Students were asked if they would or would not wear hearing protection when using a series of commonly used power tools (Handheld Circular Saw; Powered Hand Drill; Angle Grinder; Impact Wrench; Powered Miter Saw; Pneumatic Nail Gun) without being told the average decibel level of that tool. Participants then indicated, on a table, the level at which they would wear hearing protection based on a given decibel level (1 = Always; 2 = 60dB; 3 = 70 dB; 4 = 80 dB; 5 = 90 dB; 6 = 100 dB; 7 = 110 dB; 8 = 120 dB; 9 = 130 dB; 10 = 140 dB; 11 = Never). The first portion of this questionnaire was used to determine participants' willingness to wear hearing protection while utilizing tools in the agricultural laboratory. The second portion was then used to determine participants' perception of overall decibel output in a laboratory setting.

The pre-test was administered via an online questionnaire sent to students in the first week of class. The post-test was administered via the same online questionnaire during the final examination week after students were excused from campus.

In between pre- and post-questionnaires, informed by Bandura's theories, the learning environment was altered through environmental and visual exposure. Students were exposed to the visual poster described in figure one as well as the course objectives being structured in an intentional manner to allow for the exposure to specific tools to be utilized by the students. Students were required to complete a series of projects constructing three items that utilized wood, metal, and the combination of both. Over the course of the semester, students were both directly and indirectly exposed to the noise levels of the tool used through the completion of these projects. During the course of the semester, students were also indirectly visually exposed to the noise levels through posters hung throughout the laboratory consisting of the tools and their decibel outputs alongside the NIOSH recommendation of hearing protection threshold. Students were never directly taught on these outputs or recommendations, but the strategic placing of these posters maximized the indirect exposure across the entirety of the semester.

Results/Findings

Students indicated they would wear hearing protection for a majority of the power tools listed (Table 1). The one outlier is the Powered Hand Drill where only eight of the participants stated they would wear hearing protection even though the average noise output is recorded as 93dB, which is above the National Institute for Occupational Safety and Health (NIOSH) recommendation of using hearing protection with any equipment producing more than 85dB (NIOSH, 2018a; NIOSH, 2018b). When sat beside the data from our post-evaluation, we see an increase in percentages across all tools but only a slight increase due to the frequency of use of hearing protection per tool. This poses the question of the need for further instruction per decibel output per tool or the reflection on the actual output per tool used.

Table 1

Would Wear Hearing Protection per Power Tool

Power Tool (Output*)	Pre-Evaluation (N = 40)		Post-Evaluation (N = 35)	
	<i>f</i>	%	<i>f</i>	%
Angle Grinder (101dB)	28	70.0	28	80.0
Powered Miter Saw (107dB)	27	67.5	27	77.1
Handheld Circular Saw (108dB)	25	62.5	26	74.3
Impact Wrench (106dB)	24	60.0	26	74.3
Pneumatic Nail Gun (120dB)	22	55.0	21	60.0
Powered Hand Drill (93dB)	8	20.0	8	22.9

Note. *All decibel outputs are found on CDC’s NIOSH Noise Levels of Power Tools (2018).

When asked at which decibel level the participant would wear hearing protection when working with powered equipment, nineteen indicated they would wear hearing protection at or below NIOSH recommendations (Table 2). 19 indicated that they also would wear hearing protection, but above the recommended level. Two responded that they would not wear hearing protection at any decibel level.

Table 2 also shows the post-course responses to participants' decibel threshold for wearing hearing protection. More frequently, students were either in the category just above or below the NIOSH 85dB recommendation. There was also a decrease in the responses above the NIOSH recommendation, but most importantly, there was a not a single participant response for never wearing hearing protection

Table 2

Decibel Threshold to Use Protection

Threshold	Pre-Evaluation (N = 40)		Post-Evaluation (N = 35)	
	<i>f</i>	%	<i>f</i>	%
Always	7	17.5	7	20.0
60 dB	2	5.0	1	2.9
70 dB	2	5.0	1	2.9
80 dB	8	20.0	11	31.4
90 dB	13	32.5	12	34.3
100 dB	5	12.5	1	2.9
110 dB	1	2.5	1	2.9

120 dB	0	0	1	2.9
130 dB	0	0	0	0.0
140 dB	0	0	0	0.0
Never	2	5.0	0	0.0

Note. line indicates NIOSH recommended decibel threshold (85 dB).

Looking across responses to both sections of the pre- and post-questionnaire, we begin to get a clearer picture. At the beginning of the semester, our participants appear to have a disconnect between the decibel output of tools and their threshold for wearing hearing protection (Table 3). Only seven of the participants accurately indicated they would wear hearing protection for all six tools compared to their threshold of decibel output. 19 participants accurately matched four or more tools, while three inaccurately matched all six tools to their decibel threshold. This leads to the average correct response rate of 59% ($M = 3.55$, $SD = 1.82$).

Table 3

Pre-Evaluation Accuracy of Hearing Protection Responses Compared to Decibel Threshold Responses

Decibel Threshold to Use Protection	Frequency of Accurate Responses						
	0	1	2	3	4	5	6
Always	0	0	0	1	2	2	2
60 dB	1	0	0	0	0	1	0
70 dB	0	0	0	2	0	0	0
80 dB	0	1	0	3	0	2	2
90 dB	2	0	5	2	0	2	2
100 dB	0	1	1	1	0	2	0
110 dB	0	0	1	0	0	0	0
Never	0	0	0	0	1	0	1
Totals (<i>n</i>)	3	2	7	9	3	9	7
Percentages (%)	7.5	5.0	17.5	22.5	7.5	22.5	17.5

Note. $N = 40$; line indicates NIOSH recommended decibel threshold (85 dB).

This perception gap appears to begin to close over the course of the semester as the data indicates an increase in the correct responses for the post-evaluation (Table 6). The average correct response rate increased to 66% ($M = 4.00$, $SD = 1.76$), and there is increased frequency for four and six accurate responses. While there is an increase in the frequency of one accurate response, we see a decrease from the category below that helps support perception gained.

Table 4

Post-Evaluation Accuracy of Hearing Protection Responses Compared to Decibel Threshold Responses

Decibel Threshold to Use Protection	Frequency of Accurate Responses						
	0	1	2	3	4	5	6
Always	0	0	0	0	1	1	5

60 dB	0	0	0	0	0	1	0
70 dB	0	0	0	1	0	0	0
80 dB	0	1	2	1	2	3	2
90 dB	1	2	0	2	3	3	1
100 dB	0	0	1	0	0	0	0
110 dB	0	1	0	0	0	0	0
120 dB	0	0	0	0	0	1	0
Never	0	0	0	0	0	0	0
Totals (<i>n</i>)	1	4	3	4	6	9	8
Percentages (%)	2.9	11.4	8.6	11.4	17.4	25.7	22.9

Note. *N* = 35; line indicates NIOSH recommended decibel threshold (85 dB).

Conclusions/Discussion/Implications/Recommendations

When examining data for our first objective, we determined that students in introductory-level agricultural mechanics courses at Auburn University have a misunderstanding of decibels, decibel output, and the effects decibels can have on one's hearing. Through our pre-course questionnaire, we first saw that many of the tools are identified as noise concerns by a majority of the respondents, but only eight respondents indicated they would wear hearing protection while using a powered hand drill (95db) even with the decibel output being above the NIOSH recommended level of 85dB. The tool most commonly deemed to need hearing protection while in use was the angle grinder, which is the second quietest tool with an average output of 101dB. The significant increase (*n*=20) between the two quietest tools raises the question of students' perception of noise in the laboratory. Comparing the data to the post-course questionnaire, we still see these same trends, but overall, the percentage of participants identifying their willingness to wear hearing protection increased across all six tools. Close to three-quarters of the participants identified they would wear hearing protection for four of the tools (Handheld Circular Saw, Angle Grinder, Impact Wrench, and Powered Miter Saw), and all had higher percentages than the highest response rate from the pre-course questionnaire.

To address our second objective, we looked at participants' responses to their threshold for wearing hearing protection and their frequency of correctly responding if they would or would not wear hearing protection for specific tools. Pre-course questionnaire data shows that 19 respondents indicated they would wear hearing protection under NIOSH's recommendation (85dB), and 21 (52.5%) indicated in the categories either just above or below the recommended threshold line. One of the most prevalent responses were the two participants stating they do not wear hearing protection at all. A commonality across all participants arose when reviewing the individual threshold to tool use response. 21 (52.5%) participants inaccurately indicated wearing hearing protection for three or more tools per their stated threshold level. While there were seven participants who were able to accurately match the use of hearing protection to their given threshold, only four of the seven had indicated a measurable threshold of 80dB or 90dB. The post-course questionnaire provides positive insight as we see a significant percentage increase to 65.7% of the responses on the NIOSH recommendation line. Over 91% (*n* = 32) of the participants indicated they would wear hearing protection at or below the recommendation line after their exposure throughout the course of the semester. When comparing the two portions of the post-course questionnaire data, we do see an average increase in the correct responses for hearing protection per tool to the given decibel threshold. Pre-course participants averaged

correct responses for three and a half tools while the post showed an increase to four tools. While a majority had incorrectly identified three or more in the pre-course evaluation, almost two-thirds of the participants correctly identified more than four or more tools in the post-course, with almost half of all responses correctly identifying all tools or just missing one. Of the eight participants who had correctly identified all six tools, three were participants who provided a threshold above the "Always" category, and they were all in the 80dB and 90dB threshold categories.

When looking at the informational data as a whole, we can best address our third objective or known safety concerns relating to the hearing and noise levels in an agricultural laboratory/workspace. We identified before this study a need to address these concerns and feel that the environmental exposure that our students experienced did have a positive impact. Through either the use of indirect and direct exposure of the use of tools during hands-on project-based learning, visual information found on posters placed strategically across our laboratory, or a combination thereof, we see an increase in knowledge and correct perception of noise levels and hearing safety concerns in our students. The overall increase in percentages for the correct response of tool to threshold provides us with the basis for continued growth with this project's objective. We not only aimed to address these safety concerns in our teaching but also in students' understanding of their working environment. Students not only showed understanding of tool noise level outputs but also in their willingness to wear hearing protection in agricultural laboratory settings.

At the beginning of the semester, students showed they understand the need for hearing protection, albeit at differing levels, but are unsure how loud commonly used tools are in our laboratories. Through their exposure in their working environment, we see a change in perception and outlook as students were better able to identify tools at or above their hearing protection threshold. While there were increases shown, there are still shown gaps that need to be addressed. Not all students had significant breakthroughs and were able to identify all tools to decibel threshold, nor were all students at or below the NIOSH recommended exposure limit of 85dB. We attribute the increase we identify to the course and visual exposure of the noise levels throughout the semester.

Future Research Question and Application

We acknowledge a need for further instruction and research relating to hearing safety in agricultural mechanics. The instruction and research need to focus on helping students identify the level of decibel output from tools in the workspace and an increase in awareness of hearing safety concerns. We aim to discern efficient ways for raising awareness of potential hearing hazards and garner interest in the prevention of hearing loss.

A future research opportunity would expand this study to multiple sites and universities to increase our sample size for statistical analysis and provide opportunities for control and variable groups. The variable groups would use visual aids indicating decibel output posted throughout the Mechanics Lab to supplement the use of tools throughout a semester in introductory-level agricultural mechanics courses. The control group would conduct similar courses as usual without visual aids during the same period to determine if students show an increased understanding when exposed visually to noise levels.

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A Comparison of Curricular Resource Use of Florida School-Based Agricultural Education Teachers by Career Stage

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There is considerable variability in the design and quality of resource provided to teachers. There is also a lack of empirical backing guiding the process of curricular resource design, specifically as it relates to teachers in different stages of their careers. The purpose of this study was to explore curricular resource use by Florida SBAE teachers based on experience level. A census of Florida school-based agricultural education teachers was conducted. The instrument asked teachers to identify which resources they used and provided follow-up instruments for the resources selected to determine the pedagogical design capacity related to each resource. Respondents were found to use similar amounts of resources across all career stages. When comparing means related to PDC, a significant difference was only found for one resource. Overall, these findings showed that teachers use similar amounts of resources regardless of career stage and PDC for various resources remains stable across career stages. There is a slight increase in the frequency of use for teachers in the early career stage. This study provides an overview of how PDC changes depending on the resource being used across career stages. Resources should continue to be developed to teachers across all career stages.

Introduction

There has been a teacher shortage, particularly among teachers in School-Based Agricultural Education (SBAE) (Eck & Edwards, 2019). There was a total of 60 full-time and three part-time agricultural educator positions were still vacant nationally in 2019 due to a lack of agricultural educators (Foster et al., 2020). The workload involved in SBAE has been cited as one of the main reasons for leaving the profession, particularly the paperwork and planning required (Cole, 1984). This workload can be difficult for beginning teachers to balance (Boone, 2009).

Reasons attributed to leaving the profession can vary by career stage. Fessler and Christiansen (1992) described eight career stages teachers experience. These stages are pre-service, induction, competency building, enthusiastic and growing, career frustration, career stability, career wind-down, and career exit (Fessler & Christiansen, 1992). Teachers move through the various stages of their careers in a nonlinear pattern and can move between stages. However, in the induction stage, teachers are typically within their first few years of teaching or teachers can experience this stage if they switch to another grade level or subject (Fessler & Christiansen, 1992). Teachers in this stage are focusing on acceptance by their students and peers. Teachers in the competency building stage focus on finding new materials, new ideas, gaining, and gaining confidence in their knowledge and skills (Fessler & Christianson). According to Fessler and Christiansen's (1992) career cycle model, teacher burnout and job frustration occur during the career frustration stage. Although Croom (2003) found if agricultural education teachers had a high degree of personal accomplishment and efficacy, burnout may not be a concern. Croom (2003) also noted among SBAE teachers, there was a moderate level of emotional exhaustion in their work. Emotional exhaustion is one of the main symptoms of teacher burnout (Maslach et al., 1996). Burnout is the response to continuous stressors caused by one's job. Characteristics of

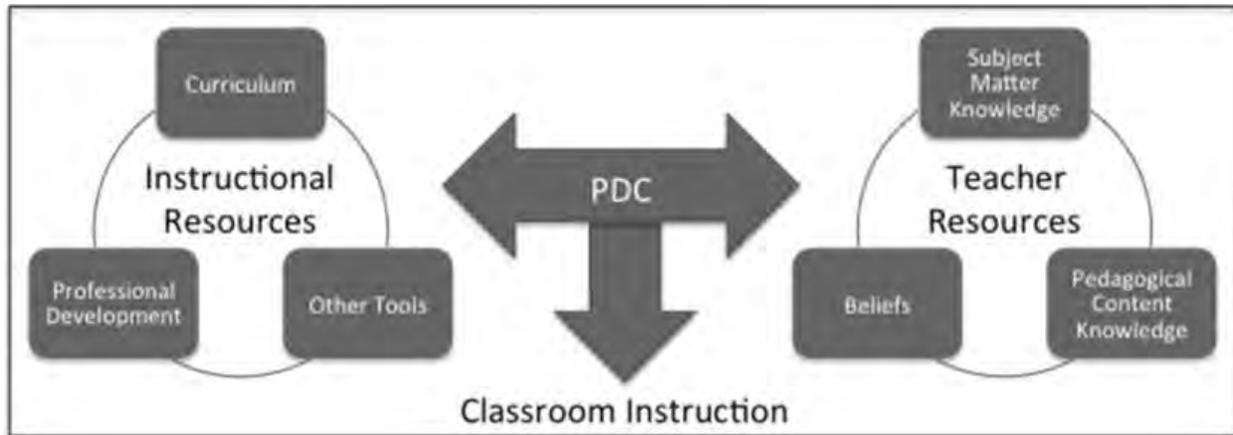
burnout can be emotional exhaustion, lower levels of self-efficacy, and cynicism (Maslach et al., 2001). Teacher burnout can result in negative instructional planning behaviors that can negatively affect the quality of instructional events that happen in the classroom (Maslach et al., 1996). These can include procrastination, lack of planning, and overuse of offloading. Offloading has been described as a teacher relying on the curricular materials, as is, for instruction with no modifications or analysis (Brown & Edelson, 2003). Offloading instructional responsibility is not always a bad thing, as this can create a multitasking environment when used in a productive way (Brown & Edelson, 2003). However, when teachers offload their instructional responsibility consistently, the teacher's Pedagogical Design Capacity, (PDC) is not fully implemented, resulting in a loss in quality of instruction. PDC is the capacity that enables teachers to craft instructional activities through perceiving and mobilizing pre-existing resources (Brown & Edelson, 2003). When teachers utilize their full PDC in planning instruction, the lessons are more specialized to each program and classroom learning goals and objectives. Further research is needed to determine how teachers use available resources to develop instruction, how these resources impact their PDC, and if there are difference in resource use by teachers across career stages.

Literature Review

This study was theoretically guided by Brown's (2009) and Knight-Bardsley and McNeil's (2016) PDC framework, which represents the relationship between teacher resources, instructional resources, and the classroom instruction delivered as a result (see figure 1). Teaching is a process of design (Brown & Edelson, 2003). This process includes teachers selecting and customizing curricular resources to meet student/classroom goals, which engages a teacher's PDC. According to Brown and Edelson (2003), there are different ways teachers can use curricular materials when designing instruction: offloading, adapting, or improvising. Offloading is a transfer of curriculum design responsibility from the teacher to the materials they are using, adapting is the addition of a teacher's design elements to the implementation of the curriculum, and improvising is the deviation from the original lesson plans with a majority of the design process being contributed by the teacher (Brown & Edelson, 2003). When teachers offload or input little to no customization in curricular resources, they are unable to design the curriculum to meet the students' or program's individual needs. However, when adapting resources or using resources as a starting point for instructional design through improvisation, teachers can better personalize the curriculum for their objectives.

Figure 1

Pedagogical Design Capacity Framework (Brown, 2009; Knight-Bardsley & McNewill, 2016)



The quality of resources for SBAE teachers varies highly, from cook-book lesson plans that lend to a high level of offloading to customizable resources that can be adapted to better meet the needs of the program. According to Easterly and Simpson (2020), several resources lead to offloading behaviors, such as Agriculture Experience Tracker (AET), iCEV, and Agriculture in the Classroom. In New Mexico, it was found that Curriculum for Agricultural Science Education (CASE) courses led to offloading behaviors as well, and Pinterest had the least amount of offloading (Thornton et al., 2020). When resources such as these lead to offloading behaviors, a teacher’s full PDC is not recognized and used when planning instruction.

Previous studies (Easterly & Simpson, 2020; Thornton et al., 2020) with SBAE teachers, found New Mexico SBAE teachers used an average of 7.5 resources in instructional planning (Thornton et al., 2020) and Utah SBAE teachers used an average of 4.9 resources in instructional planning (Easterly & Simpson, 2020). In both New Mexico and Utah, 50% or more of SBAE teachers were found to use Agriculture Experience Tracker (AET) and Agriculture in the Classroom (Easterly & Simpson, 2020; Thornton et al., 2020). Despite this research, there has not been any previous research examining the relationship between experience level and the use of curricular resources in SBAE teachers.

Purpose and Research Objectives

The purpose of this study is to explore curricular resource use by Florida SBAE teachers based on experience level. The study will examine how teachers develop their Pedagogical Design Capacity. This study was guided by the American Association for Agricultural Education Research Agenda research priority area 5, efficient and effective agricultural education program (Thoron et al., 2016). This study was guided by the following objectives:

1. Describe the resources used by Florida SBAE teachers.
2. Describe the Pedagogical Design Capacity of Florida SBAE teachers by career stage.
3. Compare Pedagogical Design Capacity of Florida SBAE teachers by career stage.

Methodology

This study examined the relationship between Florida SBAE teachers’ PDC and their PDC. A census of SBAE teachers in Florida was taken between December 2020 and February 2021. The population frame was taken from the Florida Agriculture Teacher Directory. The instrument used for this study was distributed online using the website Qualtrics and was sent out with an initial

contact email inviting participants to participate in the study following the tailored design method (Dillman et al., 2014). Notice letters were mailed to each of the teachers with a \$1 cash incentive. There were 248 respondents yielding a response rate of 49.6%. Known demographic variables of non-respondents and respondents were compared to test for non-response bias (Johnson & Shoulders, 2019; Rogelberg & Stanton, 2007). Chi-square tests indicated no significant difference in gender ($X^2(1, N = 500) = 1.18, p < .05$) and FFA district ($X^2(5, N = 500) = 1.52, p < .05$). The data were considered representative of the population and the results were generalized.

A researcher-developed instrument was implemented to determine the use of curricular resources by Florida SBAE teachers. An instrument similar to this was used in previous studies with SBAE teachers in both Utah (Easterly & Simpson, 2020) and New Mexico (Thornton et al., 2020). The instrument asked the participants to select the resources they use to plan and deliver instruction from a list of 23 resources, plus options for textbooks and other resources not included in the list. The list was devised by the researchers who know of the resources used by teachers and the validity of this list was confirmed by a panel of experts outside of the study, including the state agricultural education coordinator and a teacher educator in the state who did not participate in the study. Agricultural Education Services and Technology (AEST), which provides resources as part of the industry certification process, along with resources from the Department of Agricultural Education and Communication (AEC) at the University of Florida that were developed for online and distance instruction. Using skip-logic in Qualtrics, the participants were requested to answer follow-up questions for the resources they use in the classroom. They were then asked to rate their frequency of use using the responses of *once per semester or less*, *twice per semester*, *monthly*, *weekly*, and *daily*, which were given a numerical value of 1-5 respectively; these data were analyzed as a continuous variable using real limits. Participants were then asked to rate the organization and structure of the resource using a 0-100 sliding scale where 0 was attached to *Very Poor* and 100 was attached to *Very Good*. To measure the level of adaptation, participants were asked to rate their level of modification to the resource using a 0-100 sliding scale where 0 was attached to *No modification* and 100 was attached to *A lot of Modification*. To measure the level of offloading, participants were then asked to rate their familiarity with the content/resource being used, using a 0-100 sliding scale with 0 attached to *Not Familiar* and 100 to *Familiar*. To measure the level of improvisation, participants were asked to specify how much they modified their instruction when teaching while using the resource, using a 0-100 sliding scale with 0 attached to *No Modification* and 100 to *A lot of Modification*. The use of sliding scales compared to radio buttons was to make the questionnaire more engaging for the participants, as well as improve the data quality following the guidance of Roster et al. (2015). The instrument was reviewed by a panel of experts and was deemed to be a valid measure of PDC.

Katz (1972) model of teacher developmental stages was used to operationalize teacher group by year. Katz descriptions were used as Fessler & Christiansen's model does not provide years as a guide for the various levels of teacher career stages. Teachers in years one through three were in survival stage, four through eight years were in renewal, and late phase in nine years plus of experience (Katz, 1972). An additional category was added for teachers with more than 18 years of experience titled wind down. Katz's model of teacher developmental stages is used to define

the levels of groups we are examining. There were 55 teachers in survival stage, 52 in renewal, 53 in late phase, and 73 in wind down.

Results

Describe the resources used by Florida SBAE teachers.

All participants were asked on the instrument to select the resources they use in the classroom from a list of resources and to list any additional resources they use within the classroom. Teachers in survival stage indicated using a mean of 8.6 resources ($SD = 3.8$). Teachers in years renewal stage, indicated using a mean of 8.7 resources ($SD = 3.8$). Late stage teachers indicated using a mean of 8.7 resources ($SD = 4.8$). Teachers in the wind down stage indicated using a mean of 8.5 resources ($SD = 3.8$). The number of resources used by participants ranged from 0 to 29, which is displayed in table 1, grouped by career stage.

Table 1

Distribution of the Number of Curricular Resources Utilized by Florida SBAE Teachers by career stage.

Number of Resources	Survival		Renewal		Late Phase		Wind-Down	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
0	1	1.8	0	0	0	0	0	0
1	1	1.8	1	1.9	2	3.8	0	0
2	1	1.8	1	1.9	2	3.8	1	1.4
3	1	1.8	2	3.8	1	1.9	5	6.8
4	3	5.5	4	7.7	4	7.5	5	6.8
5	4	7.3	3	5.8	5	9.4	3	4.1
6	7	12.7	4	7.7	5	9.4	9	12.3
7	6	10.9	7	13.5	5	9.4	7	9.6
8	5	9.1	5	9.6	3	5.7	11	15.1
9	3	5.5	7	13.5	2	3.8	6	8.2
10	3	5.5	1	1.9	5	9.4	8	11.0
11	6	10.9	1	1.9	6	11.3	3	4.1
12	3	5.5	6	11.5	5	9.4	6	8.2
13	5	9.1	3	5.8	4	7.5	1	1.4
14 or more	6	10.9	7	13.5	4	7.5	8	11.0

Follow-up questions were asked to respondents for each resource they selected using skip-logic in Qualtrics, which included the frequency of use (see table 2). Respondents who are in survival stage of teaching, most frequently used the School/District Curriculum ($M = 4.78$; $SD = 0.44$), which aligns with *weekly* as defined by the real limits, and CAERT ($M = 3.25$; $SD = 0.96$), which aligns with *monthly* as defined by the real limits. Respondents in the renewal stage reported most frequently using CASE ($M = 4.20$; $SD = 0.84$), which aligns with *weekly* as defined by the real limits, and the School/District Curriculum ($M = 4.00$; $SD = 0.82$), which aligns with *weekly* as defined by the real limits. Respondents in stage 3 reported most frequent use of the School/District Curriculum ($M = 3.93$; $SD = 1.00$), which aligns with *monthly* as defined by the real limits, and Agriculture Experience Tracker ($M = 3.17$; $SD = 0.84$), which aligns with *monthly* as defined by the real limits. Respondents in the wind down stage reported most frequently using the School/District Curriculum ($M = 4.13$; $SD = 0.81$), which aligns with *weekly*

as defined by the real limits, and iCEV ($M = 3.41$; $SD = 1.02$), which aligns with *monthly* as defined by the real limits.

Table 2

Frequency of Use of Curricular Resources by Florida SBAE Teachers by career stage.

Curricular Resource	<i>Survival</i>		<i>Renewal</i>		<i>Late Phase</i>		<i>Wind-Down</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Agriculture in the Classroom	2.95	0.94	2.87	1.41	2.32	1.22	2.43	1.11
iCEV	3.16	1.07	3.68	1.03	2.91	1.26	3.41	1.02
USDA ¹	2.03	0.87	2.28	1.28	2.03	0.89	2.00	1.02
NAAE ²	3.04	0.88	2.71	0.94	2.32	1.03	2.38	0.90
Communities of Practice								
Pinterest	2.81	1.20	2.50	1.35	2.29	1.08	2.54	1.14
Teachers Pay Teachers	2.46	1.04	2.67	1.18	2.45	1.22	2.29	0.85
Georgia Ag. Ed.	2.64	1.09	2.10	0.91	2.00	1.00	2.28	1.05
National FFA Resources	2.76	0.99	2.79	1.08	2.55	0.67	2.43	0.84
One Less Thing	2.90	1.41	2.62	1.28	2.35	1.12	2.04	1.14
AEST	2.94	1.18	2.50	1.23	3.10	1.18	2.71	1.10
Agriculture Experience Tracker (AET)	2.75	1.03	2.92	0.90	3.17	0.84	2.86	1.24
Nutrients for Life	1.58	0.90	1.79	0.80	1.30	0.68	2.06	1.12
Career and Technical Education (CTE) Online	2.92	1.17	2.17	1.40	1.90	1.20	2.46	1.13
CAERT	3.25	0.96	3.00	1.00	2.86	1.02	3.08	1.24
Glen Rose FFA	1.92	0.67	2.30	1.16	1.63	0.92	2.31	1.03
School/District Curriculum	4.78	0.44	4.00	0.82	3.93	1.00	4.13	0.81
FFA Blue 365	1.90	0.74	2.50	1.35	2.00	0.71	1.50	0.76
agednet	3.14	0.69	2.71	1.50	2.18	1.08	2.83	1.27
OSHA ³	1.75	0.71	2.00	1.53	1.40	0.70	1.56	0.73
AEC Online Resources	2.45	1.04	2.22	1.30	1.00	0.00	2.33	1.21
Animal Care Technologies	3.00	1.41	3.33	1.21	2.83	1.17	3.08	1.12

CASE	2.00	0.82	4.20	0.84	1.67	1.033	2.71	1.70
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*Responses were reported on a scale from 1-5 and were only measured by the teachers who utilized the resource. ¹ United State Department of Agriculture; ² National Association for Agricultural Education, ³ Occupational Safety and Health Administration

Describe the Pedagogical Design Capacity of Florida SBAE teachers by career stage.

Respondents were asked to rate their level of resource modification before teaching for the resources they selected to operationalize adapting behavior. A question about familiarity of content resources was used to indicate levels of offloading behavior, which translates to higher familiarity indicates low levels of offloading behavior. Respondents were asked a question about the level of improvisation to indicate levels of improvising. Among survival stage teachers, between 1-3 years of teaching, the resource with the lowest level of adaptation is iCEV ($M = 35.4$; $SD = 20.4$) and the resource with the highest level of adaptation was Pinterest ($M = 68.6$; $SD = 26.2$). The resource with the lowest level of familiarity with content was AEST ($M = 59.6$; $SD = 23.0$) and the resource with the highest level of familiarity with content was One Less Thing ($M = 81.7$; $SD = 20.3$). The resource with the lowest level of improvisation was iCEV ($M = 58.0$; $SD = 26.6$) and the resource with the highest level of improvisation was Pinterest ($M = 75.6$; $SD = 20.9$). This data is displayed in table 3.

Table 3

Patterns of Pedagogical Design Capacity for Resources used by Survival Stage SBAE Teachers

Curricular Resource	n	Level of Lesson Modification (Adapting)		Familiarity with Content (Offloading)		Level of Improvisation (Improvising)	
		M	SD	M	SD	M	SD
Agriculture in the Classroom	37	49.6	20.4	63.1	25.5	65.1	20.9
iCEV	25	35.4	32.6	79.6	21.6	58.0	26.6
USDA	29	55.6	31.7	63.4	19.1	64.5	24.4
NAAE Communities of Practice	28	53.5	21.0	74.2	18.9	61.1	22.8
Pinterest	32	68.6	26.2	77.3	22.3	75.6	20.9
Teachers Pay Teachers	28	44.6	21.6	67.4	22.2	59.4	27.1
Georgia Ag. Ed.	22	51.7	24.8	74.9	22.0	69.1	18.2
National FFA Resources	29	44.9	24.9	75.7	26.0	58.7	24.3
One Less Thing	20	38.0	24.4	81.7	20.3	60.8	24.3
AEST	16	51.8	29.8	59.6	23.0	63.1	31.7

*Responses were reported on a scale from 0-100 and were only measured by the teachers who utilized the resource.

Renewal stage teachers, between 4-8 years of teaching, reported the resource with the lowest level of adaptation was iCEV ($M = 29.9$; $SD = 21.2$) and the resource with the highest level of adaptation was Pinterest ($M = 69.8$; $SD = 25.4$). The resource with the lowest level of familiarity with content was USDA ($M = 57.5$; $SD = 18.6$) and the resource with the highest level of familiarity with content was iCEV ($M = 75.0$; $SD = 25.9$). The resource with the lowest level of

improvisation was AEST ($M = 45.5$; $SD = 24.6$) and the resource with the highest level of improvisation was Pinterest ($M = 69.0$; $SD = 23.6$). This information is displayed in table 4.

Table 4
Patterns of Pedagogical Design Capacity for Resources used by Renewal SBAE Teachers

Curricular Resource	<i>n</i>	Level of Lesson Modification (Adapting)		Familiarity with Content (Offloading)		Level of Improvisation (Improvising)	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Agriculture in the Classroom	30	51.4	18.7	63.9	27.1	62.4	23.2
iCEV	25	29.9	21.2	75.0	25.9	49.4	23.4
USDA	25	66.4	30.9	57.5	18.6	57.9	20.4
NAAE Communities of Practice	28	56.4	22.6	66.4	25.3	58.8	26.0
Pinterest	24	69.8	25.4	68.6	23.0	69.0	23.6
Teachers Pay Teachers	30	52.4	27.0	71.7	20.3	56.1	22.8
Georgia Ag. Ed.	20	56.8	21.4	68.6	54.3	54.3	18.2
National FFA Resources	19	46.1	28.0	71.6	20.9	51.9	24.0
One Less Thing	21	45.1	27.6	72.1	23.6	55.5	28.2
AEST	14	59.1	21.6	66.8	26.4	45.5	24.6

*Responses were reported on a scale from 0-100 and were only measured by the teachers who utilized the resource.

Late stage teachers, between 9-17 years of teaching, reported the resource with the lowest level of adaptation was National FFA Resources ($M = 36.2$; $SD = 18.5$) and the resource with the highest level of adaptation was Pinterest ($M = 70.6$; $SD = 25.6$). The resource with the lowest level of familiarity with content was USDA ($M = 56.0$; $SD = 22.4$) and the resource with the highest level of familiarity with content was iCEV ($M = 74.7$; $SD = 24.2$). The resource with the lowest level of improvisation was AEST ($M = 46.2$; $SD = 23.6$) and the resource with the highest level of improvisation was Pinterest ($M = 65.6$; $SD = 25.5$). This data is in table 5.

Table 5
Patterns of Pedagogical Design Capacity for Resources used by Late Stage SBAE Teachers

Curricular Resource	<i>n</i>	Level of Lesson Modification (Adapting)		Familiarity with Content (Offloading)		Level of Improvisation (Improvising)	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Agriculture in the Classroom	31	47.3	19.5	61.0	29.7	61.7	26.2
iCEV	34	38.3	30.2	74.7	24.2	53.4	26.1
USDA	30	44.0	27.5	56.0	22.4	55.9	21.9
NAAE Communities of Practice	25	54.5	30.3	65.6	28.3	60.0	25.1
Pinterest	24	70.6	25.6	70.5	19.9	65.6	25.5
Teachers Pay Teachers	22	42.8	21.6	60.6	31.3	60.2	24.8
Georgia Ag. Ed.	21	55.2	24.1	62.5	24.2	60.7	12.8

National FFA Resources	22	36.2	18.5	58.9	22.1	54.1	21.4
One Less Thing	17	38.2	20.7	66.2	25.5	57.0	25.8
AEST	21	35.6	23.7	64.0	26.0	46.2	23.6

*Responses were reported on a scale from 0-100 and were only measured by the teachers who utilized the resource.

Wind-down stage teachers, 18 years or more of teaching, reported the resource with the lowest level of adaptation was One Less Thing ($M = 32.8$; $SD = 22.9$) and the resource with the highest level of adaptation was Pinterest ($M = 69.4$; $SD = 20.9$). The resource with the lowest level of familiarity with content was Pinterest ($M = 60.2$; $SD = 27.6$) and the resource with the highest level of familiarity with content was National FFA Resources ($M = 75.5$; $SD = 23.6$). The resource with the lowest level of improvisation was Georgia Ag. Ed. ($M = 47.6$; $SD = 25.2$) and the resource with the highest level of improvisation was Pinterest ($M = 58.9$; $SD = 23.0$). This data is arranged in table 6.

Table 6
Patterns of Pedagogical Design Capacity for Resources used by Wind-Down Stage SBAE Teachers

Curricular Resource	<i>n</i>	Level of Lesson Modification (Adapting)		Familiarity with Content (Offloading)		Level of Improvisation (Improvising)	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Agriculture in the Classroom	42	38.9	22.9	65.0	32.3	56.7	22.9
iCEV	34	34.9	25.8	66.7	28.3	53.7	26.0
USDA	30	53.0	26.1	64.5	23.8	54.5	24.2
NAAE Communities of Practice	29	48.0	21.0	68.1	24.1	56.7	23.5
Pinterest	24	69.4	20.9	60.2	27.6	58.9	23.0
Teachers Pay Teachers	17	53.1	34.0	62.1	32.0	52.9	28.0
Georgia Ag. Ed.	32	40.0	20.3	63.9	29.1	47.6	25.2
National FFA Resources	23	33.7	24.3	75.5	23.6	53.0	23.8
One Less Thing	25	32.8	22.9	69.7	24.9	57.0	21.9
AEST	31	42.8	30.0	67.5	26.4	52.3	28.1

*Responses were reported on a scale from 0-100 and were only measured by the teachers who utilized the resource.

Compare Pedagogical Design Capacity of Florida SBAE teachers by career stage.

To compare PDC of teachers by career stage an analysis of variants was conducted (see tables 7, 8 & 9). There were no statistically significant differences between career stage groups for the resources Ag. in the Classroom, iCEV, USDA, NAAE Communities of Practice, Pinterest, Teachers Pay Teachers, National FFA Resources, One Less Thing, and AEST for offloading, adapting, and improvising. However, there was a statistically significant difference between groups for adapting related to the Georgia Ag. Ed. Resource as determined by the one-way ANOVA ($F(3,83) = 2.82$, $p = .043$).

ies of Practice										
Pinterest	77.3	22.3	68.6	23.0	70.5	19.9	60.2	27.6	2.35	.08
Teachers	67.4	22.2	71.7	20.3	60.6	31.3	62.1	32.0	.92	.44
Pay Teachers										
Georgia Ag. Ed.	74.9	22.0	68.6	54.3	62.5	24.2	63.9	29.1	1.11	.35
National FFA	75.7	26.0	71.6	20.9	58.9	22.1	75.5	23.6	2.53	.06
Resources										
One Less Thing	81.7	20.3	72.1	23.6	66.2	25.5	69.7	24.9	1.48	.23
AEST	59.6	23.0	66.8	26.4	64.0	26.0	67.5	26.4	.36	.78

*Responses were reported on a scale from 0-100 and were only measured by the teachers who utilized the resource.

Table 9

Means, Standard Deviations, and One-Way Analyses of Variance of Level of Improvisation used by Florida Agriculture Teachers by career stage.

Curricular Resource	<i>Survival</i>		<i>Renewal</i>		<i>Late Phase</i>		<i>Wind-Down</i>		<i>F</i>	<i>P-value</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Agriculture in the Classroom	65.1	20.9	62.4	23.2	61.7	26.2	56.7	22.9	.88	.46
iCEV	58.0	26.6	49.4	23.4	53.4	26.1	53.7	26.0	.47	.70
USDA	64.5	24.4	57.9	20.4	55.9	21.9	54.5	24.2	1.08	.36
NAAE	61.1	22.8	58.8	26.0	60.0	25.1	56.7	23.5	.16	.92
Communit ies of Practice										
Pinterest	75.6	20.9	69.0	23.6	65.6	25.5	58.9	23.0	2.43	.07
Teachers	59.4	27.1	56.1	22.8	60.2	24.8	52.9	28.0	.34	.80
Pay Teachers										
Georgia Ag. Ed.	69.1	18.2	54.3	18.2	60.7	12.8	47.6	25.2	5.32*	.00
National FFA	58.7	24.3	51.9	24.0	54.1	21.4	53.0	23.8	.39	.76
Resources										
One Less Thing	60.8	24.3	55.5	28.2	57.0	25.8	57.0	21.9	.16	.92
AEST	63.1	31.7	45.5	24.6	46.2	23.6	52.3	28.1	1.38	.26

*Responses were reported on a scale from 0-100 and were only measured by the teachers who utilized the resource.

A Tukey post hoc test did not indicate a significant difference between any of the subgroups. There was also a statistically significant difference between groups for improvising related to the Georgia Ag. Ed. Resource as determined by the one-way ANOVA ($f(3,88) = 5.32, p = .002$). A Tukey post hoc analysis revealed that teachers in the wind down stage improvised significantly more than teachers in the survival stage ($f = 21.5, p = .001$). There were no statistical differences between any of the other groups.

Conclusions/Recommendations

The purpose of this study was to explore curricular resource used by Florida SBAE teachers based on experience level to determine similarities or differences in the curricular use of Florida SBAE teachers. The distribution of resources is similar across career stages. The mean number of resources used by each career stage was higher than what was found in Utah (Easterly & Simpson, 2020) and New Mexico (Thornton et al., 2020). Teachers in their first three years of teaching had a higher frequency of use for most of the resources. Teachers in years 4-8 showed slightly higher levels of modification of resources. The comparison of means for the components of PDC were somewhat stable across career stages. Only two significant differences occurred, one of which had a significant difference in the post hoc analysis. The analysis showed less improvisation as experience levels increased. This could indicate that teachers with more experience already have their resources in place and have less need for modification when they teach. Further research is needed to understand how teachers use resources to plan instruction. The methods of this study provide a broad overview of the resources used by teachers. This breadth limits the diagnostic ability to fully measure a teachers PDC related to a specific resource. Future studies could be conducted to gain further insight into the teacher-tool relationship and could inform further curricular resource design.

To better understand the implications of these findings, future studies could be conducted to examine how PDC is developed and maintained in various career stages of SBAE teachers. Beginning teachers should be encouraged to explore resources and modify them when appropriate, while teachers in later career stages should continue to find resources that can work in their classroom/program while modifying the resources to best fit the program and student goals. Since teachers across career stages did not demonstrate offloading behavior for resources, resource designers should consider designing approaches that move away from offloading. Further research is needed to establish design models that can be adapted by teachers to fit the goals of their program. There were not major fluctuations of PDC across the career stages. Since teachers tend to employ their PDC similarly regardless of career stages, resource designers should also move to design resources that benefit teachers of all experience levels rather than focusing on teachers who are at a certain experience level. Specifically, these findings do not support the development of materials focused on beginning agriculture teachers but rather holistic models that provide materials to all teachers. Educators of pre-service teachers should be supporting and teaching pre-service teachers how to better modify these lessons and how to find curricular resources to use in the classroom. Additionally, support systems may be needed to help teachers with alternative certifications find appropriate resources and use them to plan meaningful instruction.

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SBAE Teachers' Perceptions, Needs, and Barriers to Teaching Socioscientific Issues

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The purpose of this quantitative survey research study was to explore the integration of socioscientific issues (SSI) among school-based agricultural education (SBAE) teachers by describing the factors that influence integration. This research was guided by the SSI-based instruction framework and the three-component model of agricultural education. The population for this study was all SBAE teachers in the U.S. during the 2019-2020 school year. A total of 136 SBAE teachers participated in the study. SBAE teachers' self-efficacy related to SSI, their perceived need to teach SSI, and barriers to teaching SSI were explored. Survey responses were analyzed using descriptive statistics. Respondents agreed that SSI are needed in agricultural education, but time to develop curriculum and integrate SSI is a barrier. Overall SBAE teachers felt supported by their administration and communities. Recommendations include integration of SSI and the SSI-based instruction framework in both pre-service agricultural teacher preparation programs and in-service teacher professional development. Aligning state and national agricultural education standards to include SSI is also recommended. Further research should be conducted to explore SBAE teachers' knowledge of SSI, how they are integrating SSI in their classes and what resources and teaching strategies they are using.

Introduction and Need for the Study

Recent estimates of global population numbers show projected increases of 10% to 8.5 billion people by 2030 and populations reaching 9.7 billion by 2050 (United Nations, 2019). These increases cause concerns for issues related but not limited to food security, water access, and environmental impacts. The agricultural industry is deeply entrenched in these issues as it provides nutritious food for the growing population and works to preserve natural resources.

The pervasiveness of these complex global issues and their impact on agriculture has prompted stakeholders (e.g., government agencies, world organizations, educational organizations) to voice concerns and assert research priorities to address these issues facing society. The National Institute of Food and Agriculture (NIFA) Challenge Areas list several complex global issues including food security, climate concerns, and water issues (NIFA, 2019). The most recent resolution adopted by the United Nations includes 17 goals for sustainable development through 2030. This resolution cited essential topics, including hunger and food security, water, and conservation, as well as environmental impacts and climate change (United Nations, 2015). According to the current National Research Agenda of the American Association for Agricultural Education (AAAE), agricultural education has a contribution to solving these issues. Research priority seven explicitly describes the need to address these complex problems, giving rise to the number one ranked research question which is to determine the most effective methods used to prepare individuals to solve issues like climate change and food security, as well as sustainability and water conservation (Roberts et al., 2016). In addition to the AAAE research agenda, National Agriculture in the Classroom's National Agricultural Literacy Outcomes

(NALO) also includes the need to address complex issues within the context of agriculture and the environment, and healthy food and its availability to all (Spielmaker & Leising, 2013).

Topics or issues which are scientific in nature that impact society are known as socioscientific issues (SSI) (Sadler, 2004a). These issues are often controversial, contain multiple perspectives, and do not have simple solutions (Sadler, 2004b; Zeidler & Nichols, 2009). Some examples of SSI directly related to agriculture include climate change, genetically modified organisms (GMOs), food security, and natural resource usage. School-based agricultural education (SBAE) teachers have a responsibility to prepare the next generation of agricultural scientists by providing their students with the skills and tools necessary to acknowledge the complexity of SSI to develop viable solutions. SBAE is uniquely positioned as a profession to contribute to building capacity in the next generation of scientists and agriculturists to address these complex issues (Roberts et al., 2016). While research shows student benefits of SSI-based instruction (e.g., Evren-Yapicioglu, 2018; Pouliot, 2008; Sadler et al., 2007; Shoulders & Myers, 2013), it remains to be seen how SBAE teachers are intentionally integrating SSI into their curriculum. While the SSI literature is well-established in science education, research in SBAE and the integration of SSI is scarce (Cross & Kahn, 2018). If SBAE programs will contribute to the pipeline of students addressing SSI, a clearer understanding of what SBAE teachers know about SSI and their curriculum integration is essential. This study provides information as to the practice of SSI integration in SBAE. The results of this research are useful to inform the professional development needs of in-service SBAE teachers and pre-service SBAE teachers in terms of SSI integration.

Theoretical Framework and Literature Review

This research was guided by the SSI-based instruction framework, which emerged through the examination of several empirical studies of SSI-based instruction by Presley et al. (2013). This framework uses themes that developed across multiple studies to inform the critical elements of successful SSI-based instruction. This framework is a flexible tool that can be used to inform curriculum development, teaching, and learning. There are three primary components to inform curriculum development including learners' experiences, curricular design elements, and teachers' characteristics or attributes. Additionally, the framework addresses classroom environment and outside/peripheral influences that guide SSI integration (Presley et al., 2013).

While there are five primary components of the SSI-based instruction framework, this research focuses on the peripheral influences and teacher attributes as they influence SSI integration in SBAE (see Table 1). Peripheral influences include the teachers' knowledge of SSI, the support they may have from their administration and community partners, flexibility within the curriculum, connections to the learning objectives, and access to curriculum to teach about SSI (Presley, et al., 2013). Any number of these peripheral influences may determine whether a teacher integrates SSI into their classes. In addition to peripheral influences, teacher attributes may play a role in the integration of SSI. Teachers must possess knowledge of the SSI and be aware of the social considerations related to the SSI. In instances where teachers have limited knowledge of the SSI, they must recognize their own knowledge limitations (Presley, et al., 2013).

Table 1*Primary and Secondary Components of the SSI-Based Instruction Framework*

Primary Components of SSI-Based Instruction	Sub-component Examples
Peripheral Influences	Barriers to integration , Knowledge of Local SSI, Support & Encouragement, Access to Materials, Curriculum Flexibility, Navigating Community Concerns, Connections to Learning Objectives
Classroom Environment	Collaborative & Interactive, Respectful, High Participation Expectations, Safe
Design Elements	Instruction Around a Compelling Issue, Issue Presented First, Scaffolding Provided, Culminating Experience, Use of Media, Use of Technology
Teacher Attributes	Teaching Efficacy Beliefs, Perceived Need to Integrate, Personal and Professional Characteristics , Content Knowledge, Social Considerations Awareness, Acknowledgement of Knowledge Limitations
Learning Experiences	Higher Order Experiences, Use of Scientific Ideas & Theories, Analysis of Scientific Data, Navigating Social dimensions, Ethical Dimensions, Nature of Science Themes

Note. Based on the SSI-based Instruction Framework (Presley et al., 2013)

Integrating SSI in SBAE

Integrating SSI in the classroom is a pedagogical approach that introduces students to a way of learning about relevant issues that are front of the mind in their communities. Students who experience SSI in an educational setting show increased feelings of responsibility and ownership of issues, critical thinking, activism, content learning, and scientific literacy (Bencze et al., 2012; Lee et al., 2013; Sadler, 2004; Sadler et al., 2016). These behavior changes are evident even through simple exposure to the SSI and the use of discourse (Lee et al., 2013). Yet, research suggests teachers struggle to implement SSI and need training (e.g., Cross, 2019; Shoulders, 2012; Walker & Zeidler, 2007; Wilcox et al., 2014). Learning about SSI in their classes is essential for students to learn about the complex issues facing society and the pertinent science of those issues (Kampourakis, 2019).

The SBAE curriculum often includes topics considered SSI. For example, it is not unusual to discuss GMOs in a plant science, food science, or biotechnology class. However, there is little research that unites SSI and SBAE explicitly together. While there is a paucity of research in this area, the first to study SSI within SBAE, Shoulders (2012), found that while teachers were excited to integrate SSI and reported familiarity with teaching methods consistent

with SSI (e.g., problem-solving, inquiry-based instruction, experiential learning), teachers might not have been using them regularly in their classes. Research conducted by Cross & Kahn (2018) suggests that teachers believe SSI can help students apply the knowledge learned in classes but may need support to implement the SSI-based instruction framework.

Self-Efficacy Beliefs and SSI

Knowing teacher self-efficacy beliefs as they relate to SSI is essential to understanding their integration of SSI in their teaching. Bandura (1995, 2009) explains that people are influenced to act or think a certain way and are motivated by their self-efficacy. Individuals' beliefs about something will also be influential in their self-efficacy (Bandura, 1995, 2009). Roath and Hay (2016) found that teachers who had lower self-efficacy were not as committed to teaching the content and did not spend as much time teaching the material. Additionally, they found teachers used more teacher-centered approaches, and attempts to motivate students were fewer (Roath & Hay, 2016).

Teachers must have content knowledge in order to teach it to their students. Even after professional development, some teachers may still lack knowledge and confidence to teach specific content. In their study of teachers who attended a professional development regarding biotechnology, Gray and Bryce (2006) found that even after attending the professional development, teachers gained knowledge in the subject and teaching techniques, but still lacked the confidence to implement them. To integrate SSI, teachers must have knowledge relative to the content of the SSI (Lee & Witz, 2009; Presley et al., 2013). In general, teachers may avoid teaching content they are less knowledgeable about (Rapoport, 2010).

Perceived Need to Integrate SSI

When integrating curriculum, teachers must perceive a need for their students to learn the content before they will integrate it (Li & Linder, 2007). Teachers must have a felt need, regardless of if it is real or perceived, to teach SSI (Lee et al., 2006). In their research, Lee et al. (2006) found that although teachers expressed a need to integrate SSI, they did not due to peripheral influences that created barriers to integration.

Barriers to Integrating SSI

Research suggests that barriers exist when teachers integrate SSI into their curriculum. While much of this research has taken place in science education, there are studies in SBAE that suggest teachers experience barriers to integrating SSI (Cross, 2019; Shoulders, 2012). Barriers which have been identified in research outside of SBAE relate to: (a) time to develop curriculum and time within the curriculum to teach it (Lee et al., 2006); (b) teacher knowledge of the SSI and the social considerations related to them (Gray & Bryce, 2006; Lee & Witz, 2009; Presley et al., 2013); and (c) outside influences in the form of school administrative and community support (Presley et al., 2013).

If teachers are to integrate new curriculum or implement teaching strategies, they must have time to develop or gain access to the curriculum and have flexibility and time within their

curriculum to integrate it. Lee et al. (2006) suggested teachers perceived time as a barrier to integrating SSI. The SSI-based instruction framework also indicates teachers must have access to materials and flexibility within the curriculum to integrate SSI with fidelity to the framework (Presley et al., 2013). The framework also identifies core design elements that must be present when integrating SSI (Presley et al., 2013). If teachers are developing their own curriculum, this may take extra time, especially if they are unfamiliar with the SSI topic and/or the teaching strategies they are using. Eastwood et al. (2012) discovered, while SSI are useful in the classroom, teachers need support to integrate them. Integrating SSI into the existing curriculum can be daunting and overwhelming for teachers who may already be taxed. Supporting teachers in their pursuit of SSI integration is necessary to ensure the SSI-based instruction framework is followed with fidelity.

Research suggests outside influences such as community and administrator support can influence teachers' tendency to integrate SSI into their curriculum (Presley et al., 2013). Additionally, if a particular SSI topic does not align with community or administration beliefs, those topics may be omitted from the curriculum. Teachers also need access to materials to assist in integration of SSI (Presley et al., 2013). Research suggests that teacher support from administration can come in two forms, specifically in *what* teachers teach and *how* teachers teach (Crookes, 1997). In-service teachers who are teaching content new to them will need professional development or support in learning the new approaches and new content. Support for attending outside professional development is essential for in-service teachers. This idea holds true when teachers are learning teaching strategies new to them. Supovitz et al. (2010) also found that teacher pedagogy is influenced by not only their peers, but also administrative leadership. Many SBAE programs also have an advisory committee which is made up of community members and industry partners who collaborate with the SBAE teacher to ensure that students are learning the appropriate skills to meet the needs of industry and higher education. These community members can have an effect on what students are learning in the classroom.

Purpose and Objectives

This study explores the knowledge and integration of SSI among SBAE teachers by explaining the factors that influence integration and addresses the AAAE National Research Agenda priority seven, addressing complex interdisciplinary problems such as climate change, food security, natural resource usage and conservation, and sustainability (Roberts et al., 2016). This research priority acknowledges the complex challenges created by our growing global population and innovation and recommends research addressing how agricultural education contributes to the workforce of individuals who will have a direct hand in solving these challenges. This research also contributes to the dearth of research connecting SSI and SBAE curriculum. The following research objectives guided this research:

1. Describe the personal and professional characteristics of SBAE teachers.
2. Describe SBAE teachers' self-efficacy beliefs related to SSI.
3. Describe SBAE teachers' perceived need to teach SSI.
4. Describe SBAE teachers' perceived barriers to teaching SSI (i.e., time, knowledge, peripheral influences).
5. Describe SBAE teachers' integration of SSI within SBAE.

Methods/Procedures

For this research, a descriptive survey methodology was employed. The survey instrument used in this research was designed and distributed to a simple random sample of SBAE teachers in the United States using the online survey system Qualtrics. The web-based survey was utilized for this national study because it provided low-cost data collection from a large sample and large geographical area with easy data entry and analysis options (Dillman et al., 2014). Due to online fatigue caused by COVID-19, we also distributed a paper version for those that preferred. Data collected for this study were part of a larger research project exploring various aspects of SSI integration within SBAE.

The target population for this research included all SBAE teachers in the U.S. during the school year 2019-2020, which was approximately 12,000 at the time of this research (National Association of Agricultural Educators, 2020). An SBAE teacher was defined as any middle or high school teacher who is certified to teach agricultural education courses. As SBAE teachers are registered with the National FFA Organization, we obtained contact information, specifically teacher names, school mailing addresses, and teacher emails from the National FFA Organization for 500 SBAE teachers. The tailored design method guided data collection methods (Dillman et al., 2014). The participants received their first contact through an email introducing them to the study and inviting them to participate. The email contained the link to access the survey. A follow-up email was sent approximately seven days after the first email which served as the first reminder and an opportunity for participants to request an additional paper survey if they preferred a paper survey instead of the online version. Overall, the participants were contacted five times over 3.5 weeks during the first three weeks in December of 2020.

The survey instrument was comprised of items that addressed the research objectives particularly items to assess SBAE teachers' knowledge, teaching self-efficacy, perceived need to integrate, perceived barriers toward SSI integration, and actual integration. Demographic information was also collected. Survey items were guided by previous research (Giliberti, 2018; Kara, 2012; Lee et al., 2006) and the SSI-based instruction framework (Presley et al., 2013). The instrument consisted of personal demographic items related to gender and political ideology. Also included were professional characteristic items related to teaching experience, and the state they currently teach in. Additional questions related to licensure were asked, specifically whether respondents had a traditional or alternative teaching credential, a science certification, and whether students received science credit for their agricultural education courses.

The four survey items that comprised the self-efficacy construct measured efficacy related to teaching strategies, teacher knowledge and understanding, and confidence in developing materials for SSI integration. Respondents were asked to rate their level of agreement with each of the items measured on a 5-point scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*). Sample items in this construct included: "I am able to use various teaching strategies to address socioscientific issues in agricultural education classes" and "I have confidence in developing teaching and learning materials about socioscientific issues." Self-efficacy was found to be reliable (4 items; Cronbach's α .83). A higher mean response for the self-efficacy construct indicated higher SBAE teacher self-efficacy toward SSI integration.

Teachers' perceived need to integrate was measured using items related to teachers' beliefs that SSI are appropriate and needed in SBAE. Teachers' perceptions of student background regarding SSI, increasing student interest and concern, and students' need to establish their own opinions were also measured. Teachers were asked to rate their agreement with the perceived need to integrate SSI items measured on a 5-point scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*). Sample items include: "introducing socioscientific issues into agricultural education classes is definitely necessary" and "students need to be concerned with socioscientific issues related to agricultural science." Teachers' perceived need to integrate SSI was found to be reliable (6 items; Cronbach's α .79). A higher mean response indicates a higher SBAE teacher perceived need to integrate SSI.

Barriers perceived by teachers to integrating SSI were related to time, teacher knowledge, and peripheral influences of support. These items were measured on a 5-point scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*). Research recommends using the Spearman-Brown coefficient as a more reliable measure for two-item constructs (Eisinga et al., 2013). Thus Spearman-Brown coefficient analyses were conducted on the two-item constructs. The items comprising the construct of time barriers related to lack of time within the curriculum to integrate SSI and time to prepare SSI curriculum. Teachers' perceived barriers of time consisted of two items ($\rho = .67$). Knowledge barrier items entailed teachers' science content knowledge of SSI and their knowledge of social considerations of SSI. Teachers' perceived knowledge as a barrier consisted of two items ($\rho = .87$) and was found to be reliable. Peripheral influences contained items addressing barriers of support from teachers' administration and community. This construct included two items and was found to be reliable ($\rho = .77$).

SBAE teachers' integration of SSI was measured by asking participants to respond to the following question: "When reflecting on the agriculture classes you teach, please identify the socioscientific issues you teach." Participants were asked to select all that applied. Nine SSI were included in the survey along with blank spaces for teachers to write in any additional SSI they integrate into their classes but were not included in the list of options. The list of SSI consisted of: "climate issues; ecosystem & biodiversity issues; energy issues; food security issues; genetic engineering issues; human population issues; natural resource issues; sustainability issues; water issues; and I do not teach any socioscientific issues."

Face and content validity of the instrument were evaluated by a panel of experts comprised of doctoral students and faculty in Career and Technical Education and familiar with survey research methods. Additionally, we conducted a pilot test with 25 SBAE teachers in Nevada and Utah. The teachers from the pilot were not included in the responses for the national sample. Reliability estimates for all constructs were achieved from the pilot study analysis. Additionally, the instrument's constructs were guided by published research (Aviles, 2017; Giliberti, 2018; Kara, 2012; Lee et al. 2006) using similar instruments and constructs which have been reported along with reliability measures. Instrument development was also guided by the SSI-based instruction Framework (Presley et al., 2013). Some scholars have argued that Cronbach alpha estimates of .70 are arbitrary and results as low as .05 should be considered reliable (Field, 2018; Nunnally, 1978). Given that the reliability estimate of .67 for the time

barriers measure was close to the arbitrary .70 cutoff, this variable was cautiously kept in the analysis.

Upon collection, data were loaded into Qualtrics™ and analyzed using Statistical Package for Social Science (SPSS). Any surveys returned by mail were hand-entered into SPSS. Data were reviewed for abnormalities and missing entries. Research objective one described the personal and professional characteristics of SBAE teachers. Descriptive statistics were used to describe the characteristics of SBAE teachers. We used frequency, percentages, means and standard deviations to describe the findings for the various characteristics. For research objectives two, three, and four, we used descriptive statistics to describe SBAE teachers' knowledge, teaching self-efficacy, perceived need to integrate, and perceived barriers toward SSI integration, and we reported the mean and standard deviation for each construct. For research objective five, we used descriptive statistics in the form of percentages and frequencies.

Findings

The total response rate for this study, including paper and online surveys totaled 27.2% ($N = 136$; mail = 6; electronic = 130). Due to some missing data points, the responses range from 109 to 112 for some of the analyses. We analyzed early and late responses using the constructs in the survey instrument (i.e., teaching efficacy, perceived need to integrate, perceived barriers to integration) and teacher demographic variables (e.g., gender, political ideology, experience) in an independent samples *t*-test and crosstabs to compare responders and non-responders to determine the presence of nonresponse bias. No variables were found to be significant, and we concluded non-response bias was not present. Due to the relative low response rate, we acknowledge the findings are not large enough to be generalizable across all SBAE teachers in the U.S.

Research objective one sought to describe the personal and professional characteristics of SBAE teachers. The respondents represented teachers who were teaching in all AFNR pathways, with animal systems (74.2%), plant systems (61.9%), and power, structural and technical systems (55.1%) being the most commonly taught pathways followed by natural resource systems (51.5%), agribusiness systems (47.8%), food products and processing systems (33.1%), environmental systems (30.9%) and biotechnology systems (22.1%). The respondents represented experience levels from first-year teachers to those having 40 years of teaching experience, with a mean of 12. All four National FFA regions were represented in the sample. Of the respondents, 54% ($n = 58$) identified as male and 46% ($n = 49$) identified as female, while 29 respondents did not answer. Conservative political ideology represented more than half (52.3%; $n = 57$) of SBAE teachers who participated in the study, 30.3% ($n = 33$) identified as moderate, and only 5.5% ($n = 6$) identified as liberal. Those who preferred not to identify their political ideology made up 11.9% ($n = 13$) of the respondents. The majority of respondents had a traditional agricultural education teaching certification (84.5%) versus an alternative teaching license (15.5%). While more than half of the respondents (53%) did not have a science endorsement, 52.7% indicated their students did receive science credit for their agriculture classes. When asked about the term socioscientific issues, 44% of SBAE teachers indicated they had not heard of it prior to this survey.

Research objective two sought to describe SBAE teachers' perceived self-efficacy related to SSI. The survey items elicited information about teachers' self-efficacy related to using

various teaching strategies to address SSI, understanding what SSI are in agriculture, confidence about developing materials about SSI, and having knowledge to teach about SSI. SBAE self-efficacy for SSI resulted in an overall mean of $M = 3.96$ ($SD = 0.55$) indicating teachers agree they are efficacious with integrating SSI (see Table 2).

Table 2

Descriptive Statistics for Self-efficacy, Need, & Barriers of Time, Knowledge & Support

Construct	<i>M</i>	<i>SD</i>
Perceived Self-Efficacy with SSI	3.96	0.55
Perceived Need to Integrate SSI	4.21	0.45
Barrier of Time to Integration of SSI	3.62	0.84
Barrier of Knowledge to Integration of SSI	2.93	0.96
Barrier of Support to Integration of SSI	3.71	0.66

Note. Mean limits scaling for constructs 1 - 1.49 = *strongly disagree*, 1.50 - 2.49 = *disagree*, 2.50 - 3.49 = *neutral*, 3.50 - 4.49 = *agree*, 4.50 - 5.00 = *strongly agree*.

For research objective three, we sought to describe SBAE teachers' perceived need to teach SSI in their agriculture courses. The survey items elicited information about teachers' perceptions related to the appropriateness of teaching SSI in an agricultural education class, the necessity of teaching SSI in agriculture classes, the adequacy of students' backgrounds, students' interests, students' concern for SSI, and students' ability to form their own opinions related to SSI. SBAE teachers' perceived need to teach SSI in their agricultural education courses resulted in an overall mean of $M = 4.21$ ($SD = 0.45$) indicating teachers overall agreed there is a need for SSI incorporation into agricultural education (see Table 2).

Research objective four sought to describe SBAE teachers' perceived barriers to teaching socioscientific issues, specifically as they relate to teachers' time to prepare curriculum and integrate it, knowledge of science content and social considerations of SSI, as well as peripheral influences in the form of administration and community support. Teachers' perceived barrier of time resulted in an overall mean of $M = 3.62$ ($SD = 0.84$), where more than half of respondents agreed or strongly agreed they lack the time to prepare curriculum (71.8%; $n = 79$) and integrate SSI (60.9%; $n = 67$) into their classes. Teachers' perceived barrier of knowledge resulted in an overall mean of $M = 2.93$ ($SD = 0.96$), and 41.9% of respondents either disagreed or strongly disagreed they lacked the knowledge of science content ($n = 46$) and 40% ($n = 44$) disagreed or strongly disagreed they lacked knowledge of the social considerations of SSI. Perceived barrier of support resulted in an overall mean of $M = 3.71$ ($SD = 0.66$). More than half of the respondents felt supported by administration (64.6%; $n = 71$) and their community (56.4%; $n = 62$). Additionally, over one third of respondents reported being neutral regarding administrative support (33.6%; $n = 37$) and community support (40.9%; $n = 45$).

Research objective five sought to describe teachers' integration of SSI within SBAE curriculum. Results show that only 2.9% of respondents indicated they do not teach any SSI.

Most respondents indicated they teach at least one SSI topic during the school year. None of the respondents used the additional space to write in other SSI they integrate into their curriculum. Natural resource issues (66.9%; $n = 91$), sustainability issues (66.2%; $n = 90$), and water issues (64.7%; $n = 88$), were the most selected SSI taught by SBAE teachers. The least selected SSI that respondents indicated they taught were climate issues (48.5%; $n = 66$), ecosystem and biodiversity issues (49.3%; $n = 67$), and energy issues (47.1%; $n = 64$).

Conclusions and Recommendations

The purpose of this research was to explore the self-efficacy, knowledge, and barriers to integration of SSI among SBAE teachers. We draw four major conclusions from the results of this study which include: many SBAE teachers lack knowledge about SSI; SBAE teachers believe they are able to integrate SSI; SBAE teachers believe there is a need to integrate SSI into agriculture courses; and SBAE teachers face barriers to integrating SSI.

SBAE Teacher Knowledge of SSI

Our findings show that many SBAE teachers are not familiar SSI as a term or framework. Given that the SSI-based instruction framework originated in science education, it might be that teachers with a science endorsement would have heard of SSI, however many SBAE teachers in this research do not have science endorsements and many who participated in this research had not heard of SSI prior to this survey. This suggests that SBAE teachers are not being exposed to SSI in their pre-service program or in-service professional development, thus not integrating them into their classes. SBAE teachers cannot be expected to incorporate content which they do not know about or understand.

SBAE Teacher Self-Efficacy with SSI

SBAE teachers believe they are efficacious when it comes to SSI integration. As has been suggested in previous research, individuals are motivated to act and think in a particular way by their self-efficacy (Bandura, 1995, 2009). In fact, a person's beliefs will also influence their self-efficacy (Bandura, 1995, 2009). Teachers are not immune to this phenomenon and as Roath and Hay (2016) point out, will spend less time teaching material, and use more teacher-centered strategies when their self-efficacy is lower. They also pointed out that teachers with lower self-efficacy make fewer attempts to motivate students (Roath & Hay, 2016).

The SSI-based instruction framework specifically identifies curriculum flexibility, knowledge of science content, and awareness of social considerations as key components to integrating SSI. Results of this research suggest teachers believe they have flexibility and can use various teaching strategies in their classes. They also are confident in their own ability to effectively teach SSI.

The first time SBAE teachers will learn about SSI could be in their pre-service program or through professional development they will participate in once they are already in the classroom. Professional development can increase self-efficacy for in-service teachers. Learning about SSI, the SSI-based instruction framework, and teaching strategies to integrate SSI during

professional development allows in-service teachers to learn with their peers and implement what they have learned in their classrooms, potentially improving their teaching self-efficacy for SSI as well.

SBAE Teachers' Perceived Need to Integrate SSI

Teachers in this study overwhelmingly agreed there is a need to integrate SSI into agricultural education curriculum, however the data from this research does not suggest many SBAE teachers are actually doing it. Even though they agree SSI are needed in SBAE, teachers may not be integrating them if they do not see the alignment to their standards. The SSI-based instruction framework advises an essential element of successful SSI integration is the connection to state and national education standards (Presley et al., 2013). Although Shoulders and Myers (2013) reinforced the understanding that SSI-based instruction is useful in improving students' science content knowledge, explicitly making connections between SSI and SBAE education standards will ensure SBAE teachers have a perceived need to integrate SSI. Otherwise, teachers will not integrate what they do not need. Taking into consideration the mean for teachers' perceived need to integrate SSI was higher than the mean for self-efficacy, teachers appear to know SSI is important, but their self-efficacy for teaching it is lacking. This is evidenced in the low numbers of SSI integration.

Barriers to Integrating SSI

Teachers can be apprehensive when it comes to integrating unfamiliar content or new teaching strategies. Thus, the SSI-based instruction framework asserts that teachers need support and encouragement when implementing SSI into their curriculum (Presley et al., 2013). This support may be in the form of professional development to learn about the SSI content, curriculum design, or teaching strategies. Administrators and community members should also be supportive when teachers integrate often-controversial SSI, so teachers are not concerned about potential repercussions or criticism when tackling these difficult topics. Our findings show that the majority of SBAE teachers felt supported by their administration and community.

Recommendations

Based on the results of this research, we have recommendations for practice as well as for research. In terms of practice, agriculture teacher educators should include the SSI-based instruction framework in pre-service agricultural education courses. Future agriculture teachers will gain a better understanding of these issues and their impacts on society, agricultural education, and the agriculture industry. Introducing pre-service agriculture teachers to the SSI topics that are plaguing society, especially those that have connections to agriculture, will enable them to help their future students learn about these issues and how they, as future agriculturists, can have an impact on the solutions to these issues. Pre-service exposure to SSI should focus on methodologies of teaching SSI topics. In-service professional development should also be offered to SBAE teachers to inform them of SSI and the SSI-based instructional framework. Learning about SSI will help SBAE teachers provide contextual experiences for their students, enabling students to form their own opinions about these issues and increasing student interest in

activism toward SSI. Finally, National and state SBAE content standards should be updated to include SSI.

We recommend future research go beyond this study and explore more deeply the teaching strategies and resources SBAE teachers are using when teaching SSI. More precisely, research should focus on the design elements of the curriculum and the experiences of the learners as they relate to the SSI-based instruction framework. This research would benefit from an observational, qualitative approach to not only identify those strategies and resources being used, but also observe how they are being used in SBAE classrooms.

Determining the impacts of including SSI and the SSI-based instruction framework in pre-service agriculture teacher preparation programs as well as in-service professional development is an important next step. Exploring impacts on the self-efficacy of SBAE teachers related to SSI and their integration into agricultural education curriculum is important to furthering the connection between SSI and SBAE. Further research exploring barriers related to SSI, experienced by teachers at different stages in their careers as well as possible barriers influenced by location of the SBAE program should be conducted. This research would be beneficial to inform teacher preparation programs and professional development opportunities in the areas most needed. Research should also be conducted to discover the self-efficacy and knowledge of pre-service agriculture teacher educators related to SSI and the SSI-based instruction framework. Ensuring that teacher educators are positioned to integrate SSI and the SSI-based instruction framework into pre-service agricultural teacher education programs is essential.

Although the response rate for this research was not large enough to be generalizable to the SBAE teacher population the research provides important information related to SBAE teachers' self-efficacy, knowledge of, and integration of SSI. While the previous research exploring SSI and SBAE focused primarily on curriculum and instruction of SSI topics (Cross, 2019; Shoulders 2012), the field of agricultural education must know where SBAE teachers are in terms of their own knowledge and self-efficacy of teaching SSI before teachers can be expected to teach SSI in their classes. Understanding SBAE teachers' knowledge and beliefs about SSI is essential to furthering the integration of SSI into SBAE curriculum. This research helps provide a better understanding of SBAE teachers' knowledge, beliefs, and perceived barriers related to SSI and contributes to the research began by Shoulders (2012) and Cross (2019).

The complex challenges facing society are a priority for many stakeholders in education and in agriculture. SBAE students, have the potential to be change makers and instrumental in ensuring that agriculture and education play an active part in solving these complex issues. Advancing our understanding of SSI and ensuring students are agriculturally and scientifically literate will establish SBAE's seat at the table when it comes to impacting solutions of significant and complex SSI.

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Secondary Agricultural Education Instructors' Perceived Importance and Ability when Accommodating Students with Special Needs

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Abstract

Each year, the number of students with a documented disability in public schools in the U.S. has increased. However, SBAE instructors continue to identify a lack of confidence when teaching students with exceptionalities. This lack of confidence has been exacerbated by a lack of professional development regarding teaching students with special needs. To better understand this issue, this investigation sought to describe Louisiana SBAE instructors' educational experiences in accommodating students with special needs and describe their desired professional development opportunities. This study employed a Borich style online survey in which participants indicated their perceived importance and ability when accommodating different disability categories as well as utilizing specific strategies when teaching students with special needs through mean weighted discrepancy scores (MWDS). Findings identified the need for additional professional development for Louisiana SBAE instructors, specifically concerning disability types of blindness or visual impairment, deafness or hearing impairment, autism, and emotional or behavioral disorders. In addition, agricultural teachers desired to better understand the legal regulations of teaching students with exceptionalities in the classroom as well as through FFA and SAE activities. As a result of the investigation, recommendations for tailoring professional development for Louisiana SBAE instructors were provided.

Introduction and Literature Review

Historically, agricultural education has served an essential role in developing the employability skills of students with special needs (Lundry et al., 2015; Wonacott, 2001). Specifically, the hands-on application of the agricultural education curriculum has been shown to provide positive outcomes for students with a variety of learning needs (Harvey, 2001; McLeskey & Weller, 2000). As a result almost one-fifth of school-based agricultural education (SBAE) students in the United States were identified as having a learning disability in 2011 (Easterly & Myers, 2011). This comes at a time when public school accountability has demanded school systems more accurately meet students' needs (Dormody et al., 2006). The hands-on application of agricultural skills has allowed students with special needs to cultivate occupational skills and a positive self-identity that can be applied to life post-graduation and ultimately increase employment opportunities (Bowling & Ball, 2020; Hansen et al., 2003; Harvey, 2001). However, to meet the diverse needs of agricultural education students, SBAE instructors must be provided adequate training through formalized education and professional development training (Stair, 2009).

The Education for All Handicapped Children act was passed in 1975 and has been regarded as one of the first critical pieces of legislation designed to protect the rights of students with special needs (USDOE, 2010). Legislation has evolved over time, and students with special needs have

most recently been served through the Individuals with Disabilities in Education Act (IDEA). IDEA is comprised of thirteen categories of disabilities: including (a) autism spectrum disorder, (b) blindness or a visual impairment, (c) deaf-blindness, (d) developmental delay, (e) emotional disturbance, (f) hearing impairments, including deafness, (g) intellectual disability, (h) orthopedic impairment, (i) other health impairments, (j) specific learning disabilities, (k) speech or language disabilities, (l) traumatic brain injury, and (m) developmental delay (IDEA, 2004). Although students in this population have increased in prevalence over the past 50 years (NCES, 2020), research has indicated teachers have been historically underprepared to teach these individuals (Hoerst & Whittington, 2009; Stair et al., 2010). In agricultural education, research has shown teachers often disagree that their teacher preparation programs prepared them to teach with students with unique learning needs (Hoerst & Whittington, 2009; Stair et al., 2010).

In addition to formal training, professional development programs have been identified as a critical support system for teachers in the classroom as they seek to address deficiencies and emergent changes in education (Birman et al., 2000; Easterly & Myers, 2018; Ruhland & Bremer, 2002). Alquraini and Gut (2012) emphasized education should be an ongoing process for educators and professional development was essential to help teachers succeed. Further, relationships have been identified between SBAE instructors engagement in professional development and career satisfaction (Easterly & Myers, 2019). However, not all professional development programs have been created equal. The most effective opportunities have been designed to address teachers' specific needs, which may differ based on a variety of contextual variables. For example, Louisiana agricultural education teachers in all career stages have reported they desired more professional development opportunities to teach learners with special needs better (Roberts et al., 2020). Additionally, recent work conducted by Stair et al. (2019) analyzed the professional development needs of school-based agricultural education (SBAE) teachers in Louisiana based on traditional and alternative certification. An analysis between these two groups identified different professional development needs by licensure type and further acknowledged that professional development needs were not static and changed over time. Consequently, more research was warranted to understand the challenges of SBAE teachers as they accommodate students with special needs to help ensure they can be retained in the profession.

Purpose and Research Objectives

The twofold purpose of this investigation was to identify Louisiana SBAE teachers' (1) previous education regarding teaching students with special needs and (2) desired professional development opportunities when accommodating students with special needs. This research aligned with the American Association for Agricultural Education's National Research Priority 4: *Meaningful, Engaged Learning in All Environments* (Edgar et al., 2016). Three research objectives guided this investigation:

1. Identify the education received by Louisiana SBAE teachers regarding teaching students with special needs.
2. Identify the discrepancy between importance and ability of Louisiana SBAE teachers when accommodating students with special needs.
3. Identify the discrepancy between importance and ability of Louisiana SBAE teacher regarding inclusion strategies for students with special needs.

Conceptual Framework

Teacher perceptions often guide the success of inclusive practices. As such, the conceptual framework grounding this investigation was the Borich (1980) needs assessment model. This model outlined critical components that define the format and quality of data collection regarding professional development needs (Borich, 1980). Therefore, it is often used to describe teachers' training needs by identifying discrepancies between the perceived importance of a topic compared to an individual's professional knowledge or ability in that area. In this context, training needs were defined as "a discrepancy between an educational goal and trainee performance in relation to this goal" (Borich, 1980, p. 39). Typically, questionnaires that employ the Borich model have been formatted using a two-step response in which participants rank their perceived importance followed by their perceived level of competence. The difference between an individual's perceived importance and perceived competence will then be calculated to determine a Mean Weighted Discrepancy Score (MWDS) for each item in the construct.

Methodology

Instrument Design

Using the Borich (1980) model, an instrument was developed that consisted of two constructs and additional demographic information. The two constructs provided participants with 37 double-matrix competencies containing disability types as well as strategies on the successful inclusion of students with special needs. Participants were asked to respond to each competency twice on a four-point scale, first by rating the self-perceived importance of the information and then by rating their self-perceived ability.

The first construct included 11 competencies and asked participants to indicate their perceived importance and perceived degree of competence when accommodating disabilities recognized by IDEA, which included: (a) attention deficit hyperactivity disorder (ADHD), (b) autism spectrum disorder, (c) blindness or a visual impairment, (d) deaf or hearing impairment, (e) emotional or behavioral disorder, (f) intellectual disability, (g) orthopedic impairment, (h) other health impairments (not including ADHD), (i) specific learning disabilities, speech or language disabilities, and (j) traumatic brain injury. Due to the prevalence of ADHD in the general student population, it was removed from being included with Other Health Impairments and provided its own category in the instrument. The second construct included 27 competencies regarding inclusion strategies for students with special needs in SBAE, which were sourced from instruments created by Kessell (2005) and Stair (2009).

Content validity was established through an expert panel review of three agricultural education faculty members who determined the instrument to be valid. Prior to instrument distribution, a pilot study was conducted with SBAE instructors in a neighboring state, which was selected due to the similarity of demographics as compared to SBAE instructors in Louisiana. The pilot study data concluded with 25 responses. Reliability was established by Cronbach's alpha through analysis of each item on the two constructs that consisted of three data groups. The reliability scores included: Construct One – Grouping One, importance ($\alpha = 0.922$) and competence ($\alpha = 0.896$); Construct Two – Grouping Two, importance ($\alpha = 0.944$) and competence ($\alpha = 0.908$);

and Grouping Three, importance ($\alpha = 0.973$) and competence ($\alpha = 0.930$), indicating strong reliability.

Data Analysis

Research objective one sought to determine the education received by SBAE instructors in Louisiana when teaching students with special needs. Therefore, results from this objective were analyzed by employing descriptive statistics (e.g., frequency, mean, and percentage). Research objectives two and three aimed to describe the discrepancy between Louisiana instructors' self-perceived importance and ability regarding disability classifications and inclusions strategies for students with special needs in SBAE. To meet the needs of objective two, MWDS was calculated and placed in descending rank order.

For the first research objective, data were analyzed using SPSS Version 26. Regarding objectives two and three, a Microsoft Excel based MWDS calculator (McKim & Saucier, 2011) was employed to determine a discrepancy score for each competency in the two constructs (Borich, 1980). Specifically, a discrepancy score was calculated for each participant's response by subtracting the indicated degree of importance by the degree of ability (Garton & Chung, 1997). Next, the weighted discrepancy score was calculated by multiplying the individual competency discrepancy score by the mean importance rating of the competency (Garton & Chung, 1997). The MWDS for each competency was then calculated by dividing the sum of the weighted discrepancy scores for the competency by the number of participants who responded (Garton & Chung, 1997).

Population and Sample

The target population of this study was SBAE instructors in Louisiana ($N = 267$). To collect data, we employed the Dillman et al. (2014) tailored design approach to facilitate the collection of data through email. An initial email was sent to all SBAE teachers in Louisiana informing them of the study by state FFA staff. Follow-up emails with a link to the questionnaire were also sent by Louisiana FFA state staff using the Louisiana FFA listserv. We used this approach to minimize coverage error in the study (Dillman et al., 2014). Following email communication, participants were contacted through phone calls asking them to complete the survey. Of those that chose to participate ($n = 102$), 64 completed the instrument in its entirety for a response rate of 24%. Of the initial 102 that chose to participate, 22 did not complete the first grouping, an additional seven did not complete the second grouping, and eight did not complete the last grouping.

Nonresponse error of the investigation was approached through a comparison of early to late respondents. For the purpose of this comparison, early respondents were the first 25% of participants ($n = 18$) to complete the survey and the late respondents were the last 25% of participants ($n = 19$) to complete the survey. Respondent groups were then compared through a t-test to compare participant demographic of age, gender, licensing certification method, and years teaching. No statistically significant differences were present in age, years teaching, or licensure certification method. However, a statistically significant difference was detected for

gender, with more male responses being present in the last 25% of respondents. Prior literature has shown male participants being more likely to complete a survey following a reminder email, which aligns with males falling in the late response rate of this investigation and responding after multiple reminder emails were sent (Saleh & Bista, 2017). However, due to discrepancies between early and late respondents, it was determined the results from this investigation were not generalizable to participants outside of this investigation (Linder et al., 2001).

Respondents consisted of 31 (48.40%) males and 33 (51.60%) females. When asked about their highest degree earned, 35 (54.70%) participants indicated they had achieved a bachelor's degree, 23 (35.90%) indicated a master's degree, four (6.30%) possessed a specialist or sixth-year degree, and two (3.10%) participants had earned a doctoral degree. Regarding the teacher education credential pathway, 39 (60.90%) participants received their teaching license from a traditional Bachelor of Science program, eight (12.50%) participants received their alternative licensure from a Master of Science program, and 17 (26.60%) received their licensure from other alternative pathways.

Findings

Research Objective One

Research objective one sought to describe the education received by Louisiana SBAE instructors ($n = 64$) regarding teaching students with exceptionalities. Education was defined as information gained through a formal setting of a college course centered on students with special needs or members of the exceptional population. In all, 44 (68.80%) participants indicated they had completed a college course focused on working with students with special needs, while 20 (31.30%) participants indicated they had not.

Of the 44 (68.80%) participants who had completed a college course that included methods of teaching students with special needs, 40 (90.90%) reported the course was a requirement of their degree, and four (9.10%) reported they took the course as an elective. Participants were also asked to report the number of credit hours completed related to teaching students with special needs. Of the 38 participants who reported the number of course hours completed, 19 (50%) participants reported taking three credit hours related to special education coursework. An outlier was present from one participant who completed 36 course hours as a component of completing a special education certification.

Research Objective Two

Research objective two employed the Borich needs assessment model to identify the discrepancy between importance and ability regarding specific disability categories. The Borich needs assessment model allowed for the identification of participants self-perceived level of importance of 11 disability types identified by IDEA (2004) as well as their associated educational impacts. These included (a) ADHD, (b) autism spectrum disorder, (c) blindness or visual impairment, (d) deaf or hearing impairment, (e) emotional or behavioral disorder, (f) intellectual disability, (g) orthopedic impairment, (h) other health impairments (not including ADHD), (i) specific learning disabilities, (j) speech or language disabilities, and (k) traumatic

brain injury. Due to its prevalence, ADHD was removed from Other Health Impairments and given a separate category within the instrument.

Participants were asked to describe the importance of each of the 11 disability categories on a scale of one to four with one being *not relevant* and four being *very relevant*. Of the 11 disabilities types, *autism* ($M = 3.62$; $SD = 0.54$), *emotional or behavioral disorder* ($M = 3.58$; $SD = 0.61$), and *ADHD* ($M = 3.41$; $SD = 0.71$) were perceived to be of the greatest importance to participants. The three disability types perceived to be of lowest importance by participants were *orthopedic impairments* ($M = 3.06$; $SD = 0.93$), *other health impairments (not including ADHD)* ($M = 3.14$; $SD = 0.90$), and *traumatic brain injury* ($M = 3.15$; $SD = 1.00$). The mean level of importance for the 11 presented disability competencies was 3.34 ($SD = 0.18$) and ranged from 3.06 to 3.62 (see Table 3).

Participants were then asked to describe their perceived ability to teach each of the disability classifications on a scale of one to four with one being *not competent* and four being *extremely competent*. Of the perceived ability to teach different disability types, participants felt most competent when teaching students with *ADHD* ($M = 3.18$; $SD = 0.62$), *intellectual disability* ($M = 2.73$; $SD = 0.78$), and *autism* ($M = 2.71$; $SD = 0.70$). Participants reported the lowest self-perceived competence related to the disability categories of *traumatic brain injury* ($M = 1.91$; $SD = 0.91$), *blindness or visual impairment* ($M = 1.95$; $SD = 0.93$), and *deaf or hearing impairment* ($M = 2.03$; $SD = 0.89$). The mean level of ability of the 11 presented disability competencies was 2.48 ($SD = 0.38$), and ranged from 1.91 to 3.18 (see Table 1)

In analyzing the discrepancy between importance and ability, MWDS were determined for each disability type. The three disability types of highest MWDS reported were *blindness or visual impairment* ($MWDS = 4.59$), *deaf or hearing impairment* ($MWDS = 4.17$), and *traumatic brain injury* ($MWDS = 3.91$) (see Table 3).

Table 1

Mean Weighted Discrepancy Scores regarding Louisiana SBAE Teachers' Perceived Level of Importance and Ability when Working with Studnets with Special Needs (n = 79)

Rank	Competency	MWDS	Importance		Ability		<i>f</i>
			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1	Blindness or Visual Impairment	4.59	3.33	1.00	1.95	0.93	79
2	Deaf of Hearing Impairment	4.17	3.29	1.00	2.03	0.89	79
3	Traumatic Brain Injury	3.91	3.15	1.00	1.91	0.91	79
4	Autism	3.44	3.62	0.54	2.71	0.70	79
5	Emotional or Behavioral Disorder	3.31	3.58	0.61	2.66	0.73	79
6	Speech or Language Disability	3.09	3.34	0.78	2.42	0.83	79
7	Specific Learning Disabilities	3.08	3.48	0.70	2.59	0.86	79
8	Intellectual Disability	2.08	3.35	0.72	2.73	0.78	79
9	Other Health Impairments (not including ADHD)	1.83	3.14	0.90	2.59	0.69	79
10	Orthopedic Impairment	1.63	3.06	0.93	2.53	0.81	79
11	Attention Deficit Hyperactivity Disorder (ADHD)	0.78	3.41	0.71	3.18	0.62	79

Mean rating for scales (Importance and Ability)	3.34	0.18	2.48	0.38
Overall MWDS	2.84			

Research Objective Three

The third research objective sought to describe the discrepancy between participants' perceived degree of importance and ability regarding the 26 inclusion strategies as identified by Stair (2009) and Kessel (2005). Of the 26 competencies, three were reported to have the highest degree of perceived importance which included *utilizing methods to foster a sense of acceptance and inclusion for a student with a disability while in the classroom* ($M = 3.70$; $SD = 0.55$), *implementing procedures outlined in a student's IEP* ($M = 3.67$; $SD = 0.57$), and *providing an inclusive classroom atmosphere for students with special needs* ($M = 3.65$; $SD = 0.56$). The three skill competencies with the lowest perceived importance by participants were *attending [State Ag Teachers Conference] events focused on teaching students with disabilities* ($M = 3.26$; $SD = 0.75$), *receiving adequate education and training for teaching students with special needs through [State Ag Teachers Conference] opportunities* ($M = 3.42$; $SD = 0.69$), and *successfully evaluating the academic performance of students who have special needs* ($M = 3.43$; $SD = 0.69$). The level of perceived importance that participants reported for competency skills related to inclusion practices ranged from 3.70 to 3.26, and had an average, or mean, of 3.56 ($SD = 0.62$).

Regarding ability, participants indicated highest perceived ability in *modifying assignments or activities according to a student's IEP* ($M = 3.14$; $SD = 0.70$), *teaching students who possess any type of disability* ($M = 3.14$; $SD = 0.70$), and *providing an inclusive classroom atmosphere for students with special needs* ($M = 3.12$; $SD = 0.60$). Participants identified the lowest perceived ability in three competencies, which included *providing inclusive travel opportunities for students with disabilities in the FFA chapter* ($M = 2.58$; $SD = 0.85$), *providing accommodations for students when competing in FFA activities* ($M = 2.59$; $SD = 0.90$), and *understanding legal regulations of teaching students who possess special needs, not only in the classroom but also when including these students in FFA and SAE opportunities* ($M = 2.64$; $SD = 0.80$). The self-perceived ability of participants ranged from 3.14 to 3.58. The mean level of perceived ability of participants was 2.86 ($SD = 0.74$).

Regarding the discrepancy between importance and ability, strategies identified as the highest need were *understanding legal regulations of teaching students who possess special needs, not only in the classroom but also when including these students in FFA and SAE opportunities* ($MWDS = 3.54$), *receiving adequate education and training for teaching students with special needs through professional development* ($MWDS = 3.51$), and *providing accommodations for students when competing in FFA activities* ($MWDS = 3.31$) (see Table 2).

Table 2

Mean Weighted Discrepancy Scores regarding Louisiana SBAE Teachers' Perceived Level of Importance and Ability of Inclusions Strategies for Working with Students with Special Needs

Rank	Competency	MWDS	Importance		Ability		f*
			M	SD	M	SD	

1	Understanding legal regulations of teaching students who possess special needs, not only in the classroom but also when including these students in FFA and SAE opportunities.	3.54	3.62	0.70	2.64	0.80	64
2	Receiving adequate education and training for teaching students with special needs through professional development.	3.51	3.42	0.69	2.39	0.76	72
3	Providing accommodations for students when competing in FFA activities.	3.31	3.53	0.55	2.59	0.90	64
4	Attending professional development events focused on teaching students with disabilities.	3.22	3.26	0.75	2.28	0.88	72
5	Understanding special education law.	3.22	3.62	0.57	2.74	0.69	72
6	Following the requirements found in special education law.	3.16	3.61	0.62	2.74	0.82	72
7	Providing inclusive travel opportunities for students with disabilities in the FFA chapter.	3.09	3.47	0.65	2.58	0.85	72
8	Providing accommodations for students when competing in SAE activities.	3.03	3.53	0.67	2.67	0.86	64
9	Identifying approved practices when teaching students with special needs.	2.68	3.50	0.62	2.73	0.74	64
10	Seeking out additional resources to better prepare oneself for teaching students with disabilities.	2.68	3.44	0.63	2.67	0.79	72
11	Creating accommodations for students with physical disabilities.	2.65	3.61	0.61	2.88	0.72	64
12	Utilizing methods of accommodating students with special needs in extended classroom environments.	2.61	3.62	0.60	2.91	0.79	64
13	How to best communicate with students with special needs when building a mentorship.	2.59	3.61	0.63	2.89	0.73	64
14	Creating a least restrictive classroom environment for all students.	2.54	3.61	0.70	2.91	0.58	64
15	Involving students with special needs in the FFA chapter.	2.43	3.64	0.56	2.97	0.80	72

16	Providing physical accommodations for students with special needs.	2.38	3.57	0.60	2.90	0.70	72
17	Implementing procedures outlined in a student's IEP.	2.35	3.67	0.57	3.03	0.80	64
18	Utilizing methods of accommodating students with special needs while in the classroom.	2.03	3.61	0.55	3.05	0.65	64
19	Providing appropriate learning opportunities for all students.	1.96	3.63	0.59	3.08	0.69	72
20	Providing an inclusive classroom atmosphere for students with special needs.	1.93	3.65	0.56	3.12	0.60	72
21	Modifying assignments or activities according to a student's IEP.	1.71	3.61	0.62	3.14	0.70	72
22	Managing behavior of students with special needs.	1.62	3.53	0.63	3.07	0.68	72
23	Teaching students who possess any type of disability.	1.59	3.58	0.62	3.14	0.70	72
24	Effectively participating in IEP development procedures.	1.40	3.47	0.71	3.07	0.76	72
25	Successfully evaluating the academic performance of students who have special needs.	1.29	3.43	0.69	3.06	0.69	72
26	Utilizing methods to foster a sense of acceptance and inclusion for a student with a disability while in the classroom.	1.19	3.70	0.55	3.19	0.73	64
Mean rating for scales (Importance and Ability)			3.56	0.62	2.86	0.74	
Overall MWDS		2.45					

Note. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Extremely Important*; Ability Scale: 1 = *No Ability*, 2 = *Slight Ability*, 3 = *Moderate Ability*, 4 = *Extremely Able*. *Participant frequency varied due to participant's incompleteness of the second chart of presented competencies.

Conclusions, Discussions, Recommendations

The purpose of this investigation was to describe Louisiana SBAE teachers' (a) previous education regarding teaching students with special needs and (b) desired professional development opportunities regarding accommodating those students in the classroom. As a result of this investigation, we concluded the majority of teachers completed some special education coursework in a teacher preparation program. However, discrepancies existed among participants concerning their confidence to teach students with special needs. We interpreted this as indicating a need for professional development for teachers in Louisiana. This supported the

findings of previous investigations in agricultural education (Aschenbrener et al., 2010; Faulkner & Baggett, 2010; Kessell et al., 2009; Ruhland & Bremer, 2002; Stair et al., 2019).

Research objective one sought to describe the education received by Louisiana SBAE teachers related to teaching students with special needs. The majority of participants indicated they had completed some coursework designed to prepare them to teach students with special needs, however, most participants who completed coursework reported they had only completed one special education course during their teacher preparation program. This conclusion was consistent with prior research that has indicated preservice coursework in special education has often been required; however, the training may not have been extensive enough to help teachers feel adequately prepared (Faulkner & Baggett, 2010; Kessell et al., 2009; Stair et al., 2019). Therefore, we concluded that even if participants received preservice education focused on teaching students with special needs, the limited extent of the course may not have provided adequate time for the development of teachers' positive perceptions and strategies to accommodate students with special needs.

Research objective two described the discrepancies between participants' perceived importance and ability when teaching students with disabilities based on 11 disability types. Of the 11 disability types, participants indicated the most significant discrepancies were for blindness or visual impairment, deaf or hearing impairment, and traumatic brain injury. This discrepancy further reiterated the overarching professional development needs of SBAE instructors in Louisiana when teaching students with special needs – a finding aligned with prior research (Stair et al., 2016). Kessell (2005) reported that nearly 20% of preservice teachers identified a lack of confidence when teaching students who were deaf or had a hearing impairment. Because accommodating these disability types requires advanced training, this need should be addressed through professional development moving forward (RMTC-D/HH, 2020). In Louisiana, blindness and low-vision have historically represented less than 5% of the total student population (Louisiana Department of Education, 2019). However, even with its low prevalence, findings from this investigation indicated accommodating students with more severe disabilities has left teachers unprepared to address such in their classrooms. In many instances, professional development on special education has been too broad and only addressed an overview of special education. Based on this study's results, providing specialized professional development geared to each disability type may be a more effective option to prepare teachers to teach diverse learners.

Research objective three described the discrepancy between participants' perceived importance and ability when implementing inclusive strategies in their classrooms and programs. Of the included strategies, participants identified the greatest discrepancy in the following areas: *understanding legal regulations of teaching students who possess special needs, not only in the classroom but also when including these students in FFA and SAE opportunities* (MWDS = 3.54), *receiving adequate education and training for teaching students with special needs through professional development opportunities*, and *providing accommodations for students when competing in FFA activities*. Conclusions of the investigation aligned with prior work by Hoerst and Whittington (2009), who found 80% of Ohio SBAE instructors indicated a need for additional training when engaging students in the FFA program. FFA involvement has been considered a critical component of all students' experience in a total agricultural education

program (Croom & Flowers, 2001; NAAE, 2021). If SBAE teachers do not feel competent when accommodating students in FFA activities, students with special needs may be less likely to be included in such events. Therefore, more training is needed within areas of special education that directly influences teachers' perceptions and students' experiences in the SBAE program (Johnson et al., 2012; McCray & McHatton, 2011). Although this investigation builds on previous work in the state regarding the lack of education and training of SBAE instructors (Stair et al., 2016), it also expanded knowledge regarding the disability types and inclusive strategies teachers desired to gain more insight on through professional development.

Each year, the number of students with special needs has increased in U.S. public schools, resulting in a record high of 14% of students with a documented disability during the 2018–2019 school year (NCES, 2020). With the rise of this population, Pirtle (2012) identified an immediate need to ensure SBAE classrooms promote the inclusion of all students. To address this need, teacher preparation programs should expand opportunities for preservice teachers to gain confidence and experience accommodating students with disabilities (Stair, 2009). We also recommend teacher preparation courses tailor instruction based on the disability types of students, accommodation methods, and inclusive strategies. However, pre-service education methods are not enough to ensure teachers are fully prepared to teach such a wide variety of students. Therefore, we recommend diverse professional development be offered in Louisiana to better support SBAE teachers as they accommodate the various disability types of students identified in this investigation.

We also recommend this study be replicated to identify the education and professional development needs of SBAE instructors when accommodating students with special needs at the regional and national levels. Further, the investigation of the professional development needs of SBAE teachers should be conducted regularly to determine the changing needs of the profession when teaching students with exceptionalities. Licensure programs, both traditional and alternative, should also ensure preservice teachers have been provided with educational experiences that incorporate meaningful content and classroom observations that feature teaching students with special needs. Additionally, curricular experiences in teacher preparation programs should not only prepare teachers to successfully teach students with a disability in the classroom successfully but also in laboratories, Supervised Agricultural Experiences (SAEs), and the FFA (Hoerst & Whittington, 2009; Kessell et al., 2009). In addition, coursework should provide instruction on the federally recognized disability types, and the legalities teachers may face when accommodating students. Finally, we also recommend preservice teachers complete classroom observations to gain more experience observing successful strategies to accommodate students with special needs.

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The Dualism of Interdisciplinarity: A Model for Agriculture, Food, and Natural Resources Education

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Interdisciplinary in an increasingly popular term in educational settings. Analysis of the term reveals two meanings, a characteristic of an individual (i.e., interdisciplinary thinking) and a characteristic of a group (i.e., interdisciplinary collaborations). This paper serves to delineate those two meanings while building a conceptual model of the relationship between interdisciplinary thinking and collaboration wherein the two are mutually reinforcing educational experiences. In addition to modeling the two interdisciplinary outcomes, transitional processes are described. The first transitional process, transfer of interdisciplinarity, encourages learner transition from interdisciplinary thinking to participating in interdisciplinary collaborations, including a focus on working in teams, appreciation for diversity, understanding the problem or phenomenon, and awareness of individual expertise. The second transitional process, experiential interdisciplinarity, attends to the individual knowledge constructed from interdisciplinary collaborations and includes learning through reflection, managing cognitive disequilibrium, and operationalizing diverse ideas. The resultant model provides a cyclical process for engaging learners in building interdisciplinary thinking and interdisciplinary collaboration skills. Recommendations are made for the application of the model in research and educational efforts to increase the interdisciplinarity of agriculture, food, and natural resources education.

Introduction

The term “interdisciplinary” has become increasingly associated with high quality education (Boix Mansilla et al., 2006). Defined as experiences which combine multiple disciplines to form an understanding of a phenomenon, or to solve a problem, interdisciplinary education represents a shift in traditional, disciplinary approaches (Boix Mansilla et al., 2000; Nikitina, 2006). The context of agriculture, food, and natural resources (AFNR) is inherently interdisciplinary (McKim et al., 2017). Within AFNR learning opportunities (e.g., secondary school classrooms, community workshops), the convergence of science, mathematics, social studies, ethics, English language arts, engineering, and other disciplines is expected in an effort to develop learner understanding of complex natural systems (Scherer et al., 2019). Research in interdisciplinarity suggests educational spaces which combine content from multiple disciplines better prepare learners to sustainably address complex problems like climate change, deforestation, hunger, and water scarcity (Borrego and Newswander, 2010; Jacob, 2015; Klein, 2008). Therefore, preparing learners to think in an interdisciplinary way is critical to giving current and future generations the best chance to address these wicked problems (Newell, 2010).

The concept “interdisciplinary,” however, is not reserved for learning experiences which meld multiple disciplines (Huutoniemi et al., 2010). Interdisciplinary also refers to collaborations among individuals representing multiple disciplines (e.g., communications, animal sciences, economics, and engineering represented among team members collaborating to develop and disseminate a new technology). Funding opportunities and research featuring interdisciplinary collaborations have grown in tandem with awareness that interdisciplinary teams are essential to

addressing problems which transcend traditional disciplinary boundaries (Bossio et al., 2013; Klein, 2008; Petri, 2010). Therefore, in addition to the need for interdisciplinary thinking, interdisciplinary collaborations are essential to solving complex and wicked problems.

The dual use of “interdisciplinary” to represent both thinking and collaboration presents challenges and opportunities. As examples, a potential for ambiguity exists regarding the term interdisciplinary, but, an opportunity for increased support exists for interdisciplinary work. In this theoretical manuscript, interdisciplinary thinking and interdisciplinary collaboration are delineated and their relationship modeled. By modeling the relationship, interactions between the two concepts are explored and practical strategies uncovered to develop both interdisciplinary thinking and collaboration among learners in AFNR contexts.

Purpose

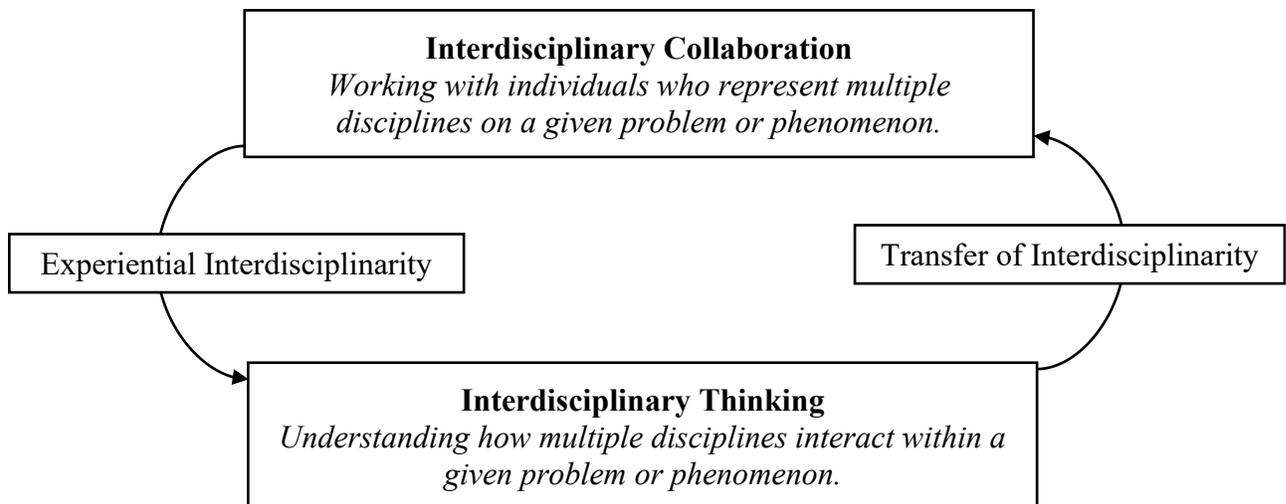
Acknowledging the need to bring together concepts related to interdisciplinarity, the current theoretical manuscript proposes and describes a model for research and practice which brings into alignment interdisciplinary thinking and interdisciplinary collaboration.

Model of Dualistic Interdisciplinarity

The model of dualistic interdisciplinarity, pictured in Figure 1, combines interdisciplinary collaboration and interdisciplinary thinking. Each element of the model is described below the figure.

Figure 1

Model of Dualistic Interdisciplinarity



Interdisciplinary Thinking

Interdisciplinary thinking is defined as *understanding how multiple disciplines interact within a given problem or phenomenon* and refers to the individual learner element of the model.

Interdisciplinary thinking represents the foundation of the model, as an individual's understanding of multiple disciplines is required to engage in collaborative work with individuals representing those disciplines (Bossio et al., 2013). Importantly, however, interdisciplinary thinking does not suggest an individual become an expert in all disciplines; instead, interdisciplinary thinking requires an individual acknowledge the contributions, or potential contributions, of multiple disciplines on a given problem or phenomenon. Pragmatically, the development of interdisciplinary thinking requires learners be engaged in experiences which continually illuminate the multitude of disciplines which contribute to, or could contribute to, a holistic understanding of a problem or phenomenon (McKim et al., 2016; Scherer et al., 2019).

Within AFNR education research, interdisciplinary thinking is often studied within the context of science, technology, engineering, and mathematics (STEM) integration. A 2019 study by Scherer et al. illuminated STEM integration occurs through a variety of instructional approaches, including problem-based learning, hands-on experiences, experiential learning, inquiry-based instruction, and competitions. The most commonly studied approaches were problem-based instruction, defined by learners engaging in real-world problems, design challenges, or AFNR-related projects and hands-on experiences which include the physical manipulation of objects related to the topic being learned (Scherer et al., 2019).

Interdisciplinary Collaboration

Interdisciplinary collaboration is defined as *working with individuals who represent multiple disciplines on a given problem or phenomenon* and refers to the social element of the model. Interdisciplinary collaboration represents the operationalization of interdisciplinary thinking; recognizing collaboration is essential for complex problem solving, the ability to utilize interdisciplinary thinking within collaborative teams is essential (Bossio et al., 2013; Newell, 2010). Pragmatically, interdisciplinary collaboration requires learning opportunities whereby individuals representing diverse disciplines are brought together to collaborate on a problem or phenomenon. In an educational context, interdisciplinary collaborations can be fostered between students enrolled in different disciplinary courses (e.g., students in science, engineering, and economics courses) *or* students enrolled in the same course who enact the roles of different disciplinary experts when discussing a problem or phenomenon.

The notion of interdisciplinary collaboration emerges from work on collaborative learning. Grounded in social learning theory, collaborative learning is described as two or more individuals working together in shared authority and acceptance to build consensus through cooperation (Laal & Ghodsi, 2012). Interdisciplinary collaboration expands this definition by highlighting each individual within the group represents a unique area of expertise. Five elements are important to fostering successful collaborations, (a) positive interdependence, (b) face-to-face interaction, (c) individual accountability and responsibility to achieve group goals, (d) use of interpersonal skills, and (e) continual group process evaluation and refinement (Johnson and Johnson, 1994). When successful, collaborative learning yields social benefits

(e.g., understanding of diversity), psychological benefits (e.g., increased self-esteem), and academic benefits (e.g., improved critical thinking skills) (Laal & Ghodsi, 2012).

Transfer of Interdisciplinarity

Existing research provides the foundation of knowledge from which interdisciplinary thinking and interdisciplinary collaboration are explored. However, when combined within the Model of Dualistic Interdisciplinarity, the transitions between these two elements are foregrounded. Importantly, these transitions provide the novelty and utility of this new way of thinking about interdisciplinarity. The first of these transitions is shifting from interdisciplinary thinking to interdisciplinary collaboration. *Transfer of interdisciplinarity* is defined as *the ability to utilize interdisciplinary thinking within collaborative groups* and represents the shift from an individual to social context within the model. Pragmatically, transfer of interdisciplinarity requires educational experiences which attend to four outcomes (see Table 1 for descriptions): (a) the ability to work in teams, (b) an appreciation for diversity, (c) an understanding of the problem or phenomenon, and (d) an awareness of individual expertise related to the problem or phenomenon.

Table 1

Transfer of Interdisciplinarity Skills

Pragmatic Skill	Description
The ability to work in teams.	A range of knowledge (e.g., stages of team development, member roles) and skills (e.g., emotional intelligence, conflict management) are associated with working in teams. Learning experiences must include opportunities for learners to construct this knowledge and develop these skills through content and practice.
An appreciation for diversity.	In preparation for working in interdisciplinary teams, individuals should engage in learning experiences which highlight the essential nature, and utility, of diverse perspectives, values, and backgrounds coming together.
An understanding of the problem of phenomenon.	Transitioning from an individual to collaborative context, learners must have a robust understanding of the problem of phenomenon in which they will be contributing ideas.
An awareness of individual expertise related to problem of phenomenon.	Interdisciplinary collaborations require each individual have an area of expertise they contribute to the problem of phenomenon. Therefore, the transition to collaboration requires individuals are aware of the expertise they bring to the collaboration.

Experiential Interdisciplinarity

The second transition is from interdisciplinary collaboration to interdisciplinary thinking. *Experiential interdisciplinarity* is defined as *the ability to utilize interdisciplinary collaborations to inform interdisciplinary thinking* and represents the shift from the social to individual context

within the model. Pragmatically, experiential interdisciplinarity requires educational experiences which attend to three outcomes (see Table 2 for descriptions): (a) the ability to develop knowledge through reflection upon experiences, (b) an ability to process through cognitive disequilibrium, and (c) an understanding of how to operationalize diverse ideas.

Table 2

Experiential Interdisciplinarity Skills

Pragmatic Skill	Description
The ability to develop knowledge through reflection upon experiences.	As informed by the experiential learning theory (Kolb, 1984), learning emerges from making meaning out of experience. Therefore, learning experiences must develop learners' ability to construct knowledge as lived experiences are reflected upon.
An ability to process through cognitive disequilibrium.	When working in interdisciplinary teams, knowledge is gained through the synergy of different disciplinary perspectives coming together. This melding of perspectives often juxtaposes a singular (i.e., individual or discipline) viewpoint; thus, individuals must cope with, and leverage, the resulting cognitive disequilibrium.
An understanding of how to operationalize diverse ideas.	In concert with cognitive disequilibrium, individuals must be prepared to incorporate the melded perspectives resulting from interdisciplinary collaborations into their own interdisciplinary thinking, including understanding how this new viewpoint changes their interaction with, and understanding of, problems and phenomena.

Conclusions and Discussion

With increasing momentum, “interdisciplinary” is becoming part of educational nomenclature (Boix Mansilla et al., 2006; Klein, 2008). However, evaluation of the concept yields two ways of conceptualizing the term: (a) a characteristic of an individual’s thinking and (b) a feature of a collaborative group. This theoretical abstract provides a model which delineates these two features while also showcasing their relationship and transitions between the two concepts of interdisciplinarity. The resulting model can be used by researchers, teachers, and other stakeholders to increase the interdisciplinarity, both thinking *and* collaboration, of AFNR education.

In addition to defining and differentiating interdisciplinary thinking and interdisciplinary collaboration, the model highlights two transitional processes, transfer of interdisciplinarity (i.e., shifting from interdisciplinary thinking to interdisciplinary collaboration) and experiential interdisciplinarity (i.e., shifting from interdisciplinary collaboration to interdisciplinary thinking). These transitional processes transform the Model of Dualistic Interdisciplinarity from a theoretical conceptualization to a practical tool for AFNR educators to encourage learners to be more individually and collaboratively interdisciplinary. Furthermore, the identification of outcomes (see Tables 1 and 2) associated with both transfer of interdisciplinarity and experiential

interdisciplinarity provide a roadmap for preparing learners to shift between interdisciplinary thinking and interdisciplinary collaboration.

The transitional processes found within the model also illuminate the cyclical nature of interdisciplinary learning. The cyclical nature implies individuals must navigate transitions between individual and social learning opportunities, wherein individual experiences strengthen disciplinary perspective while acknowledging the value, or potential value, other disciplines provide to a phenomenon or problem. Likewise, collaborative experiences provide learners with opportunities to cross disciplinary boundaries in collaboration with individuals diverse in background, knowledge, and perspectives to meld ideas, understanding, and solutions on a phenomenon or problem. Throughout the interdisciplinary cycle, educators should facilitate transitions between individual and collaborative experiences while also attending to transfer of interdisciplinarity and experiential interdisciplinarity.

The model of dualistic interdisciplinarity has the potential to unify research and practice-based efforts in education focused on interdisciplinarity. As Scherer et al. (2019) suggested in their review of interdisciplinary scholarship within AFNR education, the lack of a comprehensive teaching framework for STEM integration within AFNR leaves scholars and practitioners without a guide to promote complementary efforts. By linking interdisciplinary thinking and interdisciplinary collaboration in a cyclical process of interdisciplinary learning, the model of dualistic interdisciplinary empowers both educators and researchers with a comprehensive framework for understanding, and increasing, the development of interdisciplinary knowledge and skills throughout AFNR education.

Recommendations

As a draft model of the relationship between interdisciplinary thinking and interdisciplinary collaboration, continued work is needed to strengthen the ideas presented. Therefore, recommendations emerging from this work favor research over practice. Scholars are encouraged to challenge, critique, and expand upon the Model of Dualistic Interdisciplinarity using theoretical, conceptual, and/or empirical approaches. Additionally, pragmatic evaluations of the model within aligned educational spaces are encouraged alongside evaluations of educators who have implemented these approaches. Finally, from a holistic perspective of AFNR Education, our discipline should be actively seeking opportunities to emerge as a leader in the scholarship and practice of interdisciplinary thinking and interdisciplinary collaboration. The interdisciplinary context of AFNR systems provides a valuable head start to inform education, as a whole, on these important topics.

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Core Academic Offerings in Michigan Agriculture, Food, and Natural Resources Education Programs

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Abstract

Offering core academic credits (e.g., math, science) for completing agriculture, food, and natural resources (AFNR) coursework at the secondary school level has the potential to increase the strength of the AFNR program as well as student interdisciplinary learning. Informed by the Career and Technical Education Student Typology, we explored the scope of core academic offerings in Michigan AFNR programs, including the frequency of core academic offerings, AFNR course types in which core academics are offered, and types of core academic credit obtained. Findings indicate 95.00% of Michigan teachers responding to the survey offered some form of core academic credit through their AFNR coursework. Additionally, findings suggest science is the most obtained core academic credit and the predominance of core academic credit is being offered in introductory course types within AFNR programs. These findings, among others, were synthesized into three conclusions which focus on the frequency of core academic offerings, strength of science as an integrated discipline, and identified opportunities to expand core academic offerings. The paper concludes with a roadmap for continued efforts to enhance core academic offerings and AFNR programs via a combination of research and practice.

Introduction

Strong organizations rely on a sustained pipeline of motivated and engaged members (Winston, 2011). Therefore, the strength of a secondary school agriculture, food, and natural resources (AFNR) program is determined, in part, by the recruitment and retention of students (Myers et al., 2003). The programmatic feature perceived by teachers to be most effective and, thus, most frequently implemented to recruit students into AFNR programs is providing academic credit (e.g., science, math) for completing AFNR coursework (Nowakowski & McKim, 2021). Providing academic credit via elective coursework allows students to explore and strengthen their interests in AFNR, for example, while also meeting graduation requirements which are increasingly weighted toward core academics (Aliaga et al., 2012).

The benefits of offering core academic credit within AFNR coursework, however, are not reserved to student recruitment. Providing a learning space where core academic content and AFNR can be learned in congruence draws student attention to the overlap between multiple systems of knowledge (Scherer et al., 2019). Making connections between AFNR and core academic areas is an effective strategy for helping students learn areas like science by making abstract concepts “real” through the context of AFNR (Gonzalez & Kuenzi, 2012; McKim et al., 2017a; Stubbs & Myers, 2015). The opportunity to strengthen core academic learning through AFNR education is particularly salient given continued evidence of student underperformance in core academics in the United States (National Academy of Engineering & National Research Council, 2014).

The relationship between offering core academic credits in AFNR education, student recruitment, and student learning make research into this topic important. Therefore, we explored the academic offerings available in Michigan AFNR programs. Results from this research provide a foundation of knowledge regarding the current scope and future opportunities associated with core academic credit offerings in AFNR education. Further, results provide a pragmatic roadmap for school districts to expand core academic offerings in alignment with norms across the state.

Literature Review

The literature pertaining to core academic offerings was organized into three themes for our literature review. The three themes are (a) academic overlap, (b) role of the teacher, and (c) academic credit offerings.

Academic Overlap

Scholars in AFNR education have consistently identified overlap between AFNR concepts and core academic content (McKim et al., 2017a; Scherer et al., 2019). This overlap has led to calls for curriculum integration or illumination, in which core academic content is intentionally embedded or highlighted in secondary school AFNR curriculum (McKim et al., 2017a). The impetus for these calls includes the value of crafting interdisciplinary learning experiences in which learners simultaneously engage multiple disciplines of knowledge (Boix Mansilla et al., 2000; Nikitina, 2006; Pauley et al., 2019). Most notably, interdisciplinary learning experiences more adequately mirror authentic problems occurring in socio-ecological systems; therefore, learning experiences which are interdisciplinary better prepare students to address complex problems during and after their time in an AFNR program (McKim et al., 2019; Scherer et al., 2019).

Noted by Scherer et al. (2019) in their comprehensive review of STEM education research within AFNR education, there exists a dearth of scholarship detailing *how* core academic areas are actually incorporated within AFNR curriculum. Noting the value of these investigations for educators, scholars call for research exploring pragmatic approaches teachers are using to fuse core academic and AFNR learning. Heeding this call, we pinpoint the courses in which Michigan AFNR teachers are offering core academic credit to illuminate the *where* and *when* core academic learning is occurring within AFNR programs.

Role of the Teacher

Incorporating content from other disciplines into AFNR courses requires the AFNR teacher be both motivated to do so and knowledgeable of the incorporated content (McKim et al., 2017a). Research conducted by McKim et al. (2017a) suggested AFNR teachers fall into one of three categories detailing their ability to illuminate science concepts present within AFNR content: science illuminators (i.e., high motivation, high competence), illumination attempters (i.e., high motivation, low competence), and vocational purists (i.e., low motivation, low competence). Shifting from science to math, an investigation of teacher characteristics found perceived

behavioral control to be the only statistically significant predictor of math integration within AFNR coursework (McKim et al., 2017b). Regarding English Language Arts (ELA), a 2015 study by McKim et al. found teachers valued the integration of reading and writing within their coursework, but perceived ELA integration as an area of potential professional growth.

Existing research positions educators as the gatekeepers to core academic learning in AFNR education. To increase the prevalence of core academic learning within the discipline, teachers need to be motivated, knowledgeable, and empowered to incorporate core academics within their curriculum. Identifying the distribution of core academic credits being earned in Michigan AFNR classrooms provides teachers with a broadened perspective of the opportunities and importance of core academic learning within AFNR education which may lead to more teachers incorporating core academic credits and interdisciplinary learning within their program.

Academic Credit Offerings

In response to consistent evidence of academic underperformance among students in the United States, policies (e.g., No Child Left Behind) have been implemented to increase core academic credit requirements for high school graduation (Fletcher Jr., 2006). Increasing core academic requirements has a negative impact on elective areas, like AFNR education, due to reduced availability in course schedules (Martin et al., 2006). To address this challenge, disciplines like AFNR education have evolved to illuminate the core academic standards inherent within their curriculum, justifying their elective coursework to meet core academic learning requirements (Martin et al., 2006; McKim et al., 2017a). Research on specific courses teachers leverage for core academic credit and specific types of academic credit obtained is, however, scant. This gap in the literature misses an opportunity to inform educators on *how* to align core academic integration efforts with others based on empirical evidence. Therefore, the work being detailed in this study seizes an important opportunity to empower educators, school districts, and the AFNR education discipline to meet the goals of learners within core academics and AFNR.

Theoretical Framework

Our study is framed by the Career and Technical Education (CTE) Student Typology (Aliaga et al., 2012, 2014). This typology supplants categorizing students as either *academic* or *vocational*, a categorization system which fails to acknowledge evolving graduation requirements mandating all students, including those traditionally classified as vocational, engage in increased core academic credits (Aliaga et al., 2012, 2014). Alternatively, the CTE Student Typology suggests most secondary school students experience a combination of CTE and core academic coursework and, consequently, authors proposed a continuum of eight categories (i.e., ranging from “zero CTE credits” to “high intensity CTE”) representing varying levels of academic and vocational engagement (Aliaga et al., 2012, 2014). Our research builds on this foundation by exploring the combination of academic and CTE learning at the course level, analyzing academic credit obtained by completing Michigan AFNR coursework.

Purpose and Objectives

Through this research, we sought to understand the scope of core academic credits being offered in Michigan AFNR programs. In addition, we found utility in understanding the AFNR course types aligned to core academic credits as well as the type of core academic credit being offered. Achieving these aims yields insights for current teachers, school administrators, and the AFNR education profession to understand *what* academic credit is being offered *where* in the Michigan AFNR education curriculum. In so doing, local programs can compare their suite of core academic offerings to state norms to identify opportunities to expand core academic offerings to come into alignment with state norms as well as innovate by finding new opportunities to align AFNR coursework with core academic areas underrepresented throughout the state.

Conducting this important scholarship was guided by three research objectives: (a) identify the percentage of Michigan AFNR programs in which students receive at least one core academic credit; (b) identify the types of AFNR course in which science, math, ELA, and foreign language credits are offered; and (c) identify the type of academic credit received via AFNR courses.

Methods

Our investigation into the core academic credit offerings within Michigan AFNR programs was completed using survey research methods. Data reported in this manuscript are part of a larger research project exploring core academic integration in AFNR education.

Population and Data Collection

The population for this study included all school-based AFNR education teachers in Michigan during the 2020-2021 school year ($N = 139$). The population frame, including teacher names and email addresses, was obtained from the Michigan FFA office in accordance with accepted Institutional Review Board (IRB) policies. Given our interest in understanding the scope of core academic offerings across the state, a census of all Michigan teachers was attempted. A maximum of four emails were sent to potential respondents between March 21, 2021 and April 26, 2021 soliciting their engagement in the survey (Dillman, 2007). A total of 100 surveys were completed, yielding a 71.94% response rate. To evaluate potential non-response bias, the core academic offerings of respondents to the first two email solicitations ($n = 63$) were compared to the core academic offerings of respondents from the second two email solicitations ($n = 37$). The lack of statistically significant differences between the two groups (i.e., p -values $< .05$) suggests non-response bias was not an issue within our data (Lindner et al., 2001; Miller & Smith, 1983). Further evidence to support the lack of non-response bias comes from the similarity of current respondent demographic data and known demographic data of Michigan AFNR teachers (Nowakowski & McKim, 2021).

Instrumentation

The Qualtrics survey developed for this project included an introductory block, five response blocks for science, five response blocks for math, five response blocks for ELA, five response blocks for foreign language, and a demographic block. The introductory block narrowed which

response blocks were appropriate for respondents by asking which, if any, core academic areas were offered within the AFNR program. Introductory block responses led participants to the first block within a core academic area offered within their program. For example, if on the introductory block, Respondent A indicated science credit was offered through their AFNR program, Respondent A would be directed to the first science credit block. Within the first block of science, for example, respondents identified one science credit (e.g., life science) obtained through their AFNR program coursework. In addition, respondents indicated the AFNR course, or series of courses (i.e., coursework options described in the data analysis section), required to obtain the credit. To complete the block, respondents were asked if an additional science credit, for example, could be obtained through the AFNR program. If yes, respondents were directed to the second block within the core academic area, with questions mirroring the first block. Once the series of blocks for one academic area was complete and respondents had entered information for each credit available within their program within that academic area, respondents moved to the next core academic area block series in accordance with their responses in the introductory block (e.g., if they also offered math credit, they would then start with block one of math credit). The final block for all respondents contained demographic questions, including questions pertaining to educational background and program characteristics.

Data Analysis

Data analysis was completed using the Statistical Package for the Social Sciences. First, data were imported from Qualtrics, reviewed for completeness, and variable names were changed to assist with data interpretation. Research objective one was completed by identifying the percentage of respondents who indicated teaching science, math, ELA, or foreign language credits. Additionally, the proportion of respondents offering any academic areas was calculated by combining responses from each academic area. For research objective two, a total number of instances of academic credit being offered in AFNR courses was calculated and then concatenated by respondent-selected course type. AFNR course type options (i.e., 16 total) were developed based on course conventions in Michigan and included introductory and advanced general agriculture, plant sciences, animal sciences, agribusiness, leadership, agricultural mechanics, natural resources, and food science. For the final research objective, we categorized respondents' indication of core academic credit received by the Michigan Merit Curriculum graduation requirements (Michigan Department of Education, 2017) and counted the instances within each graduation requirement subcategory (e.g., life science, general math).

Description of Respondents

The majority of respondents to the demographic section (i.e., 77.24%) completed an undergraduate or graduate degree in AFNR education that included teacher certification. Additionally, 66.73% of demographic question respondents had completed a postgraduate degree at the time of data collection. On average, demographic respondents had taught school-based AFNR education for an average of 9.57 years. Furthermore, 78.52% of demographic respondents taught in rural school districts and had an average of 97.45 students enrolled in their program.

Findings

The first objective focused on the scope of core academic credit being taught in Michigan AFNR programs (see Table 1). Inclusive of all potential academic areas, 95.00% of respondents taught at least one course where core academic credit could be obtained. Digging deeper, the most offered core academic area in Michigan AFNR programs was science (89.00%) followed by math (43.00%) and foreign language (38.00%). A total of 9.00% of respondents indicated offering at least one ELA credit through their AFNR program coursework.

Table 1

Frequency of Core Academic Credit Offerings in Michigan AFNR Courses (n = 100)

Academic Offering	Frequency	Percentage
Some Academic Offering	95	95.00%
Science	89	89.00%
Math	43	43.00%
Foreign Language	38	38.00%
English Language Arts	9	9.00%

For the second objective, we turned our attention to the AFNR education courses in which science, math, ELA, and foreign language credits were being offered (see Table 2). In total, there were 410 instances of a core academic credit being offered across AFNR course types. Science ($f = 270$) accounted for 65.85% of these instances followed by math ($f = 71$) and foreign language ($f = 60$). Of the four core academic areas considered, ELA was the least prominent across the AFNR course types ($f = 9$). Looking across the 16 course types, the most frequently used course type for core academic credit offerings was Introductory Animal Science ($f = 77$) which accounted for 18.78% of the recorded instances. Rounding out the top three, Introductory General Agriculture ($f = 68$) and Introductory Plant Science ($f = 66$) comprised 16.59% and 16.10% of course instances respectively. The course types in which the least core academic credit was offered included Advanced Agricultural Mechanics ($f = 0$), Advanced Leadership ($f = 6$), Introductory Agricultural Mechanics ($f = 6$), and Advanced Food Science ($f = 6$).

Table 2

Distribution of Core Academic Credit Received by AFNR Course Type (n = 100)

Course Type	Science	Math	Foreign Language	ELA	Course Type Total
Introductory Animal Science	56	7	12	2	77
Introductory General Agriculture	40	13	12	3	68
Introductory Plant Science	50	5	11	0	66
Introductory Natural Resources	27	3	2	0	32
Advanced Animal Science	19	7	5	1	32
Advanced General Agriculture	12	10	5	2	29
Advanced Plant Science	9	7	4	1	21
Introductory Food Science	15	2	2	0	19
Introductory Leadership	13	2	4	0	19
Introductory Agribusiness	9	5	1	0	15
Advanced Natural Resources	6	1	0	0	7
Advanced Agribusiness	2	5	0	0	7
Advanced Food Science	5	1	0	0	6
Introductory Agricultural Mechanics	4	1	1	0	6
Advanced Leadership	3	2	1	0	6
Advanced Agricultural Mechanics	0	0	0	0	0
Instance Total	270	71	60	9	410

Note. Multiple core academic credits could be offered by a single teacher and teachers could indicate multiple course types to describe an AFNR course; therefore, response totals are not constrained to the number of respondents.

Focusing on science credit distribution across AFNR courses (see Table 2), the most used AFNR course type in Michigan to offer science credit was Introductory Animal Science ($f = 56$), accounting for 20.74% of the instances relating to science. Introductory Plant Science ($f = 50$) and Introductory General Agriculture ($f = 40$) completed the top three AFNR course types most used for science credit. The AFNR course types least likely to count for science credit in Michigan were Advanced Agricultural Mechanics ($f = 0$), Advanced Agribusiness ($f = 2$), and Advanced Leadership ($f = 3$).

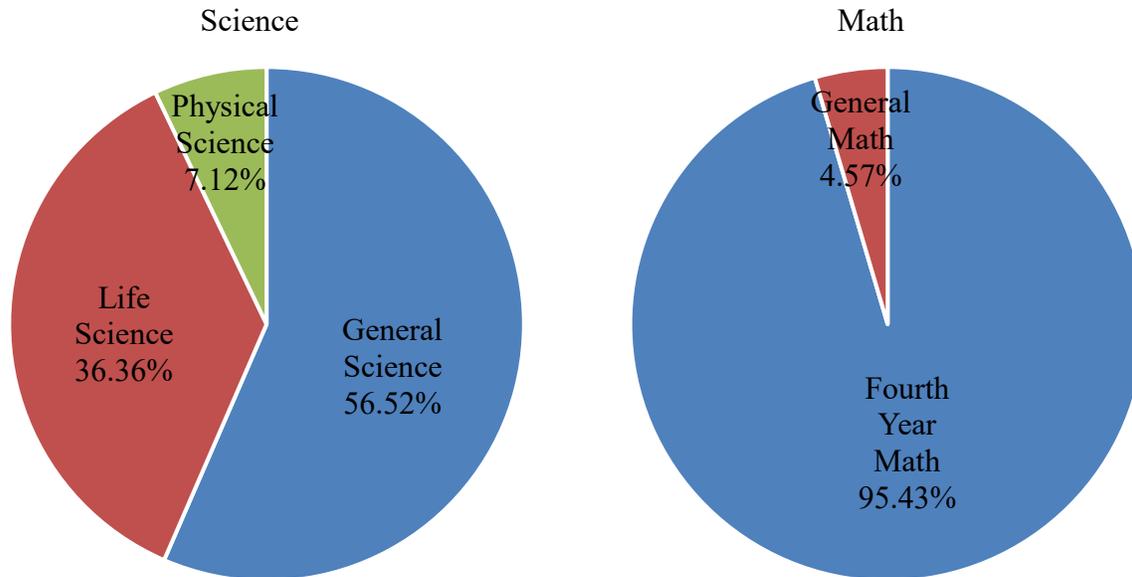
Within math (see Table 2), credits were most received within Introductory General Agriculture course types ($f = 13$) which accounted for 18.31% of the math instances. Advanced General Agriculture ($f = 10$) was the second most likely course type to include math credits followed by three courses which had seven instances, including Introductory Animal Science, Advanced Animal Science, and Advanced Plant Science. Four course types received one or zero instances of math credit being offered, including Advanced ($f = 0$) and Introductory ($f = 1$) Agricultural Mechanics, Advanced Natural Resources ($f = 1$), and Advanced Food Science ($f = 1$).

For the final core academic area, ELA (see Table 2), only nine total instances occurred across all AFNR course types. Those course types in which ELA credits were offered included Introductory General Agriculture ($f = 3$), Introductory Animal Science ($f = 2$), Advanced General Agriculture ($f = 2$), Advanced Animal Science ($f = 1$), and Advanced Plant Science ($f = 1$).

For the final objective, we identified the type of core academic credit received for each discipline, defined by the Michigan Merit Curriculum requirements for graduation (see Figure 1). In science, the majority of AFNR courses received a General Science credit (i.e., 56.52%), with 36.36% receiving a Life Science and 7.12% receiving a Physical Science credit. In the math discipline, the majority of AFNR courses received a fourth-year math credit (95.43%), with only 4.57% receiving a general math credit. The other disciplines were not separated into subcategories because the Michigan Merit Curriculum simply requires four ELA credits and two foreign language credits for graduation.

Figure 1

Distribution of Credits Within Science and Math Offered in Michigan AFNR Programs



Conclusions and Discussion

The potential gains in student numbers and interdisciplinary learning make offering core academic credits through AFNR programs a valuable approach. Research suggests offering core academic credits is common in AFNR (Nowakowski & McKim, 2021), however, additional information regarding the scope of core academic credits in Michigan is needed to empower teachers and the discipline to promote additional core academic learning opportunities. Findings from this research highlight three critical conclusions regarding core academic offerings in Michigan; these conclusions are titled (a) core academic frequency, (b) science strength, and (c) opportunities for expansion.

Core Academic Frequency

The CTE Student Typology (Aliaga et al., 2012, 2014) suggests student experiences are no longer solely vocational or academic; instead, their experiences entail courses combining vocational *and* academic learning. In the current study, we found 95.00% of programs in Michigan offer some form of core academic credit within their elective AFNR coursework. Therefore, our data support the assertions made by Aliaga et al. (2012, 2014). The prevalence of core academic offerings in Michigan AFNR programs is most likely a strategy used by educators to increase the relevance of their coursework in the face of mounting core academic graduation requirements (Martin et al., 2006; McKim et al., 2017a). Regardless of motivation, the overwhelming majority of AFNR programs in Michigan incorporating core academic learning positions programs to reap the associated recruitment benefits (Nowakowski & McKim, 2021) and provides a foundation for interdisciplinary learning within AFNR programs.

The findings from this study suggest more core academic integration (i.e., 73.66% of instances across disciplines) occurs in “introductory” course types. This finding contradicts conventional thinking - that core academic integration is reserved for advanced AFNR courses (e.g., Advance Animal Science, Advanced Plant Science) which cover topics in more depth. Instead, these data indicate teachers are incorporating core academic credits within courses attracting novice students. We posit the prevalence of core academics within introductory courses is less dependent on the nature of the AFNR course and more dependent on the core academic credit being received. Specifically, more foundational concepts in core academic areas are being included within the AFNR curriculum and, thus, occur earlier in their academic progress when they take introductory AFNR courses. Meanwhile the advanced core academic concepts appear to be reserved for the core academic classroom itself.

The final discussion item relating to the frequency of core academic offerings relates to foreign language credits being earned through AFNR programs in Michigan. This finding is worth discussing as one would not naturally connect AFNR curriculum with foreign language content. In Michigan, students are required to complete two foreign language credits to graduate; however, completing a CTE program waves one of the two required foreign language credits (Michigan Department of Education, 2017). Therefore, some respondents indicated this waving of requirements within the survey.

Science Strength

The second conclusion theme foregrounds findings relating to science credit. In total, 89.00% of respondents indicated teaching AFNR courses which count for science credit. Research within the discipline has continually reinforced the overlap between science education and AFNR education (McKim et al., 2017a; Scherer et al., 2019); therefore, finding some overlap was expected. However, the scope of science credit offerings across the state was broader than initially imagined. Reflecting upon these findings led us to consider two structural realities in Michigan that may explain the high instance of science credit being earned. First, until recently, the only AFNR teacher education institution in the state required preservice teachers include a minor teaching area in their coursework, leading to teaching certifications in a minimum of two subject areas. The overlap in required coursework between the AFNR education major and biology minor led many to pursue their teaching minor in biology. This resulted in many AFNR programs in which the teacher also teaches a non-AFNR biology course. Importantly, respondents were counseled not to include these non-CTE courses within their responses. It is our position, however, that the training received through preservice education and experiences teaching non-AFNR science courses has positioned Michigan AFNR teachers to seamlessly teach science credit through their AFNR courses.

The second structural reality in Michigan potentially contributing to the science strength is a tool commonly used by Michigan AFNR teachers. This tool helps teachers organize curriculum standards within their course sequence. Originally designed to increase program funding, the tool has been expanded to illuminate Next Generation Science Standards (NGSS) which are aligned to the Michigan academic standards. The final course report details the NGSS standards which overlap with selected AFNR standards, as identified by Michigan teachers, and example curriculum to teach to reinforce those interdisciplinary connections.

In total, the overlap between science and AFNR concepts, dual teaching certification requirements, and tool built to illuminate connections between science and AFNR have contributed to a robust portfolio of science credit being received through AFNR programs across the state. For states seeking to increase science credit offerings in AFNR, similar initiatives should be considered to shift the landscape of science credit availability.

Opportunities for Expansion

In addition to identifying strengths relating to core academic offerings in Michigan, the current research also highlighted areas of potential growth. One area of potential growth relates to ELA credits being obtained through AFNR coursework. Existing research notes teachers support the integration of ELA within their AFNR coursework (McKim et al., 2015); this integration, however, requires resources and professional support to make this overlap a reality. This presents a tremendous opportunity for AFNR education faculty, for example, to collaborate with ELA Education faculty to create resources to be implemented within AFNR education to enhance ELA learning through AFNR courses, laying the foundation for expanded ELA credit offerings in AFNR education.

Similarly, there exists an opportunity for collaborative work between experts in agricultural mechanics, mathematics education, and science education to collaboratively develop resources and tools to increase the potential for core academic integration via agricultural mechanics coursework. One prime instance of overlap is between agricultural mechanics and physical sciences, which accounted for only 7.12% of science credit obtained in Michigan. Beyond students obtaining academic credit, providing these resources will empower teachers to educate students using curriculum which draws valuable connections between AFNR, math, and science in a learning atmosphere representing diverse, emerging careers in agricultural technology.

The final opportunity for expansion attends to the relatively low proportion (i.e., 36.34%) of instances in which advanced AFNR courses were leveraged for core academic credit. Seizing this opportunity is not without challenges. It is expected teachers of core academic areas want to maintain ownership over advanced disciplinary courses. As a path forward, administrators within schools where advanced AFNR courses are being counted for core academic credit should detail the circumstances and strategies being leveraged and communicate those instances with administrators in schools which would benefit from similar overlap. In this way, advanced AFNR courses including core academic credit expands via individuals in the school (i.e., administrators) who can bring together AFNR and core academic educators to find mutually beneficial approaches to seize the learning benefits of more interdisciplinary, advanced AFNR courses.

Recommendations

The first two recommendations emanating from this research bring to attention two limitations of our research. The first limitation is an assumption that courses receiving core academic credit provide students with a more interdisciplinary learning experience than courses in which core academic credit is not offered. While likely, this assumption was not evaluated in the current

study. Therefore, future research should consider evaluating the authenticity of core academic overlap occurring within AFNR courses in which core academic credits are received. The second limitation of this research stems from the diversity of AFNR education programs in Michigan. Namely, some programs exist outside of the comprehensive public high school setting, in “career centers.” These centers, which focus exclusively on vocational training, attract students from upwards of fifteen or more neighboring high schools to attend an extended class session. The core academic credit obtained by engaging in these career center programs is dependent on each individual school sending students to the career center; therefore, respondents struggled to complete the survey given this variance. For scholars studying this line of inquiry, consideration for career center teachers is warranted and alternative data collection methods (e.g., qualitative interviews) are recommended in these instances.

The second portfolio of recommendations includes research and practical interventions to increase the core academic offerings within AFNR courses. Namely, we recommend these data be shared with Michigan AFNR teachers, counselors, and administrators to illustrate the breadth of core academic offerings in the state. Sharing this information should be paired with opportunities for schools to evaluate their current offerings and identify new pathways to increase core academic credits in AFNR programs. In addition to sharing this information with counselors and administrators in current programs, these data should be shared with academic leaders in schools without a current AFNR program to illustrate the interdisciplinary potential of AFNR education. From a research perspective, the next steps within this line of inquiry include exploring structural features which increase core academic offerings within AFNR programs. For example, research exploring teacher certification(s), administrative support, AFNR and core academic teacher relationships, community support, preservice teacher course requirements, and the presence of core academic credits within AFNR courses may reveal particularly salient variables to consider regarding core academic credit offerings. Additionally, the experiences of AFNR educators, administrators, and counselors from schools offering core academic credit through AFNR programs could be explored via qualitative methods, potentially illuminating barriers and/or best practices.

The final recommended area for research includes investigations into the outcomes of core academic offerings on students and programs. Example outcome (i.e., dependent) variables to consider in these analyses include the demographics of students enrolled in the AFNR program, community and school support, and student preparedness to solve complex problems. This research, along with the other approaches recommended within this study, will lay a foundation to guide the future of core academic offerings in AFNR programs in Michigan and beyond. The opportunity to enhance AFNR programs and learning opportunities for students compels the importance of continued efforts within this important area.

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A National Review of State Standards Relevant to SBAE Teacher Performance and Program Quality

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Because of discrepancies among U.S. states regarding how they assess school-based agricultural education (SBAE) teacher performance and program quality, little knowledge has existed about how these differences might influence critical decisions regarding hiring, pay, promotion, and dismissal. In response, the purpose of the study was to examine commonalities and differences in state-level program quality standards of teacher and program performance expectations for school-based agricultural education (SBAE) in the U.S. To accomplish this, we analyzed documents that contained teacher and program standards used by state agricultural education leaders. Using cognitive sensemaking as our lens, we found states measured SBAE teacher and program standards using a variety of formats and methods, with emphasis on teacher engagement in professional development, organization of course syllabi and lesson plans, program safety, and health protocol adherence. We also found little mention of instructional practice as prominent metrics for success and no delineation regarding standards for teachers' years of experience. We discuss the merits of these documents and encourage practitioners to critically examine their intent and use moving forward.

Introduction and Review of Literature

Education in the U.S. has evolved considerably in recent decades (Sánchez-Cabrero et al., 2021). For example, secondary school students have been tasked with navigating numerous expectations to fulfill requirements for graduation and admittance into higher education (Stronge, 2018). To complicate this issue further, high-stakes testing requirements have become more strict, which has led to many secondary school students to having little flexibility to enroll in elective courses, such as career and technical education (CTE) (Gordon & Schultz, 2020). These trends have been further compounded by individual states using students' composite performance on standardized tests as an indicator of school quality. Therefore, emphasis on teacher, student, and program performance has increased dramatically in the 21st Century (Mintz & Kelly, 2021).

Previous research (Lu et al., 2021; Yazici et al., 2017) has demonstrated that a complex interaction of factors influence students' learning. However, teacher effectiveness has remained the most significant predictor of student success over the past three decades (Marzano, 2017). Many states have responded by recruiting and retaining quality teachers to improve student performance (Wronowski, 2018). Consequently, teachers, including those in career and technical education (CTE), have been burdened with increasingly high expectations to contribute to students' learning in a way that can improve their scores on standardized examinations (Mintz & Kelly, 2021).

Researchers in school-based agricultural education (SBAE), a pathway within CTE, have thoroughly examined the expectations of SBAE teachers, with the intention to guide their

preparation, professional development, and evaluation (Eck et al., 2019; Roberts & Dyer, 2004). The research concluded that the roles and responsibilities of SBAE teachers expand beyond the traditional classroom instruction (Talbert et al., 2014). For example, teachers must deliver instructional experiences for students across agricultural education's comprehensive, three-component model that includes (1) classroom and laboratory instruction, (2) supervised agricultural experiences (SAEs), and (3) youth leadership through the National FFA Organization (Croom, 2008).

Some research (Eck et al., 2019; Roberts & Dyer, 2004) has sought to distill the characteristics of effective SBAE teachers. For example, Roberts and Dyer (2004) identified seven characteristics that gained 100% consensus among a panel of experts including, (1) cares for students, (2) planning for instruction, (3) evaluate student success, (4) promoting morals and honesty, (5) advises the program's FFA chapter, (6) communicates with stakeholders, and (7) uses and maintains laboratory spaces. More recently, Eck et al. (2019) conducted an update of the characteristics of effective instruction and reported that six reached 100% consensus: (1) is engaging, (2) demonstrates classroom management, (3) cares about all students, (4) is genuine, (5) prepares students to be leaders, and (6) is helpful. Although identifying these characteristics has been helpful, teacher preparation programs have struggled to equip their graduates with the knowledge and skills they need to succeed as secondary SBAE teachers (Roberts et al., 2020).

To further expand the discourse on SBAE teacher expectations, other research explored SBAE teacher perceptions and conceptualizations of effectiveness and how they interacted with those reified metrics (Traini et al., 2019; Traini et al., 2020; Traini et al., 2021). In their studies, Traini et al. (2019, 2020, 2021) reported teachers defined success as winning awards through participation in FFA events, high levels of student participation in FFA activities, and overall growth and involvement in the local SBAE program. Teachers viewed these metrics as unsustainable and difficult to navigate because they consistently took a toll on their physical health, mental wellbeing, and family life (Traini et al., 2019). These studies concluded the expectations of SBAE teachers, which were often unspoken norms in the profession, resulted in feelings of fear, judgment, and pressure from various individuals (e.g., community members, state associations, school administrators) and the struggle or inability to achieve work-life balance (Traini et al., 2019; Traini et al., 2020; Traini et al., 2021).

Meanwhile, ongoing conversation about supplying the workforce with qualified SBAE teachers has proven to be a daunting endeavor for agricultural education (Foster et al., 2018). For example, Foster et al. (2018) reported 45% ($n = 462$) of school administrators hired non-licensed individuals who were required to be alternatively certified because of a nationwide shortage of SBAE teachers. This was of concern to Bowling and Ball (2018) who found that alternatively certified teachers in Missouri were unprepared, experienced greater levels of stress, and left the profession more quickly. Additionally, a plethora of research in agricultural education (Roberts et al., 2020; Rice & Kitchel, 2016) has suggested beginning and early career teachers lack the agricultural content knowledge to be effective. This issue expands beyond teacher preparation programs. For example, Dale et al. (2017) found in an assessment of more than 4,000 freshmen in Oklahoma State University's College of Agriculture that agricultural literacy remained "...a work in progress" (p. 345). As our world grapples with increasingly complex problems, i.e., including disease, famine, poverty, war, and more, the agricultural industry must continue to

progress. With limited content knowledge among individuals seeking baccalaureate degrees in agriculture, however, the industry could struggle to meet global demands (Dale et al., 2017).

Given the research exploring teacher effectiveness (Eck et al., 2019; Roberts & Dyer, 2004; Traini et al., 2019, Traini et al., 2020, Traini et al., 2021), the struggle of teacher preparation programs to equip preserve teachers with the knowledge and skills to become effective SBAE teachers (Roberts et al., 2020), and ongoing concern of the causes and consequences of the SBAE teacher shortage (Foster et al., 2018; Rice & Kitchel, 2016), decision-makers in education have increasingly used *quality standards* to improve school and student performance outcomes (Donaldson & Woulfin, 2018). Perhaps the most common method of teacher evaluation has been through teacher performance and program quality measures adopted by state agricultural education leaders (Graham & Edwards, 2018). However, because many states struggled to determine the criteria by which to evaluate secondary agricultural education teachers and programs, the National Council for Agricultural Education (2015) created the National Quality Program Standards (NQPS) for Agriculture, Food, and Natural Resources education. The intent of the standards was to assist state leaders with creating measurable attributes by which to assess program quality in agricultural education (National Council for Agricultural Education, 2015). Despite this resource, however, anecdotal evidence has suggested many states have not used the NQPS. As a result, considerable variability has persisted regarding how secondary agriculture teachers and programs have been evaluated historically (LeJeune & Roberts, 2020). For example, Sands et al. (2019) reported that Iowa created unique state standards for agricultural education. However, through a statewide assessment of program quality, considerable improvements were needed concerning communication, administrative relationship-building, and program planning (Sands et al., 2019).

Because of discrepancies among U.S. states concerning how they assess teacher performance and program quality, little knowledge has existed about how these differences might influence critical decisions regarding hiring, pay, promotion, and dismissal. Further, if evaluation systems give greater priority to specific performance indicators, then quality standards used for assessment likely influence resulting behaviors and practices, including teacher satisfaction and burnout (Stair et al., 2016). Therefore, understanding the criteria by which secondary agriculture teachers and programs have been evaluated across the U.S. warranted investigation.

Theoretical Framework

Cognitive sensemaking served as our lens to examine the criteria by which SBAE teachers and programs have been evaluated (Coburn, 2006). When creating policy, such as quality standards, decision-makers often draw on their beliefs, experiences, social interactions, and worldviews to organize their ideas into a cognitive framework that guides their logic (Coburn, 2001). This process is particularly amplified when decision-makers draw on the aforementioned factors to construct quality standards to evaluate performance (Coburn, 2006). Therefore, cognitive sensemaking provides insight into how individuals construct meaning from their experiences to operationalize policy-based decisions (Coburn, 2001).

In the current study, we used this lens to examine how decision-makers framed teacher performance and program quality to evaluate success. Agricultural education leaders have been uniquely situated in their professional communities. When viewing sensemaking through

Coburn's (2006) lens, state agricultural education leaders' policy-based decisions have likely been influenced by their personal and professional experiences, collaborations, interactions (Allen & Penuel, 2015; Stosich, 2016). As an illustration, Allen and Penuel (2015) explained how school leaders, advocacy groups, and policymakers engaged in cognitive sensemaking to create Next Generation Science Standards (NGSS) by engaging in strategic planning and discussions over several years. As a result of this sensemaking process, NGSS have been widely adopted on a national level (Allen & Penuel, 2015). Meanwhile, more recent empirical evidence (Allbright et al., 2019; Cohen et al., 2020) suggested that through collective sensemaking efforts, educational reforms can positively influence how new policies can be understood and implemented. It is also important to note that cognitive sensemaking can also have negative implications for policy (Coburn, 2006). For example, if decision-makers in education hold unrealistic expectations or out-of-touch views of teacher expectations based on closed social interactions, then their policy initiatives often fail (Coburn, 2001). As such, this lens provided a critical insight to describe how leaders of secondary agricultural education have been influenced by their socio-political environments to create and implement state standards relevant to teacher and program performance.

Purpose and Objectives

The purpose of the study was to examine commonalities and differences in state-level program quality standards and teacher performance expectations for SBAE programs in the U.S.. The objectives of our study were to:

1. Identify the program and teacher standards embedded in state standard documents; and
2. Describe the scope and diversity of SBAE program and teacher standards in the U.S.

Methods

This study was descriptive in nature in which we used a cross-sectional survey research design to collect documents to examine state-level program quality standards and teacher performance expectations (Creswell & Creswell, 2018). This process helped us facilitate a systematic process to review and interpret the data to assign meaning (Frey, 2018).

Population

The population for the study was defined as the lead agricultural education supervisor or coordinator in each of the 50 states and two U.S. territories. We obtained the names and email addresses for each state leader from the National Association of Agricultural Educators. Contact information was secured for each identified leader.

Data Collection and Analysis

Key elements of the tailored design method for survey research (Dillman, et al., 2014) were incorporated into our data collection procedures. We sent a personalized email in October 2020 to each identified agricultural education leader. To emphasize the national scope of the project, the initial emails were co-signed by all members of the research team. We asked each participant to share a copy of all actively used documents that outline SBAE program and/or teacher quality indicators for their state. The email indicated that the long-term goal of the project was to

develop preliminary benchmarks for secondary SBAE teacher success across career stages. Respondents were asked to click on an Airtable link to upload a copy of their SBAE program and teacher standards. Although most responses came from state agricultural education supervisors, in some cases, we received a reply and document from a teacher educator in the state or the state FFA executive secretary. If no SBAE-specific standards were available in their state, participants were asked to reply with a note to that effect. Three weekly follow-up email reminders were sent to each nonrespondent. In a few instances when no response had been received, we reached out to a teacher education colleague in that respective state to inquire about the presence of a standards document in that state. Of the 52 states and U.S. territories (Puerto Rico and the Virgin Islands) that were invited to share their standards, 42 responded. Therefore, our total response rate was 80.76%. It should be noted, however, that 20 states provided SBAE-specific standards, 17 reported no standards, six used the NQPS, five submitted general Career and Technical Education standards, and four did not reply to our request.

Consistent with our study's purpose, we focused our analysis primarily on the documents received from the 20 state leaders who shared one or more agricultural education specific standard documents. Using a spreadsheet, our approach was to carefully read and categorize each standard contained in the documents, keeping the original standard and source state in the summary table. Two members of the research team were randomly assigned to code the documents received from 10 of the 20 states who provided SBAE-specific standards. An effort to establish intercoder consistency was also made (O'Connor & Joffe, 2020). Acceptable strategies include at least two independent coders, random selection of 10-25% of the data units (i.e., state standards documents), random assignment of data units to coders, independent coding of the data with or without prespecified codes, and group discussion of similarities and divergences (O'Connor & Joffe). To establish intercoder consistency, after the initial coding was complete, the two team members who completed the initial coding then each coded the document(s) submitted by a randomly selected state initially assigned for coding to the other coder. The full research team then compared the cross coding and concluded that the two independent coding results were similar. Although the specific wording used by the two coders often differed, the essence of each standard was accurately and consistently captured across the coders. The research team then examined the initial grouping of standards used by the coders to develop final categories for the large number of standards identified in the state-level documents.

Limitations

Potential concerns in survey research include coverage error, sampling error, measurement error, and nonresponse error (Dillman et al., 2014). Because this was a census study, coverage and sampling error were not a concern. Measurement error was also of little consequence, since state agricultural education leaders were simply asked to share an electronic copy or link to the current secondary SBAE standards document in their state, if available. We used multiple contacts over a four-week period to address nonresponse error.

The findings were the result of data analysis from our team of five researchers. Through extensive collaborative coding and analytical conversations, we strove to achieve intercoder consistency when analyzing the data. Still, we encountered challenges when coding certain documents due to formatting and organizational inconsistencies. For example, the California document contained 65 standards dispersed across the 11 categories and 214 unique

recommended implementation strategies to accompany these criteria and subsequent metrics. We chose to code the 65 standards for this state because they were the overarching metrics for evaluation, excluding the 214 specific recommended implementation strategies. Decisions like these influenced the results we report below. However, because we made consistent decisions like this for all documents, we were confident in the accuracy of our findings.

Results

Document Description

For all the documents we received, including those for CTE programs broadly and SBAE teachers and programs specifically, document length ranged from one page (Tennessee) to 124 pages (Arizona). There was great variety in the number of main quality standards and secondary quality standards ranging from 15 total standards (main and secondary) for Tennessee CTE to 98 total standards for Missouri. A majority of the documents were organized into a rubric or rating system with varying scales and degrees of detail. Thirteen documents were designed to be used on an annual basis by the individual CTE or SBAE teacher with the assistance or guidance from an administrator (e.g., CTE director, principal), advisory committee, or state staff. Only one state, Illinois, delineated quality standards by experience of the teacher. For the remaining states, the documents implied all agriculture teachers, regardless of experience or preparation in agricultural education, must meet the same qualifications, starting during their first year of teaching. Eleven states required documentation in addition to the completion of the evaluation form. This included documents such as letters, event registration lists, record books, SAE visitation logs, curriculum, FFA programs of activities, budgets, and meeting minutes. The purpose of these documents was to provide evidence the teachers and programs were meeting the listed requirements.

Several documents specific to SBAE were used to determine the amount of funding to be awarded to the program. These documents were much more detailed in their description of standards and how they were evaluated and often required administrative verification and documentation. Teachers in these states were required to do an inordinate amount of detailed recordkeeping. In some cases, the standards were presented with punitive language included if they were not met, including a formal program evaluation. In other cases, the standards were presented as incentives for incremental program improvement tied to increasing funding allocations up to a maximum value. A few of the state standards documents only pertained to summer employment.

SBAE Teacher and Program Documents

Twenty states provided documents that were specific to SBAE teachers and/or programs. The twenty states were Alabama, California, Colorado, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Mexico, North Carolina, Ohio, Oklahoma, and West Virginia. Our analysis of the documents provided by these states resulted in 60 standards categorized into six broad categories. Table 1 offers a snapshot of the six categories with example standards for each. This is followed by a description of each category and key findings from our analysis. In our descriptions, we used the terms *item* to refer to the originally-worded metrics or expectations found in the state documents, *standard* to refer to researcher-developed standards created during analysis to accommodate multiple

similarly-worded items in the documents, and *category* to refer to the overall theme for a collection of researcher-developed standards.

Table 1

Summary of SBAE Teacher and Program Standards

Category	# Standards	Example Standards
Teacher Qualifications	5	<ul style="list-style-type: none"> ● Teacher has at least 3,000 hours of occupational experience ● Teacher is qualified to teach the subjects assigned ● Teacher is an education program completer
Teacher Engagement Expectations	11	<ul style="list-style-type: none"> ● Teacher hosts students for early field experience ● Teacher acts as role models for students and exhibits leadership, teamwork, and ethical and professional practices ● Teacher has no conflicting after school athletic or administrative duties
Instruction	13	<ul style="list-style-type: none"> ● Current technology is available, maintained, and updated to offer high quality instruction and support experiential learning and student leadership development ● Higher order thinking skills are included in each course ● Teacher uses differentiated instruction
Program Design	11	<ul style="list-style-type: none"> ● Program has at least one course that receives core academic or postsecondary dual credit. ● Program has articulation in place for students to receive postsecondary credit for agriculture classes ● Program has courses that are sequenced to support at least one career pathway
Program Management	13	<ul style="list-style-type: none"> ● Proper and safe inventory is maintained for all tools, equipment, supplies, and training protocols are in place ● Teachers are provided with adequate time and compensation, typically a supervision period, to plan and regularly supervise SAE projects ● All students are encouraged to become FFA members and participate in local chapter activities and events
Stakeholder Outreach and	7	<ul style="list-style-type: none"> ● The program offers at least one community public relations activity each month

Category	# Standards	Example Standards
Engagement		<ul style="list-style-type: none"> • The program actively seek ways to recognize stakeholders for their work and involvement in the program • Relationships are built with local, state and national decision makers, including elected officials, through education and outreach

Teacher Qualifications

Ten items were coded into five standards within the Teacher Qualifications category. This category included standards that describe the certifications, experience, and education SBAE teachers must possess to be qualified for their job (see Table 1). California had the most coded standards (3), and eleven states had zero standards coded in this category. Interestingly, the standard *Licensed agriculture teacher* was specified in the standards for only five states: New Mexico, Mississippi, Michigan, Idaho, and Colorado.

Teacher Engagement Expectations

Forty-four items were coded into 11 standards in the Teacher Engagement Expectations category. This category included duties and expectations for engagement once SBAE teachers were hired. Examples of engagement expectations included mentoring other teachers, serving as a cooperating teacher for student teachers, participating in community organizations, maintaining a detailed monthly report of activities, and serving as a role model for students and the communities in which they work. State standards often conveyed clear expectations for teacher engagement in professional organizations and teacher events, their own professional development, and contributions to the development of other teachers.

By far, the most frequently coded standard was *Agricultural education instructor is an active member in local, state and national agricultural education professional education associations and participates in Ag teacher meetings and professional development events*, with 30 items coded across the 16 of the 20 states that provided SBAE-specific documents. The second most frequently coded standard was *Participate in state Ag teachers' mentoring program, or if not available, by proactively mentoring other teachers*, which was coded only three times by three states: Ohio, Illinois, and Oklahoma. The remaining nine standards were only coded once. The state with the most frequent items coded in this category was Illinois, with eight items coded into seven standards. Perhaps the most interesting finding from this category was the standard, *After year four, the teacher engages in a leadership role in the teachers' association or FFA each year*, which was coded once by Illinois. This was the only standard from our entire data set that delineated expectations by years of experience of the SBAE teacher.

Instruction

Forty-six individual items from the state documents fit into 13 unique standards comprising the Instruction standards category. These standards addressed the importance of incorporating

technology in the classroom, the appropriate use of classroom management techniques to maximize time on-task, the need for activities that are “hands-on” and performance-based, and the importance of differentiated instruction and student accessibility. Idaho had the most frequent number of items coded for each standard in this category (12) followed by Ohio (5) and California (4). The most frequently coded standard by far was *Courses are organized with syllabi and lesson plans* (26) followed by *student accessibility is provided in all program areas* (5) and *citizenship, leadership, and interpersonal skills are taught throughout* (3). The remaining standards were coded fewer than three times.

Program Design

In the Program Design category, 51 items from the SBAE-specific documents were coded into 11 unique standards. The category emphasized holistic program planning and design, in other words, what the program should entail and how it should be structured. This category included items regarding the amount of emphasis on career readiness in the program, how agriculture courses were sequenced, the incorporation of leadership development, record keeping, and supervised agricultural experiences (SAEs) in courses; the design of the curriculum to qualify for academic or postsecondary credits, and the approval of a program budget, among others.

The states with the highest number of coded items were Idaho (17), Illinois (7) and Ohio (7). Six states (West Virginia, North Carolina, Louisiana, Mississippi, Kentucky, and Alabama) had no items in their documents that were coded in this category. Standards checked most frequently were *Career readiness is emphasized through individual student career plans and student participation in career, work-based learning, and leadership development experiences, and other skill-building activities* (9), followed by *Courses are sequenced to support at least one career pathway* (7) and *Approved annual budget is shared with stakeholders* (6). Interestingly, the standard least often checked, which appeared only in the Missouri document, was *SAEs count as a part of course grade*.

Program Management

In the Program Management category, 127 items from state documents were coded into 13 standards, making this the most frequently coded category. This category included standards that emphasized the daily or yearly operation and function of the SBAE program, how teachers were situated within the program, and the expectations of student and program engagement in FFA and SAEs. This category also included items regarding technology, facilities, and equipment within the program, as well as SBAE teacher summer involvement.

The majority of standards pertaining to FFA presented high, specific expectations for FFA engagement, CDE participation, applying to FFA awards applications, and FFA event participation, all of which require significant teacher time investment beyond the normal school day. Nearly all state standards documents addressed student participation in FFA and SAEs. State standards pertaining to SAEs were wide ranging with respect to student participation, documentation, and teacher supervision and support, yet SAE expectations were listed in nearly all standards documents. Effective engagement with administrators and stakeholders; program planning, assessment, and reporting on a regular basis; and budgeting and recordkeeping were also key aspects of standards related to program management.

Specifically, Idaho had the most items coded in this section with 18 items coded into 12 of the 13 standards. The most frequently coded standard was *Safety and health protocols are met, maintained, and in compliance for all materials, equipment, supplies, and facilities* (25), followed by *Supplies, technology, equipment, and facilities exist to meet the needs of the program* (20). The least often coded standards were in regards to SAEs, including *Student SAEs are exhibited at a regional fair* (1) and *Agricultural education instructor demonstrates effectiveness involving experiential learning (SAE) activities that promote student growth* (2). Interestingly, two standards about SAE record keeping - *All students with SAEs keep records, plans, and agreements in AET or record books*, and SAE visits from teachers - *Teachers create and maintain written documentation of SAE visits*, were coded 10 and nine times, respectively.

Stakeholder Outreach and Engagement

Sixteen items from the state documents were coded into seven standards within the Stakeholder Outreach and Engagement category. Standards in this category emphasized the expectations for SBAE teachers to build relationships with individuals beyond the agriculture department (e.g., elected officials, administrators, community members), as well as outreach, marketing, and recruitment efforts to increase agricultural awareness and the number of students entering the program. Idaho had the highest frequency of items coded in this category (6), followed by Missouri (2) and Illinois (2). The most frequently coded standard was *Active recruitment and promotion plan is shared with administrators* (6).

Implications, Conclusions, and Recommendations

Our goal for this study was to explore the commonalities and differences in state-level program quality standards and teacher performance expectations for SBAE programs across the nation. Although research exploring the expectations of SBAE teachers and programs has not been uncommon (Eck et al., 2019; Roberts & Dyer, 2004; Traini et al., 2019), this study took a different approach by examining the documents states have used to evaluate SBAE teacher and program effectiveness using a cognitive sensemaking lens (Coburn, 2001, 2006). Our data analysis revealed several important conclusions, which we discuss below.

SBAE-specific state standards emphasized a blend of classroom, lab, FFA, and SAE program components. Despite the variety of organization and format of documents, states generally evaluated teachers and programs on six key categories including instruction, teacher qualifications, teacher engagement expectations, program design, program management, and stakeholder outreach and engagement. While states included items in each of these categories, specific standards emerged more often than others. Across all states, areas of emphasis were SBAE teacher engagement in professional associations, the importance of having organized courses with syllabi and lesson plans, and safety and health protocol compliance. We conclude that standards pertaining to well developed and sequenced courses, career readiness, academic and advanced credit, well equipped laboratories, and effective teaching were common base-level standards for agricultural education programs in the U.S..

Surprisingly, limited emphasis was given to instructional practice in the standards documents. State standards regarding instructional practice largely focused on curriculum and facilities and gave little attention to what constitutes effective teaching in agriculture classrooms and

laboratories (Newcomb et al., 1993). We wonder if individuals who developed standards at the state level may have intentionally deferred standards pertaining to teaching practice to local schools – a implication that aligns with Coburn’s (2006) cognitive sensemaking. This may be due to socio-political factors (Coburn, 2001) that constitute effective teaching and the variation in expectations from school to school, based on administrative directives. It may also suggest that individuals who created these documents assumed that SBAE teachers could effectively execute the teaching process itself. Still, if effective instruction is an expectation of SBAE teachers and programs (Croom, 2008; Phipps et al., 2008), it may be important to offer clearer pedagogical expectations within these evaluative documents. Further, if the trend of hiring alternatively certified teachers continues to intensify (Foster et al., 2018), more emphasis should be placed on creating state standards that better assess quality teaching.

In this study, only one item from the data set delineated SBAE teacher expectations by years of experience. Given this evidence, we conclude state SBAE evaluation documents expect all SBAE teachers, regardless of years of experience, to be evaluated against the same list of standards. In other words, first year SBAE teachers would be expected to perform the same duties and at the same level as teachers with 10+, 20+, or 30+ years of experience. We maintain that such evaluative criteria is unfair to new and emerging teachers. As such, we recommend state leaders explore creating evaluative tools that better emphasize SBAE teachers’ growth and development. Perhaps this change could stoke important conversation and changes to practice that could better support teachers based on their level of teaching experience.

We also noticed an absence of certain SBAE teacher expectations. For example, there was no mention of fundraising in the data. Yet, fundraising has been a significant activity for many SBAE teachers (Talbert et al., 2014). There was also no mention of supporting diverse students, such as students who are culturally and linguistically diverse. Are metrics like these unimportant or not to be evaluated? If they are important, how can we make this clear without adding to the already overwhelming list of expectations?

Existing state agricultural education program and teacher standards varied widely in scope and specificity. Only six states indicated they use the NQPS in their state, confirming anecdotal evidence suggesting that few states utilize the resource. As researchers who were former secondary SBAE teachers, we found looking through the NQPS was a demoralizing and overwhelming process. Even with the consolidation of nearly 300 standards in current standards documents into 60 representative standards within six major categories, the sheer number and diversity of state standards for agriculture teachers and programs may compromise teachers’ ability to meet their expectation of effective teaching daily. Perhaps this is why so few states utilize these documents. With regard to these and other lengthy state-specific documents, we wonder how SBAE teachers interact with these documents. Do they feel a sense of direction and clarity for their roles and programs after reviewing and/or utilizing these documents? Do they feel overwhelmed and demoralized like us? Do they hold themselves accountable to these standards or take them with a grain of salt? Answering these questions in future research may be a worthy pursuit for states who utilize these documents, especially the NQPS.

Engaging in this study made us question the reason state standards exist. Are they intended to serve as program and teacher evaluation metrics or as guidelines for program and teacher improvement? Or are they purely ideals that SBAE teachers should desire to meet? Some current

standards were the former, with punitive steps outlined when standards were not met. In other documents, financial incentives were associated with standards attainment, and in other states the standards appeared to simply present a roadmap for program excellence. It was similarly unclear who these state standards were written for, meaning are they aimed at currently excelling programs to help them excel or are they targeted at underperforming programs as a means of encouraging greater performance? Further, it was unclear who or what was being evaluated. Often, the SBAE teacher and the SBAE program were viewed as one entity. We find this lack of distinction problematic as it implies that *all* program responsibilities fall on the shoulders of SBAE teachers. This negates the expectation and norm that SBAE is a comprehensive school and community program that involves multiple layers of support (e.g., advisory boards, parent volunteers, local industry supporters, school administration, students, state and national associations) (Phipps, et al., 2008). Most of the documents we reviewed implied that all successes and shortcomings of the program are directly or indirectly attributed to the SBAE teacher. Perhaps this is one reason why SBAE teachers find themselves chasing reified markers of success (Traini et al., 2019, 2020) and doing so while feeling trapped, judged, and pressured by state leaders, community members, school administrators and other individuals to whom they feel accountable (Traini et al., 2019; Traini et al., 2020, Traini et al., 2021). Future studies should engage in an in-depth analysis of the content of each document to better understand its philosophical and logical underpinnings (Coburn, 2006).

Finally, our analysis revealed confusion regarding the extent to which these documents have been utilized. Do SBAE teachers know about them or use them? If so, in what capacity? Are they used as a formal evaluation tool tied to funding? Or as a guide to plan programs? Answering these questions in future research can help scholars and practitioners make useful decisions about the value of state and national standards.

Given the findings of this study, we recommend practitioners and state leaders engage in a cognitive sensemaking (Coburn, 2001, 2006) process to critically examine standards and evaluation metrics used in their states. The number of standards and required documentation should be analyzed with respect to teacher experience and preparation. Distinctions should be made about *who* (e.g. individual vs. program) is being evaluated and *what* are the rewards or consequences of evaluation. While this study clarified the current landscape of SBAE teacher and program standards, future work should propose a manageable, fewer number of standards or descriptors of SBAE program quality and teacher success that could be adaptable to the diverse programs across the nation, while not overburdening individual SBAE teachers with an impossible list of expectations.

These implications also emerged several critical questions that we perceive are important for the agricultural education profession to consider: (1) What are the expectations for agricultural education program quality and teacher performance/productivity in states without specific standards? (2) How are these unwritten expectations conveyed? (3) Can we reasonably assume that, except for states with comprehensive standards, a large list of unwritten standards exists in many states (schools) or expectations derived from multiple sources (e.g., FFA, school, community, etc.) rather than a single source? (4) Does the presence or absence of comprehensive and detailed SBAE program and teacher standards create more or less anxiety for teachers (e.g., teachers striving to meet known vs. unknown expectations)? and (5) Can SBAE teachers be expected to also meet an array of local school/community program and performance standards

that are in addition to formal standards in place at the regional or state level? We maintain that these questions warrant more profound thought, discussion, and research moving forward.

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An Experiment on the Effects of Response Mode and Incentives on Survey Response Rates

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A decline in response rates was found for agricultural education research studies using survey research methods. The use of incentives and various response modes can affect survey response rates and were the focus of this experiment. The purpose of this study was to determine the effects of survey response mode and incentives on response rates when surveying SBAE teachers. Findings revealed a significant increase in response rates for groups receiving an incentive. No significant differences were found between groups using different survey response modes. When examining summated scale scores for each construct in the questionnaire, participants answering on paper scored more positively in four of the six constructs compared to web responses. Recommendations for practice included using mixed response modes when financially feasible and oversampling to achieve the desired sample size to represent a population. Further research on the effects of communication mode on response rates is needed. An examination of why differences in scale scores occur with different response modes is recommended.

Introduction

Agricultural education is by nature an applied, social science discipline where scholars use survey research methodologies most frequently when studying populations (Doss et al., 2021; Dyer et al., 2003). However, survey response rates are declining in our research, possibly affecting the strength of our most frequently used methodology. Lindner et al. (2001) reported an average response rate of 81.6% for articles published using survey research in the *Journal of Agricultural Education (JAE)* from 1990 through 1999. Later, Johnson and Shoulders (2017) reported an average response rate of 56.3% for articles published from 2006 through 2015.

Declining survey response rates in the field of agricultural education inversely leads to increased nonresponse and therefore the possibility of nonresponse error. When a portion of the sample fails to respond to a survey by not returning a questionnaire, it can result in a biased sample (Bordens & Abbott, 2018). Results of a sample not representative of the population from which it was drawn can be a threat to the external validity of the study when attempting to generalize beyond those who were surveyed (Fraenkel et al., 2019).

While studies have recommended ways to handle nonresponse once it occurs in agricultural education research, little work has been done to address increasing response from the start (Johnson & Shoulders, 2017; Lindner et al., 2001; Miller & Smith, 1983). Higher response rates do not necessarily eliminate nonresponse error; however, “it is important to recognize that higher response rates do reduce the likelihood of nonresponse error and thus provide greater credibility to surveys’ results than do lower response rates” (Dillman et al., 2014, p. 6). Increasing the number of contacts with participants, providing incentives, and survey mode selected can have the greatest effect on survey response rates (Ary et al., 2014; Dillman et al., 2014; Fraenkel et al., 2019). In agricultural education survey research, it is common to contact participants multiple

times; however, few studies use an incentive nor use a survey mode other than web-based (Doss et al., 2021). This raises the question: do these current practices achieve the best possible response rate? In addition, what affects do incentives, and the use of different response modes have on the data collected?

The mission of the American Association for Agricultural Education (n.d.) is “to foster excellence in the discovery and exchange of evidence-based solutions for social science challenges in agriculture and related sciences.” For discovery and evidence-based solutions to occur at a level of high quality, methodologies in agricultural education research must continue to improve. Many recommendations for improving survey response rates come from the discipline of general public opinion research but can have varying results in different contexts and settings (Park & Tsuchiya, 2021). Researchers outside of agricultural education recommended testing recommendations for improving survey response within specific contexts and populations, providing a need for this study (Neal et al., 2020; Park & Tsuchiya, 2021).

Purpose and Objectives

The purpose of this study was to determine the effects of survey response mode and incentives on response rates when surveying school-based agricultural education (SBAE) teachers. The research objective and hypotheses that guided this study were:

1. Determine the main effect of providing an incentive, the main effect of survey mode, and the interaction effects of incentive and survey mode on response rates.
2. Compare respondent questionnaire completion rates by receipt of incentive and final response mode used.
3. Compare respondent summated scale scores by receipt of incentive and final response mode used.

Review of Literature and Theoretical Framework

From a review of literature, it quickly becomes apparent there are many variables influencing the decision to respond to a survey. Attitude toward surveys, questionnaire appearance and content, number of contacts made, providing incentives, and data collection mode used are all major categories influencing response rates and within each of these categories there are multiple variables at work (Ary et al., 2014; Fraenkel et al., 2019; James & Bolstein, 1990; Leeper, 2019; Mertler & Charles, 2011; Rogelberg et al., 2001; Ye, 2007). To narrow down the variables of interest, we chose to study the use of incentives and survey response modes because of their ability to have larger impacts on survey response rates and because of how they are currently used in agricultural education research (Dillman et al., 2014; Doss et al., 2021).

The use of incentives is the second-best way to increase response rates behind making multiple contacts (Dillman et al., 2014). Including a cash or material incentive encourages reciprocity and increases trust in the survey (Ary et al., 2014; Dillman et al., 2014). To obtain the greatest response rate and return on investment, researchers have determined the best time to provide an incentive in the survey process is up front with the initial invitation to participate (Ary et al., 2014; Dillman et al., 2014; James & Bolstein, 1990; Mercer et al., 2015). Studies have found

\$1.00 - \$2.00 is adequate to increase response rates substantially with \$2.00 providing the best results (Dillman et al., 2014; James & Bolstein, 1990). Incentives can be used with most survey modes, but prepaid incentives can be difficult to provide in web surveys (Dillman et al., 2014). However, in an experiment conducted by Millar and Dillman (2011), providing an incentive increased web response rates by 17%.

A potential benefit of providing an incentive is that it may reduce nonresponse bias by pulling in respondents who normally would not answer (Dillman et al., 2014). James and Bolstein (1990) recommended exercising caution on this same point because providing an incentive can also cause respondents to provide more favorable responses because they feel rewarded, resulting in bias. On the other hand, James and Bolstein (1990) suggested the extra respondent effort produced by monetary incentives may be needed, especially if open-ended questions are asked or when respondents are asked to check their records to respond.

Concerning survey mode, or the platform or media in which a survey is conducted (Dillman et al., 2014), it is important to recognize this can refer to both the communication between the researcher and the participant and the response media used by the participant to answer the questionnaire. The nature of the population being studied, expected response rate, resources available to the researcher, and research questions to be answered all influence the decision of which survey mode to use (Couper, 2011). Modes of data collection include personal interviews, direct administration, mail, telephone, email, and web-based surveys (Dillman et al., 2014; Fraenkel et al., 2019; Gay et al., 2012; Mertler & Charles, 2011). Historically, the face-to-face mode was used most in the 1970s, then telephone and mail became popular, leading to email and web modes as the most common data collection method today (Roberts, 2007).

When examining response rates by survey mode, mail surveys result in the highest response rates when compared experimentally (Dillman et al., 2014; Messer & Dillman, 2011; Olson et al., 2012). Dillman et al. (2014) suggested mail surveys can achieve 50% response rates or more if implemented correctly. However, compared to web and mixed-mode surveys, mail is more expensive to implement (Mertler & Charles, 2011). For web surveys response rates are generally the lowest of any mode (Dillman et al., 2014; Messer & Dillman, 2011; Olson et al., 2012; Ye, 2007). Ye (2007) claimed 20-35% response rates were common in web surveys.

Advantages of web surveys often outweigh the disadvantages, leading to its continued popularity as a survey mode. The main benefit of using web surveys is the relatively low cost when compared to other modes, making them more feasible for researchers with a low budget (Dillman et al., 2014; Fraenkel et al., 2019; Gay et al., 2012; Greenlaw, 2006; Mertler & Charles, 2011; Roberts, 2007; Sedwick, 2003). Convenience to the participant, ability to use multimedia within the questionnaire, mobile administration, ease of targeting respondents, potential for increased statistical power, possibility of immediate feedback to participant, and a higher level of perceived anonymity are all other advantages of using the web survey mode (Evans & Rooney, 2008; Fraenkel et al., 2019; Gay et al., 2012; Roberts, 2007). On the other hand, there is also the possibility of differences in scale measurements with web surveys when compared to a paper mode survey (Roberts, 2007; Sedwick, 2003).

Mixed-mode surveys increase the complexity of designing, deploying, and managing a survey. According to Dillman et al. (2014), the following are three ways modes can be mixed for surveys:

1. Use of multiple contact modes to encourage response by a single response mode.
2. Use of multiple response modes to collect respondent answers with only one contact mode.
3. Use of multiple contact and response modes for the same study.

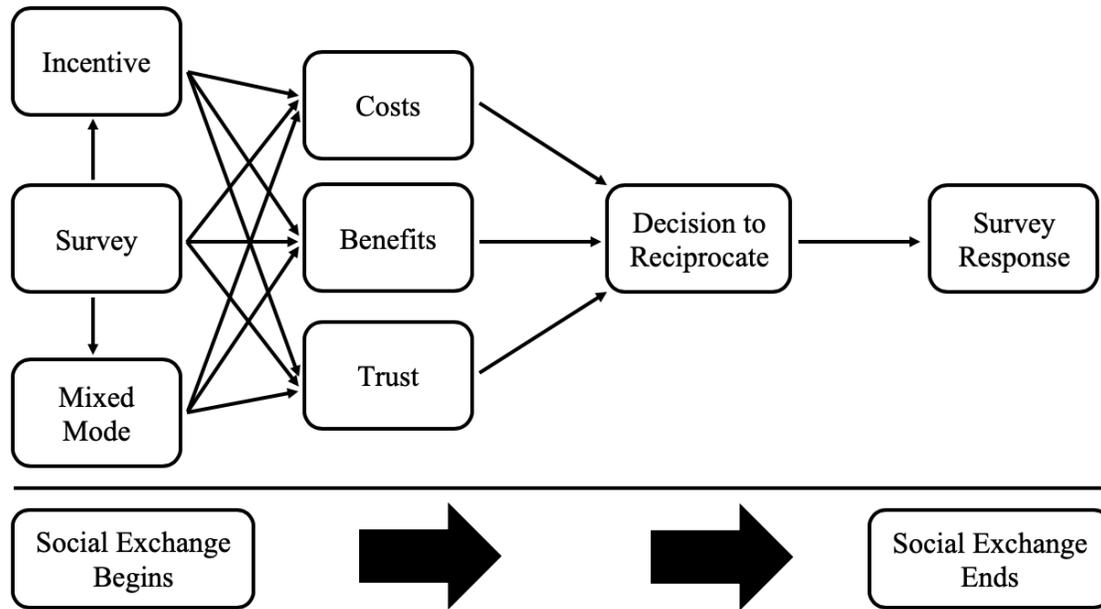
However, research has shown mixed-mode surveys can achieve higher response rates than web only surveys and can be as high as mail only surveys for a fraction of the cost (Dillman et al., 2014; Greenlaw, 2006; Millar & Dillman, 2011). In a mixed-mode experiment conducted by Messer and Dillman (2011), 44-52% response rates were achieved. Mixed-mode surveys can also reduce coverage error and nonresponse error (Dillman et al., 2014). When a mixed-mode study is conducted, there is opportunity to check for differences in response quality when comparing the different modes (Dixon & Turner, 2007). Messer and Dillman (2011) found mail only and web only surveys produce different demographic respondents, however web and mail mixed-mode surveys produce respondents with similar demographics as the mail only study.

There are also several considerations to make when deciding how to mix response modes for a study. One major choice is whether to use simultaneous or sequential response options. Several studies have provided evidence that giving participants the option to choose which mode they want to respond with (simultaneous) does not increase their likelihood of responding (Dillman et al., 2014; Millar & Dillman, 2011). However, offering response modes in sequence can increase response rates significantly (Millar & Dillman, 2011). Dillman et al. (2014) recommended offering a mail response option after a web response option in a sequential-mixed mode design to increase response rate and improve quality of the data. Studies have found little change in response rates when web follows mail first (Dillman et al., 2014). However, significant increases in response were reported in studies where the web survey mode was first, followed by mail (Dillman et al., 2014; Lang, 2007; Messer & Dillman, 2011; Millar & Dillman, 2011). Concerning timing of mode switch, Wagner et al. (2017) found no significant difference in response rates when switching modes after the first, second, third, and fourth contact leading to the recommendation of switching at the final contact to the more expensive mode.

Social exchange theory was used to guide this study. Blau (1964) described social exchange as “voluntary actions of individuals that are motivated by the returns that are expected to bring and typically do in fact bring from others” (pp. 91-92). Within the context of survey response, social exchange theory is applied in that “people are more likely to comply with a request from someone else if they believe and trust that the rewards for complying with that request will eventually exceed the costs of complying” (Dillman et al., 2014, p. 24). “Social exchange involves the principle that one person does another a favor, and while there is a general expectation of some future return, its exact nature is definitely not stipulated in advance” (Blau, 1964, p. 93). Social exchange theory considers many different influences on a decision to respond. According to Dillman et al. (2014), the decision to participate in a survey is assumed to involve multiple considerations taking into account perceived benefits, perceived costs, and trust.

Figure 1

Application of Social Exchange Theory to Survey Response for this Study



The application of social exchange theory to this study is simple. Providing the participant with a survey creates a feeling of obligation in the participant to reciprocate. The presence of mixed-modes or incentives can increase the feeling of obligation. As can be observed in Figure 1, the survey itself, presence of an incentive, and providing mixed modes can all influence costs to the participant, benefits to the participant, and establishment of trust. The overall balance of costs, benefits, and trust influence the decision to reciprocate leading to completion of the survey and returning it to the researcher.

Methods

The research design for this study was an experimental, two-way, between-subjects, factorial design with eight treatment groups (Maxwell et al., 2018). The two independent variables were survey response mode and incentive. For survey response mode, there were four types: mail only, web only, mail + web, and web + mail. For the incentive variable there were two levels: received a \$2 incentive and did not receive a \$2 incentive. The levels of each independent variable make this a 2 X 4 design. Subjects were randomly assigned to one of eight treatment groups shown in Table 1 after IRB approval was obtained at Texas Tech University.

Table 1

Treatment Groups Used in this Study for Comparison

Response Mode (B)	\$2 Incentive (A)	
	Yes (A ₁)	No (A ₂)
Mail Only (B ₁)	Group 1 (A ₁ B ₁)	Group 5 (A ₂ B ₁)
Web Only (B ₂)	Group 2 (A ₁ B ₂)	Group 6 (A ₂ B ₂)

Mail + Web (B ₃)	Group 3 (A ₁ B ₃)	Group 7 (A ₂ B ₃)
Web + Mail (B ₄)	Group 4 (A ₁ B ₄)	Group 8 (A ₂ B ₄)

The target population of this study was all SBAE teachers in the United States. According to the National Association of Agricultural Educators (2020), there are approximately 12,000 SBAE teachers in the nation. The sampling procedure used for this study was stratified random sampling. Participants were stratified proportionate to the number of FFA chapters in the state compared to the nation. Lists of active FFA chapters were available online for each state and the needed number of chapters were randomly selected from each list. After the chapters were identified, specific agricultural education teachers were identified for each chapter through published online state SBAE teacher directories or by viewing individual school websites. G*Power was used to estimate the desired sample size to accomplish the level of power needed based on expected effect size as recommended by Johnson and Shoulders (2019). A sample size of 1,095 was determined in G*Power (Faul et al., 2007). Each of the eight treatment groups needed 137 participants for a total sample size of 1,096.

The instrument used in this study was a researcher designed questionnaire measuring challenges faced by SBAE teachers. There were 131 items on the questionnaire including scale items for each of the six constructs, one open-ended question, and demographic questions. Consistency of appearance was maintained across both paper and online modes. The instrument was an eight-page questionnaire on the paper format and one continuous page for the online format. The instrument was pilot tested with 60 SBAE teachers in Texas who were not included in the main study. Fifteen surveys from each response mode were sent to the pilot test group to make sure communication and response modes were conducted properly and to address any logistical concerns before conducting the main study. A total of 40 SBAE teachers responded to the pilot test for a 66.67% response rate. Data received from the pilot test was used to calculate a Cronbach's alpha for instrument reliability for each of the six constructs. Table 2 lists the alpha levels for each construct. All were acceptable according to Field (2018).

Table 2
Construct Calculated Reliability for Questionnaire from Pilot Test (N = 40)

Construct	Cronbach's α
1. Relationships with school and community personnel	0.86
2. Classroom factors, activities, and responsibilities	0.94
3. Program factors, activities, and responsibilities	0.94
4. Miscellaneous factors, activities, and responsibilities	0.91
5. Professionalism factors, activities, and responsibilities	0.89
6. Personal factors, activities, and responsibilities	0.96

Timing for all contacts was consistent across all response modes. A prenotice email was sent to participants two days after the initial invitation to participate was mailed allowing time for mail delivery to teachers' physical addresses. The first reminder email was sent two weeks following the mailing of the invitation to respond with a copy of the questionnaire/online instructions to allow for returned completed surveys and the opportunity to correct undeliverable addresses. All additional reminders and contacts were made at one-week intervals. Table 3 summarizes the contact procedures used.

Table 3*Contact Procedures Used*

Contact	Procedure
1 st	Prenotice Email
2 nd	Mailed Invitation Letter, Paper Copy or Link to Questionnaire, (\$2, If Applicable)
3 rd	Emailed Reminder to Complete Questionnaire
4 th	Emailed Reminder to Complete Questionnaire
5 th	Mailed Reminder w/Another Copy/Link to Questionnaire (Mode Switch)
6 th	Emailed Final Reminder to Complete Questionnaire

Note. Refer to Table 1 for determining receipt of incentive and mode.

Data were compiled in Qualtrics for web surveys and manually entered into a Microsoft Excel spreadsheet for mail/paper surveys. All data for this study were analyzed in IBM SPSS version 26. Basic descriptive statistics for demographic information and response rates across and within treatment groups were calculated including frequencies, percentages, means, and standard deviations. To test the hypotheses in objective one, a two way, between-subjects, factorial ANOVA was calculated. For objectives two and three, independent samples *t*-tests were calculated. Significance was established *a priori* at $p \leq 0.05$.

Results

With all eight experimental groups combined, there were 444 responses received for an overall response rate of 40.85%. Experimental group response rates ranged from 31.85% ($n = 43$) for Group 8 to 51.85% ($n = 70$) for Group 2. A total of 227 (51.13%) paper responses were received with the combined eight groups, while 217 (48.87%) online responses were received. Response rates achieved for each experimental group is presented in Table 4. Responses were received from 49 out of 50 states. No surveys were completed and returned from the state of Maine.

Table 4*Achieved Response Rates for Experimental Groups by Response Mode (N = 444)*

Group	Paper		Web		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
1 ($n = 137$)	66	48.18	0	0.00	66	48.18
2 ($n = 135$)	0	0.00	70	51.85	70	51.85
3 ($n = 135$)	52	38.52	12	8.89	64	47.41
4 ($n = 137$)	10	7.30	51	37.23	61	44.53
5 ($n = 135$)	45	33.33	0	0.00	45	33.33
6 ($n = 137$)	0	0.00	47	34.31	47	34.31
7 ($n = 136$)	43	31.62	5	3.68	48	35.29
8 ($n = 135$)	11	8.15	32	23.70	43	31.85
Total ($N = 1,087$)	227	20.88	217	19.96	444	40.85

Demographic information collected from participants revealed near equal participation from male ($n = 227$, 51.13%) and female ($n = 215$, 48.42%) SBAE teachers. The majority of participants indicated they were White or Caucasian ($n = 415$, 93.47%) while 14 (3.15%) were

Hispanic or Latino, two (0.45%) were Black or African American, one (0.23%) was Asian or Pacific Islander, seven (1.58%) were Native American or Alaskan Native, two (0.45%) were multiracial or biracial, and three (0.68%) did not respond. Participants had an overall average age of 38.69 years ($SD = 11.31$) and average teaching experience of 13.05 years ($SD = 10.17$). Overall, 219 (49.44%) participants reported having a bachelor's degree as their highest level of education and 216 (48.76%) had a master's degree with 82.43% ($n = 366$) reporting earning teaching certification through a traditional university setting. The final demographic variable examined in this study was survey mode preference. Participants were asked to indicate how they prefer to respond to a survey. The majority of participants preferred to answer online ($n = 354$, 79.73%), 73 (16.44%) preferred to answer on paper, five (1.13%) preferred telephone, four (0.90%) indicated other, and eight (1.80%) did not respond.

The first hypothesis tested for objective one was the main effect on response of providing an incentive. The results indicated there was a significant difference on the main effect among groups depending on receipt of an incentive with $F(1, 1,079) = 22.75, p < .001$, and $\eta^2 = .01$. Given this information, the null hypothesis was rejected. The second hypothesis tested was the main effect on response for different response modes. According to the ANOVA summary table, there is no significant difference between groups based on response mode ($F(3, 1,079) = 0.46, p = 0.711, \eta^2 < .01$). We fail to reject the null hypothesis. The final hypothesis tested was the interaction effect of mode and incentive on response. The results indicated there was no significant difference between groups based on the interaction effect with $F(3, 1,079) = 0.24, p = 0.208$, and $\eta^2 < .01$. Since the null hypothesis was not rejected, *post hoc* comparisons were not needed. The complete ANOVA summary table for objective one is presented in Table 5.

Table 5

Factorial ANOVA Summary Table Comparing Experimental Groups (N = 1,087)

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	η^2
Incentive	5.41	1	5.41	22.75	<.001	.01
Mode	0.33	3	0.11	0.46	.711	<.01
Mode*Incentive	0.15	3	0.05	0.24	.208	<.01
Error	256.59	1,079	.24			

The second objective was to compare respondent questionnaire completion rates by receipt of incentive and final response mode used. An overall average of 98.84% ($SD = 2.74$) of questions were answered on the 131-item questionnaire. Table 6 presents a complete breakdown of the percentage of items completed by experimental group.

Table 6

Average Completion Percentage of 131-Item Questionnaire by Experimental Group (N = 444)

Group	<i>n</i>	<i>M</i>	<i>SD</i>
1	66	98.06	4.95
2	70	98.56	4.06
3	64	98.91	1.03
4	61	99.46	0.60
5	45	99.00	1.22
6	47	99.19	0.92

7	48	99.01	1.21
8	43	98.72	2.47
Overall	444	98.84	2.74

To compare questionnaire completion rates of those receiving an incentive and those not receiving an incentive, an independent samples *t*-test was conducted. The null hypothesis stated there is no difference in questionnaire completion rates when comparing respondents receiving an incentive to those who did not. The difference between completion rates of those receiving an incentive ($M = 98.73\%$, $SD = 3.33$) and those not receiving an incentive ($M = 98.99\%$, $SD = 1.55$) resulted in a *t*-score ($t_{442} = -0.97$, $p = 0.33$) indicating no difference between groups. The null hypothesis for this test was not rejected. These findings are summarized in Table 7.

Table 7

Comparison of Questionnaire Complete Rates by Receipt of Incentive (N = 444)

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	t_{442}	<i>p</i>
Incentive	261	98.73	3.33	-.97	.33
No Incentive	183	98.99	1.55		

To compare questionnaire completion rates of those answering on paper to those answering online, an independent samples *t*-test was conducted. The null hypothesis stated there was no difference in questionnaire completion rates when comparing those responding on paper to those responding online. The difference between completion rates of those responding on paper ($M = 98.62\%$, $SD = 3.00$) and those responding online ($M = 99.06\%$, $SD = 2.42$) resulted in a *t*-score ($t_{442} = -1.72$, $p = 0.09$) indicating no significant difference between groups. The null hypothesis for this test was not rejected. These findings are presented in Table 8.

Table 8

Comparison of Questionnaire Completion Rates by Response Mode (N = 444)

Response Mode	<i>n</i>	<i>M</i>	<i>SD</i>	t_{442}	<i>p</i>
Paper	227	98.62	3.00	-1.72	.09
Online	217	99.06	2.42		

The final objective of this study was to compare respondent summated scale scores by receipt of incentive and final response mode used. Average summated scale scores were calculated for each respondent for each of the six constructs from the questionnaire used in this study. The scale ranged from 1 = *very negative influence* to 6 = *very positive influence*. Independent samples *t*-tests were used to compare responses for those receiving an incentive to those not receiving an incentive for each construct. There were no significant differences between scores for those receiving an incentive compared to those not receiving an incentive for any of the six constructs. This information is summarized in Table 9.

Table 9

Comparison of Construct Scores by Receipt of Incentive (N = 444)

Construct	Incentive (<i>n</i> = 261)		No Incentive (<i>n</i> = 183)		t_{442}	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
1. Relationships	4.78	0.46	4.77	0.44	-0.25	.80

2. Classroom	4.50	0.58	4.52	0.53	0.38	.71
3. Program	4.64	0.63	4.63	0.64	-0.06	.95
4. Miscellaneous	4.03	0.68	3.92	0.71	-1.57	.12
5. Professionalism	4.56	0.73	4.57	0.71	0.10	.92
6. Personal	4.08	0.93	3.96	0.97	-1.31	.19

Independent samples *t*-tests were used to compare responses on paper to responses online for each construct. The results of these tests are presented in Table 10. For all constructs, the mean summated score was higher for paper responses compared to online responses. Responses for constructs one, two, five, and six were all significantly higher for those answering on paper compared to those answering online. Responses for constructs three and four were not significantly different depending on final response mode.

Table 10

Comparison of Construct Scores by Final Response Mode (N = 444)

Construct	Paper (n = 227)		Online (n = 217)		<i>t</i> ₄₄₂	<i>p</i>
	M	SD	M	SD		
1. Relationships	4.82	0.45	4.73	0.46	1.99	.05
2. Classroom	4.57	0.51	4.45	0.60	2.26	.02
3. Program	4.68	0.65	4.58	0.63	1.63	.10
4. Miscellaneous	4.04	0.67	3.92	0.73	1.85	.06
5. Professionalism	4.65	0.70	4.48	0.73	2.59	.01
6. Personal	4.13	0.94	3.93	0.95	2.28	.02

Conclusions, Implications, and Recommendations

From the results of this experiment, it can be concluded providing an incentive significantly increases survey response rates with SBAE teachers. In this study the increase ranged from approximately 12% to 17% more responses. The significance of providing an incentive on response rates was to be expected since it has been recommended by many as the second most effective way to increase responses (Ary et al., 2014; Dillman et al., 2014; James & Bolstein, 1990; Mercer et al., 2015; Mertler & Charles, 2011). Incentives increased survey response with SBAE teachers at similar rates found in the literature, confirming findings of other studies with a different population (Millar & Dillman, 2011). Increases in response across all modes may indicate an incentive pulls in respondents who normally would not answer with the potential to reduce nonresponse bias, a benefit highlighted by Dillman et al. (2014).

Response mode used had little influence on SBAE teacher response rates; however, effect size was very small making this difficult to detect with our selected sample size. This conclusion was contradictory to what others have found where mail surveys resulted in the highest response rates (Dillman et al., 2014; Messer & Dillman, 2011; Olson et al., 2012). Online-only group response rates exceeded mail-only groups regardless of incentive, although these differences still were not significant. Literature indicated mail surveys could achieve 50% or greater response rates (Dillman et al., 2014), however 50% response was not achieved in either group regardless of incentive use. Several studies indicated web response rates were the lowest of any survey mode (Dillman et al., 2014; Messer & Dillman, 2011; Olson et al., 2012; Ye, 2007). This was not the

case with SBAE teachers. When an incentive was provided, online was the mode receiving the greatest response. For mixed-mode studies, Messer and Dillman (2011) found that 44-52% response rates could be achieved. Response rates for both mixed-mode groups receiving an incentive fell in this range, however those not receiving an incentive were less. SBAE teachers also did not produce significant differences in response rates with mixed modes based on the sequence of mixing the modes. Finally, there was no significant interaction effects found on response rates from incentives and response mode. This indicates that incentives had the same effect across all response modes used in this study.

Through the lens of social exchange theory, incentives appear to be an element that impacts SBAE teachers' decision to respond to a survey. Dillman et al. (2014) suggested the chances of convincing participants to respond are higher when many aspects of a survey request work together to encourage response. This was observed in this experiment when comparing differences in response rates for groups based on incentive. Mode, on the other hand, does not seem to significantly contribute to the decision to respond or have an effect on perceived costs, benefits, and trust when surveying SBAE teachers.

After examining completion rates of questionnaires returned by SBAE teachers who received an incentive compared to those who did not receive an incentive, there was no significant difference between the two groups. James and Bolstein (1990) suggested providing incentives to encourage more complete and clarifying responses on questionnaires, particularly with open-ended questions. Since this study only had one open-ended question, overall completion rates were examined instead. It does not appear an incentive helps with completion rates of closed-ended questions when studying SBAE teachers. Dixon and Turner (2007) noted there is an opportunity to check for differences in response quality when comparing different response modes. In terms of completion rate of the questionnaire as an indicator of response quality, both online and paper completion rates were near 99% with online being slightly higher. There was no significant difference found in completion rates indicating response mode did not affect how much of a questionnaire was completed by SBAE teachers. The findings from this objective are also likely an indicator that both online and paper versions of the questionnaire were viewed similarly in the decision to respond to questions, meeting the goal of keeping this variable constant.

When comparing scale scores of respondents receiving an incentive to those not receiving an incentive, there were no significant differences found. This indicates incentive did not influence how teachers responded. James and Bolstein (1990) recommended using caution when using incentives because they can cause respondents to provide more favorable responses because they feel rewarded, resulting in bias. It appears incentive did not have this effect with this study.

In this study, SBAE teachers produced significantly more positive responses on four of the six constructs measured when responding on paper. Differences in scale measurement are possible with web surveys when compared to a paper survey (Roberts, 2007; Sedwick, 2003). Design of the questionnaires across the different modes and differences in demographics of those responding are possible explanations from Roberts (2007) and Sedwick (2003) for why this could happen in their studies. In this study, the design of the questionnaire and scales were held constant across both modes. A possible explanation for why differences in scale scores occurred across modes is that those responding online felt a higher level of anonymity and were able to

express more negative feelings. Higher perceived anonymity for web surveys is an advantage of using online response modes according to several scholars (Evans & Rooney, 2008; Fraenkel et al., 2019; Gay et al., 2012; Roberts, 2007). Those answering on paper may have felt like their responses were less anonymous and were more reluctant to indicate negative feelings toward different aspects of their job. However, this study did not directly collect data on this matter.

Recommendations for practice emerging from this experiment include using incentives and oversampling when studying SBAE teachers. Incentives should be used to gain better response rates from this population when budget allows. Since survey data collection mode used does not impact response rates, other factors such as completion rates, quality of data across modes, and cost should influence the mode decision. Oversampling may be used to reach a desired sample size based on results from specific conditions in this study. Oversampling could be used to strengthen power of a study. In fact, Ary et al. (2014) and Dillman et al. (2014) recommended oversampling to achieve a desired sample size. However, oversampling does not necessarily fix the problem of nonresponse error if those responding are still different from those who are not responding (Fraenkel et al., 2019). Nevertheless, it is widely accepted higher response rates are less likely to have nonresponse bias than lower response rates (Ary et al., 2014; Dillman et al., 2014; Fraenkel et al., 2019).

Dillman et al. (2014) recommended using mixed-mode surveys to improve the quality of data collected for a study. Since differences were found in scores across response modes in this study, Dillman's recommendation should be considered when studying SBAE teachers. This study has found few advantages to conducting a mixed-mode study, however, the possibility of having a higher quality data set from multiple modes is an advantage. When quality of data is not the greatest concern in designing the survey procedures, the online-only mode seems to be the least expensive and results in the highest response rates. The decision of which survey mode to use really belongs to the researcher and where their priorities lie with budget and data quality.

Further research should be conducted on the effects of contact mode used to improve response rates rather than response mode. Mixed contact modes were used across all experimental groups; however, this is not really used often in agricultural education research (Doss et al., 2021). Communication was the largest expense in this study, even above incentives. Information from research conducted based on contact mode may help identify more efficient ways to save money when conducting surveys. This study found responses differed on scale scores between online and paper respondents. Further research should be conducted to determine why this happens and the effects this has on interpreting scores from each mode. Finally, qualitative research should be used to determine why some SBAE teachers do not respond to surveys.

Survey research procedures are constantly changing based on the available technology. Many factors influence the decision to respond to a survey. We suspect the level of influence of many factors is constantly changing for an individual. However, there are likely a few factors that make up the majority of the decision to respond. Research in survey methodology should continue to attempt to identify these factors and take advantage of them. Survey research is an evolving field and will have a continued need for study in the future if we are to continue improving the quality of research in agricultural education. We believe this is an endeavor our profession should continue to pursue into the future.

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Agriculture Majors' Perceptions of Studying Agriculture: A Q Method Examination

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There are noted benefits for producers and consumers to learn about agriculture. Although benefits exist, little is known about the perspectives surrounding why people should learn about agriculture. This study allowed us to employ Q methodology to examine the perspectives of University of Idaho College of Agricultural & Life Sciences undergraduate students (N = 32) related to why people should learn about agriculture. Data analysis led to the extraction of three unique factors, each representing a unique persona among participants and accounting for 65.5% of explained variance. We labeled the personas Production-Focused, Heritage-Focused, and Data-Focused to highlight the views expressed by each group. Examining the distinguishing statements for each of these personas, along with an exploration of the Q set statements which received consensus or disagreement across factors could be helpful for agricultural educators at the secondary and postsecondary level, recruiters for postsecondary programs and those in the agricultural workforce to frame conversations about why people should learn about agriculture and how those beliefs can translate to recruitment, retention, and consumer-education initiatives.

Introduction/Theoretical Framework

Agriculture is an ever-evolving industry which is influenced by technological advancements, political changes, economic stability, and many other factors (NASEM, 2019). Agricultural education takes many forms, from formal school-based programs in elementary, secondary schools, and post-secondary arenas to informal education for both producers and consumers of agricultural products (National Research Council, 2009; Rivera & Alex, 2008). There are differing opinions, even within agricultural education, about why people should study agriculture (Rice & Kitchel, 2017; Roberts & Ball, 2009).

The impacts of learning about agriculture include benefits to the scientific community, to agricultural producers, and to those charged with completing education both in and about agriculture (Lindner, et al., 2020). Determining why people should learn about agriculture requires an examination of the importance of the interactions people have with agriculture in their lives (Rivera & Alex, 2008). Previous explorations of the topic led researchers to suggest that the desire to learn about agriculture can be influenced by many factors (Dyer & Breja, 2003; Myers, et al., 2004; Rayfield, et al., 2013; Torres & Wildman, 2001). Researchers note that choosing to learn about agriculture could be motivated by a desire to uphold family and rural traditions (Adedokun & Balschweid, 2008; Mat Taib, et al., 2019), to provide consumer education (Myers, et al., 2004; Rice & Kitchel, 2017), or because of the multiple career opportunities available within agriculture (Esters & Bowen, 2005; Rayfield, et al., 2013).

Upholding agricultural ideals and traditions is one reason people should study agriculture (Burton, et al., 2020). Numerous researchers note increased desire for a personal pursuit of

agricultural knowledge among those with a family connection to agricultural production (Burton, et al., 2020). Individuals with an agrarian background are noted to desire additional agricultural education for those who come from non-agrarian backgrounds (Burton, et al., 2020). Ang (2019) noted that persistent agricultural knowledge can lead to the development of sub-cultures within society, whereby production practices, commodity choices, and individual management choices are perpetuated through beliefs in agriculture as a lifestyle or specific management practices as ties to family or regional legacy. Cultural identity as a farmer or rancher can lead those with an agricultural background to desire education for themselves in agriculture to help the family farm. The same motivation and personal identify can drive a desire to learn about agriculture to become more efficient and protect the viability of farming operations. Researchers also note that an agrarian identify can also stimulate a desire to educate others about agricultural production as a method of ensuring farm success, a way to help secure favorable public policy, and as a way of describing and promoting an agricultural way of life (Burton, et al., 2020). Strong positive associations for agricultural learning are found among those with an agricultural or rural background (Adedokun & Balschweid, 2008; Burton, et al., 2020).

Consumer education is also noted in the literature as a reason people should study agriculture (Lusk & McCluskey, 2018; Rice & Kitchel, 2017; Wunderlich, et al., 2017). Consumer education in agriculture can prevent the spread of misinformation and help consumers make more informed purchasing decisions (Wunderlich, et al., 2017). Producer and commodity groups often point to the lack of consumer education as a critical challenge in moving forward with production practices, implementing new products, and influencing policy surrounding sustainable agricultural initiatives and point to the need for increased consumer education as a way to drive consumer demand for products and therefore influence positive changes to production practices (Lusk & McCluskey, 2018). A widely held belief among producers is that learning about agriculture can increase consumer confidence, help producers adopt new practices, and help bring new employees into agricultural careers (Rivera & Alex, 2008).

Another reason people might learn about agriculture is to obtain a career in the agricultural industry (Goecker, et al., 2015). Nationwide, there are not enough workers entering the agricultural field, especially for positions which require advanced degrees (Charleton, et al., 2018; Rivera & Alex, 2009). The nationwide shortage of skilled agricultural workers reached a near critical level prior to the COVID-19 pandemic, and experts forecast continued challenges to workforce development for at least the next decade (Charlton & Castillo, 2021). To address the shortage, researchers point to the need for more people to pursue studies that lead to agricultural careers (Goecker, et al., 2015). While many experts disagree on the methods through which a sustainable agricultural workforce is best recruited and retained, most do agree that the shortage of agricultural workers is at least partially addressed through improved agricultural knowledge at all levels (Rivera & Alex, 2008).

Recruitment into agricultural education relies on motivating students to pursue agriculture as a course of study (National Research Council, 2009). There are differing opinions, even within agricultural education, about the factors motivating students to pursue agriculture at the high school and post-secondary level (Alston, et al., 2019; Rice & Kitchel, 2017; Roberts & Ball, 2009). For college students, individual beliefs about agriculture can help determine why someone would choose an agriculturally related major and pursue an agricultural career (Torres

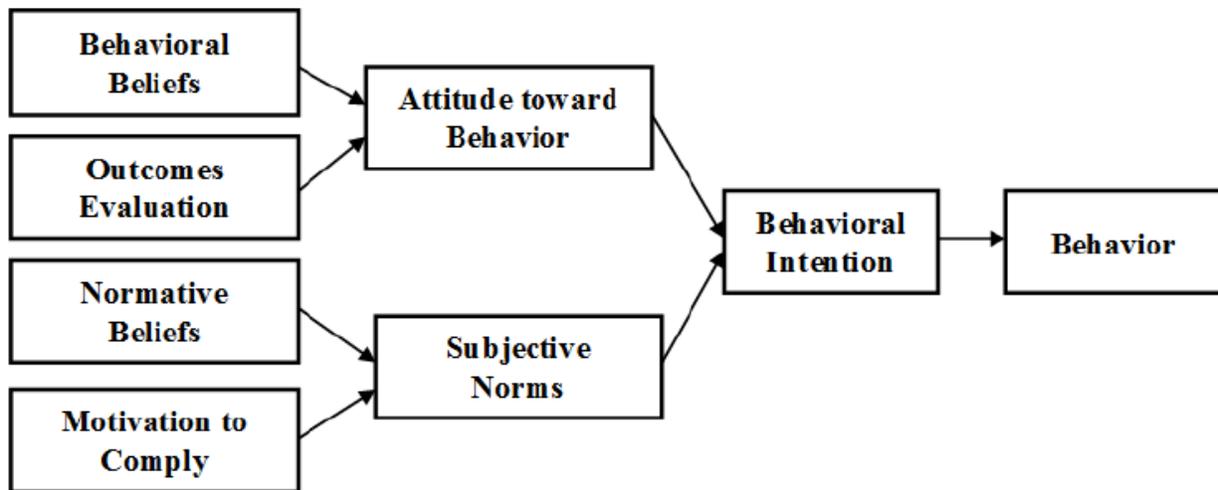
& Wildman, 2001). Knowing the perceptions of students who have made the choice to enroll in an agricultural major could help provide insight into the motivations for their choice and could provide information needed to help recruit more students into agriculture careers (Rayfield, et al., 2013; Torres & Wildman, 2001).

Much of the previous work examining motivations for agricultural learning focused on survey data and approach the question largely from an external viewpoint, with many studies framed to allow respondents to report why they personally desire a course of study in agricultural subject areas. Missing from the literature is information about individual beliefs surrounding the purpose for learning about agriculture from a perspectives point of view. This study was designed to examine the perceptions of University of Idaho (UIIdaho) College of Agricultural & Life Sciences (CALs) undergraduate students related to why they feel people should learn about agriculture from a perspective

The theoretical framework for this study was rooted in Ajzen and Fishbein's (1980) theory of reasoned action as shown in Figure 1. Ajzen and Fishbein (1980) noted that behavioral beliefs are likely influenced by personal background and the nature of exposure to the topic, with positive associations yielding a greater likelihood of positive behavior surrounding the subject.

Figure 1.

Ajzen and Fishbein's (1980) theory of reasoned action



Within the confines of the theory, beliefs and attitudes surrounding the purpose for learning about agriculture are based on both attitudes about agriculture and subjective norms related to studying agriculture. This study was an examination of why participants believed others should learn about agriculture which relied on understanding both their attitude toward the behavior and normative beliefs. In this study, we were less concerned with the behavioral intention or outcome behavior of studying agriculture, as all participants had already enrolled in an agricultural course of study.

Purpose/Objectives

This study was conducted to determine UIdaho CALS undergraduate student perceptions on why people should be educated about agriculture. To meet this purpose, we worked to fulfill the following objectives:

1. Define the concourse of beliefs and attitudes surrounding perceptions of studying agriculture.
2. Examine UIdaho CALS undergraduates' perceptions related to why people should learn about agriculture.
3. Determine which, if any, personas exist among UIdaho CALS students regarding why people should learn about agriculture.

Methods

We used a Q method research design to meet the objectives of this study. Q method allows an examination of personal beliefs, opinions, or subjective meaning to define general types or patterns of perspectives held by a particular group (Stevenson, 1936). This method allows researchers to examine the respondents rather than instrument items as a dependent variable and measures respondent similarities as the independent variables of interest (Leggette & Redwine, 2016).

A Q method study includes three main components: the Concourse (population of ideas on a given topic), Q set (sample of ideas that will be analyzed), and the P Set (participants who will sort statements in the Q set). The Q method allows the Q set and P set to be analyzed and interpreted through factor analysis (Watts and Stenner, 2014; Van Exel & de Graaf, 2005). Resulting groups are then interpreted for meaning based on similarities between members of the P set to describe the factors (Watts & Stenner, 2014).

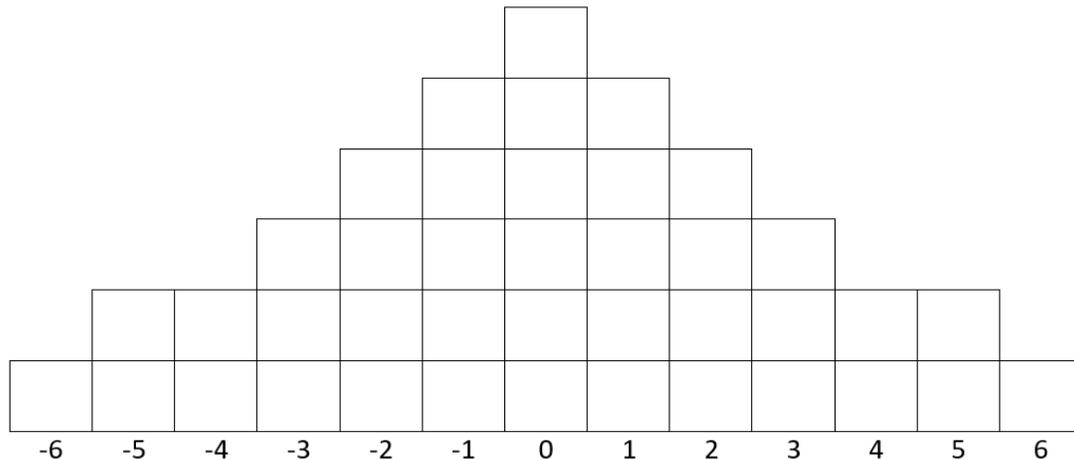
Using Q method in this study allowed us to describe types of patterns or perspectives held by undergraduate CALS students related to their answer to the question: *Why should people learn about agriculture?* It is important to note that our study was not designed to ask why respondents chose to study agriculture themselves, but rather why people in general should study agriculture.

Concourse and Q Set

The process of Q method allows respondents to use personal preferences to sort a set of statements into a forced quasi-normal curve (Stephenson, 1953). Using 40-60 statements in a Q sort is recommended to allow adequate coverage of the relevant topic (Watts & Stenner, 2014). Although some researchers advocate for additional statements, many agree that a 40 statement Q set will yield viable responses (Kerlinger & Lee, 1999; Watts & Stenner, 2012), and recommendations allow for the use of less Q set statements to avoid respondent fatigue. We selected a 40 statement Q set, following the recommendation to use a more flattened curve in situations when respondents have large amounts of subject knowledge (Watts & Stenner, 2012). The Q sort distribution table used in this study is shown in Figure 2.

Figure 2.

Q sort distribution used in this study



To generate the statements, Watts and Stenner (2012) recommend conducting an exhaustive literature review of the concourse. For this study, we defined the parameters of the concourse to include concepts relevant to agricultural literacy, agricultural education, extension education in agriculture, and intent to study agriculture. The literature review included examination of $n = 320$ scholarly works from which we generated $n = 102$ issues, theories, findings, and recommendations related to the concourse. Concourse refinement included organization and condensing these concepts to generate 40 unique Q set statements balanced across the concourse (Watts & Stenner, 2005). The 40 Q-set statements were validated by a group of four CALS faculty members, and a semantic review of statements by graduate students allowed further refinement of 3 statements.

Participants (P Set)

Watts and Stenner (2012) recommend 20-30 participants from varying backgrounds and beliefs for a Q sort in which viewpoints have been previously attributed to the participant population. As all P-set members were CALS students, we determined they would have a viewpoint related to the research question. We developed a list of potential variation in the population including academic rank, major and minor, background in agriculture, gender, and intended career path. Potential participants were noted for each combination of factors and members of the research team reached out via email to recruit members. It is important to note the purposive sampling used in this study and note that results are not intended to be generalized to a broader population. Our final P-set consisted of $n = 32$ participants representing every CALS department, 22 different majors within CALS, and participants from each academic level (freshman through senior). Once agreeing to participate, P set members identified a time and location to join the research team and complete the components of the study.

Data Collection

Data were collected in April and May 2021. Data collection for each participant occurred in four phases: questionnaire, presorting process, Q sort, and follow up interview. When participants arrived for data collection, they were first directed to complete a ten-question paper questionnaire. The instrument allowed collection of demographic characteristics (age, gender, ethnicity), academic information (current and previous majors and minors, time in school, expected graduation), and agricultural background (personal experience, agricultural related organizations).

Q set statements were placed on movable boxes within the Google JamBoard platform, the background of the board included the Q sort distribution, along with boxes for agree, disagree, and neutral to facilitate the presorting process. Participants began their work on the Q sort board by presorting the 40 statements into piles based on whether they agreed, disagreed, or were indifferent to the statement. Watts and Stenner (2012) recommend presorting to measure general agreeability of a participant to the Q set.

During the Q-sort procedure, participants ranked the Q set statements into the presented normal distribution columns based on their psychological significance (Watts & Stenner, 2012). The stem, or common set of words “*Learning about agriculture...*”, preceded each statement (Watts & Stenner, 2012). Participants placed statements they most agreed with on the positive side of the curve (0 through +6) and statements they least agreed with on the negative side (0 through -6). Following the Q sort, our team interviewed each participant. Questions asked during the post-sorting interview included an explanation of the items placed at extremes, personal meaning for certain statements, and items the participant felt were omitted (Watts & Stenner, 2012).

Data Analysis

To analyze the Q-sorts, we used PQMethod software. In accordance with Q Method analysis guidelines (Watts & Stenner, 2012; Schmolck, 2014), we used Principal Component Analysis (PCA) to create an unrotated factor matrix, and used the Kaiser-Guttman Criterion as an initial guide to determine an appropriate factor extraction solution. 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). Once factors with an Eigenvalue greater than 1.0 were selected, factor loading values were used to select a workable and meaningful solution, as recommended by Watts and Stenner (2012). Then, we used VARIMAX rotation to generate a rotated factor matrix and select defining sorts for characterization of viewpoints. PQMethod software uses these steps in factor analysis to generate factor arrays based on factors extracted and identify distinguishing sorts (Schmolck, 2014).

We interpreted each factor array through a holistic inspection of distinguishing Q-set statements, the items in the exemplary sorts, and post-sorting interview data (Watts & Stenner, 2012). Significant differences between the three factors were interpreted by referencing z-scores at a $p < 0.01$ level. The z-scores were converted into a factor array to further aid in the

interpretation process. A factor array is a single Q sort configured to best represent the viewpoint of a specific factor that forms the basis of persona development (Watts & Stenner, 2012). To provide a measure of trustworthiness in the interpretation process, each member of the research team developed a reflexivity statement related to the topic, we used peer-debriefing and triangulation through the interpretive process, and a detailed audit trail was included in the study procedures (Creswell, 2018).

Results/Findings

A total of $n = 32$ Q-sorts were intercorrelated and factor-analyzed. Of the $n = 32$ Q-sorts, 28 loaded significantly to one of three factors. The three extracted factors combined to account for 65.5% of study variance. We calculated the correlation between factors and noted that no individual sort loaded significantly on more than one factor. This examination allowed us to determine that the extracted factors were dissimilar enough to be considered distinctive viewpoints (Watts & Stenner, 2012). Factor characteristics related to defining sorts, reliability and standard error of z-scores are exhibited in Table 1.

Table 1

Characteristics of Extracted Factors

Characteristic	Factor 1	Factor 2	Factor 3
No. of defining sorts	9	12	7
Eigenvalue	3.60	1.72	1.28
Explained variance	30.9%	18.2%	16.4%
Average reliability coefficient	0.81	0.79	0.80
Composite reliability	0.97	0.98	0.96
Standard Error of factor z-scores	0.12	0.14	0.18
Correlations between factors			
Factor 1	--	0.37	0.43
Factor 2	0.37	--	0.52
Factor 3	0.52	0.43	--

The exemplar sorts in each factor were combined to create a typical Q-sort for each factor, called a factor array. We interpreted the factor arrays through a careful and holistic inspection of the items in each array (Watts & Stenner, 2012) paired with information from the questionnaires and post-sorting interviews to fully explain the viewpoint captured by each of the three extracted factors.

Factor one included nine defining sorts and accounted for 30.9% of explained variance. Six statements were noted as distinguishing statements associated with factor one, indicating similarities between P set members for those statements. The distinguishing factors for factor one, along with their respective Q sort and Z score values are shown in Table 2.

Table 2.

Distinguishing Statements for Factor One

#	Statement	Q Sort Value	Z-Score
8	Learning about agriculture can help producers gain applicable knowledge	5	1.90*
26	Learning about agriculture allows consumers and agriculturists to have a common understanding	4	1.11*
25	Learning about agriculture should be a lifelong pursuit	4	1.08
14	Learning about agriculture can direct people to numerous career paths	3	1.04
15	Learning about agriculture is important for all people	3	0.98*
30	Learning about agriculture is not as important as learning about other educational subjects	-5	-1.37*

Note. *indicates significance at the $p = 0.01$ level

Factor two had 12 defining sorts and accounted for 18.2% of explained variance. This factor included five distinguishing statements. Distinguishing statements and their associated values and Z scores are shown in Table 3.

Table 3.

Distinguishing Statements for Factor Two

#	Statement	Q Sort Value	Z-Score
7	Learning about agriculture helps connect agricultural youth to their family mission and legacy	5	1.37*
13	Learning about agriculture allows those involved with the land to tell the story of family farms, ranches, and people who work in agriculture	4	1.29*
29	Learning about agriculture should be passed from generation to generation	4	1.13*
16	Learning about agriculture plays an important role for women to be equally represented in agricultural careers	-4	-1.22*
5	Learning about agriculture is not important for all people	-5	-1.46*

Note. *indicates significance at the $p = 0.01$ level

Factor three included seven defining sorts and accounted for 16.4% of explained variance. This factor included four distinguishing statements which are shown along with their respective value and Z scores in Table 4.

Table 4.

Distinguishing Statements for Factor Three

#	Statement	Q Sort Value	Z-Score
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8	Learning about agriculture can help producers gain applicable knowledge	5	2.08*
19	Learning about agriculture will allow producers to develop science-based innovations to improve sustainability	4	1.56
11	Learning about agriculture is necessary to expand opportunities for farmers and community members	3	1.20
33	Learning about agriculture allows producers to understand ecological factors associated with different types of agriculture	2	0.87
29	Learning about agriculture should be passed from generation to generation	-4	-1.22

Note. *indicates significance at the $p = 0.01$ level

Examining the overall disposition of participants to the entire Q set revealed a general level of agreement on all statements, with a mean of $M = 31.3$ (SD 1.2) of the 40 statements sorted in the agree pile in the first sort. This disposition indicates that respondents generally agreed that people should learn about agriculture.

An examination of agreement and disagreement for Q set statements revealed several statements distinguished from others due to their overall variance across factor arrays. These statements with Q sort values from the exemplar sort for each factor are outlined in Table 5.

Table 5.

Q Sort Values Across Factors for Selected Statements Based on Consensus/Disagreement

#	Statement	1	2	3
9	Learning about agriculture can open opportunities for someone's future	4	4	4
35	Learning about agriculture helps youth see the relevance of the agricultural industry	4	3	3
28	Learning about agriculture helps consumers understand how food and fiber is produced	3	3	2
15	Learning about agriculture is not important for all people	-4	-5	3
29	Learning about agriculture should be passed from generation to generation	1	4	-4
20	Learning about agriculture is not as important as learning about other educational subjects	-5	-3	-3

Examining the selected statements can provide some insight into similarities and differences between factors, which is important in interpreting beliefs and perspectives (Watts & Stenner, 2014). The statement “learning about agriculture can open opportunities for someone's future” received the highest positive placement across all factors. The Q set items “learning about agriculture helps youth see the relevance of the agricultural industry” and “learning about agriculture helps consumers understand how food and fiber is produced” also received positive placement in the exemplar distribution for all three factors. The statement “learning about

agriculture is not as important as learning about other educational subjects” sorted as the statement sorted most negatively in the distribution for all factors. Two statements were noted as differentiation points between factor arrays. The statement “learning about agriculture is not important for all people” was placed in a negative (disagree) position for factors one and two and sorted as a statement agreed with on the exemplar sort for factor three. The factors also differed in placement for the statement “Learning about agriculture should be passed from generation to generation”. Defining sorts for factors one and two agreed with the statement, while factor three disagreed with the statement.

Conclusions/Recommendations/Implications

Result of this study yielded three distinct factors with unique viewpoints regarding the statement *Why should people learn about agriculture?* We examined the demographic information for the P set sorting to each of the factors to further examine similarities and differences between factor arrays. According to Watts and Stenner (2012), it is important to include both the quantitative information surrounding factor arrays and the qualitative interpretation of distinguishing statements to allow for a complete analysis of Q set statements as they relate to each extracted factor. This examination led us to define factor one as *Production-Focused*, factor two as *Heritage-Focused*, and factor three as *Data-Focused*.

The persona developed from factor one included individuals who could be categorized as *Production-Focused*. Production-focused individuals focused on the need for production practices to be improved through learning about agriculture while focusing on the need for everyone, including consumers and youth to learn about agriculture. Production-focused individuals indicated that learning about agriculture should occur for two main reasons; to give information to producers to improve yields and production practices, and to inform consumers of modern agricultural practices.

Each of the nine individuals who sorted to this factor had personal and family background in agricultural production. Eight of the members identified themselves as an agricultural producer and the additional member noted their immediate family was involved in production agriculture. Based on academic credit earned toward their degree, members of this persona included four seniors, three juniors and one sophomore. Majors varied across several departments in the college, and the genders were four males and five females.

Factor two revealed characteristics of a *Heritage-Focused* viewpoint. Heritage-focused individuals polarized their beliefs around the need for legacy and tradition to remain at the forefront of agricultural learning. Members of this persona believed that learning about agriculture should occur between generations and noted a desire to retain the family-centered nature of agricultural production. Heritage-focused individuals felt positively about the impact of agricultural learning on youth, with the exemplar sort including all youth-based statements to the positive end of the distribution. The heritage-focused viewpoint also included a desire for consumers to learn about the traditions embedded into agricultural production.

When examining members of the P set who sorted to the heritage-focused persona, we noted that only one of the 12 members identified as an agricultural producer themselves, while

eight noted their immediate family (parents) were involved in agricultural production and three noted their second -generation association with agricultural production (grandparents were agricultural producers). No grouping related to similarity of majors or credits completed were found between individuals in this persona.

Our research team deemed the third factor *Data-Focused*. Data-focused individuals agreed with agricultural learning to help producers become more efficient, sustainable, and informed. This group differed from the production-focused and heritage-focused groups in their view on who should learn about agriculture, with a preference for agricultural learning to producers and youth over general consumers. This persona included individuals who indicated the need for agriculture to become more sustainable and economically viable and seemed in opposition to the heritage-focused individuals about the need for legacy and heritage to be a driver for agricultural learning.

Although not a distinguishing statement for the group, all individuals in the data-focused group placed the statement “learning about agriculture should be passed from generation to generation” on the negative end of the distribution. During the interview process, three data-focused individuals noted discontent with promoting agriculture through “old”, “antiquated”, or “not-modern” production practices. The data-focused persona included members both with and without an agricultural background. Data-focused members were largely under-classmen from majors that require more science courses than others in the college (i.e. entomology, food science).

All participants in this study indicated agreement that people should learn about agriculture. This is promising as positivity about a subject may indicate likeliness of retention in the industry after graduation (Mat Taib, et al., 2019). The three identified factors align with findings from previous studies conducted within secondary and post-secondary populations which noted different personal motivations for studying agriculture (Dyer & Breja, 2003; Myers, et al., 2004; Rayfield, et al., 2013; Torres & Wildman, 2001).

The production-focused persona in this study most closely aligned with reasons for outlined by Rice and Kitchel (2017), who found that secondary agricultural educators believed in a holistic purpose for agricultural education with the need to education for career preparedness, agricultural literacy, and content knowledge. No identified study aligned directly with the reasons for learning about agriculture expressed in the heritage-focused or data-focused personas. This leads us to wonder if a production-focused holistic belief is most appropriate for agricultural educators as they form their own attitudes toward learning about agriculture. We recommend replicating this study with agricultural educators to further investigate this finding and examine the viewpoints which may exist in agricultural educators in response to the concourse of interest.

We also recommend using the personas identified through this study to tailor educational opportunities for undergraduate students. Undergraduates from the production-focused persona might benefit from the students might include allowing them the opportunity to develop producer education and outreach and allowing this group to share practical solutions to solving problems in production agriculture. Retention and career longevity for *heritage-focused* students may

include allowing them to share the stories of agriculture and note the places where tradition can come into modern practice. Burton et al. (2020) recommended allowing those with strong ties to agrarian culture an opportunity to share their story and culture to recruit new individuals to an agricultural lifestyle. Heritage-focused students should also be tasked with outreach to those without an agricultural background, as they have a strong desire to share agriculture with consumers and are likely well-suited to affective methods for stimulating concern and awareness of agricultural issues (Burton, et al., 2020). *Data-focused* respondents were largely focused on the science behind agricultural improvements and may be helpful to conduct research and collect data related to changes in production practices.

For post-secondary agricultural degree recruitment, we recommend individualized recruitment, similar to the recommendations of Alston, et al. (2020). We recommend highlighting the impact of agricultural degrees to potential students in a threefold approach. To interest *Production-focused* students we recommend highlighting how knowledge can impact yields, return on investment and productivity, for *heritage-focused* we recommend sharing how agricultural careers can preserve the best traditions of an agrarian society, and for *Data-focused* respondents we recommend talking about how agricultural careers can improve the science behind agricultural production.

Although not the main focus of the study, during the interview process, we asked respondents to share what experiences in their life had influenced their own choice to pursue a major in an agricultural field. It is worth note that none of the participants responded by naming a person (either through role or name) when asked to identify why they chose to study agriculture themselves. This is a slightly different take than studies which asked respondents to identify the most influential person on their choice to pursue an agricultural career (Dyer & Breja, 2003; Myers, et al., 2004; Rayfield, et al., 2013). We recommend further examination of this finding to determine how guiding beliefs and attitudes about personal choices to pursue agriculture are developed within the context of learning about agriculture, and what influence individuals have in the creation of those perceptions.

This study can provide a platform for additional research into the purpose of learning about agriculture. We recommend further examination into the impacts of differing perspectives of agricultural learning on recruitment and retention into postsecondary agricultural majors and While it is important to know why students pursuing an agricultural degree think people should study agriculture, we strongly recommend applying this Q set to additional populations including faculty members, secondary agricultural education teachers and students, consumers, producers, and agricultural employers to identify potential similarities and differences in perspectives and personas that exist in each group.

There are noted benefits to learning about agriculture. Continued examination of the beliefs surrounding why people would study agriculture can allow a more individualized approach to disseminating knowledge. By examining the perceptions surrounding why people believe others should study agriculture, we may find new ways to recruit and retain those who should learn about agriculture, from producers to consumers.

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A Snapshot Semester: Students' Reflections of Performance and Mental State throughout a Graduate Course

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Graduate students are anecdotally reputed to be among the most stressed groups of young adults. Guided reflection can be used by educators to assist students in both learning (Boud, et al., 2013; Kolb, 1984) and managing stress (Shoulders et al., 2018). By understanding how students' progress through a semester in terms of both their learning and their management of stress, instructors and advisors can better anticipate times of struggle among their students, giving them greater opportunity to meet their students' needs with appropriate guidance and instruction. The purpose of this study was to explore graduate students' perceptions of their own academic and coping experiences throughout a Research Methods course. Students enrolled in the Fall 2018 Research Methods in the Social Sciences at the University of Arkansas (N = 43) were assigned to submit weekly visual reflections that portrayed their relationship with the class, along with a written justification for the image selected. Data was analyzed using a constant comparative method (Glaser, 1965). From these reflections, 130 themes were identified from the 16 weeks. Nine overarching themes were then developed over the entirety of the semester. By examining these experiences, professors can better prepare their teaching methods to match students' needs.

Introduction

Graduate students are anecdotally reputed to be among the most stressed groups of young adults. However, this reputation is not without empirical support; graduate students have been found to retain a higher level of stress than their undergraduate peers (Wyatt & Oswalt, 2013). Common sources of stress for graduate students have included coursework, assistantships, finances, career preparation, and family (Mazzola et al, 2011; Oswalt & Riddock, 2007). These additional stressors can affect graduate students' academic performance and mental health (Wyatt & Oswalt, 2013). When used correctly, reflection can foster a better learning environment (Boud et al, 2013).

Reflection can be defined by the following four criteria. One, reflection is a process that moves the learner from one experience to another; two, reflection is rigorous; three, reflection should happen in a community; and four reflection requires specific attitude (Rodgers, 2002). Reflection can also be presented in different modes. The human brain processes information in two modes, linguistically and non- linguistically (Paivio, 1990). There is no one size-fits-all form of reflective practice for students (Lamm et al, 2011). Educators should be aware of these different preferences and consider the use of multiple methods of reflection (Lamm et al, 2011).

Students also respond emotionally towards learning. Krathwohl et al (1973) developed three taxonomy of educational objectives, cognitive, affective, and psychomotor. The affective

domain is described by how students respond emotionally to learning. Reflection has been acknowledged to have a place in the affective domain due to the emotional nature of reflection. (Schön, 1987),

Guided reflection can be used by educators to assist students in both managing stress (Bono et al, 2013; Shoulders et al, 2018) and learning (Boud et al, 2013; Kolb, 1984). Stress management and deeper learning is promoted by the reflection because it offers both the instructor and the student to perceive feelings towards content; this interaction creates a dialogue between student and instructor (Hubbs & Brand, 2005). Hubbs & Brand (2005) further stated that “an ultimate goal in professional education is for students to synergize theories with their personal styles, broaden their repertoires of professional methods, inculcate professional ethics into their practices and develop a base of knowledge that is the foundation for becoming well-rounded, model practitioners” (p. 70). The use of reflection in an educational setting can help accomplish this goal. By understanding how students’ progress through a semester in terms of both their learning and their management of stress, instructors and academic advisors can better anticipate times of struggle among their students, giving them greater opportunity to meet their students’ needs with appropriate guidance and instruction.

Theoretical Framework

This theoretical framework dives into the purpose and usage of reflection as an educational tool. Dewey (1938) believed that all learning was an experience. Especially in agricultural education and its boarder disciplines at the university level (agricultural leadership, agricultural communications, and teacher preparations) students experience many forms of experiential learning (Roberts, 2006). Reflection is necessary for the experiential learning process (Kolb, 1984). Understanding the use of reflection as an educational tool, the educator has better understanding of how students are progressing in their course (Hubbs & Brand, 2005).

After careful examination by theorists of the experiential learning process (Dewey, 1938; Joplin, 1981; Kolb, 1984), Roberts (2006) synthesized the theorists’ models and theories to create a model of the experiential learning process. The models showed attention to the learner, the learners required a direct experience, learners then required a reflective piece following the experience, and finally, the cycle continue to new experiences (Roberts, 2006). In this model, reflection is again used to organize the experience into testable knowledge. The initial focus becomes the experience. The learner then reflects on the experience where generalizations can be formed and tested as new experience. The process continues. Reflection is critical role in experiential learning design.

In education, researchers recognize the role of affective and cognitive dimension when it comes to learning (Vygotsky, 1962). Krathwohl et al. (1964) developed the Taxonomy of Affective Domain, which is used to assess affective learning through students’ reflective writing. The affective domain involves matters from an emotionally perceptive, such as values, feelings, motivations, and attitudes. There are five levels associated with the affective domain, from lowest to highest they include: Receiving; Responding; Valuing; Organizing; and Characterizing (Krathwohl et al, 1973). The affective domain plays an important role in the educational environment (McLeod, 1991). A research methods course contains both cognitive and affective

dimensions in the content because students are both learning and reflecting on their feeling towards the content. As students weekly reflect on course content, their reflections can be perceived to fall into the affective domain levels.

Purpose and Questions

The significance of this study aligns with the research agenda of the American Association for Agricultural Educators (AAAE) (Roberts et al, 2016). Under the AAAE National Research Agenda, this study falls under Research Priority 4: “Meaningful, Engaged Learning in All Environments”, under Research Question 1: “How do digital technologies impact learning in face-to-face and online learning environments?” (Roberts et al, 2016, pg. 39). Developing positive learning environments for students is needed at the postsecondary setting. The purpose of this study was to explore students’ perceptions of their own experiences throughout a fall semester research methods course. The purpose was fulfilled by the following research questions:

1. How do students perceive their interaction with course content as a piece in their holistic lives?
2. How do online versus face-to-face (FTF) students perceive their engagement with course content as a piece in their holistic lives?

Methods

Students enrolled in the Fall 2018 Research Methods in the Social Sciences at University of Arkansas ($N = 43$) were assigned to submit weekly visual reflections. Census sampling was employed as all visual reflections from each student was used in this set. The students enrolled in this course come from a diverse background. Even though the course is an introduction to research methodology in social sciences, students came from hard or bench science backgrounds and some with no prior research experience at all. Students were later identified as online or FTF by the instructor of the course. This course is delivered as an online format however, students were able to attend a one hour in person session once a week to discuss course material. Online students engaged in the same format through an online collaborate service once a week.

Students were asked to submit a weekly visual reflection that portrayed their relationship with the class, along with a written justification for the image selected. The assignment outlined the following: “Through an internet search, find one image that accurately portrays your relationship with this class. Essentially, you should be finding an image that shows how you feel about embarking on this adventure in learning about research methods. Copy the image to a word document. Below the image, type one paragraph explaining why you selected this image and how it represents your feelings. There are no wrong answers, so be honest! You won’t hurt my feelings. Your honesty will help classmates who might feel the same way and will help me adjust instruction to meet your needs, strengths, and concerns. These images will be discussed each Monday during our class meeting, so be sure to submit by Friday night.” Table 1 shows the weekly topic taught through the duration of this course.

Table 1

Topic Per Week of the Fall 2018 Research Methods Course

Week	Topic
Week 1	Introduction to Social Sciences Research
Week 2	Research Designs and Reading Research Articles
Week 3	Research Questions and Problems – the Continuum of Research Epistemologies
Week 4	Creating Valid, Reliable Research – Quantitative Studies
Week 5	Creating Valid, Reliable Research – Qualitative Studies
Week 6	Selecting an Appropriate Sampling Methods
Week 7	Midterm
Week 8	Instruments and Methods of Data Collection – Qualitative Studies
Week 9	Instruments and Methods of Data Collection – Quantitative Studies
Week 10	Creating Questionnaires
Week 11	Methods of Data Analysis– Quantitative Studies
Week 12	Methods of Data Analysis– Qualitative Studies
Week 13	Research Design Highlight: Qualitative and Mixed Methods Studies
Week 14	NO CLASS – Thanksgiving Break
Week 15	Research Design Highlight: Nonexperimental Research Design
Week 16	Research Design Highlight: Experimental Research Design
Week 17	Finals

The primary focus of the data analyzed was the visual component of the reflection. Data was analyzed using a constant comparative method (Glaser, 1965). First, images were individually analyzed; I independently wrote down first impression and assumptions of feelings portrayed by the images (Pain, 2012). Then, I performed “line-by-line reading of the text[s]” (Ryan & Bernard, 2003, pg. 780) to confirm or alter impressions and assumptions. Next, developed terms were organized into themes. Visuals and written text were re-read and categorized into themes and coded. The coding was indexed. I collectively delineated and negotiated themes. Each week led to the unearthing of several themes focusing on students’ perceptions of how they engaged with the course as a part of their overall lives. These themes were then compiled and used to describe the course as a part of the students’ lives and used to compare between FTF and online students.

Trustworthiness was established following Lincoln and Guba’s evaluative criteria (1985). Credibility and confirmability were established through triangulation between visual reflections and accompanying text. Thick description of the course content, assignment, and students is provided to aid in transferability. An inquiry audit was performed via a third researcher who was involved in the course but not in the initial data analysis in order to establish dependability.

Due to the qualitative nature of this study, my personal experiences and bias could potentially affect how I analyze the data collected. As the primary researcher it is my duty to recognize my biases and not let them interfere with the data (Krathwohl, 2009). I was a graduate student in agricultural and extension education enrolled in the class that was analyzed. This course was a required course for my degree program. I understand my roles as a researcher and will do my best to not have my personal connection to the course affect the outcome of this study.

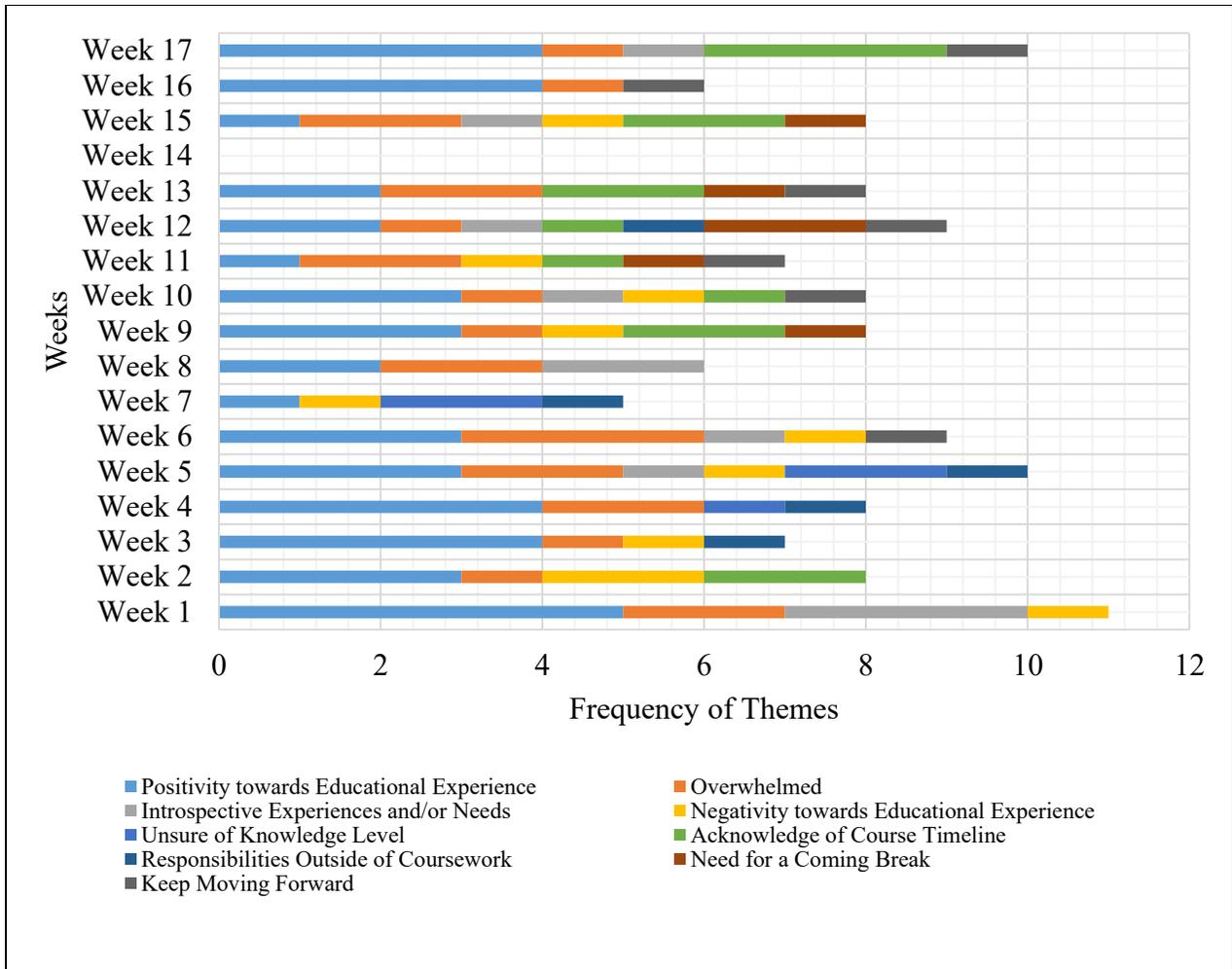
Results

The complete analysis of the 16 weeks of visual reflections submitted by online and FTF students resulted in 130 themes total. Of that number, nine overarching themes were used to explore how students viewed course content as a piece of their holistic lives. Figure 1 shows how each weekly theme was grouped in an overarching theme. The comparison of online and FTF students discovered themes associated with each group, separately, and themes they shared. Generally, students were consistently positive towards their educational experience and overwhelmed by their lives throughout the semester. Online and FTF students experienced a similar semester, overall.

Throughout the results section, pictures and student quotes will display the themes discussed below. Several themes were discovered through data analysis per week. As weekly themes were found, overarching themes revealed themselves. These overarching themes were used to explore how students perceive their interaction with course content as a piece in their holistic lives. The overarching themes included: *Positivity Towards Educational Environment; Overwhelmed; Introspective Experiences and/or Needs; Negativity Towards Educational Environment; Unsure of Knowledge Level; Acknowledgement of Course Timeline; Responsibilities Outside of Coursework; Need for a Break/End; and Keep Moving Forward.*

Figure 1

Themes per week groups in overarching themes



Students showed positivity towards their educational experience in every week throughout the semester. This was also the most popular theme. At the beginning of the semester, students started optimistic and excited about new knowledge. In the first few weeks a routine was set in the course and student started to gain confidence. By the fourth week, students began to see material more than just as assignments needing to be completed for a grade. Students continued forward and expressed positivity towards their mid-term grades, course content, and feelings of accomplishment. For example, in week 9, P1, said “*After getting my scores and feedback from the midterm. For the first time this semester I'm starting to feel like I can really do this*” (Figure 2). During the last third of the course, student positivity was lower, however past Thanksgiving break, students finished the semester with course satisfaction and confidence in their new skill set. Student started and ended the semester feeling positive towards their educational experience.

Figure 2

Week 9 Visual Reflection, Submitted by P1 on October 19, 2018.



Students consistently felt overwhelmed throughout the semester. Week 7, mid-term week, was the only week not to have an overwhelmed theme, however the week presented other challenges for students. Students started the semester feeling overwhelmed by the content they did not know in the course. That feeling evolved to students being overwhelmed by coursework. P2 said in week five, *“I think I am failing with balancing my working hours and study hours. I want to scream out loud sometimes, but I scream inside more”* (Figure 3). Similar sentiments continued throughout the semester. In the middle of the semester, students struggled each week and towards the end of the semester, students were exhausted. The consistency of this theme remained present till the last week.

Figure 3

Week 5 Visual Reflection, Submitted by P2 on September 21, 2018.



The introspective experience and/or needs theme showed what students experienced and needed throughout the semester. A part of the implementation into the course was to show that other students had similar feelings towards course content. In week ten, P3 shared, *“When looking through pictures for this week’s visual reflection this one came across on google and I automatically chose it. It reminds me of seeing everyone else’s visual reflection responses and laughing internally because I know I am not the only one experiencing these feelings. They make me laugh and feel relieved all at the same time.”* (Figure 4). From personal motivations at the beginning of the semester to holistic reflection at the end, some students took the opportunity with visual reflections to share more than just their feelings on course material.

Figure 4

Week 10 Visual Reflection, Submitted by P3 on October 26, 2018.



Negativity towards course material was characterized by the feelings that students had with course content. Most negative feelings included confusion and frustration regarding specific subject matter. Throughout the subject of social science research methods, some topics were easier to grasp, and others were more difficult. Out of the multiple topics of the course, data analysis covered in week 11 appeared to be the most difficult according to the students' reflections. A prominent feeling reported was confusion and misunderstanding with how to establish data analysis methods for each research project. P4's visual reflection read, *"This week I am feeling very confused. I feel completely lost with the information, more than I have for any other week. I get the basic difference between inferential and descriptive statistics but not what test to pick. Mean and averages make sense from a math point and with some of my quantitative questions but p test and t test I feel so lost"* (Figure 5). Students expressed confusion and frustration over this topic and several others.

Figure 5

Week 11 Visual Reflection, Submitted by P4 on November 2, 2018.



The overarching theme of Unsure of Knowledge only appeared in weeks 4, 5 and 8. This theme was characterized by students how were uncertain and waited for feedback to feel more confident about the knowledge they should be attaining. The theme appeared to be connected to some of the feedback given on the Research Component Project, a semester long project with

weekly assignments, and the mid-term. In week 4, P5 said, *“This week’s assignment did not seem too hard, but when I actually started, I was not too sure if I did it right or not. I keep on going through them over and over in case I am misunderstanding the threats. I am not too sure what I am doing, so I look forward to the feedback”* (Figure 6). Like other students, they were unsure about what they submitted, however they trusted that the feedback they would receive would clear up their questions. The unsureness would continue to feel this way in the coming weeks but were left unmentioned in the second half of the semester.

Figure 6

Week 4 Visual Reflection, Submitted by P5 on September 14, 2018.



Throughout the semester, students additionally acknowledged the timeline of the course. At the beginning of the course, students discussed how much longer the course would last. P5 shared at the semester’s halfway point, *“Bon Jovi says it all. We’re halfway there. I was really excited to reach the halfway point and be done with our midterm. Additionally, we are right at the halfway point for the semester at [school] where I teach. This semester has been incredibly busy both with work and with my master’s classes, so it is nice to see some light at the end of the tunnel. Even if it is just a small flicker right now”* (Figure 7). As the course began to conclude, students expressed their push to finish the semester strong and relief it was ending. Finally, students reflected how the completion of the semester made them feel.

Figure 7

Week 9 Visual Reflection, Submitted by P6 on October 19, 2018.



As graduate students tend to lead busy lives, some students would discuss their responsibilities outside the course. Sometimes students felt like they were being pulled in many different directions. P7 said during the midterm week, *“My mind has been going in all directions this week. From working on the midterm to travelling for my job and putting out last minute fires (figuratively – hopefully not literally as the show isn’t over yet) at our largest farm show of the year, I’ve been doing running in every direction as well. Additionally, I’ve felt as if my responsibilities have been pulling me in different directions like in the photo...”* (Figure 8). Other reflections listed responsibilities and tasks needing to be accomplished, other than the work for the class. The dialog this created for between the instructor and the student was beneficial to understand a student’s current state.

Figure 8

Week 7 Visual Reflection, Submitted by P7 on October 5, 2018.



Towards the end of the semester, students’ increasing mentioned their need for a break. The instructor elected to work through the university’s fall break in an effort to give a larger break at Thanksgiving. Students were thankful for this decision however, their need for the break was consistent from the middle of the semester to the end. They also showed relief at the conclusion of the semester. P8 was looking forward to the weekend where they could disconnect from the coursework, *“I AM PLUMB TIRED!!! I cannot wait for the extra hour of sleep and doing nothing this weekend”* (Figure 9).

Figure 9

Week 11 Visual Reflection, Submitted by P8 on November 2, 2018.



Finally, throughout the middle of the semester, students fell into a theme of keep moving forward. This theme was characterized by the neutral feeling of perseverance. P9 said during week ten, “*This week is all about moving forward. I am encouraged because I have come from far and has not lost hope yet*” (Figure 10). There was a push to continue to move forward in the course. These themes continued in the same way for the next 2 weeks.

Figure 10

Week 10 Visual Reflection, Submitted by MS on October 26, 2018.



Research Question 2 divided the course into two groups, online and FTF students, to compare how each group perceives their engagement with course content as a piece in their holistic lives. There were identifiable similarities and differences in the themes associated with online and FTF students. This course was taught entirely online, however there was a blocked time during the week for an in-person lecture for students available to attend. Each lecture was repeated, livestreamed, recorded, and assessable by all the students. Students were required to attend the in-person session, online session, or watch the online session once it was recorded and posted. In online verse FTF students, their general educational experience was very similar. Online students took longer to settle into a routine, however both groups of students shared their ups and down equally. Online students also expressed how their other tasks and responsibilities made them feel the course was more taxing. FTF students shared a deeper understanding in research methods. Overall, however, both groups of students mostly found success.

Conclusions & Recommendations

In the final weeks, students reflected on the use of visual reflections as a positive addition to the course. This study also confirms that the implementation of visual reflections served students well (Shoulders et al, 2018). Additionally, this study was able to give an overarching view of how students perceived their holistic lives interacted with course content, therefore accomplishing the study's purpose.

Students started and ended with positive feeling towards their educational experience, however, students were consistently overwhelmed throughout the semester. Visual reflections gave the students an opportunity to reflect on course content, their reasons for signing up for the course, and the semester as a whole in a way they would not have had without the assignments. Students also took the opportunity to express which subject matter was more difficult for them. Aligning with previous studies (Wyatt & Oswalt, 2013), graduate students expressed their responsibilities outside coursework that prove to make their educational experience more difficult.

Students' reflections also fell into various levels of the affective domain of learning. The reflection prompt encouraged students to reflect on their relationship with the course content weekly. As students moved through the course, reflection began to fall into higher levels of the affective domain. In earlier weeks, student reflection collected around the receiving and responding levels as they would express reacts to course content. In week 13, some students reflected on synthesizing the information they had learned from previous weeks and related the information to both the current weeks content, but also applications outside of the course. Potentially, with more guided reflection students would be able to consistently reach higher levels of the affective domain.

Many students, online and FTF, expressed a fatigue from their responsibilities inside and outside of the classroom. Graduate students are found to retain high levels of stress (Wyatt & Oswalt, 2013) throughout the semester. Whereas online and FTF students moved through the semester in tandem, online students continued to reflect on their responsibilities outside the course. This study further backs up previous work that said online students can face a higher rate of distractions while they progress through a semester (Truluck, 2007). A common trait of online student visual reflections was the listing of personal, school or work responsibilities needing to be accomplished. Online students also expressed a need for the breaks throughout the semester. Whereas FTF students aligned with themes that showed a deeper connection to course matter.

I recommend academic advisors and instructors consider students outside tasks and guide students in employing successful time management practices early in the semester. Students displayed time management concerns as early as Week 1. Additionally, I recommend instructors begin the semester by fueling feelings of optimism and confidence in students' ability to succeed while alleviating concerns related to "the unknown" aspects of a course. Instructors should encourage students to focus on health and self-care in the first third of a semester, as students expressed health concerns and a need for self-care in Week 8 (halfway through the course). Additionally, instructors should be on the lookout for student burn out. Throughout the final third of the semester, students expressed feeling more overwhelmed by the many tasks they had at

hand. Where instructors should nourish optimism, they should also stifle feelings of anxiety regarding course content.

The research of visual reflection used as an educational tool is yet to meet its full potential. Many more studies can be done to investigate their usage for instructors and students. To start, I would repeat the project as an explanatory mixed methods design. Using the visual reflection as a perceived self-evaluation of course content for each week, I would also ask students to complete an evaluation based on learning objectives for each week. To better understand the mental state of a graduate student, I would want to see if there is a correlation between positive reflection and a perceived positive educational environment, and vice versa. I recommend repeating this study in the same course, however changing the course schedule. Many negative themes towards the educational experience were related to the subject matter during the week of reflection. Would the same negative feelings arise if different content was taught in a different schedule?

Finally, I would recommend the implementation of visual reflections for instructors seeking to perform action research on their teaching style and delivery. By implementing the visual reflections, instructors have the potential for themselves to reflect on their experience in the classroom. It can also offer an interaction for instructors and students in online settings that otherwise would be difficult to foster. By repeating this study, and others recommended, researchers can further understand the mental state of a graduate student as they move through the semester and better understand the use of visual reflections as a tool for a positive educational experience.

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Student Teachers' Perceptions of Motivation, Independence, and Supervision Preferences

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The student teaching experience is one of the most impactful capstone experiences for the preparation of preservice teachers. The supervisor, either a cooperating teacher or university supervisor, plays a critically important role in the student teaching experience. The purpose of this study was to explore preservice teachers' perceived motivation and independence throughout their student teaching experience. It is recommended that early in the student teaching experience, a directive supervision style should be utilized. Then, as motivation starts to decline in the middle of the student teaching experience, the focus of supervision should shift to providing moral support and encouraging commitment to the profession of teaching. Recommendations for future research include replication of this study with future cohorts of student teachers across multiple institutions so data trends can be analyzed longitudinally. Additionally, it is recommended that future iterations of this study should administer a post-then version of the quantitative plotting instrument to control response shift bias.

Introduction and Problem Statement

The student teaching experience is one of the most impactful capstone experiences for the preparation of preservice teachers (Coleman et al., 2021; Miller & Wilson, 2010). Either a cooperating teacher or university supervisor, the supervisor plays a critically important role in the student teaching experience (Roberts, 2006). The relationship between the supervisor and student teacher has been ranked as one of the most critical components of the student teaching experience (Clark et al., 2015; Harlin et al., 2002; Kasperbauer & Roberts, 2007; Young & Edwards, 2006). The vicarious experiences and modeling provided are essential elements for student teachers to build stronger self-efficacy to perform instructional tasks (Clark et al., 2015). However, supervising a student teacher can be a challenging role. The supervisor must step into a passive mentorship role in which they analyze teaching behaviors, evaluate student learning, prompt reflection, foster problem-solving skills, and provide formative, constructive feedback to the student teacher (Henry & Weber, 2010; Roberts, 2006).

Furthermore, supervision of student teachers is not a one size fits all approach. Determining the best approach for supervision depends on the individual development of the student teacher and their desires for a style of supervision (Henry & Weber, 2010; Glickman, 1995). Such development is posited to occur in phases throughout the student teaching experience (Henry & Weber, 2010; Sorensen et al., 2018). Further, for supervision to be effective, teachers are to be included in the developmental process (Danielson, 1996). Understanding the student teaching experience and preservice teachers' perceived phases of development could help to improve the preparation of cooperating teachers and lead to more impactful student teaching experiences.

Conceptual Framework

Henry's (1995) paradigm for supervision of student teachers was the conceptual frame utilized for this study. Henry (1995) proposed that the supervision style utilized during the student teaching internship should be unique depending on the supervised person. The style to be utilized can be determined based on analyzing a student teacher's level of commitment and abstraction (Henry, 1995; Henry & Weber, 2010). As problem solving and reflection are two critical areas of effective teaching, identifying a preservice teacher's abstraction abilities, or conceptual development, is a key facet in determining supervision style (Henry & Weber, 2010). Preservice teachers with low levels of abstraction cannot see more than one alternative to a problem, thinking in concrete terms. Inversely, preservice teachers with high abstraction abilities can differentiate and discriminate problems and integrate solutions independently (Henry & Weber, 2010). Similarly, a preservice teacher's commitment to the teaching profession influences supervision style. Preservice teachers with low levels of commitment are characterized by indifference or even laziness with minimal standards and lacking motivation (Henry & Weber, 2010). However, preservice teachers with high levels of commitment are highly motivated, have high energy, are eager to become more effective, and plan on making teaching a career (Henry & Weber, 2010).

Henry (1995) expounds on Glickman's (1990) description of supervision styles by offering a four-quadrant model specifically for supervision of student teachers based on different combinations of abstraction and commitment (see Table 1).

Table 1

Henry's (1995) Modified Four Quadrants Model for Supervising Student Teachers

	Motivation & Independence	Characteristics	Supervision Style Recommended
<i>Quadrant 1</i>	Low motivation, low independence	Difficulty identifying & responding to problems; unimaginative teaching; low amounts of preparation Eager to teach, but lacks a sense of direction; will devote time and energy but without a sense of purpose; may have ideas but lack ability to bring ideas to fruition	Directive control with specific instructions and expectations
<i>Quadrant 2</i>	High motivation, low independence	Highly intelligent, but is not dedicated to teaching as a profession; low or absent levels of progress towards effective teaching	Directive information with choices presented by supervisor
<i>Quadrant 3</i>	Low motivation, high independence	High intellectual capacity; aware of teaching strategies and methods; will try things that involve risk; likely to take advantage of every opportunity during the student teaching experience	A collaborative style where supervisor and teacher negotiate ideas and solutions with both parties agreeing on course of action
<i>Quadrant 4</i>	High motivation, high independence		Indirect approach with focus on creativity and reflection; Mostly need support and encouragement

Supervisors should make efforts to classify student teachers through several avenues such as student portfolios, previous academic performance, written statements by the preservice teacher, one-to-one conversations, as well as observations (Henry & Weber, 2010). It is expected that the quadrant the student teacher is classified within will change over the course of the student teaching internship. However, the ultimate goal for supervision is for all preservice teachers to be in *Quadrant 4*, with high abstraction and high commitment, at the end of the student teaching experience (Henry, 1995). While Henry (1995) proposed examining developmental levels of *commitment* and *abstraction*, these words were operationalized for this study. Commitment was operationalized as *motivation* based on the descriptions of effort put forth towards their internship experience by preservice teachers and their desire to continue with teaching as a profession (Henry & Weber, 2010). Abstraction, or a preservice teacher's conceptual ability to problem solve or plan creative lessons (Henry & Weber, 2010), was operationalized as *independence*.

The four quadrants presented by Glickman (1990), Henry (1995), and Henry and Weber (2010) were to be utilized by the supervisor based only on the supervisor's perceptions of the student teacher's level of development. However, the student teacher's perceptions of their development and their desires for a specific supervision style are imperative to a positive supervision relationship (Glickman, 1995; Henry & Weber, 2010). Structured time for student teachers to self-reflect in a non-evaluative environment has been shown to benefit their growth during the student teaching experience (Snead & Freidberg, 2019). What if the preservice teacher does not feel they are or desire to be in the quadrant their supervisor perceives them to be? Understanding preservice teachers' perceptions of their development and any impact on supervision could lead to a more positive student teaching experience. It is almost impossible for any supervisor to precisely know what has happened while student teachers are in the school (Wilkins et al., 2015).

Purpose

The purpose of this study was to explore preservice teachers' perceived motivation and independence over the course of their student teaching experience. The following questions guided the research:

1. What are preservice teachers' perceived developmental classifications?
2. What are preservice teachers' perceived levels of motivation and independence?
3. Do preservice teachers' perceived levels of motivation and independence align with their described desires for supervision style by cooperating teachers and university supervisors?

Methods

A convergent mixed-methods design was used for this study (QUAN + QUAL). This design was chosen because we collected both quantitative and qualitative data simultaneously during the research process. Even though data were collected simultaneously, we analyzed the quantitative

and qualitative data separately, then compared the results to determine congruency and discrepancy (Creswell & Creswell, 2018). Researchers' biases potentially influence the interpretation of data (Patton, 2002). When the data were collected, two of the researchers were graduate students and teaching assistants for the course in which the data were collected. One researcher was the instructor of record for the course where the data were collected and the teacher education coordinator. All three researchers were university supervisors for the cohort of preservice teachers during the time in which the data were collected. The researchers attempted to limit their biases by using bracketing (Creswell, 2013; Tufford & Newman, 2010). Specifically, the researchers met bi-weekly to discuss and reflect upon data collection and analysis procedures (Tufford & Newman, 2010).

This study's population consisted of all preservice teachers ($N = 7$) enrolled in the student teaching experience during the spring semester of 2021. Eighty-six percent of the participating preservice teachers were white, mostly female (86%; $f = 6$), and had a mean age of 21 years. Data were collected using a questionnaire via Qualtrics in four intervals during the student teaching experience. Data collection intervals were spaced every four weeks for the entirety of the 16-week student teaching experience. A total of 28 questionnaires were collected for a census completion rate of 100%.

Instrumentation

The questionnaire used in this study consisted of two sections. In the first section, students were presented with a four-quadrant graph. They were asked to plot their perceived level of development across their student teaching semester at four different periods. The Qualtrics "heat map" function was utilized to collect this data. The X-axis of the displayed graph represented motivation, with the Y-axis being independence.

The first section of the instrument also included four additional open-ended questions. Two questions asked the student teachers to reflect on the thoughts, feelings, and specific experiences that led them to plot their point. Qualitative questions one and two related to preservice teachers' motivation, while questions three and four associated with independence. The second section of the instrument consisted of eight items to collect personal and professional data.

Data Analysis

Quantitative data were analyzed using descriptive statistics (i.e., means, standard deviations, frequencies, and percentages). Additionally, data from the points were plotted using the Microsoft Excel graphing function. Qualitative data were analyzed deductively for congruent and discrepant statements according to their plotted perceived motivation and independence levels.

Results

Research Question 1: What are Preservice Teachers Perceived Developmental Classification?

Figure 1 illustrates preservice teachers' developmental classification for January 12th. The majority of the preservice teachers' plot points classified them as a *Quadrant 2* student teacher. Preservice teacher three was classified as a *Quadrant 4* student teacher, while preservice teacher two was classified as a *Quadrant 3* student teacher.

Figure 1

Preservice teachers' developmental classification for January 12th

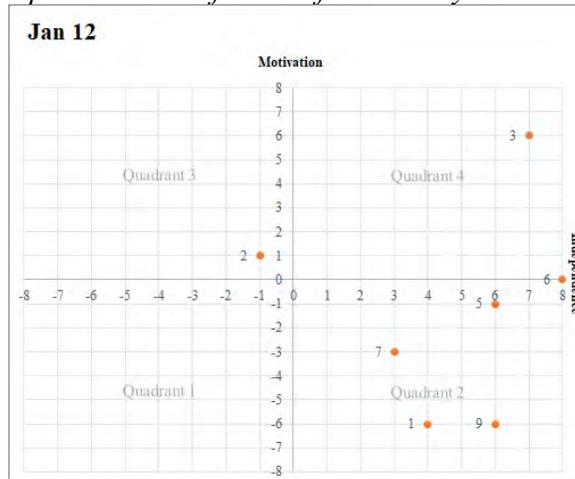


Figure 2 displays preservice teachers' developmental classification for February 17th. The majority of the preservice teachers' plot points classified them as a *Quadrant 4* student teacher. Preservice teacher seven was classified as a *Quadrant 2* student teacher.

Figure 2

Preservice teachers' developmental classification for February 17th

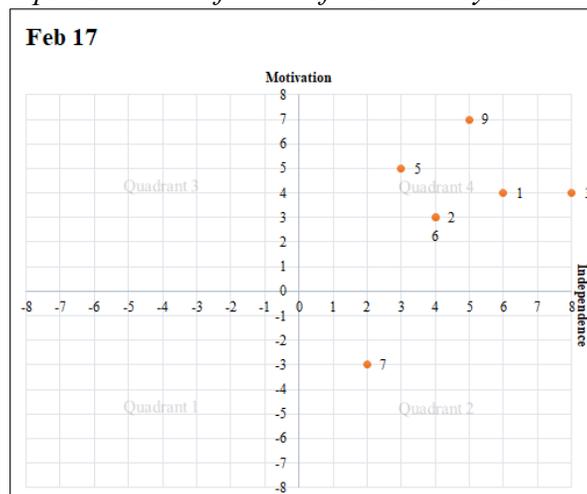


Figure 3 depicts preservice teachers' developmental classification for March 24th. The majority of the preservice teachers' plot points classified them as a *Quadrant 4* student teacher. Preservice teacher six was classified as a *Quadrant 3* student teacher.

Figure 3

Preservice teachers' developmental classification for March 24th

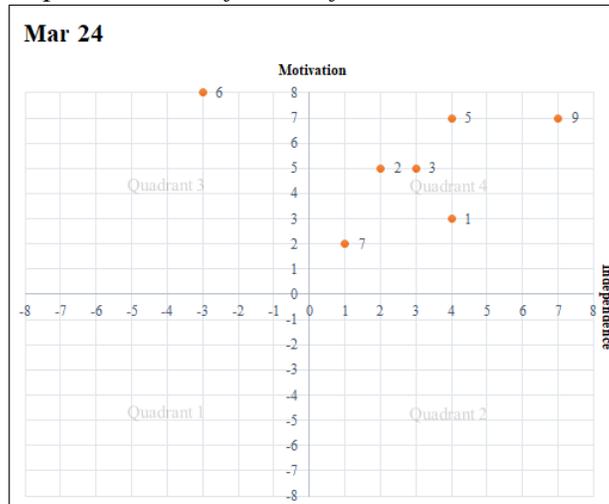
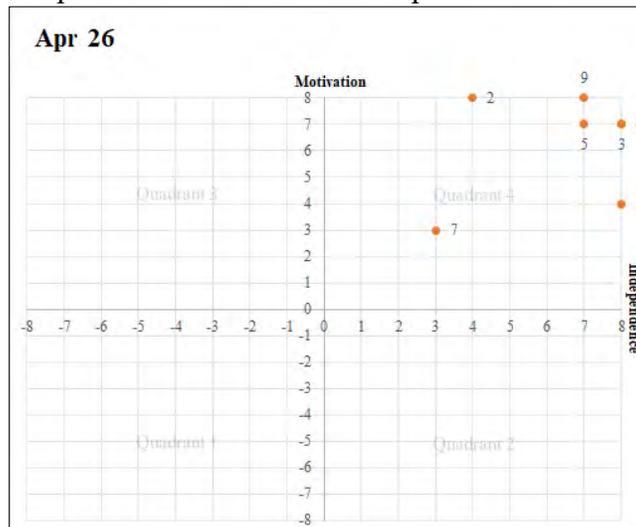


Figure 4 portrays preservice teachers' developmental classification for April 26th. All preservice teachers' plot points classified them as a *Quadrant 4* student teacher.

Figure 4

Preservice teachers' developmental classification for April 26th



Research Question 2: What are Preservice Teachers Perceived Levels of Motivation and Independence?

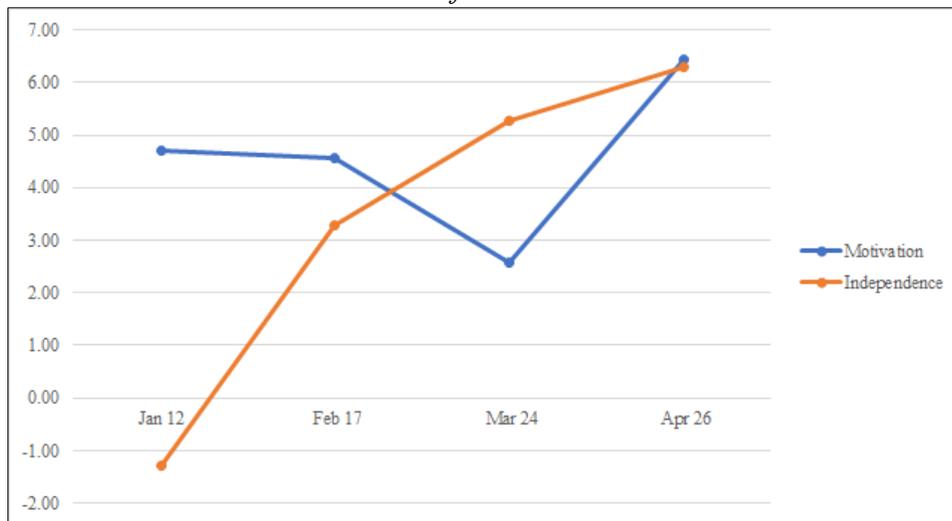
Figure 5 displays preservice teachers' perceived mean levels of motivation across the data collection points of the study were 4.71 ($SD = 3.04$)_{Jan 12}, 4.57 ($SD = 1.99$)_{Feb 17}, 2.57 ($SD =$

3.10)_{Mar 24}, 6.43 (*SD* = 2.07)_{Apr 26}. Preservice teachers perceived mean levels of independence across the data collection points of the study were -1.29 (*SD* = 4.23)_{Jan 12}, 3.29 (*SD* = 3.09)_{Feb 17}, 5.29 (*SD* = 2.21)_{Mar 24}, 6.29 (*SD* = 1.98)_{Apr 26}.

We observed that the mean perceived motivation level at observation one (Jan 12) was 4.71 and slightly declined by observation two (Feb 17). At the third observation on March 24, the preservice teachers' motivation level had a noticeable decline and then sharply increased by observation four (Apr 26). Related to preservice teachers' independence, the mean level at observation one was -1.29, and sharply increased across the next three observations with the largest increase being from observation one to observation two (*M* = 3.29), a difference of 4.58 points.

Figure 5

Preservice Teachers Perceived Mean Levels of Motivation Across Observations



Research Question 3: Do Preservice Teachers’ Perceived Levels of Motivation and Independence Align with their Described Desires for Supervision Style by Cooperating Teachers and University Supervisors?

Table 2 displays quotes describing the student teacher’s perceived motivation. Congruent statements aligned with Henry’s (1995) characteristics for the student teachers’ self-determined plot point. Incongruent statements did not align with the characteristics provided for the corresponding quadrant.

Table 2

Comparing Preservice Teachers' Description of Motivation with Their Self-Designated Quadrant

Quadrant Placement	Congruent	Discrepant
<i>Jan 12 – Observation One</i>		
<i>Q2 (n = 5)</i>	<p>I feel prepared for this internship but I know that things are going to be different than my other experiences within a program and classroom. My biggest reservation is the fact that <u>I have not had experience</u> with the vet assisting curriculum but yet I have to teach it. (Participant 5)</p> <p>I am <u>excited</u> for this opportunity <u>but not really sure what I am doing, so I think I will need a lot of help.</u> (Participant 1)</p>	<p>I don't want to let someone down. I also can be shy and easily intimidated and I don't want my students to get the best of me. (Participant 9)</p> <p>I have visited with my teacher twice, and <u>she is giving me A LOT of freedom on what to teach.</u> I have also always been a very confident public speaker. (Participant 6)</p>
<i>Q3 (n = 1)</i>	<p><u>I am having trouble thinking of iterative ways</u> to teach this anatomy and the functions of the different muscle groups. (Participant 2)</p>	<p>I am negative one on the motivation scale because I am feeling anxious to start student teaching which is causing more stress in my life. <u>I chose a one for independence because I feel that I do not have adequate teaching resources to be successful.</u> (Participant 2)</p>
<i>Q4 (n = 1)</i>	<p><u>I am super motivated to start my internship!</u> I get along with my cooperating teacher very well and <u>she has helped continue to motivate me...</u> I just hope that my university supervisor is there <u>for me to bounce ideas off of and ask advice too.</u> (Participant 3)</p>	<p><u>I am not prepared to take over Horticulture</u> I am very much the animal science aspect of agriculture education. However, {Cooperating teaching} has assured me that <u>if I get stuck or need help she will be more than willing to guide and jump in to help.</u> (Participant 3)</p>
<i>Feb 17 – Observation Two</i>		
<i>Q4 (n = 6)</i>	<p>I am really <u>motivated</u> to get better at teaching and engaging with students (Participant 1)</p> <p>I was <u>really challenged</u> when my cooperating teacher requested that I teach the estrous cycle in livestock because I know very little about that topic, so I felt very dependent on others to help me figure out how to teach that. <u>But that further motivated me because I want to be able to figure that stuff out on my own.</u> (Participant 1)</p> <p><u>I feel extremely independent and I really like teaching... I am motivated to keep doing better and getting better!!</u> (Participant 9)</p>	<p>The students attitudes towards learning mainly. It can be <u>discouraging</u> if you do not properly engage them. (Participant 6)</p> <p><u>Student disrespect and disruptions.</u></p> <p><u>Finding fun and engaging lessons and activities.</u></p> <p><u>Working with students SAE programs and getting involved with the FFA.</u> (Participant 2)</p> <p><u>..it seems that no matter how much I put in lately, a lot or not, I don't really see much in return (in the form of student involvement/interest) so it is really disheartening...it is still discouraging when nothing I do really gets them excited..</u> (Participant 5)</p>
<i>Q2 (n = 1)</i>	<p><u>I feel motivated to teach</u> but sometimes it can be hard when I know the students aren't dedicated and I hear crickets when I teach. On the other hand, <u>I like to collaborate with {cooperating teacher} on lesson ideas which helps me when creating ideas</u> (Participant 7)</p>	<p>Students are great they just don't want to work bell to bell which is understandable considering the way the world is right now. So the most challenging aspect would be the participation on classwork and in discussions. (Participant 7)</p>

Mar 24 – Observation Three

<p>Q4 (n = 6)</p>	<p>I feel like this point is where I am at because at this point in my internship, <u>I am almost completely independent...I would say I am about a 4 in motivation because I enjoy it and I am motivated to be the best I can be</u> (Participant 5)</p> <p><u>I am very independent with my teaching and lesson planning, but I second guess my lessons and just need that reassurance from time to time.</u> (Participant 7)</p> <p><u>I believe that I am even more motivated than I was before I started my student teaching. I am motivated to be finished and have MY OWN classroom. I feel completely independent on the teaching aspect of things...</u> (Participant 9)</p> <hr/> <p>Q3 (n = 1)</p>	<p><u>I am feeling little motivation, I find myself extremely exhausted and a little beat down from the critiques</u> I receive from my cooperating teacher. (Participant 2)</p> <p>Although I am feeling a lot more comfortable with my students, <u>I am starting to count down the days until its over because I am tired.</u> (Participant 7)</p> <p><u>I get to the point that I am going all of the time and constantly doing something, that when it's time to wind down, I end up just stressing over everything that I still need to get done so I feel like I never have a break to recuperate.</u> (Participant 5)</p> <hr/>
<p>Apr 26 - Observation Four</p>	<p>I am so ready to start my own program and do my own thing! I am going in early this summer to set up my classroom!!! (Participant 9)</p> <p>As I ended the internship, I am more <u>motivated to have my own classroom</u> and <u>begin my own journey</u> with ag education. (Participant 7)</p> <p>I feel like <u>I grew a lot in</u> my internship in leadership, teaching methods, and confidence as a teacher. (Participant 5)</p>	<p>I have been very independent during my teaching internship. <u>I have been lacking motivation</u> especially towards the end. (Participant 2)</p> <p>I am highly motivated due to finishing my internship successfully and moving towards graduation, but <u>I feel like I would still need a lot of help in my own classroom.</u> (Participant 1)</p> <hr/>

Apr 26 - Observation Four

<p>Q4 (n = 7)</p>	<p>I am so ready to start my own program and do my own thing! I am going in early this summer to set up my classroom!!! (Participant 9)</p> <p>As I ended the internship, I am more <u>motivated to have my own classroom</u> and <u>begin my own journey</u> with ag education. (Participant 7)</p> <p>I feel like <u>I grew a lot in</u> my internship in leadership, teaching methods, and confidence as a teacher. (Participant 5)</p>	<p>I have been very independent during my teaching internship. <u>I have been lacking motivation</u> especially towards the end. (Participant 2)</p> <p>I am highly motivated due to finishing my internship successfully and moving towards graduation, but <u>I feel like I would still need a lot of help in my own classroom.</u> (Participant 1)</p> <hr/>
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Note. Q = Quadrant

Independence

Table 3 displays quotes describing the student teacher's perceived independence. Congruent statements aligned with Henry's (1995) characteristics for the student teachers' self-determined plot point. Incongruent statements did not align with the characteristics provided for the corresponding quadrant.

Table 3*Comparing Preservice Teachers' Description of Independence with Their Self-Designated Quadrant*

Quadrant Placement	Congruent	Discrepant
<i>Jan 12 – Observation One</i>		
Q2 (n = 5)	I think I would need lesson ideas for topics I'm not comfortable with and assistance answering student questions in these topics. (Participant 7)	
	I mostly need resources and ideas for how to teach the content, and then feedback on how lessons went. (Participant 1)	
	I need a lot of help with structure in the beginning.. (Participant 9)	Feedback! I love learning from my mistakes. (Participant 6)
Q3 (n = 1)	I will need <u>support through guidance</u> because I know that I can be hard on myself, but I also want to improve so I will need the corrections just in a way <u>that gives me specific ways to be better next time.</u> (Participant 5)	
	<u>More resources</u> - I am sure {cooperating teacher} would be more than happy to help! (Participant 2)	
Q4 (n = 1)	A chance <u>to run plans by my supervisor</u> and additional teaching resources. (Participant 2)	<u>The biggest thing is resources for supplemental materials... I hope that {cooperating teacher} is willing to share the years of materials she has from her experience. ... I put a 6 for independence just based on her classes that I will be taking over and I am still learning myself.</u> (Participant 3)
<i>Feb 17 – Observation Two</i>		
Q4 (n = 6)	<u>Advice</u> on presenting information, directions, and lectures. (Participant 2)	I don't really think I need more resources or anything, <u>I really just need to find ways to motivate myself</u> even when the students make it hard. (Participant 5)
	I think the <u>advice</u> and personal experiences of what worked for her is very helpful... <u>new ideas of how to improve</u> and make my life easier. (Participant 9)	<u>I think I need some more ideas for lessons</u> .. instead of {my cooperating teacher} saying “we need to teach animal nutrition,” {I want them to} <u>say what exactly the kids need to know.</u> (Participant 9)
	She has been so helpful, but she has found this year to be really hard too. We are <u>learning together</u> on the best ways to approach different situations. (Participant 5)	<u>Resources and more ideas about how he wants specific lessons taught</u> would be a great help... more <u>structured guidance</u> in looking ahead at how the current topic will connect to the next topic. (Participant 1)
Q2 (n = 1)	My co-op is very supportive when I am teaching. <u>She will jump in when kids ask a question,</u> I don't know which helps me not look lost. She also <u>helps me create lesson ideas and gives me realistic feedback.</u> (Participant 7)	{University supervisor} is great. He has helped me realize that I am overthinking things and to not stress myself out on the little things. (Participant 7)

Mar 24 – Observation Three

- My [cooperating teacher] is very helpful...she gives me a lot of freedom to do whatever in the classroom as a learning tool of trial and error.** (Participant 7)
- Q4 (n = 6) **I feel prepared and supported.** I think I am just excited to see how the last few weeks will go. (Participant 5)
The biggest support from my university supervisor was **advice and guidance.** (Participant 3)
- I would like more lesson planning ideas** from my university supervisor for when I am stuck. (Participant 9)
I think more support from my co-op teacher could be **guidance in aspects that are not specifically teaching.** (Participant 9)
- I would like **more support in terms of feedback after lessons and ideas for teaching certain topics of information.** (Participant 1)
-
- Information on steps after internship (Participant 6)
- Q3 (n = 1) More information on how to give the class back (Participant 6)
-

Apr 26 – Observation Four

- Advice and mentoring** (Participant 6)
Just a **colleague and someone I could go to for advice or inspiration.** (Participant 9)
{My cooperating teacher} gave me **freedom and flexibility** in the classroom. She also had the same mindset as I did. She (Participant 2)
- Q4 (n = 7) hated lectures and focused more on student discovery, **so I never was afraid** of what she would say about my lessons. (Participant 7)
Someone who I can go to for **advice or inspiration.** (Participant 9)
- Resources, classroom management, and ideas for professional development** (Participant 2)
Information for larger teaching techniques (Participant 6)
Resources on classroom management (Participant 2)
-

Note. Q = Quadrant

Conclusions, Discussion, and Recommendations

According to Glickman (1995), university supervisors can classify student teachers into four quadrants based on specific characteristics. Based on the teachers' developmental classification, detailed recommendations on supervising student teachers are then provided (Glickman, 1995). However, levels of independence and motivation can vary widely within the quadrants, as seen in the mean levels displayed in Figure 6. Most student teachers plotted themselves in *Quadrant 2* on the first observation (Jan 12) (Figure 1). According to Henry (1995), teachers in *Quadrant 2* have high motivation and low independence. These teachers are eager to teach but lack a sense of direction. *Quadrant 2* teachers prefer a direct supervision style, with choices provided by their supervisor. Two student teachers were not in *Quadrant 2* quantitatively; however, their qualitative responses aligned with *Quadrant 2* characteristics of high motivation and low independence. When student teachers were asked to describe their perceptions about their internship at this observation point, they were excited but desired resources and specific lesson ideas. Incongruently, student teachers reported an abundance of autonomy over their classroom and lesson topics. They also discussed the feeling of intimidation as they began their internship (see Tables 2 & 3).

At the second and third observations (Feb 17 & Mar 24), the majority of student teachers plotted themselves in *Quadrant 4* (Figure 2). All student teachers aligned themselves in *Quadrant 4* for the last observation (Apr 26; see Figures 3 & 4). According to Henry (1995), *Quadrant 4*

teachers have high levels of motivation and independence. These teachers know teaching strategies and methods and are willing to try new teaching approaches. *Quadrant 4* teachers should be supervised indirectly, including encouraging them to be creative, prompting self-reflection, and providing moral support (Henry, 1995). While a majority of student teachers were quantitatively in *Quadrant 4* on February 17 (observation 2), their qualitative responses do not align with the characteristics of *Quadrant 4*. This could be due to a lack of motivation, as indicated by their qualitative responses. For example, many student teachers continued to request resources, lesson ideas, and materials instead of seeking these resources independently (see Tables 2 & 3).

On the other hand, on March 24 (observation 3), both the quantitative scores and the qualitative responses align with *Quadrant 4*. Student teachers shared a need for moral support, advice, and feelings of being stressed and tired (see Tables 2 & 3). Therefore, it is recommended that early in the student teaching experience, a directive supervision style should be utilized by providing choices, resources, and lesson ideas, in addition to focusing on support and encouragement congruent with *Quadrant 4*. Then, as motivation starts to decline in the middle of the student teaching experience, the focus of supervision should shift to providing moral support and encouraging commitment to the profession of teaching. As the student teaching experience approaches the third quarter, those who are responsible for supervising student teachers (i.e., cooperating teachers, university supervisors, etc.) might consider providing more moral support than targeted performance feedback originally recommended by Henry and Weber (2010) and Roberts (2006).

Recommendations for future research include replication of this study with future cohorts of student teachers across multiple institutions so data trends can be analyzed longitudinally. Additionally, it is recommended that future iterations of this study should administer a post-then version of the quantitative plotting instrument to control response shift bias. However, qualitative data could still be collected throughout the student teaching experience to provide a real-time description of students' perceptions about their experiences.

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Best Practices for Mentoring: Cooperating Teacher & Student Teacher Perspectives

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With nearly half of U.S. teachers leaving the profession within the first five years of their career, focusing on retention is a continual effort. Providing quality mentorship during the student teaching internship provides further support to new teachers preparing to enter the classroom. Cooperating teachers play a pivotal role in the success of these student teachers. However, little is known about the mentoring process between the cooperating teachers and their student teachers. This study compares the perspectives of the cooperating teacher and their student teacher on the frequency of 17 best practices employed by the cooperating teacher during the student teaching experience. The results suggest cooperating teachers rate themselves as utilizing 16 of the 17 best practices of a cooperating teacher more frequently than their paired student teacher observed. Additionally, the student teachers rated their observed frequency for five of the 17 best practices employed by their mentor teacher between rarely and often, implicating potential weaknesses in the preparation of the cooperating teacher. Differences between the perceived practices of the cooperating teachers and the observed frequencies of these practices by the paired student teachers warrants further research in the preparation and support of cooperating teachers in their roles as mentors.

Introduction

The continuous challenges that educators face bring forth the need for additional research that can help uncover the necessary steps to help meet the demand for agricultural educators (Foster, Lawver & Smith, 2020). Teacher retention is seen through a variety of efforts and programs and is often focused on the first years of teaching, as 44% of teachers leave the profession within the first five years of starting their teaching career (Ingersoll et al., 2018). The partnership with cooperating teachers is key in teacher preparation, yet we still have little knowledge of the mentoring of student teachers by their cooperating teachers (Matsko et al., 2020).

Cooperating teachers exert profound influence over the student teacher and work to maintain their position as positive role models (Young & Edwards, 2005). Increasing self-efficacy during the student teaching experience has been linked to a higher intention to teach, with previous research indicating the importance of an effective cooperating teacher relationship as a major component (Edgar et al, 2011; Kasperbauer & Roberts, 2007; Roberts, 2006; Rocca, 2005). Higher teacher self-efficacy can help to lower teacher burnout and increase retention (Swan et. al, 2011). Roberts (2006) developed a model for cooperating teacher effectiveness, however there is some confusion from cooperating teachers as to their exact role during the internship experience (Dunning et al., 2011; Ganser, 2002). To support the relationship of the cooperating teacher and student teacher, and provide guidance on how to utilize observation, feedback, and appropriate mentorship, cooperating teachers need be prepared and supported for

their role in the supervision of student teachers (Young & MacPhail, 2005). Although cooperating teachers are not novice teachers, they can be new to the mentoring role and the collaborative relationship with the teacher education program (Young & MacPhail, 2005).

To support the mentor-mentee relationship of the cooperating teacher and their student teacher, there should be planned time for the pair to learn about and discuss each other's roles and expectations (Kajs, 2002). Korte and Simonsen (2018) indicated opportunities for implementing best practices of mentoring. Previous research has discussed the need for mentoring during the beginning years of teaching (Guffey & Young, 2020; Ingersoll & Strong, 2011; Swan et. al, 2011). Formalized mentoring should be structured during pre-service teacher experiences to support growth and development, as well as teacher self-efficacy (Korte & Simonsen, 2018). The mutual understanding of roles and the exchange needed to make a mentoring relationship successful should be pursued, as the opportunities and likelihood for both the cooperating teacher and student to benefit is far greater (Kajs, 2002). The student teacher needs guidance in both pedagogical practices and content knowledge throughout the student teaching experience (He, 2010). Previous research indicated that cooperating teachers tend to shy away from critical feedback and observations overall (Zimpher et al, 1980). However, when cooperating teachers have been given guidance and training for their role, they are more likely to provide quality feedback to student teachers (McIntyre & Killian, 1987).

Preparing cooperating teachers helps to improve observation and feedback and can reduce the halo-effect of evaluating student teachers. Halo-effect describes the tendency to rate a person higher in specific areas because of other positive attributes that influence the perceptions of the evaluator (Thorndike, 1920). The reduction of the halo effect can help cooperating teachers evaluate student teachers based on evaluation of specific skills instead of their overall impression of the mentee (Phelps et. al, 1986). The University of Florida Department of Agricultural Education and Communication instituted a cooperating teacher & student teacher workshop aimed at developing the skillsets and increasing the understanding of expectations for both the student teacher and the cooperating teacher. This study aligns with Priority 3 in the AAAE National Research Agenda (Roberts et al., 2016).

Theoretical Framework

The theoretical foundation for this study was rooted in constructivism, where assumptions are made that learners construct their own knowledge through experiences in a variety of social environments (Vijaya Kumari, 2014; Vygotsky, 1978). Vygotsky observed how the social setting can provide opportunities for experts to influence the learning of others who may have little or no experience in an area (Oyster & Bobbit, 2020). The theory of constructivism posits that students who are learning a new skill will be much more likely to be successful if they are taught by someone who is advanced or experienced in that area. This is further assimilated by the description of instructional scaffolding, where the construction of new ideas can be strengthened and formed with a firmer foundation (Oyster & Bobbit, 2020; Seifert & Rosemary, 2009).

Higher education institutions are often criticized in this area as they typically elicit only a few means for evaluating student perspectives and outcomes within the broader purposes of the institution (Burke, 2005; Measuring Up, 2002, 2004). To address this issue, there is a growing push for the diversification of assessment measures, which has resulted in more reliance on surveys and self-reported data (Astin, 2003; Chun, 2002; Kuh, 2003; Takalkar, Waugh, and Micceri, 1993). Although some researchers and policy makers traditionally have less confidence in these more subjective measures, evidence demonstrates that there is value in this form of data (Astin, 1993b; Kuh, 2001; Kuh, Pace, and Vesper, 1997; Pace, Barahona, and Kaplan, 1985; Pascarella and Terenzini, 1991). Many studies (e.g. Cronin et al., 2009; Bauhoff, 2011; Donaldson & Grant-Vallone, 2002; Johnson & Fendrich, 2005) can be found that evaluate self-reports in the fields of psychology, sociology, and medicine, and found that self-report evaluative approaches demonstrate relative efficacy, matching the same, mixed results that can be found in studies within the higher education context.

In higher education, assessments will often extend beyond measuring knowledge acquisition to include behavioral evaluations, assessing the frequency for which students and teachers are carrying out certain practices. For example, it is common for assessments to ask students and teachers to report current or past participation, frequency, or duration in certain activities (Goneya, 2005). The challenge in measuring these types of behavioral outcomes stems from the respondents' conceptualizations of behavioral frequency. This was an issue that was identified early on by Pace and Friedlander (1983) that found that respondents (ie. Students) will conceptualize behavioral frequency differently given the response anchors. For example, students conceptualized frequencies differently when provided response categories of "often" or "occasionally" were given versus options such as "one or twice a year."

While self-reported measures demonstrate relative efficacy, many times they do not match the accuracy of their objective counterparts, so why do higher education institutions continue to use these measures? According to Astin (1993), the main advantage and potential rationale for using self-reported data for evaluative purposes in this context is feasibility. Astin (1993) claimed that self-report questionnaires, while exhibiting lower fidelity, have a greater bandwidth to collect data. Many times, self-reported data from surveys are often the only practical source of certain types of information because they are quicker and more economical to implement than objective testing or observational studies. One must consider that many desired outcomes are impossible to measure empirically, and in cases where measures are available, they are often costly and impractical (Goneya, 2005).

Two issues that threaten the credibility of self-reported data are social desirability bias (SDB) and halo error. Social Desirability Bias (SDB) presents the biggest challenge in conducting cooperating teacher assessments in the context of higher education. SDB is the desire to edit a response before communicating it to a researcher to present themselves in a more positive way (Beretvas et. al, 2002). Respondents may feel a need to present oneself favorably to the interviewer or researcher to preserve one's self-esteem (King & Bruner, 2000). SDB can compromise evaluations in one of two ways: (1) overreporting of socially desirable behavior (such as performing teaching best practices) and underreporting of socially undesirable behavior

(extensive absence), and (2) attenuation, inflation, or moderation of relationships between variables (Nancarrow and Brace, 2000). In addition, halo error creates the tendency to give consistent evaluations across a set of specific items based on a general perception of the subject (Symonds, 1925; Thorndike, 1920). This causes discrepancies in student and teacher responses, and the researchers' ability to generalize results.

These issues require the careful development of assessments that will require extra time and special consideration to increase their validity and credibility (Goneya, 2005). One such consideration is training the respondents on the survey and its ratings, to familiarize them with the rating scales and criteria, and thus a higher understanding of the underpinnings of the scales, which can minimize halo error (Goneya, 2005; Pike, 1999). Additionally, it is useful to use multiple data sources or triangulation rather than relying solely on self-reported data for making policy decisions. For example, self-reported data related to the cooperating teacher best practices can be collected by multiple sources (i.e. student and teacher) and compared alongside each other to understand different perspectives of the shared experience. If information from these differing sources appears to convey a consistent message, then the trustworthiness of the message is more secure (Goneya, 2005).

The development of effective mentoring programs and models can help to strengthen pre-service teacher skills and help to pave the way for a success start to a career in teaching (He, 2010). The areas of mentorship explored in this study support major tenets of successful mentorship characteristics and build upon the work of previous research that has identified areas of focus for cooperating teacher effectiveness (He, 2010). Roberts' (2006) Model of Cooperating Teacher Effectiveness focused on the areas of Teaching/Instruction, Professionalism, Student Teacher/Cooperating Teacher Relationship, and Personal Characteristics. The area of Student Teacher/Cooperating Teacher Relationship from Roberts' 2006 study and findings from Stewart et al. (2017) make a case for mentoring and its imperative role in the development of student teachers. Further advancement of the nuanced understanding of the participation of cooperating teachers has the potential to help researchers better facilitate the significant role of the cooperating teacher and the development of the next generation of agricultural educators (Clarke et. al, 2014).

Purpose and Objectives

The purpose of this study was to compare the frequency of best practices for mentoring self-reported by the cooperating teacher, as well as from the perspective of the paired student teacher. The objectives of this study were to:

1. Determine the frequency of use of best practices for mentoring behaviors from the perspective of the cooperating teacher.
2. Determine the frequency of use of best practices for mentoring behaviors from the perspective of the student teacher.
3. Compare the perspectives of the cooperating teacher and student teacher for frequency of use of best practices for mentoring behaviors.

Methods

This exploratory study investigated the reported frequency of best practices for mentoring behaviors of cooperating teachers, the perspective of these behaviors from the viewpoint of the student teacher, and how these perspectives compare. This study utilized survey research methods that are described below. The data collected in this study was part of a larger research project that explored cooperating teacher needs for professional support and the use of best practices for mentoring.

The population for this study included the University of Florida Department of Agricultural Education and Communication cooperating teachers who served in their role in the Spring of 2021 ($N=7$), as well as the University of Florida's student teachers who were under their supervision for the semester ($N=7$). Data were collected following the conclusion of the 14-week student teaching internship. The surveys were delivered using Qualtrics® software. All participants were assigned a study identification number, for the ability to complete paired analysis for the student teachers and cooperating teachers who worked together for the internship experience. Analysis of data was conducted utilizing Statistical Package for Social Sciences (SPSS©) version 26. Of the seven cooperating teachers, six teachers responded to the survey. All seven student teachers responded to the survey. Because of the nature of this comparative study, the data for the unmatched student teacher were not utilized in the analysis.

The survey listed 17 best practices for mentoring behaviors. The 17 best practices for cooperating teachers used in this study were assembled based on the work of Alemdag and Simsek (2017) and Russell and Russel (2011). To ensure further validity, they were vetted by three agricultural education faculty at The University of Florida. The construct used in this study was piloted in 2019 with cooperating teachers ($N=15$) who had served in their role during the Spring 2019 semester. The instrument was validated in 2019, with Cronbach's alpha of $\alpha = .82$. The Cronbach's alpha for the 2021 cohort of cooperating teachers in this study was $\alpha = .72$ for the cooperating teachers instrument and $\alpha = .94$ for the student teacher instrument. The respondents were asked to rate the frequency of the behavior using a Likert-type scale. The ratings on the scale were (1) always, (2) often, (3) sometimes, (4) rarely, and (5) never. The only variation in the instruments for the cooperating teacher and student teachers was the use of first-person pronouns for cooperating teachers. Cooperating teachers self-reported on frequency of use of best practices mentoring behaviors that they implemented, while student teachers reported on their observation of best practices mentoring behaviors of their cooperating teacher.

The 17 behaviors included: communicating regularly with the student teacher/intern, communicating openly with the student teacher/intern, supporting the student teachers effort, staying attuned to their mindset, attitude, and well-being, providing weekly comprehensive feedback on performance in an uninterrupted setting, using observational data as the basis for feedback sessions, encouraging the student teacher to take the lead in evaluating their teaching, involving the student teacher in all roles as a teacher, talking to the student teacher about how to become an excellent teacher through all phases of their career, sharing approaches for SAE program development and supervision, sharing their philosophy for FFA advising, making an effort to introduce the student teacher to the school community, making an effort to help the

student teacher develop positive views of teaching, coaching the student teacher on strategies for developing a positive rapport with students, discussing effective student discipline strategies with the student teacher for maintaining a productive learning environment, shared approaches for effectively managing the administrative aspects of teaching, including building effective relationships with administrators and other teachers, encouraging the student teacher to maintain active memberships in FAAE, NAAE, and FACTE, and discussing strategies for effectively managing time, priorities/projects, and email.

A paired samples t-test was utilized to analyze the set of matched pairs of student teacher and cooperating teacher. Using histograms as suggested by Lomax & Hahs-Vaughn (2012), all dependent variables were distributed normally prior to analysis. The matched samples consisted of the student teacher and the cooperating teacher, who worked together collaboratively during the 14-week student teaching internship. In addition, researchers analyzed overall mean scores of individuals for their ratings of frequency of the 17 mentoring behaviors.

Findings

Objective 1

Of the seven cooperating teachers surveyed, six responded. Participants had an average rating of 1.52 ($SD=.67$). This shows that cooperating teachers felt that they were exhibiting best practices for mentoring an average frequency between *often* and *always* (Table 1). Of the 17 best practices for mentoring behaviors, cooperating teachers rated themselves significantly lower for behaviors five and 16, between *sometimes* and *often*. Behavior five included the use of observational data as the basis for feedback sessions ($M=2.17$, $SD=.75$), and Behavior 16 described the encouragement of the student teacher to maintain active memberships in FAAE, NAAE, and FACTE ($M=2.83$, $SD=1.17$) (Table 2).

Table 1

Cooperating Teacher and Student Teacher Frequency of Best Practices for Mentoring Behaviors.

CT/ST	<i>n</i>	<i>M</i>	<i>SD</i>
Cooperating Teachers	6	1.52	.67
Student Teachers	6	1.79	.80

Note. The ratings on the scale were (1) always, (2) often, (3) sometimes, (4) rarely, and (5) never.

Table 2

Cooperating Teacher Frequency Score for Best Practices for Mentoring Behaviors 5 & 16.

Mentoring Best Practice	<i>n</i>	<i>M</i>	<i>SD</i>
Behavior #5: Used observational data as the basis for feedback sessions	6	2.17	.75

Behavior #16: Encouraged the student teacher to maintain active memberships in FAAE, NAAE, and FACTE	6	2.83	1.17
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Note. The ratings on the scale were (1) always, (2) often, (3) sometimes, (4) rarely, and (5) never.

Objective 2

All seven student teachers responded, but for the purposes of this study and alignment of responses for the paired student teacher and cooperating teacher, one student teacher was removed from the data set. Respondents had an average rating of 1.79 ($SD=.80$) for their observation of mentoring best practices. This reflects the frequency observed by student teachers was closest to *often* in frequency (Table 1). When reviewing individual best practices, there were five that had a mean score between 2-4 (Table 3), indicating a frequency between *rarely* and *often*. The following behaviors are included in the range of 2-4: Behavior #9, shared approaches for SAE program development and supervision; Behavior #10: shared philosophy for FFA advising; Behavior #15: shared approaches for effectively managing the administrative aspects of teaching, including building effective relationships with administrators and other teachers; Behavior #16: encouraged the student teacher to maintain active memberships in FAAE, NAAE, and FACTE; and Behavior #17: discussed strategies for effectively managing time, priorities/projects, and email.

Table 3

Student Teacher Least Observed Frequency for Best Practices for Mentoring Behaviors of Cooperating Teachers.

Mentoring Best Practice	<i>n</i>	<i>M</i>	<i>SD</i>
Behavior #9: Shared approaches for SAE program development and supervision	6	2.00	1.10
Behavior #10: I shared my philosophy for FFA advising	6	2.00	1.27
Behavior #15: I shared approaches for effectively managing the administrative aspects of teaching, including building effective relationships with administrators and other teachers.	6	2.00	.89
Behavior #16: Encouraged the student teacher to maintain active memberships in FAAE, NAAE, and FACTE	6	3.83	1.48
Behavior #17: I discussed strategies for effectively managing time, priorities/projects, and email.	6	2.00	.63

Note. The ratings on the scale were (1) always, (2) often, (3) sometimes, (4) rarely, and (5) never.

Objective 3

When comparing the perspectives of the cooperating teacher and student teacher, the cooperating teachers had an overall slightly higher frequency for their self-reporting of best practices for mentoring behaviors ($M=1.52$, $SD=.67$), when compared to the ratings reported by

the student teachers who would have received the mentoring and observed these behaviors ($M=1.79$, $SD=.80$) (Table 1). There was only one instance of an overlap in lower frequency behaviors from both groups, indicating that there was agreement that the behavior was not implemented at a high frequency. The behavior at an equally low frequency included the encouragement of the student teacher to maintain active memberships in FAAE, NAAE, and FACTE (Table 2 and Table 3).

A paired samples t-test was conducted to determine if there was a difference in the mean scores for self-reported cooperating teacher frequency for best practices mentoring behaviors, and the mean scores for the paired student teachers who would have observed these behaviors. Descriptive statistics in Tables 4 & 5 show missing data for Pair 4. This is due to the same reported responses by cooperating teacher and student teacher for both the self-reported and observed best practices mentoring behaviors. The t-test was run to determine if there was a significant difference in pairs. One paired sample was removed from the data set because of matching responses. The results indicate that the reported frequency for best practices mentoring behaviors were statistically significant for Pair 3 ($t = -2.135$, $df = 16$, $p = .049$), and Pair 5 ($t = -3.246$, $df = 16$, $p = .005$). Effect size was calculated as $d = .37$. Using Cohen's (1998) guidelines, this is a small effect size.

Table 4

Paired Samples Statistics for Cooperating Teacher & Student Teachers Frequency of Best Practices for Mentoring Behaviors.

		<i>M</i>	<i>n</i>	<i>SD</i>	<i>SE</i>
Pair 1	CT1	1.41	17	.51	.12
	ST1	1.88	17	.99	.24
Pair 2	CT2	1.77	17	.66	.16
	ST2	1.70	17	.99	.24
Pair 3	CT3	1.24	17	.56	.14
	ST3	1.65	17	.86	.21
Pair 4	CT4	1.41	17	.51	.12
	ST4	1.00	17	.00	.00
Pair 5	CT5	1.35	17	.61	.15
	ST5	2.41	17	1.23	.30
Pair 6	CT6	1.94	17	1.14	.2
	ST6	2.0	17	.75	.18

Table 5

Paired Samples Correlations for Cooperating Teacher & Student Teachers Frequency of Best Practices for Mentoring Behaviors.

		<i>n</i>	<i>Correlation</i>	<i>P</i>
Pair 1	CT1 & ST1	17	.23	.38
Pair 2	CT2 & ST2	17	.56	.02
Pair 3	CT3 & ST3	17	.44	.08
Pair 4	CT4 & ST4	17	.	.
Pair 5	CT5 & ST5	17	.04	.87
Pair 6	CT6 & ST6	17	.44	.08

Table 6

Paired Samples Test for Cooperating Teacher & Student Teachers Frequency of Best Practices for Mentoring Behaviors.

		Paired Differences					<i>t</i>	<i>df</i>	Sig. (2-tailed)
		<i>M</i>	<i>SD</i>	<i>SE</i>	95% Confidence Interval				
					Lower	Upper			
Pair 1	CT1 ST1	-.47	1.00	.24	.99	.05	-1.93	16	.07
Pair 2	CT2 ST2	.06	.83	.20	-.37	.48	.29	16	.77
Pair 3	CT3 ST3	-.41	.80	.19	-.82	.00	-2.13	16	.05
Pair 5	CT5 ST5	-1.06	1.34	.33	-1.75	-.37	-3.25	16	.01
Pair 6	CT6 ST6	-.12	1.05	.26	-.66	.42	-.46	16	.65

Conclusions & Recommendations

This study begins to provide a better understanding into the mentor-mentee relationship between the cooperating teacher and student teacher pair. Objective one was utilized to determine the frequency of use of best practices behaviors from the perspective of the cooperating teacher. Overall, the cooperating teachers perceived themselves to be between *often* and *always* practitioners of best practices for mentorship. We conclude that two factors could be attributed for the high self-reported scores of the cooperating teachers. First, the cooperating teachers felt successful in their implementation of the behaviors after receiving training prior to the internship experience based on the constructivist foundation of the study (Vijaya Kumari, 2014; Vygotsky, 1978). The University of Florida Department of Agricultural Education and Communication instituted a cooperating teacher & student teacher workshop which included instruction on coaching that supported implementation of the 17 best practice behaviors. Second, the cooperating teachers self-reported data could potentially be explained by the desirability to

look successful when completing the survey (Beretvas et. al, 2002). Two best practice behaviors emerged to be significantly lower indicating a need for additional preparation. Training on how to use observational data as the basis for feedback sessions, as well as an emphasis on sharing the importance of membership in professional organizations, could be increased to support greater application of these specific practices.

Objective two sought to determine the frequency of use of mentor teacher best practices behaviors from the perspective of the student teacher. Overall, the student teachers observed the best practices of mentoring from their cooperating teachers closest to *often*. We conclude that they saw room for improvement in their cooperating teachers' implementation of the best practice behaviors. Based on literature about self-reported data, student teachers' perceptions may provide a more accurate representation of what is occurring in the classroom (Beretvas et. al, 2002; Goneya, 2005). Five best practices emerged to be significantly lower: shared approaches for SAE program development and supervision, shared philosophy for FFA advising, shared approaches for effectively managing the administrative aspects of teaching, including building effective relationships with administrators and other teachers, encouraged the student teacher to maintain active memberships in FFAE, NAAE, and FAFCE, and discussed strategies for effectively managing time, priorities/projects, and email. The emergence of these less frequent behaviors provides valuable insight into additional preparation that may need to be emphasized during cooperating teacher professional development.

When comparing the perspectives for objective three, the cooperating teachers perceived themselves as utilizing best practices for mentoring more frequently than the student teachers who observed them. These results align with the perspective that diversifying assessment measures and going beyond self-reported data may provide a more accurate picture (Goneya, 2005). Additionally, the differences could be attributed to perceptions of what the best practice for mentoring behaviors could and should look like. (Wigfield & Eccles, 1992). Notably, both groups did report a lower use of the cooperating teacher's encouragement of the student teacher to maintain active memberships in FFAE, NAAE, and FAFCE. There is further inquiry that could be done to investigate potential reasons for a shared perspective relating to the topic of professional organizations (Goneya, 2005). The significant differences in reported frequencies for Pairs 3 & 5 may be attributed to greater need for support for those specific cooperating teachers. This could include further clarification of how to implement these best practices in their role as a mentor. Additionally, there may also be other factors at play, such as varying viewpoints between the cooperating teacher and the student teacher on how the mentoring was implemented.

Our recommendation for cooperating teachers is to self-assess their use of the 17 best practice behaviors before, during, and after each experience with a student teacher. Best practices could serve as a guide for cooperating teachers and help them to strive for implementation of these practices. Furthermore, the cooperating teachers should utilize preparation and support opportunities that are available in individual schools, districts, and teacher education programs to increase their understanding of how to successfully mentor the student teacher. Cooperating teachers should ideally incorporate best practices at a high frequency when mentoring the student

teacher, striving to make the time for formal observations, as well as regular feedback and reflection time with the student teacher.

In addition, we recommend that the university faculty who partner cooperating with teachers take the time to assess potential gaps in the knowledge and understanding of best practices for mentoring student teachers. Once they are identified, these gaps can help provide practitioners with guidance on how to adjust professional development to meet the needs for the preparation and support of cooperating teachers. University faculty should also share mentoring needs with school district and other stakeholders, who may be able to provide additional support and resources to support mentor-mentee teacher relationships and provide the strongest support system for a positive capstone student teaching experience.

We recommend that similar studies be conducted with a larger sample size and recognize the findings from this study are not generalizable due to the small sample size. The needs of the cooperating teachers may vary according to current practices that are being implemented, as well as the experiences of the cooperating teachers. It would be helpful to partner with other institutions to implement similar professional development and support measures to gain a stronger perspective. In addition to collecting survey data, we recommend the use of observational data to gain a more robust view of the experience from both perspectives. Also, exploring the perspectives of cooperating teachers through interviews would help researchers gain additional insight into how teachers implement mentorship best practices. Gaining a deeper understanding on ways that cooperating teachers are actively mentoring student teachers will help researchers clarify best practices for future cooperating teachers.

The researchers of this study are currently exploring qualitative measures using interviews to better grasp how cooperating teachers specifically implement best practices for mentoring student teachers during the internship experience. Additional research should be conducted to seek resolution strategies for the best practices being utilized less in the student teaching experience. Furthermore, research into the differences between the cooperating teacher and the student teacher perceptions is needed to better understand why student teachers observed less practices than the cooperating teachers perceived to be utilizing. This type of research could also provide insight on potential needs to modify current mentoring models in teacher education. Young & MacPhail (2005) stress the importance of preparation and support of cooperating teachers, and results from this exploratory study can begin to guide practitioners toward their needs.

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Designing Arduino Instruction for Novice Agriculture Students using Program Evaluation Theory: Effects on Interest, Self-Efficacy, and Knowledge

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This study employed program evaluation theory to develop, evaluate, revise, and re-evaluate an instructional treatment (lesson and hands-on activity) intended to increase the interest, self-efficacy, and knowledge of novice Arduino users in two colleges of agriculture. In the pilot-test study at University A (n = 28), the initial instructional treatment resulted in significant ($p < .05$) and large increases in students' breadboarding self-efficacy ($\eta^2 = 0.29$) and Arduino knowledge ($\eta^2 = 0.40$), but not in programming self-efficacy or interest in learning about Arduino. After revising the instructional treatment to include four hands-on tasks as part of the lesson, the re-test study at University B (n = 20) resulted in significant ($p < .05$) increases in students' interest in learning about Arduino ($\eta^2 = 0.43$), breadboarding self-efficacy ($\eta^2 = .56$), programming self-efficacy ($\eta^2 = 0.59$), and Arduino knowledge ($\eta^2 = 0.70$). The results of this study indicated the utility of program evaluation theory as a curriculum development model and the efficacy of incorporating small hands-on activities into lessons for novices learning new technical skills. Finally, use of self-efficacy theory as a framework for curriculum development was validated.

Microcontrollers are integrated circuit devices containing a microprocessor, memory, and peripherals that receive inputs and control outputs in electronic and other systems (Keim, 2019). Microcontrollers are widely used as embedded computing systems in many agricultural applications such as tractors (Goering et al., 2003), smart irrigation systems (Goap et al., 2018), field robots (Suprem et al., 2013), and variable-rate applicators (Schumann, 2010). Given the ubiquity of microprocessors and embedded computing, undergraduate agriculture students should develop a basic understanding of these technologies.

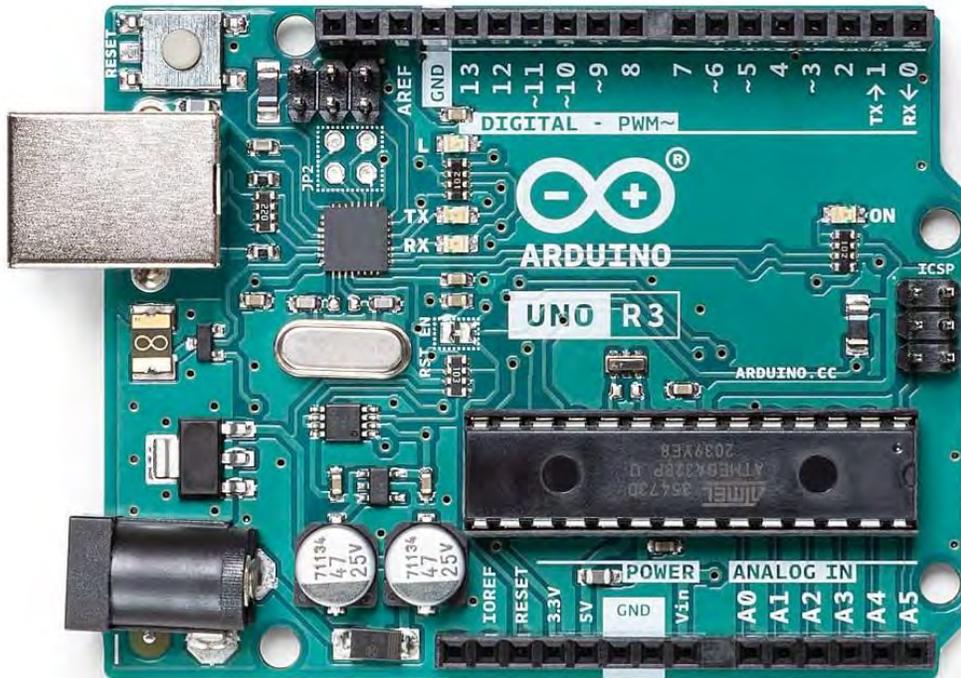
The Arduino UNO (Figure 1) is a programmable, open-source microcontroller and software program widely used at all levels of education (Al-Abad, 2017). According to Herger and Bodarsky (2015), the Arduino UNO package consists of “a compact hardware . . . and programming environment that is easy to set up and can be used with beginners, as well as advanced students” (p. 1). Although Arduino is relatively user-friendly, barriers may exist as novice users encounter unfamiliar concepts associated with computer programming (Thomas et al., 2011).

Wiedenbeck (2005) noted that introductory programming courses are challenging for students who have limited experience, but Medeiros et al. (2019) reported that problem-solving abilities and mathematical knowledge have been associated with novice students' success in learning programming. Consequently, Medeiros et al. called for investigations to further develop students' understanding of problem-solving in programming. Relatedly, Mercier (2015) urged educators to prepare graduates for “related occupations that serve the . . . agricultural and food science disciplines” (p. 2), while Stripling & Ricketts (2016) called for research to support a

scientific workforce by identifying methods, models, and programs effective in preparing people to work in a global agriculture workforce. Thus, the need to prepare agriculture students in programming is warranted.

Figure 1

Arduino UNO Open-Source Microcontroller

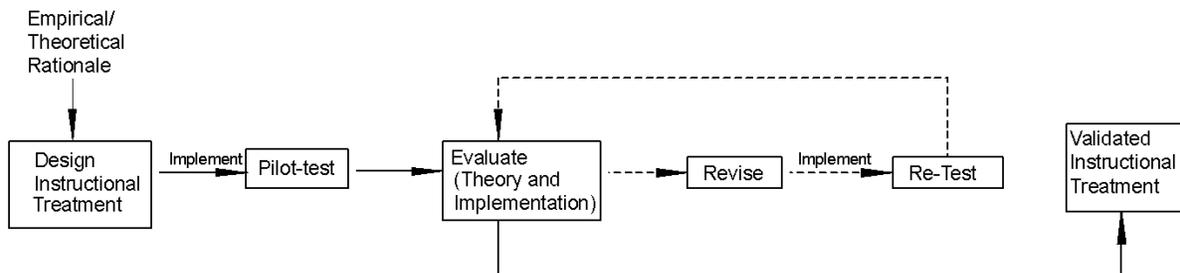


Theoretical Framework

Program evaluation theory (Epstein & Klerman, 2013) and Bandura's (1986) self-efficacy theory provided the theoretical framework for this study. Program evaluation theory applies a logic model approach (Figure 2) to designing, revising, and evaluating the effectiveness of educational programs. First, the pilot program is developed, based on empirical and/or theoretical rationales of how and why the program should accomplish the relevant educational objectives (Rogers et al., 2000). Next, the program is implemented and evaluated, and, if necessary, revised based on the pilot test results, with both the implementation and the underlying empirical and theoretical rationales evaluated. If the program does not work as anticipated, efforts are made to determine if this failure was caused by faulty implementation, erroneous or insufficient empirical and/or theoretical rationale, or both. Once the fault is identified, necessary revisions are made to the program design and/or implementation and the program is replicated and evaluated with a different group. This process may continue through numerous iterations until satisfactory results are achieved (Epstein & Klerman).

Figure 2

Program Evaluation Theory Logic Model



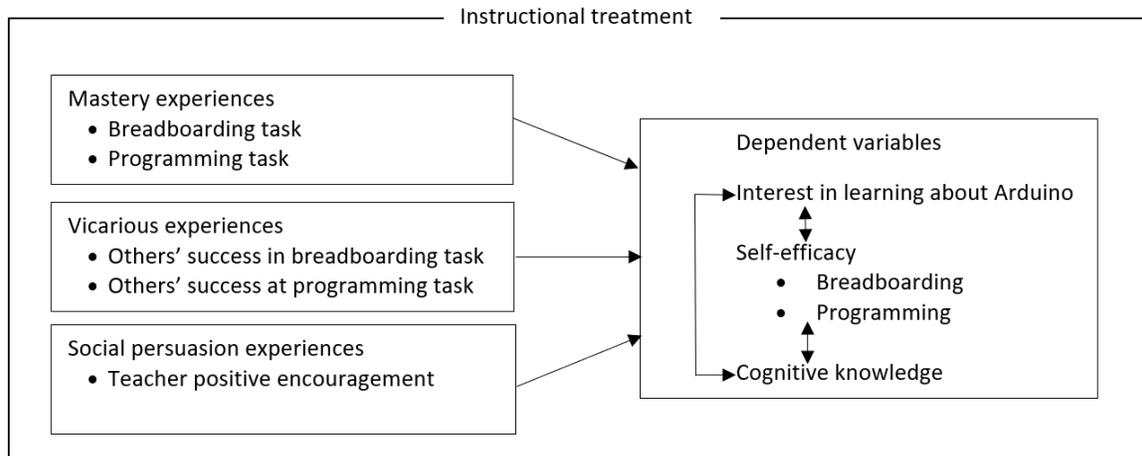
According to Bandura (1986), self-efficacy is an individual's assessment of their own ability to successfully achieve a desired outcome when engaged in a task or activity. Self-efficacy is affected by mastery experiences, vicarious experiences, and social persuasion (McKim & Velez, 2016). Mastery experiences, which have the most powerful effect on self-efficacy, occur when an individual has personal success in accomplishing a task. Vicarious experiences occur when an individual observes others, similar to themselves, successfully accomplish a task. Social persuasion experiences occur when a trusted individual expresses confidence the individual can successfully accomplish a task.

Wiedenbeck (2005) found that among non-majors, previous experiences significantly increased their programming self-efficacy throughout a course, and with respect to programming task success and course grade, perceived self-efficacy and knowledge organization had positive effects. However, when pretest self-efficacy ratings were compared to performance outcomes, results suggested that non-majors were overconfident about their abilities. Bandura (1986) posited that students who have less experience can be subject to misjudge their capabilities due to a lack of indicators. Wiedenbeck concluded that teaching of programming should focus on the development of students' organization of knowledge to increase their self-efficacy. According to Wiedenbeck, "frequent, small hands-on programming activities seem likely to build the history of success more than infrequent, large assignments" (p. 22).

Figure 3 illustrates how Bandura's (1986) self-efficacy theory was applied in this study and served as our program logic model (Epstein & Klerman, 2013). Following classroom instruction, students engaged in mastery experiences with breadboarding and programming within the context of the hands-on activity. Students also participated in vicarious experiences as classmates achieved success in the breadboarding and programming tasks; these successes were announced by the instructor during the activity. Finally, students participated in social persuasion experiences as the instructor made encouraging comments as the students worked. Example comments included, "Great job on breadboarding - many of you have your circuits correctly breadboarded" and "You're getting the hang of programming - many are just a step away from having it correct." Previous research (Lee et al., 2014) has found positive relationships between self-efficacy, interest, and learning in academic subjects. Therefore, our model assumes positive intercorrelations between the dependent variables on the study.

Figure 3

Bandura's (1986) Self-efficacy Theory as Applied to the Arduino Study



Purpose and Null Hypotheses

The purpose of this study was to use program evaluation theory (Epstein & Kellerman, 2013) and self-efficacy theory (Bandura, 1986) to develop an instructional treatment (lesson and activity) for novice Arduino users and to determine the effects of the initial and revised treatments on the interest, self-efficacy, and knowledge of students in a college of agriculture. The following null hypotheses were tested for the initial and revised instructional treatments:

H₀₁: An instructional treatment consisting of a 30-minute lecture and a 45-minute hands-on Arduino activity will have no significant ($p < .05$) effect on novice undergraduate agriculture students' interest in learning about Arduino, breadboarding self-efficacy, Arduino programming self-efficacy, or Arduino knowledge.

H₀₂: There will be no significant ($p < .05$) relationship between Arduino interest, breadboarding self-efficacy, programming self-efficacy, or Arduino knowledge for novice undergraduate agriculture students after completing a 30-minute lecture and a 45-minute Arduino activity.

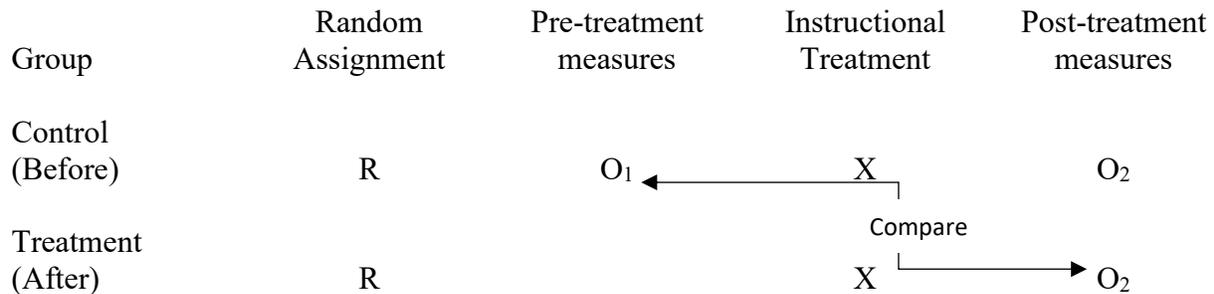
Methods

The population for this study consisted of undergraduate agriculture students enrolled in introductory agricultural systems technology courses at land-grant universities. The accessible population consisted of all students enrolled in two similar introductory agricultural systems technology courses at University A ($N = 41$) and University B ($N = 30$) in fall 2021. Following IRB approval by both universities, 28 students at University A agreed to participate and completed all research activities; at University B, 20 students agreed to participate and completed all activities. The pilot study was conducted at University A during the second week of classes during the fall 2021 semester. The re-test study was conducted at University B during the ninth week of classes in fall 2021.

Because we considered it unethical to withhold the instructional treatment from one group of students, within each university, we employed a simulated before-after research design (Christensen, 1985) with random assignment of subjects to groups (University A) and random assignment of treatment or control conditions to intact groups (University B). In the simulated before-after design (Figure 4), one group serves as the control group and is pretested before administration of the treatment; the other group serves as the experimental group and is post tested after administration of the treatment. The effects of the treatment were assessed by comparing the pretest (O_1) and posttest (O_2) scores for the two groups. According to Christensen (1985), the primary threat to the internal validity of the simulated before-after design is history. However, because of the short duration of the study, we believe it highly unlikely that students had any relevant intervening experiences that would have affected scores on the post-treatment measures.

Figure 4

Simulated Before-After Research Design (adapted from Christensen, 1985)



Pretest and posttest versions of two instruments were developed and used in the pilot and replication studies. The first instrument was based on an interest inventory developed by Gable and Roberts (1983) and a programming self-efficacy instrument developed by Kittur (2020). This instrument contained four sections measuring interest in Arduino (13 items), programming self-efficacy (8 items), breadboarding self-efficacy (8 items), and student demographic characteristics (4 items). Self-efficacy scales were constructed following recommendations by Bandura (2006). The researchers developed an 11 item multiple choice test to measure cognitive knowledge. The same cognitive test was administered as a pre and post measure, with response options reordered for the second administration. Reliabilities for the pre and post versions of each scale are reported in Table 1, by university. All scales exhibited acceptable reliabilities, with the exception of the knowledge pretests. The low reliabilities on the pretest were consistent with guessing as the test completion strategy (Paek, 2015). This was confirmed by a 12th item on the knowledge pretest where 93.8% (University A) and 93.3% (University B) indicated they “were not at all confident” their answers were correct. All instructional materials and instruments used in this study were examined by a panel of three experts in engineering education at two land-grant universities. These experts were apprised of the study population, procedures, and objectives and judged the instructional materials and research instruments to possess face and content validity, and to be appropriate in achieving the study objectives.

Table 1*Instrument Reliabilities by University for Scales Used in Arduino Study*

Instrument	University A		University B	
	Pretest	Posttest	Pretest	Posttest
Interest in learning about Arduino ^a	.86	.93	.78	.90
Breadboarding self-efficacy ^a	.91	.92	.98	.97
Arduino programming self-efficacy ^a	.94	.94	.95	.96
Knowledge about Arduino ^b	.47	.64	.39	.62

^a Coefficient alpha. ^b KR-21

All student projects were collected at the end of the hands-on activity and were assessed for correct breadboarding (10 points possible) and programming (15 points possible) using a researcher-developed rubric. Researchers scored five randomly selected artifacts using the rubrics with Cohen's kappa coefficients of .87 and 1.0, respectively, for breadboarding and programming, indicating near perfect and perfect agreement (Cohen, 1960).

Data analysis for the pilot and re-test studies was identical. One-way MANOVAs were used to test for significant ($p \leq .05$) differences between O₁ and O₂ on the dependent variables of interest in Arduino, Arduino breadboarding and programming knowledge, breadboarding self-efficacy, and programming self-efficacy (H₀₁). Significant MANOVAs were followed by univariate ANOVAs to identify the dependent variables where the groups differed (O'Rourke et al., 2005). Pearson correlations were used to examine the relationships between Arduino interest, breadboarding self-efficacy, programming self-efficacy, or Arduino knowledge (H₀₂).

University A (Pilot-Test) Procedures

At University A, students consenting to participate in the study ($n = 28$) were randomly assigned to one of two groups. On Day 1 (Monday) students met by group in separate online class sessions. The control group was pretested prior to the instructional treatment to measure baseline interest, knowledge and self-efficacy, concerning circuit breadboarding and Arduino programming. Both groups received the same 30-minute pre-recorded lecture. On Day 2 (Wednesday), students met in the computer lab at two different, but successive 45-minute periods, and completed the hands-on activity. Because of student class schedules, each lab session contained students from both the control and treatment groups. On Day 3 (Friday), all students met together and were debriefed on the instructional treatment and completed the interest, knowledge, and self-efficacy post-measures. All activities were conducted in accordance with the intended implementation procedures.

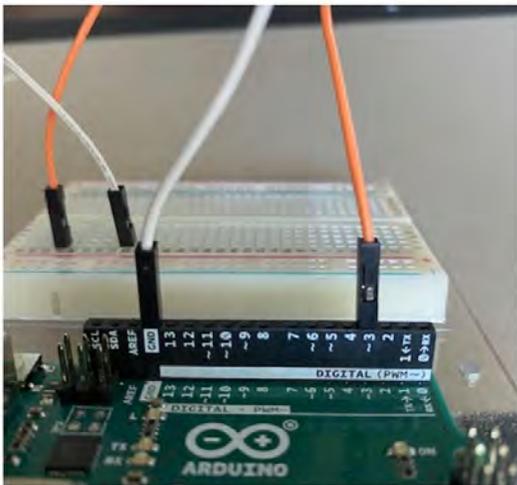
The pilot-test instructional treatment consisted of a 30-minute illustrated (PowerPoint) lecture followed by a hands-on activity. The illustrated lecture consisted of 12 slides that introduced the Arduino Uno and its components; provided information about breadboards,

resistors and light-emitting diodes (LEDs); how to breadboard complete circuits from the Arduino UNO; basic Arduino programming; how to upload programs to the Arduino UNO; and a video showing the completed hands-on student activity. A sample slide from the illustrated lecture is presented in Figure 5.

Figure 5

Sample Slide from the Illustrated Lecture

Connecting the Arduino UNO to the Breadboard with “Pin Connector” Wires



Pin connector wires connecting Digital pin 3 and GND to breadboard



Pin Connector Wire

For the 45-minute hands-on activity, students worked alone to construct two LED (one red LED and one blue LED) circuits on the same breadboard and program the Arduino UNO to cause the LEDs to blink on and off in a specific order at specified intervals. Each student was provided with a written activity sheet, a one-page reference sheet, an Arduino UNO and breadboard, all necessary connectors and components, and a desktop computer with the Arduino programming software installed and accessible from the desktop. During the activity, the instructor circulated among the students providing encouragement and making audible positive comments to the entire group about student progress.

University B (Re-Test) Procedures

At University B, all students ($N = 30$) enrolled in an introductory agricultural systems technology course were invited to participate in the study. The lecture and lab were scheduled consecutively for three and three-quarters hours, however, students were only required to enroll in one section of lab either on a Tuesday ($n = 19$) or Thursday ($n = 11$). This difference in course offering from University A resulted in unavoidable modifications to the implementation of the revised instructional treatment. Each lab section was randomly assigned to either the control or treatment group and students were instructed to attend only on their assigned day for the lecture

and lab, and they were directed to download the Arduino programming software on to their personal laptops. Informed consents were collected at the beginning of the assigned session. On Day 1 (Tuesday) students attending the first session met face-to-face with the researcher and served as the control group. A total of 14 students in this group consented to participate in the study. The control group was pretested prior to the instructional treatment to measure baseline interest, knowledge, and self-efficacy concerning circuit breadboarding and Arduino programming. On Day 2 (Thursday), students attending the session met face-to-face with the researcher, and a total of six students consented to participate. Students attending Day 2 did not complete the pretest. At the beginning of each session, the researcher checked students' laptops to ensure the programming software was installed. Students who had not installed the software were assisted by the researcher to install the software.

Both groups received the same 30-minute lecture used at University A, which was provided face-to-face. However, based on the results of the pilot-test (University A), the lecture was modified to provide students with four practice tasks integrated within the lecture presentation. During the lecture, students were provided an Arduino UNO, all necessary supplies, and access to a laptop computer with Arduino programming software. The first practice task required students to identify the primary components of the Arduino Uno. The second practice task required students to identify resistors and parts of the LED, including the cathode and anode side. Students were asked to point to the corresponding resistor and LED parts listed on the PowerPoint slide. The third practice task required students to practice breadboarding a single LED circuit following an example presented on the PowerPoint slide. Correct breadboarding was verified by the instructor. The fourth practice task required students to write a command so the LED would blink with a one second delay. Students followed the PowerPoint slide example for writing the command for a LED to blink with a one second delay. Once the command was verified by the instructor, students uploaded the program to the Arduino UNO to operate the single LED circuit. During practice tasks, the instructor made audible positive comments to the entire group when students successfully completed a task.

After the lecture and practice tasks, both groups were provided with the activity sheet, an Arduino UNO, all necessary supplies, access to a laptop computer with Arduino programming software and help menu, and a printed reference sheet. For the activity, students were allowed 45 minutes to breadboard two separate light-emitting diode (LED) circuits (one with a blue LED the other with a red LED) and program the Arduino to cause the LEDs to blink on and off in a specific order at specified intervals. After the 45-minute activity period, all students completed the interest, knowledge, and self-efficacy post-measures.

Results

Pilot-Test: University A

Twenty-eight students completed all required study activities and were included in data analysis, with 16 students in the control group and 12 students in the treatment group. In the control group, 50.0% identified as female, 67.7% were freshmen or sophomores, 87.5% reported no prior programming experience, and 93.7% reported no prior Arduino experience. The most frequent majors among students in the control group were agricultural communications and

leadership (37.5%), agricultural education (18.7%), and agricultural systems technology (12.5%). For the treatment group, 66.7% identified as female, 75.0% were freshmen or sophomores, 75% reported no prior programming experience, and 100% reported no prior Arduino experience. The most frequent majors in the treatment group were agricultural communications and leadership (58.3%), agricultural education (16.7%), and agricultural business, agricultural systems technology, and horticulture, each at 8.3%.

The control and treatment means for attitude, breadboarding and programming self-efficacy, and Arduino knowledge are presented in Table 2. Observed means for breadboarding self-efficacy, programming self-efficacy, and Arduino knowledge were higher for the treatment group, while the observed mean for interest was slightly higher for the control group.

Table 2

Control and Treatment Means and Standard Deviations for Arduino Interest, Breadboarding Self-Efficacy, Programming Self-Efficacy, and Arduino Knowledge for University A Students

Measure	Control ($n = 16$)		Treatment ($n = 12$)	
	M	SD	M	SD
Interest in learning about Arduino ^a	3.46	0.45	3.36	0.74
Breadboarding self-efficacy ^b	1.75	0.69	2.80	0.97
Programming self-efficacy ^b	1.96	0.78	2.30	0.84
Knowledge about Arduino ^c	39.2	19.6	74.2	22.2

^a Measured on a 1 - 5 scale where 1 = strongly disagree and 5 = strongly agree. ^b Measured on a 1 - 5 scale where 1 = very unconfident and 5 = very confident. ^c Percent correct on a 14 item test.

A one-way MANOVA, between-groups design was used to test the null hypothesis of no effect of the instructional treatment on any dependent variable (attitude, breadboarding or programming self-efficacy, and knowledge). The results indicated a significant difference between groups for one or more dependent variables, Wilkes' Lambda = 0.42, $p < .001$. Thus, H_{01} was rejected. Subsequent univariate ANOVAs indicated significantly higher treatment means for breadboarding self-efficacy [$F(1, 25) = 9.99, p = .004$], and Arduino knowledge [$F(1, 25) = 18.14, p < .001$]. A large effect (Cohen, 1988) was noted for the instructional treatment for breadboarding self-efficacy ($\eta^2 = 0.29$) and Arduino knowledge ($\eta^2 = 0.40$). There were no significant differences for interest [$F(1, 25) = 0.18, p = .67$] or programming self-efficacy [$F(1, 25) = 0.80, p = .38$].

Relationships between Project Rubric Scores, and Post-Measures of Interest, Self-efficacy, and Knowledge

On a percentage basis, rubric scores on breadboarding for all students ($n = 27$) ranged from 0% to 100%, with a mean of 58.5% ($SD = 24.0\%$). Rubric scores for programming ranged from 0% to 100%, with a mean of 23.5% ($SD = 36.0\%$). There were significant ($p < .05$) positive

correlations between rubric scores and post-measures of Arduino interest, breadboarding and programming self-efficacy, and Arduino knowledge test scores (Table 3). Breadboarding and programming self-efficacy were highly correlated ($r = .83$) and there were very strong (Davis, 1971) correlations between programming ($r = .73$) and breadboarding ($r = .77$) self-efficacy and interest in learning about Arduino. Actual breadboarding and programming achievement, as indicated by rubric scores, were not significantly correlated and had significant but lower correlations with interest in learning more about Arduino ($r = .46$ and $.45$, respectively). Based on these results, H_{02} was rejected.

Table 3

Intercorrelations between Rubric Scores, and Post-Measures of Interest, Self-efficacy, and Arduino Test Scores

Variable	X1	X2	X3	X4	X5	X6
Breadboarding rubric score (X1)	1.0	.22 ^{NS}	.52 ^{**}	.52 ^{**}	.46 [*]	.54 ^{**}
Programming rubric score (X2)		1.0	.36 ^{NS}	.49 [*]	.45 [*]	.58 ^{**}
Breadboarding self-efficacy (X3)			1.0	.83 ^{***}	.77 ^{***}	.50 ^{**}
Programming self-efficacy (X4)				1.0	.73 ^{***}	.52 ^{**}
Interest in learning about Arduino (X5)					1.0	.55 ^{**}
Knowledge about Arduino (X6)						1.0

^{NS}Not significant ($p > .05$). * $p < .05$. ** $p < .01$. *** $p < .001$.

Summary - University A Pilot-Test Study

The results of the pilot study provided the necessary data to evaluate both the implementation and the theoretical and empirical rationale supporting the instructional treatment. The treatment was implemented as designed and resulted in significant ($p < .05$) increases in breadboarding self-efficacy and student knowledge about Arduino. However, significant increases were not noted for either interest in learning more about Arduino or in programming self-efficacy. Self-efficacy increased significantly in breadboarding (where rubric scores were higher), but did not increase in programming (where rubric scores were lower). In addition, across all students, there were significant, positive correlations between rubric scores, self-efficacy, interest and knowledge. Taken together, these results indicated that Bandura’s (1986) self-efficacy theory was an appropriate theoretical basis on which to design an instructional treatment to increase the interest, self-efficacy, and knowledge of novice Arduino users in a college of agriculture. However, the results also revealed a need to modify the instructional treatment to enhance student performance as a mechanism for increasing interest, self-efficacy, and knowledge. Specifically, it was determined that modifications were needed to assist students better make the connection between the lesson and the hands-on application, in both breadboarding and (especially) programming.

Re-Test: University B

Based on the results of the pilot study, modifications were made to the lesson only and were evaluated in the re-test study at University B. Specific modifications included providing the lecture in a face-to-face format and integrating four hands-on practice tasks within the lesson. The hands-on student activity was conducted using the same materials and in the same manner as it was conducted during the pilot-test (University A).

Twenty students completed all required study activities and were included in the data analyses, with 14 students in the control group and 6 students in the treatment group. In the control group, 80.0% identified as male, 40.0% were freshmen or sophomores, 66.7% reported no prior programming experience, and 100% reported no prior Arduino experience. The most frequent majors among students in the control group were agricultural systems technology (42.9%), agricultural education (35.7%), and undeclared (14.3%). One student (7.1%) was majoring in agricultural machinery technology (two-year AAS program). For the treatment group, 50% identified as male, 100% were freshmen or sophomores, 50% reported no prior programming experience, and 100% reported no prior Arduino experience. One-half of the students in the treatment group were majoring in agricultural systems technology (50.0%), with one student (16.7%) each majoring in mechanical engineering, dietetics, and agricultural machinery technology.

The control and treatment means for attitude, breadboarding and programming self-efficacy, and Arduino knowledge are presented in Table 4. Observed means for each dependent measure were higher for the treatment group than for the control group.

Table 4

Control and Treatment Means and Standard Deviations for Arduino Interest, Breadboarding Self-Efficacy, Programming Self-Efficacy, and Arduino Knowledge for University B Students

Measure	Control ($n = 14$)		Treatment ($n = 6$)	
	M	SD	M	SD
Interest in learning about Arduino ^a	3.21	0.39	4.09	0.67
Breadboarding self-efficacy ^b	1.74	0.97	3.98	0.89
Programming self-efficacy ^b	1.49	0.64	3.37	0.96
Knowledge about Arduino ^c	34.55	17.25	86.36	12.53

^a Measured on a 1 - 5 scale where 1 = strongly disagree and 5 = strongly agree. ^b Measured on a 1 - 5 scale where 1 = very unconfident and 5 = very confident. ^c Percent correct on a 14 item test.

A one-way MANOVA, between-groups design was used to test the null hypothesis of no effect of the instructional treatment on any dependent variable (attitude, breadboarding or programming self-efficacy, and knowledge). The results indicated a significant difference between groups for one or more dependent variables, Wilkes' Lambda = 0.22, $p < .001$. Thus, H_{01} was rejected.

Subsequent univariate ANOVAs indicated significantly higher treatment means for interest in learning about Arduino [$F(1, 19) = 14.63, p = .001$], breadboarding self-efficacy [$F(1, 19) = 23.94, p < .001$], programming self-efficacy [$F(1, 19) = 27.96, p < .001$], and Arduino knowledge [$F(1, 19) = 44.17, p < .001$]. A large effect (Cohen, 1988) was noted for the instructional treatment for each dependent measure; attitude ($\eta^2 = 0.43$), breadboarding self-efficacy ($\eta^2 = 0.56$), programming self-efficacy ($\eta^2 = 0.59$), and Arduino knowledge ($\eta^2 = 0.70$).

Relationships between Project Rubric Scores, and Post-Measures of Interest, Self-efficacy, and Knowledge

On a percentage basis, rubric scores on breadboarding for all students ($n = 21$) ranged from 0.0% to 100%, with a mean of 90.0% ($SD = 25.3\%$). Rubric scores for programming ranged from 0.0% to 100%, with a mean of 81.6% ($SD = 35.0\%$). Programming rubric scores ($r = .50$) and post-measures of breadboarding self-efficacy ($r = .63$) and programming self-efficacy ($r = .76$) had significant ($p < .05$) positive correlations with post-measures of interest in learning about Arduino (Table 5). Breadboarding rubric scores ($r = .61$) and post-measures of breadboarding self-efficacy ($r = .52$), programming self-efficacy ($r = .59$), and interest in learning about Arduino ($r = .45$) all had significant ($p < .05$) positive correlations with knowledge about Arduino. There was a very strong (Davis, 1971) correlation ($r = .83$) between post-measures of breadboarding self-efficacy and programming self-efficacy. Based on these results, H_{02} was rejected.

Table 5

Intercorrelations between Rubric Scores, and Post-Measures of Interest, Self-efficacy, and Arduino Test Scores

Variable	X1	X2	X3	X4	X5	X6
Breadboarding rubric score (X1)	1.0	.26 ^{NS}	.40 ^{NS}	.44 ^{NS}	.41 ^{NS}	.61 ^{**}
Programming rubric score (X2)		1.0	.65 ^{**}	.55 [*]	.50 [*]	.29 ^{NS}
Breadboarding self-efficacy (X3)			1.0	.83 ^{***}	.63 ^{**}	.52 [*]
Programming self-efficacy (X4)				1.0	.76 ^{***}	.59 ^{**}
Interest in learning about Arduino (X5)					1.0	.45 [*]
Knowledge about Arduino (X6)						1.0

^{NS}Not significant ($p > .05$). * $p < .05$. ** $p < .01$. *** $p < .001$.

Summary - University B Re-Test Study

The results of the re-test study provided the necessary data to evaluate the implementation and the theoretical and empirical rationale supporting the instructional treatment. The treatment was implemented as designed and resulted in significant ($p < .001$) increases in all dependent variables; interest in learning about Arduino, breadboarding self-efficacy,

programming self-efficacy, and Arduino knowledge. Large effect sizes (Cohen, 1988) with the modified instructional treatment for each dependent measure indicated high efficacy of the intervention warranting use of this modified instructional treatment with novice Arduino users in a college of agriculture. Modifying the original lesson by incorporating the four hands-on practice tasks into the lesson resulted in significant increases in interest in learning about Arduino, breadboarding self-efficacy, programming self-efficacy, and Arduino knowledge. Strong significant correlations between breadboarding self-efficacy and programming self-efficacy indicated students connected the activities as complementary programming skills.

Implications and Recommendations

The results of this study indicated that program evaluation theory (Epstein & Klerman, 2013) provides an effective framework for developing technical instruction. Curriculum developers should consider the use of program evaluation theory when developing, refining, and evaluating curriculum and instructional materials, as its use allows evaluation of both the implementation and the theoretical and empirical rationale underlying the curriculum.

Results supported the efficacy of integrating small, hands-on activities into a technical lesson for novice Arduino users in a college of agriculture. Integrating these activities into the lesson likely allowed students to better relate theory and practice, producing Wiedenbeck's (2005) 'history of success,' which is conducive to novice learning. This finding is also consistent with Bandura (1986), as the experiences served to build self-efficacy by providing students with opportunities for mastery, vicarious, and social persuasion experiences at frequent intervals during the learning process.

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A Case Study: Agricultural Literacy Proficiency in an Iowa Elementary School

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Planning theories suggest a step-wise structure for organizing programs; evaluate current status with a needs assessment, identify strengths, weaknesses or gaps, use tools such as a logic model to plan, then implement and evaluate programming (Kettner et al., 2017). The National Agriculture in the Classroom organization and its state affiliates have the responsibility of providing agricultural education content to school-aged children and teachers to increase agricultural literacy (NAITC, n.d.). The Longhurst Murray Agricultural Literacy Instrument (LMALI) is a modern, valid tool to assess proficiency level of students participating in such programming (Longhurst, et al., 2020). Tri-Center Elementary in Iowa administered the LMALI to kindergarten through fifth grade students in March 2021. The findings from this case study suggest recommendations to state and national program planners to improve effectiveness of agricultural literacy outreach programs.

Introduction

Most Americans do not live on farms or work in agricultural occupations, however, all Americans make daily decisions about their food, clothing, and shelter impacting farming practices and the use of natural resources. Agriculture in the Classroom programs work to connect school-age students and teachers to increase agricultural literacy (NAITC, n.d.) for future decision making. The mission of Agriculture in the Classroom programs is to “increase agricultural literacy through K-12 education” (NAITC, n.d., About section). Research Priority 1 of the American Association for Agricultural Education’s (AAAE) Research Agenda focuses on methods, models, and programs in agricultural education for informing the public and policy makers about agricultural and natural resources issues (Roberts et al., 2016). Priority 1 emphasizes the importance of agricultural education across all age levels, not solely school-based Career and Technical Education courses. Guidance within the agenda suggests a need to evaluate all agricultural education programs. This agenda priority highlights the importance of agricultural literacy research and findings from such research has the potential to influence future agricultural literacy programming.

In 2020, research-based agricultural literacy assessments were developed and aligned with the National Agricultural Literacy Outcomes (NALOs) measuring students’ proficiency level of agricultural concepts (NCAL, n.d.). These assessments are considered valid and reliable instruments (Longhurst et al., 2020). The assessments have been developed as a tool to determine student agricultural literacy knowledge based on the NALO themes in three levels and distributed to state AITC staff for use (NCAL, n.d.). A baseline regarding agricultural literacy is needed to develop programming to increase agricultural literacy (NAITC, n.d.).

Supported by national resources, each state AITC program is responsible for planning, executing, and evaluating their own programming (NAITC, n.d.). Iowa was the first state program to provide the assessments to kindergarten through fifth grade students at partnering

elementary schools. The Iowa agricultural literacy program, home to the state's AITC program, engages approximately 6,000 students annually through school-based outreach. Staff and volunteers provided the agricultural literacy assessments to 684 students in grades kindergarten through fifth grade during the 2020-2021 school year. This case study focuses on 277 students at Tri-Center Elementary, the only Iowa school with a complete dataset representing students in kindergarten through fifth grade.

Theoretical Framework

Program planning methods are rooted in several planning theories cited throughout the last century (Kettner et al., 2017). In the 1950s Banfield and Meyerson indicated planning should be comprehensive in scope and based in analysis of current practices or needs (Kettner et al., 2017). Theorists went on to define three main types of planning including strategic planning, management planning, and program planning.

Program planning addresses a specific problem through specific inputs. Asset mapping or needs assessments commonly establish a baseline of where a specific population is at in relation to this specific need before implementing programming (Kettner et al., 2017). As indicated by Research Priority 1, there is a need to effectively inform the public about agriculture and natural resource topics (Roberts et al., 2016).

This basic research focused on one case of Iowa agricultural literacy outreach at Tri-Center Elementary by collecting baseline data to determine agricultural proficiency at this school as a first step to inform program planners. Iowa AITC staff can use this data to take the next steps in program planning to modify or enhance programming. Research suggests the assessments be repeated after interventions have been modified, based on this baseline data, to continue measuring effectiveness of programming (Johnson & Christensen, 2014).

Literature Review

Agricultural Literacy Frameworks

An agriculturally literate person “understands and can communicate the source and value of agriculture as it affects our quality of life.” (Spielmaker et al., 2014, p. 2). This most recent definition is built on several previous iterations. In 1988 the National Research Council suggested “an agriculturally literate person’s understanding of the food and fiber system would include its history and its current economic, social, and environmental significance to all Americans.” (National Research Council, 1988, p. 8). Shortly following the publication of this definition, Frick, with the assistance of a panel representing 48 land-grant institutions further contributed by adding the ability to “synthesize, analyze, and communicate basic information about agriculture” to the National Research Council definition. The panel also narrowed the purview of agricultural literacy outreach into 11 subject areas (Frick, 1990). In the mid 1990s the 11 categories were condensed further to five, creating the Food and Fiber Systems Literacy Standards (FFSLS) including: understanding of food and fiber systems; history, geography, and culture; science, technology, and environment; business and economics; food, nutrition, and health. These new standards aligned agricultural concepts with national education standards

(Leising, 1994). This alignment with standards emphasized the relevance of the National Research Council's Committee on Agricultural Education in Secondary Schools (1988) recommendation that all students, kindergarten through 12th grade, should receive some agricultural instruction (National Research Council, 1988).

For many years, FFSLs were used to guide lesson and assessment creation. Previous research evaluated student knowledge of agriculture through use of treatment and control groups, pre and post intervention testing, and other assessment practices (Leising et al., 2000; Pense et al., 2005). These studies evaluated specific changes in student knowledge after interventions aligned to the five categories defined in FFSLs. The researchers found while most students did have knowledge gains as a result of agricultural education interventions, specific theme increases varied by grade level (Leising et al., 2000; Pense et al., 2005). Based on assessment results, it was recommended that kindergarten through 3rd grade students needed more lessons in the Science, Technology & Environment, Business & Economics, and Food, Nutrition, & Health themes whereas 4-5th grades need increased emphasis on History, Geography, & Culture, Business & Economics, and Food, Nutrition, & Health themes (Pense et al., 2005).

Currently, the National Agricultural Literacy Outcomes (NALOs) provide updated guidance for K-12 agricultural education programs (Spielmaker & Leising, 2013). Constructed with influence from the FFSLs, these outcomes are also organized into five themes including: agriculture and the environment; plants and animals for food, fiber & energy; food, health, & lifestyle; science, technology, engineering, & mathematics; and culture, society, economy, & geography. Each theme contains specific outcomes for four grade-level groups: K-2, 3-5, 6-8 and 9-12. Like the FFSLs, the NALOs connect agricultural content to current national educational standards including Next Generation Science Standards and Common Core (Spielmaker & Leising, 2013).

Organizations Working Toward Agricultural Literacy

The *Logic Model for Agricultural Literacy* provides a framework for programs focused on increasing agricultural literacy. The model indicates financial and human capital are being leveraged to share agricultural education with students and educators at the pre-kindergarten through college levels, general public consumers, and policy makers (Spielmaker et al., 2014). Program planners can rely upon logic models to assist in effectively defining inputs, outputs, outcomes, and impacts to address a community need (Kettner et al., 2017). Led by the National Agriculture in the Classroom organization, state Agriculture in the Classroom programs put this logic model into action (NAITC, n.d.). These state AITC programs are housed within Extension, state departments of agriculture, Farm Bureaus, or private non-profit foundations.

Agricultural Literacy Assessment

Built upon the work of Leising et al. (2000) and Pense et al. (2005), four updated instruments have been created to assess agricultural literacy proficiency levels of students in grades K-12 (NCAL, n.d.). The Longhurst Murry Agricultural Literacy Instrument (LMALI) uses the NALOs as the guiding framework for content, aligning questions to each of the five themes within two of the NALO grade level bands; K-2 and 3-5. The other grade level bands, 6-8 and 9-12, do have assessment instruments developed in this fashion but are not within the scope of this case study.

The LAMLI was created by researchers using framework from the Programme for International Student Assessment (PISA) (Longhurst et al., 2020). Within this framework, assessment questions were developed using a Delphi technique. Two committees were created; one panel was made up of national stakeholders in AITC programming representing four states. The second of expert teachers within the grade levels. Each committee followed an iterative process to determine the assessment questions. The questions were aligned with PISA proficiency stages which allows researchers to better understand a learner's level of understanding (OECD: Programme for International Student Assessment, 2016). There are three proficiency stages: exposure, literacy, and proficiency. Questions were written at the highest grade level of the band. For example, on the 3-5 instrument, questions were written to a fifth-grade level. Third-grade students should use this assessment, but it is anticipated most would only be able to answer the exposure level questions. The LMALI contains 15 items, one item per proficiency level for each of the NALO themes. Therefore, students' proficiency level could be evaluated on a by-question basis as well as on a total score basis. The ability to rate proficiency by question allows agricultural literacy practitioners to identify gaps in programming more clearly. The assessments were validated through testing in eight randomly selected states via their AITC programs (Longhurst et al., 2020).

Purpose and Objectives

The purpose of this instrumental case study is to understand the baseline proficiency of students at Tri-Center Elementary school in Neola, Iowa. Researchers who developed the LMALI suggest the instrument be further validated through use with student populations across the United States. This research also states the instrument can be used to evaluate AITC programming (Longhurst et al., 2020). This research was guided by two objectives:

1. To determine a baseline of the agricultural literacy proficiency knowledge of kindergarten through fifth grade students at Tri-Center Elementary.
2. To make recommendations to Iowa program leaders concerning the development of programming to increase agricultural literacy.

The purpose and objectives of this study work to address Priority 1 where the goal is to determine needs to develop methods and programs to effectively inform public opinions about agriculture, including those of school-age children (Roberts, et al., 2016).

Methods

Research Design

Structured as an instrumental case study, this research study focuses on the agricultural literacy proficiency of Tri-Center Elementary students. In social science research, a case study is arranged around one bounded unit; a specific person, group, or institution within one sector or community (Hamilton & Corbett-Whittier, 2013). The case study should reflect interactions of this population with the wider world. Many types of case studies have been defined within educational research (Hamilton & Corbett-Whittier, 2013). Some structures seek to investigate

all aspects of the case drawing conclusions about the larger picture of this community. An instrumental case study narrows the study's focus to just one aspect or issue of the case (Hamilton & Corbett-Whitter, 2013). Because this research seeks to understand only agricultural literacy proficiency within this one elementary school community it can be considered an instrumental case study. This study is also reflective in nature. The assessment is evaluating students' proficiency based on past experiences and interventions to establish baseline data for the Iowa AITC program at this school. Continuation of such research could contribute to longitudinal or cumulative case studies in the future.

National Agriculture in the Classroom organization has made the LAMLI assessments available to all state AITC program leaders. These state leaders were encouraged to administer assessments to partnering schools. Detailed instructions for how to accurately proctor these assessments were provided with the assessments. States could elect to return raw data to researchers for analysis. A case study is research arranged around one specific group, with two data collection methods (Hamilton & Corbett-Whittier, 2013). Therefore, one elementary school in Iowa was selected as the focus of this LMALI analysis. While NAITC has expressed goals of having statewide datasets reflective of the state's AITC program reach, because this was the first school with a full kindergarten through fifth grade dataset, researchers limited this study to a single case study. All kindergarten through fifth grade students at Tri-Center Elementary were provided the LMALI on March 23, 2021. The LMALI was the first means of data collection and a personal interview with AITC staff was the second. For this personal interview, the researcher met with the one Iowa AITC staff person responsible for interventions at Tri-Center Elementary via Zoom. This interview sought to understand the agricultural content of any interventions students might have participated in prior to taking the LMALI.

Instrumentation

The Longhurst Murray Agricultural Literacy Instrument (LMALI) was developed by researchers for the purpose of assessing kindergarten through fifth grade students' agricultural proficiency based upon the National Agricultural Literacy Outcomes (Longhurst et al., 2020). Each assessment was 15 questions in length with all questions being multiple choice. There were two forms of the K-2 assessment, with similar type questions in a different order on each form. Most K-2 questions provided black and white images with one or two word labels as response options whereas more 3-5 grade responses were offered in sentence form. The instruments were previously validated by the researchers who developed the tool. Assessments in Iowa were taken in paper and pencil format then scanned into a digital file to send to researchers. Excel was used by the researcher to score assessments and analyze the data. For the personal interview, researchers asked the Iowa AITC staff to list agricultural education interventions that the K-5 grade students at Tri-Center Elementary had participated prior to taking the assessment. This list included which NALO theme aligned with the lesson content and reflected all content provided from 2018 to the time of the assessment. This timeframe reflected the tenure of the employee interviewed.

Population

The Iowa agricultural literacy program engages nearly 6,000 students each year. Iowa AITC staff randomly selected classrooms to participate in the LMALI based on relationships with teachers and administrators with a willingness to participate. Nearly 300 students at Tri-Center Elementary participated in this case study. The school is the only elementary school in the district which employs 100 staff servicing 700 students in total (Tri-Center Community School District, 2021). This district is located in Pottawattamie County with a population of more than 93,200 people where the main industries by occupation are education, health care, and social assistance, retail, manufacturing (U.S. Census Bureau, 2019).

To provide context for this case study, Iowa AITC program staff have partnered with teachers at Tri-Center since 2018 to provide agricultural literacy outreach. In that timeframe, 33 instances of AITC interventions took place in grades pre-kindergarten through fifth grade; 16 pre-kindergarten, 6 kindergarten, 2 first grade, 1 second grade, 1 third grade, 3 fourth grade, 1 fifth grade, and 3 interventions where all grades participated. Four events were hosted in partnership with local FFA Chapters, two events involved farmers reading to students as a part of the lesson, two were conducted virtually, and all others were taught by the staff person. Each school year this AITC staff person presents to the elementary school staff offering options for programming and showcasing lessons teachers could use on their own. The 33 instances of intervention by the AITC staff person are a result of being invited in by the classroom teacher. No state or administrative requirement direct teachers to use AITC programming; it is a completely voluntary offering (M. Bruck, personal communication, January 11, 2022)

Lessons used were retrieved from Iowa AITC's lesson database or the National Agricultural Curriculum Matrix on the National Agriculture in the Classroom website. Both sites had previously matched lesson content to NALO themes. Lesson content addressed one or two NALO themes therefore instances of themes add up to more than the number of interventions. Most content taught connected to Theme Two Plants and Animals for Food, Fiber, and Energy ($n = 23$). Theme Five Culture, Society, Economy and Geography ($n = 15$) was the next most frequently taught followed by Theme Three Food, Health, and Lifestyle ($n = 7$); and Theme One Agriculture and the Environment ($n = 5$). Only one intervention connected to Theme Four Science, Technology, Engineering, and Math.

While this research is not structured as a pre and posttest, it is important to understand the history of interventions at Tri-Center Elementary as a part of establishing a baseline for agricultural proficiency at this school. This context combined with the findings from the newly available LMALI will provide insight for program planners to make decisions about next steps with Iowa agricultural literacy outreach at this school.

Analysis

The researcher was provided a scanned PDF of the completed LMALIs. Responses were organized into Microsoft Excel by coding for each multiple-choice response option as well as correct or incorrect by question. This granular coding allowed for most specific analysis of student responses by NALO theme. Excel was used to calculate descriptive statistics.

Findings

Tri-Center Elementary in Iowa returned a complete kindergarten through fifth-grade data set with 277 student responses representing: 46 kindergarten, 50 first grade, 41 second grade, 36 third grade, 49 fourth grade, and 46 fifth grade students.

Most kindergarten students ($n = 31$) total test score fell into the Exposure proficiency level meaning most students received a score of less than 50% on the assessment (Table 1). As the grade level increased, so did the students' proficiency level with more first grade students scoring within the factual literacy level ($n = 28$). More second grade students did score within the applicable proficiency level ($n = 9$) than kindergarten ($n = 1$) and first grade ($n = 4$) however most second grade students ranked within the factual literacy level ($n = 29$). Kindergarten through second grade students scored highest on questions related to NALO Theme One: Agriculture and the Environment with mean scores ranking as the factually proficient for this theme. Questions in this theme asked students to identify pictures of animals raised on a farm where sheep, cattle and chickens were the correct responses, whales and tigers were incorrect. The second question asked about plant needs offering rain, soil, and sun images as correct responses. The final question in Theme One addressed problematic weather for farms where correct responses included no rain, tornado, and hail.

Table 1

Kindergarten through second grade students LAMLI total score

Proficiency Level	Kindergarten	First Grade	Second Grade
Exposure (<50%)	31	18	3
Factual Literacy ($\geq 50\%$)	14	28	29
Applicable Proficiency ($\geq 80\%$)	1	4	9
	46	50	41

Kindergarten through second grade students proved weakest in NALO Theme Four: Science, Technology, Engineering and Math with mean scores falling in the exposure proficiency level. These questions asked students to identify tools used by farmers. Consistently students did not select the image of a computer a tool that could help a farmer do their job ($n = 7\%$). However when presented with a fan, tractor, shovel, and light bulb, most students ($n = 96\%$) did select that a fan would help farmers keep chickens housed in a building cool during hot weather.

Similar to the younger subset, as grade level increased from third through fifth grade, the number of students at higher proficiency levels also increased (Table 2). Third grade had the most students scoring at an Exposure level ($n = 24$) than the other two grades. While the number of students at the Factual Literacy and Applicable Proficiency levels fluctuate between grades, overall, there is an increase in students scoring at higher proficiency levels from each grade to the next.

Table 2*Third through fifth grade students LAMLI total score*

Proficiency Level	Third Grade	Fourth Grade	Fifth Grade
Exposure (<50%)	24	15	7
Factual Literacy (≥50%)	19	18	24
Applicable Proficiency (≥80%)	2	16	15
	45	49	46

Grades three and five were strongest in NALO Theme Four: Science Technology Engineering and Math. These questions asked students to select reasons scientists should study agriculture, if science and technology helps farmers grow healthier plants and animals, and a question about farmers using inherited traits to determine the kinds of plants and animals grown on their farms. Third and fifth grade students also had the same lowest scoring NALO Theme Five: Culture, Society, Economy, and Geography. Questions in this theme addressed locations of foods grown throughout the United States, reasons people eat different foods around the world, and the effects to a community if farmers quit farming.

Fourth grade did not follow the same pattern as third and fifth grade. Fourth grade students were strongest in responses associated with NALO Theme Two: Plants and Animals for Food, Fiber and Energy. These questions asked students to identify reasons a farmer might rotate crops, define renewable, nonrenewable and recyclable, and identify ways farmers provide fruits and vegetables in the winter. The weakest theme for fourth grade was Theme One: Agriculture and the Environment. Students were asked questions related to the effects a decrease in water might have on plants, natural resources needed to support plant growth, and types of resources farmers manage to provide food, clothing, and shelter. Questions two and three of this theme offered either circle all that apply or circle all of the above. Routinely students selected some of the correct responses but did not fully answer the question.

Based on mean score per question, Theme Two had the highest level of proficiency for fourth grade. However, one of the questions addressing Theme Two was routinely answered incorrectly across all three grades. The question asked students to match the appropriate definition to the words renewable, nonrenewable, and recyclable. Often, students only selected one of the multiple-choice responses rather than writing letters on each line to link the words and definitions. While not the lowest scoring theme for each grade, Theme Three: Food, Health and Lifestyle was a commonly lower scoring theme across the three grades. Questions in this theme addressed safe food handling, the role of protein for the human body, and reasons food costs might increase.

Conclusions and Discussion

The LMALI developers indicated as grade level increases so should a students' level of proficiency in agriculture as measured by assessment score (Longhurst et al., 2020). This

phenomenon is demonstrated in the instrumental case study of Tri-Center Elementary. In both the kindergarten through second and third through fifth grade bands, students are moving within the continuum from the Exposure level to Factual Proficiency to Applicable Proficiency as grade level increases. Longhurst and collaborators indicate scoring below the Exposure level is nearly impossible as even without formal learning humans have some interaction with agricultural content. The Tri-Center Elementary data supports this statement.

The LMALI was administered at Tri-Center as part of a statewide initiative by Iowa AITC program. Given the recent publication of the LMALI, this data provides support to the validity of the instrument as a measure of student proficiency based on previous experiences as the students represented in this data had participated in agricultural literacy interventions prior to administration of the instrument. With the information shared by the Iowa AITC staff, we can draw some conclusions about the agricultural content taught to improve Iowa AITC offerings. This alignment is best illustrated by the fourth-grade students. These students would have participated in AITC interventions during the 2018-2019 (second grade), 2019-2020 (third grade), and 2020-2021 (fourth grade) school years prior to taking the assessment. This grade level scored highest on NALO Theme Two. Iowa AITC staff indicated most content taught aligned with Theme Two more than other NALO Themes.

For kindergarten through second grade, the weakest theme was Theme Four Science, Technology, Engineering, and Math. Only one intervention aligned with this NALO theme therefore the students may not have had appropriate knowledge to adequately answer these questions. While this result could be directly tied to minimal Theme Four intervention by AITC staff, NALO researchers indicate these outcomes connect to science education standards such as Next Generation Science Standards (Spielmaker & Leising, 2013). The National Science Teaching Association indicates in these early elementary years science education often receives less lesson time than reading and math (NSTA, 2022). Therefore, students could have less background knowledge to bring forward, however further research would be needed to validate this explanation.

It is concerning that third and fifth grade students scored lowest on questions related to Theme Five, yet this theme was the second most prevalent in lessons taught. A possible explanation for this could be that the lessons taught focus on Iowa specific content as it relates to Culture, Society, Economy and Geography whereas the assessment is based in more broad terms. Further research would have to be done to investigate this content. Also, these grade levels were most proficient in Theme Four, however, only one intervention aligned with this theme.

Program planning theories suggest needs assessments or baseline data be used to create or improve program offerings (Kettner et al., 2017). The results of this study can inform Iowa AITC leaders as to program strengths and deficiencies at Tri-Center Elementary. Based on the overall proficiency levels of kindergarten through fifth grade there is growth in proficiency as grade level increases, supporting the work of this agricultural literacy outreach program. However, analyzing each theme's proficiency can provide recommendations for future program content. To address weaknesses demonstrated in Theme Four at the kindergarten through second grade level, Theme Five for third and fifth grade and Theme One for fourth grade, Iowa AITC staff should evaluate the strength of content taught in these lesson plans. Program staff indicated lessons

taught to these grade levels addressed Themes Four, Five, and One, however students demonstrated low proficiency. This suggests the lessons are either inaccurately associated with these themes or need additional content to adequately address the themes. It is recommended Iowa AITC staff reevaluate this content and its alignment to these themes.

In addition, Iowa AITC staff indicated most lessons taught across all grades aligned with either Themes Two ($n = 23$) or five ($n = 15$). Such a heavy imbalance in content could skew student proficiency levels. It is recommended AITC program staff evaluate their program of work by theme then adjust offerings as necessary to balance content by theme more evenly.

While the results of this case study cannot be generalized across all state Agriculture in the Classroom programs, it can be used as a model. Gathering baseline data provides a solid platform for effectiveness-based program planning (Kettner et al., 2017). With the addition of the newly published Longhurst Murray Agricultural Literacy Instrument, AITC programs now have a more modern, validated tool to assess student proficiency (Longhurst et al., 2020). The Logic Model for Agricultural Literacy and the National Agricultural Literacy Outcomes are theory-based tools to assist program planners in building effective outreach. The LMALI provides the last piece to this puzzle, the evaluation tool. It is recommended other state AITC staff leverage existing relationships with schools and administrators to measure agricultural literacy proficiency using the LMALI. Like with the Tri-Center Elementary, this could provide a baseline to evaluate the current status of agricultural literacy outreach, identify gaps, and plan for future programming.

Future research recommendations related to this dataset could follow a few paths to further support AITC program development. First, Iowa AITC program should continue this type of work repeatedly at Tri-Center Elementary and other partnering schools to build on this data. Once baseline data is established and program plans are in order, organizations need to continue to evaluate programming for effectiveness and relevancy (Kettner et al., 2017).

Second, Iowa AITC staff indicated interventions at Tri-Center Elementary were primarily led by one staff person visiting classrooms in the school building to teach agricultural lessons. Many other modalities of agricultural education outreach exist (NAITC, n.d.). This data could be compared with similar populations who participated in a different modality of AITC outreach to assist program planners in evaluating effectiveness of methods. Factors such as planning logistics, staffing, budgets, travel, and infrastructure all influence program planner decision making (Kettner et al., 2017). By using this research in comparison to other similar studies, across different modalities, program planners could make informed decisions about the direction of new offerings.

Finally, as more state AITC programs use the LMALI and return data to researchers, the Tri-Center Elementary data can contribute to a nationwide dataset. Further analysis of this data could be stratified to evaluate just one grade level's proficiency across the nation, one full state program's proficiency, or other subsets within this possible larger dataset. The National Agriculture in the Classroom organization should consider continued encouragement of state programs to use the LMALI to increase this dataset.

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A Three-Year Examination of Attitudes and Behaviors During a Secondary Agricultural Curriculum Intervention

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To determine the effectiveness of the Theory of Planned Behavior (TPB), the researchers examined secondary agriculture youth behaviors prior to and following a four-part curriculum intervention. Utilizing a quantitative cross-sectional research design over a three-year period, the researchers evaluated students (N = 298) from 28 schools in ten-states within the Southeast region of the United States. Findings revealed that the project led to a variety of behavioral changes that sparked further inquiry. No significant changes occurred in attitudes, subjective norms, and perceived behavioral control; however, each year subjective norms decreased. A significant increase occurred among behavioral intent all three years and in attitudes during the first year. The research team posits that family relationships and employer demand on farms play a significant role in a power and modeling dynamic; thus, affecting the student's perceived control of behavior and perceived societal norms. As a result, the researchers conclude that the Apprenticeship of Observation theory hinders behavioral shifts within the dynamic of farm safety concerns. Recommendations includes the infusion of parental involvement within curriculum intervention and the addition of a third measurement point in the data collection timeline.

Introduction

The National Institute for Occupational Safety and Health (NIOSH) ranks agriculture among the most hazardous occupations in the United States. In 2014, an estimated 893,000 youth under 20 years of age lived on farms, with 454,000 children performing farm work (National Institute for Occupational Safety and Health [NIOSH], 2019). According to the United States Bureau of Labor Statistics (2019), nearly forty farming fatalities were caused by tractor rollovers in 2018 with the majority being under the age of 18 (NIOSH, 2019). While this statistic is alarming, it is avoidable. The most effective way to prevent tractor overturn deaths is using a Rollover Protective System (ROPS). In 2014, agriculturalists equipped 62% of tractors used on farms in the United States with ROPS (NIOSH). Hoy (2009) determined that ROPS, with the proper use of a seat belt, are 99% effective in preventing tractor overturn deaths.

Youth who observe older-age farmers utilizing outdated and hazardous equipment are more prone to cause fatalities (Myers & Hendricks, 2009). According to the United States Bureau of Labor Statistics (2019), nearly forty farming fatalities were caused by tractor rollovers in 2018. While this statistic is alarming, it is avoidable. The most effective way to prevent tractor overturn deaths is using a Rollover Protective System (ROPS). In 2014, agriculturalists equipped 62% of tractors used on farms in the United States with ROPS (NIOSH, 2019). Hoy (2009) determined

that ROPS, with the proper use of a seat belt, are 99% effective in preventing tractor overturn deaths.

In a previous study analyzing the effectiveness of CROPS, arose regarding attitudinal and behavioral effects toward the intended purpose of the success of the curriculum (Schafbuch et al., 2016). Tingle et al. (2018) discovered that teachers are able to combat these predeveloped attitudes if particular behaviors are addressed by the instruction. Furthermore, if at least two types of behaviors are addressed throughout the curriculum by the instructor, enhancement in attitudes, subjective norms, and perceived behavioral control occurred among the students (Tingle et al., 2018).

Youth spend hours and years developing perceptions of what they believe that establishes lifelong attitudes and behaviors. When considering how youth perform farm safety practices, it often comes from adults who taught throughout an example of practice or experience (Mazur, 2013). Many adults are aware of agricultural dangers, but due to time constraints, money, or traditional views, they do not embrace safe behavioral practices (Lee et al., 1997); thus, the young student or apprentice begins modeling the poor safety practices into their own work ethic (Baker et al., 2001) and creates a hazardous, and oftentimes fatal situation.

Theoretical Framework

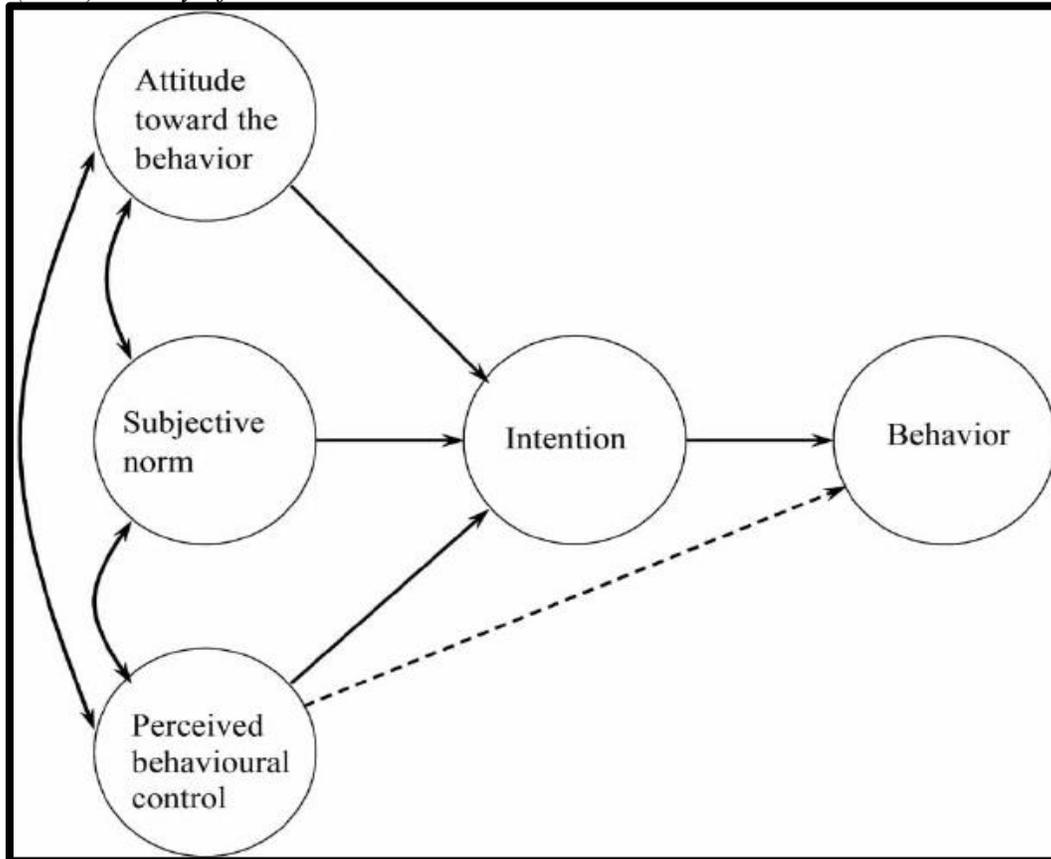
Theory of Planned Behavior

The Theory of Planned Behavior (TPB; Ajzen, 1991) emerged as an appropriate framework for evaluating tractor safety instruction while analyzing human behavior within the secondary agricultural mechanics curriculum. The TPB explains that three determinants influence a student's intention: attitudes towards behaviors, the subjective norms regarding behavior, and perceived behavioral control. Figure 1 shows the TPB and how each element works together to change student behavior.

Ajzen (1991) explains that if an individual has a positive attitude, supportive subjective norms, and a powerful sense of behavioral control, one is more likely to have strong intentions to change their current behavior. However, if there is an inconsistency in any of the three contributing factors it may result in weak intentions. Therefore, the student is less likely to complete the desired behavior. Similar combinations of negative intention factors are believed to influence the negative safety behaviors carried out by students (Vincent et al., 2019).

Figure 1

Ajzen's (1991) Theory of Planned Behavior Model



Note. From The Theory of Planned Behavior Article (p. 182), by Icek Ajzen 1991, in the *Organizational Behavior and Human Decision Process Journal*, 50, 179-211.

Attitude towards behavior expresses one's positive or negative evaluation of performing a given behavior, entailing a consideration of the outcomes before performing the behavior (Eck et al., 2021). Individuals form their attitude based on their perception of what they may deem to be true about a subject. The individual's perception may or may not be based on information, knowledge, or an emotional reaction to the subject (Willock et al., 1999).

Subjective norms reflect a personal perception of the social expectations to adopt a given behavior (Gorgievski et al., 2018). The social pressures an individual perceives may determine if they will perform a specific behavior is considered subjective norms (Ajzen, 1985; 1991). Furthermore, researchers describe subjective norms as whether others' opinions are of approval or disapproval with the behavior in question paired with the motivations to comply with the norms (Zhang et al., 2020).

A personal belief as to how easy or difficult performing a particular behavior is considered perceived behavioral control (Chumbley et al., 2019). Perceived behavioral control is held to determine behavior to the extent that it reflects people's actual control over the behavior (Sheeran et al., 2003). An individual's perception about the amount of promoters or barriers

when performing a specific behavior in addition to their perceived power of each promoter or barrier is also a characteristic of perceived behavioral control (Montano & Kasprzyk, 2015). Studies over time reflect significant effects of TPB core variables (attitudes, subjective norms, perceived behavioral control, and behavioral intentions) on individuals' intentions to change their behaviors (Clark & Finley, 2007; Lam, 1999; 2006; Trumbo & O'Keefe, 2001). The predictive power of attitudes, subjective norms, perceived behavioral control and behavioral intentions vary across different situations and behaviors. Thus, it is crucial to explore these factors relative to agricultural science education and tractor safety (Tingle et al., 2018).

Apprenticeship of Observation

The Apprenticeship of Observation theory (Lortie, 1975) was discovered within teacher education programs as scholars observed the period students spent observing in schools prior to teaching. Lortie (1975) posits that students spend years developing perceptions of what they believe teaching is, developing deep-seated notions of a) a subject area; b) the structure of pedagogy; and c) what constitutes a teaching practice. When considering how youth are taught proper farm safety practices, it often comes from adults modeling practices to youth at a very young age, which is then emulated by the child as they begin to operate equipment (Mazur, 2013). Many adults are aware of agricultural dangers, but due to time constraints, money, or traditional views, they do not embrace safe behavioral practices (Lee et al., 1997); thus, the young student or apprentice begins modeling the poor safety practices into their own work ethic (Baker et al., 2001). Within the CROPS project, Tingle et al. (2018) determined that Apprenticeship of Observation played a role in setting poor attitudes, unwanted subjective norms, and disheartening perceived behavioral control regarding safe tractor operation (Tingle et al., 2018).

Purpose and Objectives

This quantitative study sought to determine if the curriculum intervention and agriculture teachers could positively change behaviors set by the presence of the Apprenticeship of Observation. The following research questions aided in obtaining the purpose of this study:

1. Describe the behaviors (attitudes, subjective norms, perceived behavioral, and behavioral intentions) prior to the curriculum intervention each academic school year.
2. Describe the behaviors (attitudes, subjective norms, perceived behavioral, and behavioral intentions) following the curriculum intervention each academic school year.
3. Determine the change in behavior (attitudes, subjective norms, perceived behavioral, and behavioral intentions) by each academic year.

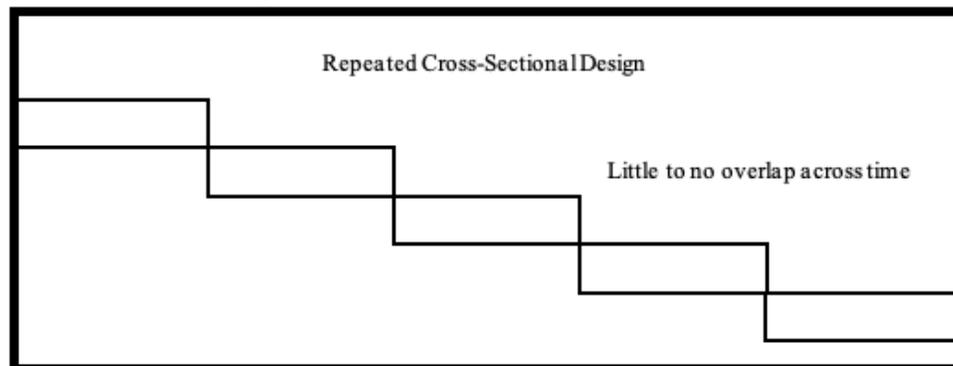
Methodology

This study consisted of a repeated cross-sectional design, quantitative in nature. A tractor safety curriculum and professional development, also known as Cost-effective Rollover Protective Systems (CROPS), served as the intervention for students enrolled in secondary agriculture courses across ten states in a resource-depleted region of the United States. The intent of the CROPS project is to assist youth in overcoming poor farm safety practices and attitudes that

were adopted from social and environmental factors throughout key moments in their youth development. Figure 2 displays how the repeated cross-sectional design is utilized.

Figure 2

Repeated Cross-Sectional Design



Note. Visual image of Repeated Cross-Sectional Design. Reprinted from *Longitudinal Research, Second Edition*. (p. 27), by Menard, S., 2002, Sage. Copyright 2002 by Sage University Papers series on Quantitative Applications in the Social Sciences.

In repeated cross-sectional design studies, the researcher draws independent study samples from each measurement point. These samples contain different sets of cases for each period, or the overlap is so minimal that it is considered negligible, but the case should be comparable from one period to another as would be the case in a total population design (Menard, 2002). Although each year, the study encompassed eight to ten new schools, the demographics nor geographic region changed; thus, the researchers deemed each year's population as comparable.

The focus of repeated cross-sectional quantitative research is to view time as both an outcome and a predictor, collect data on both time-varying and time-invariant measures, collect data prospectively whenever possible, collect data beginning in multiple base years, and collect data at all relevant times throughout the study (Singer & Willett, 1996).

The advantage of a *repeated* cross-sectional design over a *pure* cross-sectional design is the possibility of replicating the design in the possibility of cross-sectional results across time periods (Menard, 2002). This reduces, but does not eliminate, the possibility that the developmental patterns suggested by inter-cohort comparisons may be reflected (Sedgwick, 2014). The repeated cross-sectional design permits the researcher to replicate cross-sectional results from one period to another.

Over the three-year period, the participants were secondary students enrolled in agricultural mechanization courses where the teacher had participated in a three-day CROPS curriculum summer professional development prior to instruction. Each year, a new school and students participated in the curriculum intervention and completed behavioral questionnaires one week prior and one week following the six-eight-week CROPS curriculum intervention. The CROPS curriculum engages teachers and students in mutual leading and learning (Julian et al., 2021). Approval to work in schools and with youth under the age of 18 was provided by the

Institution's Review Board and consent was obtained from the school, parent, teacher, and student participant.

While developing a test instrument that evaluates behavioral change, the researchers received permission to modify a previously developed questionnaire (Namkoong et al., 2016). The modifications reflected farm and tractor safety, as determined by the objectives of the curriculum. A pilot test was conducted for reliability estimates, and Cronbach's alpha was determined. Each of the constructs of the TPB instrument was considered "acceptable" (George & Mallery, 2003) because the alpha values were above 0.70. The four constructs, with their alpha scores, were: (1) participant attitude ($m = 6.05$, $SD = 1.28$, $\alpha = 0.89$); (2) perceived norms ($m = 4.70$, $SD = 1.39$, $\alpha = 0.88$); (3) behavioral control ($m = 5.41$, $SD = 1.47$, $\alpha = 0.85$); (4) and behavioral intent ($m = 5.40$, $SD = 1.40$, $\alpha = 0.95$). Participant attitudes were measured with a seven-point bi-polar scale, while the other four constructs used seven-point Likert scales. All assessments were distributed face-to-face, before and after delivery of the curriculum.

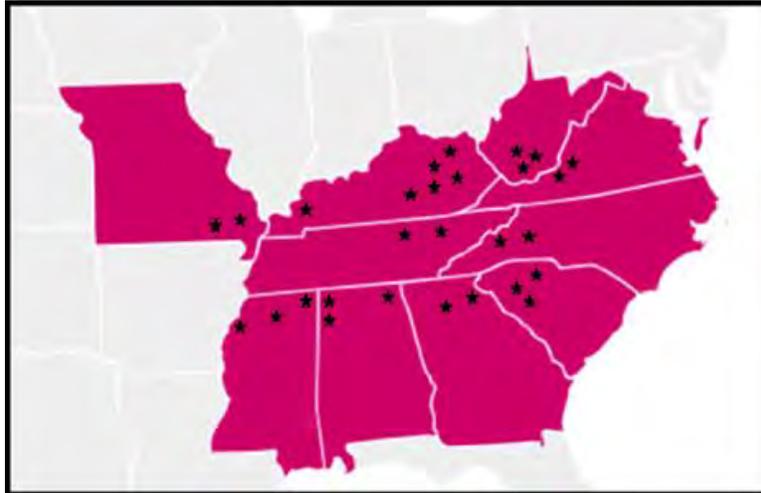
To obtain proficient educators who were competent to utilize the CROPS curriculum, state staff and teacher educators within the service region were contacted. Each were asked to nominate teachers who met a particular selection criterion: a) within the service regions of the Appalachian and Mississippi Delta Regions; b) have a 60% or higher free/reduced lunch rate; c) be within one county of a tractor fatality within the last three years; d) teacher is tenured in their current school; and e) the teacher is considered to be a leader in agricultural mechanics education. Over 100 teachers were initially nominated. Each were invited to participate in a 3-day summer professional development and understood that they would be required to teach the curriculum in its entirety. Forty-seven teachers did not respond to the email request or declined with responses that reflected personal or administrative reasons (i.e., retirement, health, lack of courses, movement of career, etc.). Of the 53 teachers, eight failed to provide written consent. The remaining 45 teachers were ranked based upon years of experience at the school, proximity to nearest tractor fatality, and years of experience teaching agriculture mechanics.

During the three years of this study, the 28 participating schools were all located in rural communities within the Appalachia and Mississippi Delta regions. Each school had remarkably similar demographics regarding race, gender, and socioeconomic status comprising primarily of white, male, low socioeconomic status participants. Due to the similar demographics across the schools and communities, a repeated cross-sectional design was implemented to extrapolate the data to a larger population (Moretti, 2004).

Teachers participated each year based upon their ranking/placing (e.g., teacher #1 - #10 were selected to participate in Year 1). Two schools did not complete the project during Year 3 due to reasons of oversight. The locations of all participating schools are provided in Figure 3 and were in regions of high poverty and recorded use of tractor models that lack the proper safety equipment; of which are noted as the highest regions in the country for tractor fatalities (Cole, 2007; Kerstetter et al., 2014). In Year 1, 126 students participated in the curriculum project; the following year, the enrollment consisted of 104 participants; and in Year 3, 68 students participated.

Figure 3

Locations that Participating Schools in the CROPS Curriculum Project over a Three Academic Years (N = 28)



Note. The star symbol (★) represents the locations that participated in the CROPS project. Alabama (n = 3); Georgia (n = 2); Kentucky (n = 6); Mississippi (n = 3); Missouri (n = 2); North Carolina (n = 2); South Carolina (n = 3); Tennessee (n = 2); Virginia (n = 2); and West Virginia (n = 3)

Prior to the curriculum delivery, the teachers attended a summer professional development that engaged them in each element of the curriculum and provided opportunities for the teachers to engage in the teaching methodological practice. Each teacher was provided with additional resources, such as the projects' virtual and augmented reality simulators that assisted in tracking behaviors and attitudes.

Findings

Research objective 1 sought to describe the behaviors prior to the curriculum intervention each academic school year. Table 1 displays the behavioral constructs each year at the pre-test stage of the study. In the second year of the three-year study, students had the highest attitude ($m = 5.89$; $SD = 1.16$) and behavioral intentions ($m = 4.99$; $SD = 1.36$). For subjective norms, the first-year cohort scored highest ($m = 5.08$; $SD = 1.33$). The third-year cohort began the curriculum intervention with the highest perceived behavioral control ($m = 5.77$; $SD = 1.68$).

Table 1
Behaviors Prior to Intervention (N = 298)

TPB construct	<i>m</i>	SD	<i>n</i>
Attitude			
2016 – 2017	5.83	1.21	126
2017 – 2018	5.89	1.16	104
2018 – 2019	5.60	1.42	68
Subjective norms			
2016 – 2017	5.08	1.33	126

	2017 – 2018	5.00	1.32	104
	2018 – 2019	4.81	1.46	68
Perceived behavioral control				
	2016 – 2017	5.62	1.58	126
	2017 – 2018	5.64	1.46	104
	2018 – 2019	5.77	1.68	68
Behavioral intent				
	2016 – 2017	4.95	1.20	126
	2017 – 2018	4.99	1.36	104
	2018 – 2019	4.69	1.47	68

Table 2 describes the behavioral constructs each year at the post-test stage of the study. The first year of the three-year study, students had the highest attitude ($m = 6.28$; $SD = 1.70$) upon the completion of the curriculum intervention. Each year's cohort reported lower scores for the subjective norms construct during the post- round of evaluations. In fact, the Year 3 cohort ($m = 4.46$; $SD = 1.71$) reported the lowest score that was also the largest decrease. Moreover, the Year 3 cohort noticed the largest increase following the curriculum intervention in the preconceived behavioral control ($m = 5.93$; $SD = 1.53$) construct.

Table 2
Behaviors Following the Intervention (N = 298)

TPB construct	m	SD	n
Attitude			
2016 – 2017	6.28	1.70	116
2017 – 2018	6.12	1.08	98
2018 – 2019	5.81	1.23	64
Subjective norms			
2016 – 2017	4.97	1.44	125
2017 – 2018	4.81	1.53	104
2018 – 2019	4.46	1.71	66
Perceived behavioral control			
2016 – 2017	5.65	1.53	124
2017 – 2018	5.91	1.33	103
2018 – 2019	5.93	1.53	67
Behavioral intent			
2016 – 2017	5.39	1.20	124
2017 – 2018	5.39	1.17	100
2018 – 2019	5.21	1.42	67

Although a difference did exist each year among each TPB construct, only among four occasions noted a significant ($p \leq 0.5$) difference (see Table 3). For the construct of Attitude, the year 1 students reported a significant increase in their attitudes (2016-2017 $t = 2.44$; $p = 0.02$). In years 2 (2017-2018; $t = 1.55$; $p = 0.13$) and 3 (2018-2019; $t = 1.13$ $p = 0.26$), a significant difference did not exist.

Table 3*Paired Sample t-test of Pre-Post Behavioral Constructs by Year (N = 298)*

Year	Attitude		Subjective norms		Perceived behavioral control		Behavioral intention	
	t	p	t	p	t	p	t	p
2016 – 2017	2.44	0.02*	0.79	0.43	0.18	0.86	3.68	0.01*
2017 – 2018	1.55	0.13	1.00	0.32	1.58	0.12	3.03	0.01*
2018 – 2019	1.13	0.26	1.61	0.38	0.88	0.38	3.27	0.01*

*Note. *p ≤ 0.5*

At the conclusion of the curriculum, the students reported lower subjective norms each year, resulting in a decrease. Although the results were not considered significant (2016-2017; $t = 0.79$; $p = 0.43$; 2017-2018; $t = 1.00$, $p = 0.32$; 2018-2019 $t = 1.61$; $p = 0.38$). Through the three years of data collection, perceived behavioral control noticed non-significant growth change upon the completion of the CROPS curriculum (2016-2017 $t = 0.18$; $p = 0.86$; 2017-2018 $t = 1.58$; $p = 0.12$; 2018-2018 $t = 0.88$; $p = 0.38$).

Behavioral intentions were the only element of the study where each year of the CROPS curriculum intervention, the students reported a significant increase (2016-2017 $t = 3.68$; $p = 0.01$; 2017-2018 $t = 3.03$; $p = 0.01$; 2018-2019 $t = 3.27$; $p = 0.01$).

Conclusions, Implications, and Recommendations

In this three-year quantitative study, the researchers explain the complexity of the Theory of Planned Behavior model. Each element of TPB works together to make an impact on shifting a child's behavior. For the current study, changes occurred in each of the areas, yet not significant in attitude (exception Year 1), subjective norms, or perceived behavioral control. More importantly, subjective norms decreased every year over the course of the curriculum intervention.

In the analysis of students' *behavioral intent* (Ajzen, 1991), students viewed CROPS as a benefit in installing tractor rollover structures. The teacher and the CROPS curriculum played an important role in improving the students' behavioral intentions to implement safe tractor operations. Additional research in agricultural education highlights the importance of behavioral beliefs as a benefit to classrooms and communities (Roberts et al., 2019). In this project, the improvement of behavioral beliefs was a result of the communities and curriculum benefiting the classroom.

The researchers recommend using the TPB, but teachers must understand that overcoming the subjective norms will require teachers to form additional partnerships in the teacher's community.

Each year of the study, the students perceived subjective norms dropped at the conclusion of the curriculum intervention. Clearly the teacher, the community involvement, nor the curriculum were impactful to overcome the personal perceptions and social pressures that surround the home environment. For many of the students, the family expectations or employer demands create a culture that reflects a *norm* that isn't placing tractor safety operation as a major priority. Due to the impact family can have on subjective norms (Krithika & Venkatachalam, 2014), the researchers posit that as the curriculum intervention continued, the students gained a better understanding at home or among their farm employer of the choices and power that they have, specifically in the decision making of safety needs and practices on farm tractors.

The Apprenticeship of Observation theory has been a point of contention in educational research for years (Botha, 2020; Boyd et al., 2013; Lortie, 1975). The CROPS project embeds TPB in the curriculum and teacher training prior to the implementation. Unfortunately, the findings indicate that the continued presence of Apprenticeship of Observation hinders the behavioral intent for students enrolled in agricultural science education studying tractor safety. It is possible that Apprenticeship of Observation, or more specifically, the mentalities set by older individuals who make the primary decisions to the daily farm practices impact the student's subjective norms more than any of the other three elements of TPB. The curriculum project engages the students with multiple community members; however, it does not engage the students' work with family members who they associate with the farm. As a result, it would be beneficial to see the impact made to subjective norms if parents were included more and asked to participate throughout the curriculum project.

The agriculture teacher can assist by discussing the project with family as they attend parent teacher conferences, parents being made aware of the impact of the work, or corresponding with guardians to discuss, support and involve their child regarding the work taking place.

The impact that the teacher has at bringing the principal issue to the forefront of the students' life is instrumental. It is not certain that additional time could have led to greater increases, but a second round of post-assessments that occurs six months after the conclusion of the curriculum intervention, may reveal a greater change in behavior. With the decrease in subjective norms, it can be assumed that the subjective norms present among each student's life plays a role in the attitudes and behavioral controls. The instructor, accompanied with the curriculum, improve behavioral intentions more than any of the other behavior constructs.

Although the study encompassed youth over a three-year period, it was at a different school, instructed by different teachers, and with various student populations each year. It would be to the interest of the research team that the study worked with the same teachers each year to see if the continued work created a positive culture within the community, school, and home in order to gain positive change in behavior.

Historically, the apprenticeship of observation has examined a teacher as someone in the school setting. The researchers encourage scholars to critically analyze who is teaching an individual at all stages of life. The influence that the family unit has on a young person has the potential to instill behaviors that one will have for the rest of their life (Carr & Sequeira, 2006). Therefore,

the subjective norm component of TPB is more simplistically understood by utilizing Apprenticeship of Observation.

The current data suggests that regardless of how effective the CROPS curriculum is written, students will still follow the lead of their parents, grandparents, guardians, or employers before questioning their family's way of operating the farm. The researchers suggest that when analyzing behavior-changing curriculum that researchers should extend their scope to see who all has an influence on the learner. Current research supports this understanding (Tingle et al., 2018), but this phenomenon explains why the behavioral intent was significant in the current study, but the other three elements of TPB were not significant.

A recommendation that the researchers have for the profession is to help preservice teachers understand that they cannot change all the behaviors of their students. There are factors that are working against their daily teachings. Therefore, the researchers suggest that higher education institutions that educate preservice teachers help young educators understand TPB and Apprenticeship of Observation.

A further recommendation from the researchers is that a third measurement point is added to the data collection timeline. This third measurement should be a mid-point between the pre- and post-assessments. The additional measurement will serve as an indicator to see if TPB constructs enhance the students' willingness to change their behavior.

There are multiple reasons as to why preservice educators need this information. Gray (2019) reported that once young educators start struggling in the classroom, they will resort to mimicking the behaviors they observed when they were a student. Their personality, creativity, and confidence are lost, and for the case of this study, the ability to consider safety procedures, once the Apprenticeship of Observation occurs (Furlong, 2013).

Scholars throughout agricultural education should work closely to minimize the impact Apprenticeship of Observation has on youth. Within this study, Apprenticeship of Observation played a significant role in the safety decisions youth make each time they are asked to operate a tractor. Over the past six years, researchers (Julian et al., 2021; Vincent et al., 2019; Tingle et al., 2018; Schafbuch et al., 2016; Mazur & Westneat, 2013) have worked to combat Apprenticeship of Observation yet the findings of this study highlight the overwhelming power it has within the subjective norms of a child's behavior.

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Identifying the relationship between augmented reality welding instruction and welding performance

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The goal of this study was to identify a relationship between augmented reality (AR) welding instruction and welding performance utilizing the Lincoln Electric REALWELD trainer. The gas metal arc welding (GMAW) process was utilized in the entirety of this study. Forty-four undergraduate students completed seven training passes using the AR training system. Of those seven passes, four were in the arc-off mode, and three were in the arc-on mode with a break in between the separate modes. Participants were scored on the AR training system based on the following five parameters: travel speed, contact tip to work distance (CTWD), travel angle, work angle, and position. The overall score compiled from these parameters was analyzed and compared to participant produced welds that were visually inspected by a certified welding inspector (CWI) from a local industry partner. Our results indicated using AR weld training utilizing the Lincoln Electric REALWELD had a statistically significant ($p > .05$) impact on CWI scores. Based on the results of the study, we can conclude that AR welding training is an effective learning tool for beginning welders.

Introduction

Welding is a manufacturing process that is indispensable to various industries and is found in every corner of the world (Stone et al. 2011). The need for welders has never been higher with new estimates indicating the welder deficit will nearly hit 375,000 by 2026 (Guerra, 2018). With the demand in this industry increasing, welding training needs to be safe, effective, and efficient (Whitney & Stephens, 2014). With the growing shortage of welders, there needs to be a quicker and more efficient way to train young welders. This welder deficit can be combatted at the secondary level with effective welding courses, as well as at post-secondary level by training proficient agricultural educators. Implementing new welding training methods could be a viable solution to the welder deficit problem.

Previous studies suggest virtual reality (VR) and augmented reality (AR) welding training can be an effective method to address workforce needs (Abrams et al., 1974; Byrd, 2014; Byrd, 2015; Chambers et al., 2012; Stone et al., 2011; Stone et al., 2013; Wells & Miller, 2020; Whitney & Stevens, 2014). AR welding is new technology that has yet to be researched and analyzed for welding education. AR technology is closely related to virtual reality (VR) technologies with similar abilities such as real-time feedback and safe training environments (Lee, 2012; Yuen et al., 2011). VR technologies have been developed and used in various sectors including medicine, mine safety training, first responder training, education, and more recently welding (Wells & Miller, 2020). Stone et al. (2011) suggest that few studies have compared the effectiveness of VR training in the context of a complex skill domain, such as welding. VR technologies can be implemented in education settings where a skill set needs to be developed in

order to progress in the learning process, such as welding training (Pantelidis, 1993). VR provides a completely immersible environment that simulates a learning experience with aural and visual effects. VR is a rapidly progressing technology that has been studied for many years with recent studies focusing on welding training (Byrd, 2014; Byrd, 2015; Chambers et al., 2012; Pantelidis, 1993; Stone et al., 2011; Stone et al., 2013; Thiagarajan, 1998; Wells & Miller, 2020; Yuen et al., 2011). The Virtual Reality Society (2017) described VR as “a three-dimensional, computer-generated environment which can be explored and interacted with by a person”. Thiagarajan (1998) portrays simulation technologies as an evolving system that will become widespread over time to fulfill different roles.

VR is closely tied with augmented reality (AR) in the mixed reality spectrum (Lee, 2012; Yuen et al., 2011). AR refers to a wide spectrum of technologies that project computer-generated materials onto users' perception of the real world via oculus helmets or goggles (Lee, 2012; Yuen et al., 2011). Abrams et al. (1974) suggests complex psychomotor skills can be acquired more efficiently with augmented feedback than performing the skill traditionally. AR is regarded in a broad sense as "augmenting natural feedback to the operator with simulated cues" (Milgram et al., 1994, p. 283). Fields utilizing AR in their research include areas such as design, manufacturing, and education (Lee et al., 2012).

During AR welding, users develop their psychomotor skills without the vast cost of consumables and materials typically seen in traditional welding (Stone et al., 2011) since there is less physical welding in AR applications, a reduced amount of steel, gases, and welding wire are consumed thus reducing the cost of training exponentially (Whitney & Stephens, 2014). Throughout this research, AR weld training is applied by means of aural assistance during mock welding passes, as well as live welding passes. The Lincoln Electric REALWELD is the AR welding machine utilized during the entirety of this study. The REALWELD reinforces welding techniques in a highly interactive and supervised platform. This is achieved by employing aural coaching and welding performance tracking of five key welding parameters such as travel speed, contact tip to work distance (CTWD), travel angle, work angle, and position. These parameters are tracked during the two modes of the AR training system, arc-off mode, and arc-on mode. The aural coaching is present during both modes and is only applied when deemed necessary.

Theoretical Framework

The Skill Acquisition theory is the underlying framework of this study. According to the Skill Acquisition theory there are three stages of development one progresses through while learning a skill which include declarative knowledge, procedural knowledge, and automaticity (DeKeyser, 2015). Declarative knowledge is achieved through research, demonstrations, and observation without acting upon said skill. Participants in our study develop declarative knowledge in the classroom from lectures, personal research, and demonstrations involving VR, AR, and live weld training. The declarative stage of skill development is achieved when learners obtain knowledge about a skill without attempting the skill (DeKeyser, 2015). Procedural knowledge is achieved when the learner's understanding of the skill is applied to an experience. From the procedural stage, learners often have trouble progressing to automaticity (DeKeyser, 2015). This is a major hindrance within the traditional method of welding instruction. A large portion of time is spent overcoming the fusillade of information and fears that are presented to

beginning welders in training. The time spent between the declarative stage and procedural stage of skill acquisition is typically the longest and most stressful for the learner (DeKeyser, 2015). Once a beginning welder advances from the procedural stage to the automaticity stage, complex skills are absorbed and applied. The automaticity phase is underpinned by repetition and practice. Audial coaching and arc-off mode in AR training can help advance beginning welders with anxiety through all stages of skill acquisition and ultimately develop the complex skills required of welders.

A novice welder that begins welding training with AR is provided with real time audial feedback that allows learners to be continuously critiqued on their weld performance skills. Upon weld pass completion, they can compare their virtual or REALWELD end result with a score conceived from recorded parameters immediately. Traditionally when students want to be critiqued by their instructor during live welding training, they physically leave their workstation to receive feedback on a completed weld. The student's memory of their previous weld and their acquired psychomotor skills is usually diminished upon receiving feedback and returning to their workstation (Chambers et al., 2012).

Purpose and Objectives

The purpose of this study is to determine if a relationship exists between overall weld scores and certified welding inspector (CWI) scores of beginning welders utilizing augmented reality welding simulation. This study aligns with the American Association for Agricultural Education's National Research Agenda Priority Area 5: Efficient and Effective Agricultural Education Programs (Roberts et al., 2016). Students participating in AR training should gain fundamental psychomotor skills such as hand placement on the welding gun, body position, arm/forearm position, arm/forearm movement, head position, and general welding motions. Many beginning welders have anxiety about the welding process which can inhibit their ability to progress Byrd (2014). By utilizing AR training students can overcome initial anxiety paired with the welding process, as well as develop the skills required for welding.

Objectives of this study include:

1. Determine if a relationship exists between AR training test scores and CWI scores.
2. Determine if a relationship exists between arc modes.

Methods

After approval by the Texas State University Institutional Review Board (IRB), this study was conducted during the Spring 2021 semester and consisted of undergraduate students from Texas State University enrolled in the Introduction to Agricultural Engineering course. The study incorporated the Lincoln Electric C300 multi-process welder, teaching the gas metal arc welding (GMAW) process with .035 wire, 75% CO₂- 25% Argon gas mixture, and short-arc weld transfer. We opted to use ¼ inch mild steel oriented in the 2F welding position. The GMAW process is a learner friendly process that includes a constant feeding wire and a constant fed

shielding gas. GMAW also requires shielding gas which protects the cooling weld. Both products are projected through a welding gun which is actuated with a trigger. This process is widely used by secondary agricultural mechanics shops across the US and is currently one of the most popular welding methods in industrial environments (Hooda et al., 2012). The GMAW process has been used extensively in previous studies including those integrating VR and AR weld training (Byrd 2014; Byrd 2015; Rose et al., 2015; Stone et al. 2011; Stone et al. 2013; Wells & Miller, 2020; White, et al., 2011).

Prior to the study, the travel speed parameter within the Lincoln Electric REALWELD was adjusted from 10 IPM (inches per minute) - 20 IPM, to 6 IPM- 12 IPM. The default parameters were wider than necessary for our weld training and produced inaccurate weld profiles. Additionally, the range of the work angle parameter was adjusted from 40 ° - 55 °, to 40 ° – 50 °. The weld settings used for the Lincoln Electric C300 multi-process welder were the factory recommended settings for ¼” mild steel at 18 V, and 250 (IPM) wire feed speed. For the study no other parameters were adjusted aside from travel speed and work angle; travel angle, CTWD, and position remained at the default settings. The AR overall score is calculated by compiling the percent of time a user spends welding within the allotted parameter ranges. Participants filled out a self-evaluation sheet covering weld quality developed by Herren (2015). CWI scores were determined by an American Welding Society (AWS) CWI and were calculated from many factors such as weld uniformity, penetration depth, porosity, and joint fusion. The weld curriculum specifications are represented below in Table 1.

Table 1

RealWeld WPS Curriculum Setting

Variable	Min	Max	WPS
Work Angle (degrees)	40	50	45
Travel Angle (degrees)	10	20	15
CTWD (inches)	0.25	0.75	0.50
Travel Speed (IPM)	6	12	9
Position (inches)	-0.25	0.25	
Current (Amps)	100	200	0
Voltage	17.0	19.0	18.0
Wire Feed Speed (IPM)	245	255	250
Weld Size (inches)		0.25	

Between four labs within the Introduction to Agricultural Engineering course, forty-four students completed the study. Students were randomly assigned to one of three sequence training groups for the larger study using a randomization formula in Microsoft Excel. Students then performed single pass 2F welds on ¼” mild steel coupons within each of the three rotations. Researchers created a script explaining the GMAW process with instructions that was presented at each training method prior to each lab. Table 2 displays the sequencing schedule below.

Table 2

Weld Process Training Sequences

Sequence Group	Weld Process Training for	Weld Process Training for	Weld Process Training for
	Week One	Week Two	Week Three
Sequence Group 1	VR	AR	Live
Sequence Group 2	AR	Live	VR
Sequence Group 3	Live	VR	AR

Using the REALWELD, each participant was instructed to conduct four arc-off welds, and three arc-on welds. The REALWELD's arc-off mode allows users to train in a 100% safe environment with real-time audial coaching. The welding gun sensor works in conjunction with three cameras placed above the welding area to track the user's weld gun position. The information gathered by this technology is then translated into real time audial coaching for the user. This same technology is present during both the arc-off and the arc-on mode. The transducer relays wire speed and voltage information while welding and allows for the change between modes. The only difference between arc-on mode and arc-off mode to users, is the physical welding arc and puddle. Weld parameters and scores are recorded in both modes which include work angle, travel angle, (CTWD), travel speed, position, and overall score. Prior to the training, ¼" mild steel plates were pre-tacked in the 2F configuration in order to avoid plate distortion between weld passes.

During the arc-off mode, each participant was required to be in full welding PPE except for the welding helmet. Having a helmet in the up position would block cameras and sensors needed to complete the score. All other forms of PPE such as gloves, safety glasses and jackets were required in order to simulate a consistent environment in both scenarios. Each participant was required to be in full welding PPE in the arc-on mode as live welding ensued.

A scripted introduction was given to provide a background on AR welding and how it differs from VR and live training. Researchers also described the parameters and cues in which the REALWELD grades and scores welds by. Next, researchers gave demonstrations of both an arc-off and arc-on weld passes. Two demonstrations of arc-off were given in which the first pass was an intentionally low scoring weld in order to activate the audial coaching of the REALWELD. The second pass was performed as to exemplified what an ideal weld pass would look like. Before the arc-on pass, researchers ensured participants' welding helmets fitted and functioned correctly. Participants were able to gauge what a live weld resembled through a functioning welding helmet before their initial live weld attempt. During arc-on passes, participants were observant of correct weld pool structure based on sight and sound. During their training we personally coached participants on ques from the REALWELD and how to use the feedback effectively. Participants completed six passes (four arc-off, two arc-on), and proceeded

to rotate within the group until everyone completed their initial training. After each participant had completed six passes, they were asked to complete an additional arc-on pass. Each completed and scored weld pass was recorded and entered into the database.

Each student filled out a demographic sheet that included age, gender, dominant hand, academic major, academic grade level, welding experience, welding process experience, situational experience, VR welding experience, and AR welding experience, and previous ag mechanics project experience.

Results

This study recorded data from a total of forty-four participants. Student in our study ranged in majors such as: Agricultural Mechanics ($n = 4$), Animal Science ($n = 1$), Pre-vet ($n = x$), Horticulture ($n = 9$), Agribusiness ($n = 7$), General Agriculture ($n = 16$), Agricultural Education ($n = 2$), Non-Ag ($n = 5$). The majority of the participants registered for the class as an elective or as an agriculture requirement. Just over half of the participants were female ($f = 23$; 52.3%). The average age of the participants was 21.84 years ($SD = 5.17$). Most participants reported being right-hand dominant for most daily tasks ($f = 36$; 81.8%) however, a larger portion reported being right- hand dominant while welding ($f = 39$; 88.6%). The largest reported academic major of participants was General Agriculture ($f = 16$; 36.4). Out of forty-four participants nearly half were sophomores ($f = 19$; 43.2%). Specific details regarding the demographics of the study are presented below in table 3.

Table 3

Participant Demographics (n = 44)

Item	<i>f</i>	%
What is your gender?		
Female	23	52.3
Male	19	43.2
Other	2	4.5
What is your age?		
18	3	6.8
19	12	27.3
20	9	20.5
21	7	15.9
22	6	13.6
23+	7	16.1
Which hand is your dominant hand for most tasks?		
Right hand	36	81.8
Left hand	8	18.2
Which hand is your dominant hand for welding?		

Right hand	39	88.6
Left hand	5	11.4
What is your academic major?		
General Agriculture	16	36.4
Horticulture	9	20.5
Agriculture Business Management	7	15.9
Non-Agriculture	5	11.4
Agricultural Mechanics	4	9.1
Agricultural Education	2	4.5
Animal Science	1	2.3
What is your academic grade level?		
Freshman	7	15.9
Sophomore	19	43.2
Junior	13	29.5
Senior	5	11.4

The participants' prior VR, AR, and live welding experience is reported in table 4 below. The majority of the participants came into the study with zero welding experience ($f = 29$; 65.9%). Of those who had prior experience, shield metal arc welding (SMAW) was the most frequently reported ($f = 12$; 27.3%). Of the various locations participants gained prior welding experience, the most frequently reported was from the family farm or business ($f = 6$; 13.6%), and high school Agricultural Education programs ($f = 6$; 13.6%). All participants reported no prior experience with VR or AR systems ($f = 44$; 100%). No participants reported any welding certifications and only 2.3% of participants showed a project at a major agricultural mechanic show. Specific details regarding participants prior welding experience are represented in table 4 below.

Table 4

Participants' Prior Welding Experience (n = 44)

Item	<i>f</i>	%
Have you ever welded before?		
No	29	65.9
Yes	15	34.1

If you have welded before, which of the following processes have you performed?		
Shielded metal arc welding (SMAW; “Stick welding”)	12	27.3
Gas metal arc welding (GMAW; “MIG”; “wire welding”)	7	15.9
Flux-cored arc welding (FCAW)	1	2.3
Submerged arc welding (SAW)	1	2.3
Oxy-fuel welding (OFW)	5	11.4
Gas tungsten arc welding (GTAW)	2	4.5
If you have welded before, where have you gotten the opportunity to weld or practice welding?		
At my family’s farm or business	6	13.6
In my high school’s Agricultural Education program	6	13.6
At a farm or business not owned by my family	4	9.1
In my high school’s Industrial Technology program	3	6.8
Other location	5	11.4
Have you ever used a welding simulation / simulator system		
Yes	0	0
No	44	100
Do you have any prior experience using the VRTEX 360 VR welding simulator?		
Yes	0	0
No	44	100
Do you have any prior experience using the REALWELD AR welder?		
Yes	0	0
No	44	100
Have you ever completed an agricultural mechanic project for a local or county show?		
Yes	3	6.8
No	41	93.2
Have you ever completed an agricultural mechanic project for a major show?		
Yes	1	2.3
No	43	97.7
Do you have a welding certification?		
Yes	0	0
No	44	100

Table 5 reports the overall mean scores for all participants’ weld passes using the REALWELD AR welding training and the final CWI mean score. The mean score for Pass 1 was 55.98 ($SD = 19.12$). The mean score for Pass 2 welds was 63.59 ($SD = 24.67$). The mean score for Pass 3 was 70.41 ($SD = 23.49$). The mean score for Pass 4 was 67.70 ($SD = 24.97$). Pass 5 of the AR training was the first live (arc-on) weld participants performed. The mean score

for Pass 5 was 56.93 ($SD = 27.05$). The sixth AR training pass was the participants second live arc-on pass in which the mean score for Pass 6 was 58.66 ($SD = 29.35$). Results for the third live (arc-on) weld participants showed a mean score of 64.39 ($SD = 28.87$).

Table 5

Comparison of RealWeld Mean Scores and Final (CWI) Mean Score (N = 44)

Score	Mean	SD	t	p
Pass 1 (Arc-Off)	55.98	19.12	-7.91	<0.001
Pass 2 (Arc-Off)	63.59	24.67	-4.40	<0.001
Pass 3 (Arc-Off)	70.41	23.49	-2.72	0.009
Pass 4 (Arc-Off)	67.70	24.97	-3.07	0.004
Pass 5 (Arc-On)	56.93	27.05	-5.35	<0.001
Pass 6 (Arc-On)	58.66	29.35	-4.71	<0.001
Pass 7 (Arc-On)	64.39	28.87	-3.60	<0.001
CWI	80.66	11.12		

Table 6 reported mean scores of all participants' arc-on and arc-off scores, the standard deviations, and statistical significance. The mean arc-off score of all participants was 63.33 ($SD = 23.25$), while the mean arc-on score of all participants was 59.99 ($SD = 28.40$). There was no statistical significance between arc-off and arc-on mean scores ($t = -1.34$, $p = <0.18$).

Table 6

RealWeld Mean Scores With and Without Arc On

	N	Mean	SD	t	p
Arc Off	132	63.33	23.15	-1.34	0.18
Arc On	132	59.99	28.40		

Table 7 reported mean scores of all participants' REALWELD AR training scores with arc-on, and the CWI mean scores. The arc-on REALWELD mean weld scores was 56.93 ($SD = 27.04$). There was a statistical significance between arc-on mean scores with AR training and CWI mean scores ($t = -5.35$, $p = <0.001$).

Table 7

Comparison of RealWeld Mean Scores With Arc On and Certified Welding Instructor (CWI) Mean Scores

Cue	<i>N</i>	Mean	<i>SD</i>	<i>t</i>	<i>p</i>
RealWeld	44	56.93	27.04	-5.35	<0.001
CWI	44	80.66	11.12		

Table 8 reported mean scores of all participants' REALWELD AR training scores with arc-off, and the CWI mean scores. The arc-off REALWELD mean weld scores was 55.98 (*SD* = 19.12). There was a statistical significance between arc-off mean scores with AR training and CWI mean scores ($t = -7.91, p = <0.001$).

Table 8

Comparison of RealWeld Mean Scores With Arc Off and Certified Welding Instructor (CWI) Mean Scores

Cue	<i>N</i>	Mean	<i>SD</i>	<i>t</i>	<i>p</i>
RealWeld	44	55.98	19.12	-7.91	<0.001
CWI	44	80.66	11.12		

Conclusions, Discussion, Recommendations, Implications, & Limitations

Our results indicated using AR weld training over the course of four weeks had a statistically significant ($p > .05$) impact on CWI scores. Each weld pass had statistically significant impact, regardless of whether it was arc-on or arc-off. We concluded that after each pass with AR training, overall scores improved. We noticed a decrease in scores on the initial arc-on pass (fifth total pass) but saw a rise in overall scores in the last two passes. This plateau can be derived from participants recognizing a new psychomotor skill in the procedural knowledge stage of the skill acquisition theory (DeKeyers, 2015). Perhaps the amount of passes we required participants to complete affected their overall score performance.

We saw a skill progression from the initial pass until the third pass with a drop in scores for the fourth pass. We believe the decrease in overall REALWELD scores after the third pass can be derived from frustration with personal performance. Participants tend to overcompensate for a struggling cue which is represented in a decreased overall REALWELD score. In passes one through three participants gained procedural knowledge and became frustrated in pass four when they attempted to transition into the automaticity stage of skill acquisition (DeKeyser, 2015).

Based on the results of the study, we can conclude that AR welding training is an effective learning tool for beginning welders. AR training systems like the Lincoln Electric REALWELD are likely to be implemented in the near future in various education settings such as trade schools, high schools, and university level welding shops. Schools looking to adopt AR training systems can provide their students with immediate feedback in an individualized setting that welding instructors can not duplicate.

Limitations to our study include the lack of REALWELD AR training machines available; this hindered student's ability to gain enough training to enter the automaticity stage of skill development (DeKeyers, 2015). With more training stations, participants could have more time dedicated towards developing their automaticity skills to where their overall scores matched or exceeded CWI scores. In this scenario, lab training would be conducted differently as their focus would be to increase REALWELD scores. Participants could dedicate the entire duration of lab time achieving credible scores rather than completing a set number of weld passes, similar to the traditional weld training strategy used in the larger study.

We recommend future researchers replicate this study and split the arc-on passes and arc-off passes with a suitable break in order to relieve participants of fatigue. We recommend rotating test pieces after one weld is completed. This would allow the test piece to cool down to room temperature so that participants do not train on pre-heated material. Welding on pre-heated material can affect different training parameters such as travel speed and travel angle. We recommend future studies have participants continue training with AR in arc-on and arc-off until their scores reflected CWI numbers in order to further time in the automaticity stage (DeKeyers, 2015). Considering our study, if students had reached the ability to earn AR overall scores parallel with CWI numbers, pass/fail rates could increase.

We elected to utilize the 2F weld configuration as Stone et al. (2013) identified as a less complex position allowing for quicker skill development. We recommend future studies replicate this study utilizing various weld configurations, materials, and processes. Out of position welds and configurations such as overhead and pipe require longer durations of practice and skill development. The same can be said about different materials such as aluminum and stainless steel. Evaluating welding performance on more advanced welding positions and processes will assist in further understanding the effectiveness of the REALWELD in broader aspects of welding education. We recommend replicating this study using a larger sample size, obtaining a larger sample will improve the reliability of our findings. We recommend conducting future research that evaluates training durations to determine if additional individualized instruction time improves the overall scores evaluated on the REALWELD. We recommend implementing a control group with every set of data in order to rule out variables between data sets. Lastly, we recommend replicating Byrd's (2015) study using the REALWELD to evaluate experienced welders to develop baseline scores among certified welders.

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Cultivating Black Leaders for Rural Communities: A Case Study of a Leadership Development Program at an 1890 Land-Grant Institution

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Rural leadership development has been a field with a long, varied history. Despite this, Black rural leadership development programs have been almost non-existent. In response, this investigation explored the effectiveness of a cooperative extension program called Learning Everyday About Development (LEAD), designed and facilitated by an 1890 land-grant university to revitalize rural communities while supporting economic development in traditionally historically Black communities in Louisiana. Three themes emerged from our qualitative analysis: (1) sparking rural leadership, (2) challenges to new leadership approaches, and (3) rethinking rural renewal. As such, we found the participants reported that LEAD was effective overall. This effectiveness was demonstrated in the first theme, sparking rural leadership. For example, the participants discussed in detail the benefits of networking at LEAD, an immense appreciation of not being forgotten, and being made aware of resources. Although participants reported they experienced growth in their leadership style and career because of participation, the extent of the growth varied substantially. The participants also reported that they devoted more time in their offices to work on grants and programming. Moving forward, we recommend a robust longitudinal evaluation of LEAD. Perhaps data from this study could provide a basis to create a framework for other Black rural development initiatives and add meaningful insight into this phenomenon.

Introduction and Review of Literature

Rural leadership development is not a new concept. In fact, millions of dollars have been invested in rural leadership development for over 50 years (Kaufman & Rudd, 2006). Despite this, the field has been severely under-researched (Madsen & O'Mullan, 2014). Although rural leadership development programs vary considerably in delivery and scope because the needs of each rural community have been unique, many rural leadership development programs have similar overarching goals. For example, common program goals include: (a) strengthening leaders by equipping them with the knowledge, (b) tools and resources to be successful, and (c) aiding rural leaders in utilizing their unique assets most efficiently. The unique assets addressed by rural leadership programs have included: (a) restoring historic districts, (b) downtown revitalization, (c) community history projects, (d) building attractions to inspire tourism, and (e) programs that focus on leadership-based skills that are specific to the community (Hustedde & Woodward, 1996). The RuraLead Initiative (2020), an organization committed to strengthening and developing leadership in rural communities, recently conducted listening sessions regarding the need for rural leadership development throughout the southern U.S. As a result of this work, they found, "leadership in rural communities is relational, not transactional. To create change, one has to know the place and the people from the ground up" (RuraLead Initiative, 2020, p. 1). Because of this need, rural leaderships programs have become a priority for programming in the Cooperative Extension Service (CES).

Leadership Development Program Outcomes in Extension

Leadership development programs in agriculture and the CES have been in existence for decades as a way to increase the competence and understanding of community leaders (Lamm et al., 2013). Originally developed in 1983 for participants in rural areas, the first coordinated state-wide leadership development program was created by the W. K. Kellogg Foundation. Consequently, leadership development programming quickly expanded throughout the country and now has thousands of alumni. Because of the benefits of evaluating CES leadership programming, Sowcik et al. (2018) examined an online leadership development program whose target audience for participation was Florida County Extension Directors. As a result, participants indicated a high level of satisfaction with the online format, communication, and engagement of the instructor (Sowcik et al. 2018). Meanwhile, Lamm et al. (2016) evaluated leadership development programs facilitated by CES in the Southern U.S. Recognizing the importance of measuring objective performance outcomes by ensuring that the programs were engaging appropriate audiences, the researchers provided evidence of program effectiveness at the individual, environment, and behavioral levels using Bandura's (1986) social learning theory. For example, Lamm et al. (2016) assessed the individual level using the personal characteristics of respondents and found that 74% were male, and the average age of participants was 49 years old (ages ranged from 24 to 80). Of note, 92.2 % of respondents identified as *white*. While interpreting the results of the evaluation, Lamm et al. (2016) highlighted how Bandura's (1986) social learning theory helped reveal key weaknesses regarding diversity in leadership programming for CES. As a result, Lamm et al. (2016) called for a greater diversity of individuals, especially for women and individuals of color, who receive leadership training to "...ensure participants are exposed to a variety of viewpoints and can expand their social learning potential accordingly" (p. 131). Because of the south's well-documented history of racial discrimination, it is critical to ensure that underserved groups, such as rural Black citizens, have access to leadership development opportunities in the future (RuraLead Initiative, 2020).

Cultivating Rural Black Leadership

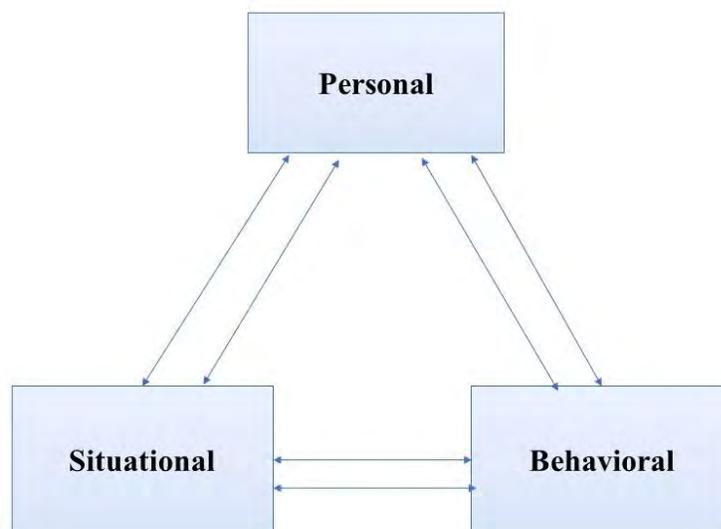
People of color in the Southern U.S. have overwhelmingly not participated in rural leadership programs (Lamm et al., 2016). As a consequence, a need emerged to expand leadership development programming for racial minority groups, particularly for Black citizens in rural communities (Lamm et al., 2016). Because of the lack of representation of Black leaders, little knowledge has existed about this phenomenon. As a result, 1890 land-grant universities have been challenged to address this issue to foster greater leadership for the Black communities (Southern University, 2021). Because rural leadership programs have grown in tandem with the national focus on improving diversity, equity, and inclusion, leadership development programs that focus on racial minority groups have witnessed an increase in funding (USDA, 2020). These changes to the funding structure of leadership development programs have allowed 1890 land-grant universities to begin to invest more purposefully in Black communities. Anecdotal evidence has suggested that the lack of participation in rural leadership development programs by rural Black leaders has resulted in a lack of knowledge about tools and resources available to help move their towns, villages, and communities forward (RuraLead Initiative, 2020). To date, little research has explicitly addressed the outcomes experienced by rural Black leaders who engage in leadership development programs, indicating this issue warranted greater attention.

Theoretical Framework

The theoretical framework that informed this study was Albert Bandura's (1986) social cognitive theory (SCT). Originally theorized as a *social learning theory* in the 1960s, SCT has been used to describe the influence of a complex interaction of variables (see Figure 1). For example, SCT postulates how the individual, environment, and behaviors influence learning. The key components of SCT include an individuals' behavioral ability, expectations, self-control, self-efficacy, observational learning, and reinforcement. In this study, we used SCT to evaluate how learning was experienced during LEAD facilitated by Southern University's CES.

Figure 1

Bandura's (1986) Social Cognitive Theory



Viewing leadership development through this lens, allowed us to analyze how LEAD could aid in developing the talent of Black leaders in rural Louisiana. SCT, often used interchangeably with its predecessor, social learning theory, asserts that an individual's actions and behaviors are derived to describe how individuals think, view themselves, the environment, and their perceived actions.

Background of the Study

The current study investigated the effectiveness of a rural 1890 land-grant CES program called *Learning Everyday About Development (LEAD)*, which was designed to revitalize economic development in traditionally underserved communities. The communities participating in the program, primarily historically Black, have several barriers to success, including (a) limited funding and (b) little access to resources. LEAD targeted community leaders for the program, such as mayors, police juries, city council members, clergy, and other change agents. Programming topics ranged from *How to Apply for Grants* to *Revitalizing Historic*

Districts/Main Street, which addressed various aspects of economic development. To accomplish this, the community leaders were invited to attend full-day sessions free of charge in 2019. The sessions were initially designed as part of a series and scheduled to be facilitated in various regions throughout the state quarterly; however, because of the COVID-19 pandemic, only two sessions were facilitated. In addition to the scheduled presentations, the CES at Southern University participated in the LEAD sessions by disseminating information on certifications and program availability for the stakeholders in their areas. The LEAD program was implemented twice. The first session was held on October 8, 2019, and the second occurred on January 30, 2020. The third session was tentatively scheduled for April 2020; however, the event was canceled as a result of the COVID-19 global pandemic. For the current investigation, we focused exclusively on the outcomes of Black participants of LEAD since they were the target audience for programming.

Purpose Statement

The purpose of this case study was to describe the experiences and perspectives of black rural leaders regarding their participation in LEAD. Therefore, this investigation aligned with the American Association for Agricultural Education's *Research Priority 7: Addressing Complex Problems* (Andenero et al., 2016).

Methodology

We used an instrumental case study design to guide this study (Stake, 1995). According to Creswell and Poth (2018), case study research “involves the study of a case (or cases) within a real-life, contemporary context or setting” (p. 97). The case was bounded by time and place (Stake, 1995). For example, the data collected examined a program for Black rural leaders in Louisiana. To achieve this, we used a non-probability sampling approach to select the participants (Patton, 2002). We achieved this by employing a purposeful sampling of the participants. Maxwell (2005) defined purposeful sampling as a selection strategy in which activities, individuals, or settings have been selected deliberately to provide information that cannot be achieved from other choices. We recruited the extension agent responsible for creating and facilitating LEAD to achieve a purposeful sample. The participants were also selected using a maximum variation approach to fully represent the varying and multiple perspectives of program participants (Patton, 2002). As a result, this study included five participants (see Table 1).

Table 1

Participants' Personal and Professional Characteristics

Pseudonym	Race	Job-Title	Affiliation to Bounded System	Years of Experience
John	African American	CEP Professional	Facilitator	One year as CEP professional; former Mayor for eight years
Xavier	African American	Mayor	Session #1 and Session #2 Participant	Two years as Mayor (1st term)
Jayden	African American	Mayor	Session #1 and Session #2 Participant	Two years as Mayor (1st term)
Xyla	African American	Executive Assistant	Session #1 Participant	10+ years
L.J.	African American	Council Member	Session #2 Participant	1.5 years

Data Collection and Analysis

The various sources of data collected helped enhance the rigor by triangulating the study’s findings. We interviewed participants using a vital meeting platform because of the COVID-19 global pandemic to ensure participants’ safety. The interviews were recorded with a separate recording device. The audio recordings were stored on a password-protected computer until transcribed. Verbatim transcription of the study’s findings was conducted promptly after each interview session. Participants were then provided a copy of their interview transcripts to review for accuracy, address any areas of concern, and provide further explanation or clarity – a process known as *member checking* (Patton, 2002). Participant interviews occurred over several months, beginning with the LEAD’s facilitator. The interviews were guided by five major guiding questions and 35 probing questions. Probing questions were used to keep the interviewee talking while skillfully guiding them to answer the purpose of the study (Creswell & Poth, 2018). The interview questions were developed to capture the essence of Black rural leaders’ experiences during LEAD and determine the participants’ perceptions of the program’s effectiveness. Lastly, it is important to note that the lead researcher engaged as a participant-observer during data collection for this study (Creswell, 2005). As a key instrument for data collection and interpreter of the research findings, we scrutinized this bounded system within its natural settings (Denzin & Lincoln, 2000). This allowed us to simultaneously understand the social structures and processes without disturbing or influencing the context (Stake, 1995). Additionally, the lead researcher attended both sessions of LEAD to observe and capture ethnographic fieldnotes.

This study followed Creswell’s (2009) data analysis procedures. Creswell’s (2009) first step is to “organize and prepared the data for analysis” (p.185). In this phase, we organized all data

sources into a single document to prepare the data for analysis. The second phase of Creswell's (2009) analytic process is for researchers to familiarize themselves with the data. To accomplish this, we read through each source to "get intimate with the data" (Esterberg, 2002, p. 157). This allowed us to understand the information participants shared more in-depth. In this third phase, we began to analyze the data. To accomplish this, we employed Saldaña's (2021) coding approaches in which we engaged in first cycle and second-cycle coding. This process helped reduce our initial codes. During this process, we used structural coding to emerge initial codes (Saldaña, 2021). In the second cycle, axial coding, we reduced the initial codes in categories by scrutinizing their relationships. Finally, we used thematic coding to emerge themes from the data to identify a detailed description of the bounded case (Saldaña, 2021). In the final step, we aimed to understand and present the themes in a *story*. As a result, the lead researchers' experiences as a cooperative extension professional informed and lent to our understanding of the participants' experiences. We focused solely on the data before us and remained true to the meaning-making process. As a result of this process, the study's three themes emerged.

Ethical Considerations

In this study, we aimed to uphold Tracy's (2010) criteria for high-quality qualitative studies, that included: (a) a worthy topic, (b) rich rigor, (c) sincerity, (d) credibility, (e) resonance, (f) significant contribution, (g) ethics, and (h) meaningful coherence. We used the following practices and methods to achieve the criteria for a high-quality study. To ensure my topic was worthy, we aimed to identify a topic that was relevant, significant, and interesting. Through research, we uncovered that rural Black leaders were either not participating or not aware of leadership development programs. Thus, we found it very important and timely to capture the essence of their experiences and perceptions of the effectiveness of LEAD. To enhance the rigor of this study, we grounded our process in a theoretical lens and immersed ourselves in the field. For example, the lead researcher participated in planning meetings to understand the thought and processes used in designing and developing LEAD. We also participated as a participant-observer to interact with participants while capturing ethnographic fieldnotes. We aimed to collect a vast amount of rich data that could be analyzed and triangulated. Lastly, we sought to have an ethical, meaningful, and significant case study by approaching it so that it could add to the literature on rural Black leaders while addressing their lack of access to existing leadership development programs. Additionally, we meaningfully ensured that our purpose, literature, findings, conclusions, and recommendations were all aligned and interconnected.

Reflexivity

Creswell and Poth (2018) explained that researchers' reflexivity was their attempt to *position themselves* within the investigation. In qualitative research, researchers are a data collection tool, and while they should strive to be as free from bias as possible; it is also expected for the researcher to disclose their background, how their background factors into their interpretation of the data, biases they may have, and what do they gain from conducting this study. As a result, it was important to disclose the following information. The leader researcher identified as an African- American cisgender female. She attended college at Southern University as an undergraduate students, and has been an employee at Southern University in the Cooperative Extension Department for over 10 years. Additionally, she recently received her Ph.D. in

Agricultural and Extension Education from Louisiana State University. It is also important to note that she was present at both sessions of LEAD. Her interest in Black leaders contributed to her earning a second master's degree with a concentration in leadership development. She was hopeful that this study would inform program development practices within the Cooperative Extension Department and discover mutual measures of program effectiveness from the perceptions of extension professionals and program participants.

Findings

During the collection of data, participants described their perceptions of the program's effectiveness and how it influenced the way in which we approached the investigation. The research findings were derived from analyzing several data sources, such as interviews, conference documents, observations, ethnographic field notes, and pictures. In total, three themes emerged from my analysis: (1) sparking rural leadership, (2) challenges to new leadership approaches, and (3) rethinking rural renewal.

Theme 1: Sparking Rural Leadership

The first theme, sparking rural leadership, described how participants' motivation to become a quality rural leader improved as a result of LEAD. For example, the participants reported they sought to develop themselves further by enhancing their leadership style by learning from more experienced professionals. The leader researcher observed the priority that participants placed on networking with others at both sessions. As an illustration, during breaks, the participants would instinctively get up with a stack of business cards in hand and *work the room*. The lead researcher also noticed the younger participants would seemingly hold onto every word of the older, more experienced participants. On this point, L.J. explained: "When we first were invited, before we had our new Council Members in office... [participating in LEAD] was kind of an opportunity to get comfortable in [my] new position and see what the position was going to be about and learning about communicating as a team [from the program facilitators and other mayors]."

Meanwhile, Xavier explained how networking during the event motivated him to connect with individuals in his community more authentically. He explained: "what I was able to learn from [LEAD] was a level of wisdom through networking and communication and understanding how to read people [in my community] and not allow them to be able to pull me down while trying to be compassionate to what they need." Xavier continued: "I was able to gain wisdom and application of knowledge to situations from [other program participants], and they were able to learn from me [about] how to engage a younger generation through different technology and different ways of reaching out to them." As a result, participants who had less experience, such as Xavier, reported that LEAD opened their eyes to the value of networking and navigating leadership roles in rural, Black communities. On this point, L.J. also articulated: "when you go to [LEAD]...you mix with other people... if you sit with the people that you are always with, you basically know everything that goes on at your office, but if you sit with someone else, you're getting an inside look of what goes on in other offices as well." He also added that LEAD "reassured me that we are actually on the right path." It is important to note that all participants

self-reported that the knowledge and skills they acquired from their LEAD sessions were “useful and could be applied to my professional activities.”

Several participants, as well as the facilitator, also provided insight into how the structure of the conference influenced their perceptions of rural leadership. For example, John, the program facilitator said: “The second one [LEAD session] didn’t have as many people, but the audience was more engaged.” John also mentioned, “In the first conference, basically no questions were asked, the second conference, it got more in-depth with questions.” The quality of the presenters also greatly influenced the participants’ perceptions of how to foster leadership in their communities through communication. On this point, Xyla added:

...the main one I really liked was realistic. She had no cards, nothing written down. She spoke from experience. She spoke from what she is doing and what she’s going through, and it just made it so much easier because once she started speaking, everybody started getting in tune because she was giving real life scenarios, real realistic. And for the program, like everybody was professional, but conservative. She was professional, but she was way more relaxed. So, when your speaker is relaxed, guess what happens to your audience? They become relaxed as well. She was just a relatable, relaxed speaker, and everybody in the room immediately relaxed.

During data collection, the lead researcher jotted in her fieldnotes that the audience paid close attention to the presenters. Typically, at other programs, the lead researcher would notice a few individuals playing on their phones or just staring into space daydreaming; however, it appeared to the lead researcher that the speakers had the full attention of the entire audience throughout the conference. Consequently, it seemed that the LEAD participants had a genuine interest in the content and chose to remain engaged throughout the entire session. Participants also reported that improving their community’s social and economic foundation motivated them during LEAD. For example, some participants reported that learning how to improve these factors contributed to their decision to attend the professional development opportunity. Others, however, suggested that through LEAD, they began to recognize that community and economic development were areas of weakness that they should act upon more aggressively after returning home. Xavier expanded on this notion: “we wanted to go to the conference to understand and be able to bring some things that would happen in major cities to be able to give it to smaller, rural cities and town through different avenues, such as grant writing and resources available.” Moreover, Jayden explained he was “hoping that we get insight on how to rebuild our community as a whole, to build a foundation to where, if we are no longer in those positions anymore, the foundation we started from just attending different conferences, it’ll stay where it’s at or keep moving forward.” Xyla also expressed similar sentiments when describing the struggles of Louisiana’s most rural areas that lack access to many resources. She also mentioned that she often feels her town is “forgotten about” regarding new opportunities.

It is important to note that during observations, the lead researcher captured jottings regarding the peak attentiveness of participants, which occurred when the presenter’s placed emphasis on enhancing historic districts for rural communities. The engagement and questions posed from participants suggested they had a desire to lead restoration efforts and to make their historic downtowns more appealing. For instance, a conference participant stood in session #2 and asked,

“Yeah, yall will pay to get it up and going but who is going to keep it going, who is going to maintain it when the money is gone... I know y’all not gone pay for it forever,” the audience joined in applause and a traditional southern head nod of approval, which opened up an important conversation about the role of leadership in rural spaces and how it must continue to be developed, strengthened, and adaptive to their everchanging needs.

Theme 2: Challenges to New Leadership Approaches

Although the participants noted that LEAD sparked new ways of thinking about rural leadership for Black communities, they also explained how the professional development opportunity led to shifts in how they approached leadership in their careers. As an illustration, Xavier, who attended both LEAD sessions, reported that he increased from “five to eight hours” dedicated to strategic rural development planning weekly. He also emphasized helping aspiring entrepreneurs obtain “small business loans” and other critical resources. Finally, Xavier explained that after LEAD he began “following through” on his commitments more consistently and was also able to communicate about issues and problems more “positively,” which reduced conflicts and disagreements among key individuals.

Xyla and L.J. also agreed the conference “shifted their approaches to leadership,” but they could not quantify how much time they spent implementing new skills acquired through LEAD. Jayden, however, reported that he increased time dedicated to “networking” with individuals in his local community. He explained: “I spend a lot of my time doing something that [the LEAD facilitators] talked about, and that is networking... because living in a rural community, if you’re going to get some stuff done, you don’t necessarily always have the resources.” In addition to networking, Jayden also spoke in detail about how his efforts to improve the resources available to individuals in his rural community changed as a result of LEAD. He described his efforts:

I want to say [I partnered with individuals from the] watershed initiative [after LEAD]. We applied for some grants and we’re still in the process now of getting those grants. We made it through the first phase of the application. So, hopefully, we will make it to the next phase of the [grant award process]. I was also able to [secure resources our local high school] and let them know about the scholarships that are being offered to the ag department.

Despite these positive changes to the participants’ approaches, they did note some key challenges that complicated their role as a leader. Because leaders have been tasked with navigating complex barriers faced by their communities such made the challenges of rural leaders even more acute because they have historically had fewer resources. Consequently, the participants realized that “adaptability” was key to successfully navigating these complications and barriers. The five participants of this study expanded on the barriers they faced when adapting their leadership approach in greater detail. For example, Jayden explained that the largest barrier he encountered was identifying community members capable of assisting with new initiatives. Further, he noted that because his staff was already “overworked and underpaid, the challenge is when you live in a poverty-stricken community, you know, there is a lack of education.” Meanwhile, Xyla articulated how the challenges introduced by the COVID-19 global pandemic reshaped the challenges of her work. She explained the pandemic made her largely put her career

on hold due to meetings and communication about new ideas largely stopping because the city council was not allowed to meet outside of their regularly scheduled face-to-face meetings. She explained, “we try to meet one time per month, but it’s breaking laws. So, we have to be mindful of how we communicate and talk about things. We can talk amongst a few of us. Still, not everybody will be in attendance.” Finally, Xyla and L.J. detailed that in their rural communities they faced a resistance to change because individuals in their community were content “with the way things were always done.” She expanded: “when people are content. You try to bring about change, it makes them uncomfortable. So, it’s like a fight, just constantly fighting.”

Theme 3: Rethinking Rural Renewal

During our analysis of data, it became evident that participants’ understanding and strategies for inspiring rural renewal varied considerably. On this point, Xavier explained that his goal was to bring about change to ensure that the resources available to urban populations could also be accessed by Black citizens in his rural community. Additionally, he explained that because of LEAD, he now placed more emphasis on ensuring that individuals in his community had awareness and competence to secure key resources. He believed that creating this understanding also helped to “build bridges between community members and creates a mutual understanding of different [happenings] and initiatives that may be going on in their community...” Meanwhile, L.J. articulated that his purpose for attending LEAD was to learn how to tap into new resources. Because leaders should be forward-thinking, L.J. wanted to leave a lasting legacy by creating sustainable resources in his rural community that would survive long after he was gone.

When reflecting on how LEAD could inspire renewal for rural, Black communities, the participants used several recurrent terms such as “connections,” “networking,” “learning,” and “creativity.” Further, because of LEAD, all participants reported they felt more confident in “unlocking previously untapped resources.” On this point, Jayden stressed the need for and importance of LEAD for rural Louisiana:

What they did with the LEAD conference is something that needs to go on all around the state of Louisiana with these rural Black communities, because there are many that do not know that these things [resources] are available. And if you are not constant, if you’re not in the loop of it, you won’t know because some folk [people] are not going to share with you things that we are able to learn in that LEAD conference. So it’s very educational, very informative, and it’s very much needed throughout the state of Louisiana, especially in our small town, and other small towns and villages; we have been able to reach out to different agencies throughout the state to start a lot of communication...I would encourage anyone who can take advantage of the LEAD conference to do so, to bring it to your community because it’s well worth the investment in time and effort.

Although the perceptions of the LEAD program were highly favorable, we sought to understand how the participants interpreted the program’s effectiveness more broadly. During interviews, therefore, we asked the participants how they would describe the effectiveness of LEAD. All participants reported they experienced increased “knowledge,” “skills,” and “abilities” – key indicators of effectiveness. Despite this, John, the program’s facilitator, asserted that programs were only effective when participants “utilize the knowledge and resources gained.” John also

noted, there is “no cookie-cutter approach to Cooperative Extension programming” and “different things work in different communities. So, what may be unworkable in this community, maybe exactly what another community would need.” Using this frame to analyze LEAD, we noted that the participants overwhelmingly linked its effectiveness to their ability to inspire productivity and results for Black rural renewal. For instance, Jayden explained that he perceived that LEAD was effective because “after the program, you can see the fruit. You see that the community is better. The people quality of life has improved for Black people.” Several other concepts emerged as participants discussed their formative experiences and characteristics that influenced the effectiveness of LEAD. When asked to describe the personal growth that he experienced, Xavier stated, “basically, my strength is that leadership is my strong point. I am easy to get along with, and I can get people to talk.” In short, participants believed their formative experiences and personal characteristics influenced their worldview and how they perceived the program's success. Additionally, their leadership roles reduced barriers to participating in programs that aimed to improve their rural, Black communities.

Conclusions, Discussion, Implications, and Recommendations

The purpose of this case study was to describe the experiences and perspectives of Black rural leaders regarding their participation in LEAD. Through our analysis of data, we found the participants reported that LEAD was effective overall. This effectiveness was demonstrated in the first theme, *sparkling rural leadership*. For example, the participants discussed in detail during their interviews the benefits of networking at the conference, an immense appreciation of not being forgotten, being made aware of resources, and the relatability of the presenters. Although participants reported they experienced growth in their leadership style and in their career as a result of participating in LEAD, the extent of the growth varied substantially. For example, all participants spoke about the importance of networking and securing outside resources, i.e., revitalization programs and grants, to enhance their rural Black communities. The participants also reported that they devoted more time in their offices to work on grants and programming after their participation in LEAD.

We conclude that LEAD supported participants' improved accountability (Van Dierendonck & Nuijten, 2011), innovation (Kouzes & Posner, 2002), ability to define goals (Bass, 1981), and communication (Jacobs, 1983). Moreover, the rural Black leaders came to the program with a pre-existing worldview that was shaped by personal, environmental, and behavioral factors (Bandura, 1986). For example, Xavier explained during his interview that he came from a lineage of leaders – although his grandmother was not an elected official, she was a strong pillar in the community. Therefore, LEAD helped him understand how to carry on this tradition. All participants echoed a similar sentiment. We also conclude that participants were motivated to strengthen their leadership approach and practices as a result of their participation in LEAD. For example, in this study, the participants reported that they began to improve how they approached leadership regarding various projects and long-term planning in their rural communities after LEAD. Despite this, the participants rarely reported success quickly. Instead, they reported it was ongoing as they implemented changes gradually in a way that could be sustained over time. It should also be noted that participants' formative experiences appeared to be a critical contributing factor to improving participants' motivation to strengthen their leadership approach and practices moving forward.

Therefore, we recommend CES programs regularly and consistently offer professional development programs to promote rural leadership in Louisiana. Current programs tend to focus on leadership development solely. However, data from this investigation suggested that LEAD supported participants' leadership growth while also providing opportunities for additional development. Consequently, we recommend that extension professionals complete short- and long-term evaluations while also considering participants existing personal and environmental characteristics and factors (Bandura, 1986). Most extension professionals conduct short-term evaluations to measure impacts because it is easier (Lamm et al., 2013). However, collecting data from both short and long-term evaluations could better demonstrate whether reciprocal determinism exists while providing insight into the types of reinforcements that could be most useful, concepts that align with Bandura's (1986) social cognitive theory. We also recommend that program designers identify the facets of LEAD that contributed most to participants' success. The continuous process of evaluating and making critical adjustments for the program could promote improvement and ensure the program facilitators adequately meet the needs of the participants. Extension professionals should also use Bandura's (1986) social cognitive theory as a lens to understand the role of self-efficacy as Black rural leaders engage in leadership development programming. For instance, using this lens could help describe how their self-confidence evolves after participation. Perhaps by better understanding self-efficacy's role, we could better position program administrators to cultivate rural Black leadership.

Because networking through LEAD was vital, we conclude that participants' understanding of how to navigate leadership challenges in rural communities expanded as a result of their participation. The rural Black leaders examined in this investigation appeared to have little access to information regarding available resources, grants, and funding. As a result, networking, modeling, and observational learning through LEAD allowed the participants to acquire new information and adapt their behaviors to meet the needs of their rural communities – concepts supported by Bandura's (1986) social cognitive theory. Moving forward, we recommend creating, maintaining, and regularly updating a database of resources available to rural communities. This database could allow rural leaders access to a composite list of funding, grants, resources, and programs available to their communities. Additionally, if regularly checked, it would grant rural leaders access to applications and other pertinent information they would have routinely missed. An additional recommendation is to create networking opportunities for rural leaders. These networking opportunities could serve as observational learning and further support leaders' development. We also recommend extension professionals create a networking program that will allow seasoned and experienced Black rural leaders to mentor young professionals. This change could help create a Black rural leadership pipeline to support emerging leaders.

Sandmann and Vandenberg (1995) called for more experiential learning opportunities to enhance rural leadership development. Therefore, we recommend that extension professionals create hands-on learning and group reflection opportunities for rural Black leaders. Perhaps such opportunities could enhance the practical and theoretical knowledge of rural Louisiana communities that have been predominantly Black. Finally, we conclude that participating in LEAD helped improve participants' ability to foster rural renewal in Black communities. LEAD was developed to help identify issues, barriers, and challenges in rural Black communities while empowering leaders to create practical solutions. Data from this investigation suggested that

participation in LEAD equipped Black rural leaders with knowledge, tools, and resources to overcome some of the challenges they have encountered in their careers. These challenges ranged from understanding how to address utility bill payment processing issues to helping them foster greater community cohesiveness. Therefore, we recommend that LEAD programming be expanded more broadly throughout Louisiana. Because extension programming must be relative to the needs of the communities they serve, we recommend including greater reinforcements for positive and lasting changes and behaviors in LEAD. For example, participants could be assigned strategic leadership exercises to recruit additional leaders in their local communities. This support could help improve the diversity of rural leaders. As Lamm et al. (2016) suggested, there has been a weakness regarding the racial diversity in leadership programming for CES. Therefore, we recommend that extension professionals identify the expectations and reinforcements that could better support Black rural leaders' participation in leadership development programs in the future. Finally, we recommend a robust longitudinal evaluation of LEAD. Perhaps data from this longitudinal evaluation could provide a basis to create a framework for other Black rural development initiatives and add meaningful insight into Black rural development. This data could develop the field further because of the lack of knowledge and empirical evidence on Black rural leadership.

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Evaluating Student Outcomes from a College of Agriculture and Life Sciences Leadership Development Program

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The Dr. Joe Townsend Leadership Fellows Program focuses on developing students in five specific areas, developing self, developing others, organizational management skills, vision, and values. Evaluations should assess the extent leadership programs are meeting outcomes and preparing students for post-graduate success. The purpose of this study was to determine the effectiveness of the program through the use of Kirkpatrick's evaluation model, Bloom's taxonomy, and Ajzen's theory of planned behavior. A summative evaluation was used to assess whether or not the program had been meeting its stated objectives. Students who once participated in the program since its inception was sent a survey through Qualtrics to determine the success rate of graduates through Kirkpatrick's reaction, learning, behavior, and results domains. The data collected was then analyzed to determine if the objectives of the study were met. The participants scored statistically significant scores on all four portions of Kirkpatrick's model. The overall effectiveness of the agricultural leadership program, per the data collected, was deemed successful, and the results from the participants were both positive and promising for the program. Recommendations for future practitioners and researchers, as well as other agricultural leadership programs, were delineated based on the study's data and conclusions.

Introduction/Theoretical Framework

Leadership programs offered at colleges and universities assist in the growth of future leaders and their leadership development. In the case of leader development, the emphasis typically is on individual-based knowledge, skills, and abilities associated with formal leadership roles (Day 2001). Another way to perceive leadership development is as a strategy helping people understand how to relate to others, coordinate their efforts, build commitments, and develop extended social networks by applying self-understanding to social and organizational imperatives (Strong, 2016). Leadership development, as defined by the Center for Creative Leadership, is the expansion of a person's capacity to be effective in leadership roles and processes. Leadership roles and processes are those that enable groups of people to work together in productive and meaningful ways (Van Velsor et al., 1998). Involvement in leadership programs, both before and during students' college years, is very pertinent for their growth and development as leaders. In fact, numerous post-secondary institutions are developing and formalizing the study of leadership at both undergraduate and graduate levels through majors, minors, certificates, or selected course offerings (White, 2006). Although institutions are incorporating more formal leadership learning courses, knowledge is a necessary first step, but by itself, it is not sufficient for changing leadership behavior (Kotter, 1996; Strong et al., 2013a). The new knowledge must be put into action. Skills encompass the action domain of learning (McDonald-Mann, 1998). Therefore, it is crucial for students to get involved in leadership programs (Miller, 2018; Strong & Williams, 2014). USDA's (2018) strategic plan called for increased numbers of agricultural leadership programs to develop future leaders and to maintain a competitive and stable global food supply.

Over the last 30 years, there has been a rapid increase in leadership programs at universities and colleges across North America (Dugan & Komives, 2007). However, as leadership programs continue to increase in number, a lack of consensus persists regarding how these programs should be designed to teach (Eich, 2008). Due to the increase in leadership programs, there is an even higher need for program evaluations and assessments. Not all programs are deemed effective and appropriate based on their program objectives (Lindner et al., 2016). As identified by Gall et al. (1996) educational evaluations are procedures to develop judgments about the value or merit of educational programs. To help ensure leadership programs are teaching students significant information that will help in their future leadership endeavors, program evaluations are needed to solidify the programs. Brungardt and Crawford (1996) posited assessment of leadership programs help focus program development and implementation in the needs of students. In addition to the effectiveness of leadership programs, financial support of these programs is also an important aspect to consider when looking at the value of the program. Leadership educators in an era of fiscal tightness understand the importance of program justification and survival (Brungardt & Crawford, 1996). Without the proper fiscal support, a program will not survive despite how effective the program is to the students involved. Moreover, despite the growing evidence that structured leadership programs benefit students, little is currently known about the best methods for making such interventions (Strong et al., 2013b; Strong et al., 2021). Effective leadership education must address foundational questions, such as theoretical framework, curricular content, instructional methods, and assessment (Strong et al., 2021). This is a major reason why evaluations are so important. The best way to help figure out the best methods for program development is through current program evaluations, as well as, basing future programs on the recommendations found through those assessments (Strong et al., 2021).

All levels of Kirkpatrick's (1990) evaluation model are extremely important in determining the overall effectiveness of trainings or programs. Reio et al. (2017) suggested Kirkpatrick's model is outcome and objective-oriented and focuses on determining the results of a program. Although Kirkpatrick's model does not include formative evaluation levels, its main purpose is to assess the overall effectiveness of programs. Kirkpatrick's model was not designed to evaluate the planning and creating of the leadership program, but merely to assess the final result. When using Kirkpatrick's (1990) model, it is important to assess all four levels to ensure the most accurate evaluation outcomes. In conclusion, "limiting an evaluation to one particular level almost certainly will not provide an adequate picture of the overall outcomes of any training program (Reio et al., 2017).

Kirkpatrick's (1998) model has made valuable contributions to training evaluation thinking and practice. Not only has Kirkpatrick's model been a great evaluation tool, but it also has been a building block for other evaluation models. The model has also served as a useful—if preliminary—heuristic for training evaluators (Alliger & Janak, 1989; Lee et al., 2021) and has been the seed from which a number of other evaluation models have germinated (Holton, 1996; Strong et al., 2022). The learning level of Kirkpatrick's and Kirkpatrick's (2006) model will be assisted using Bloom's taxonomy to help determine the level of learning the students achieved. In addition to Bloom's taxonomy, Ajzen's (1991) theory of planned behavior will be used to strengthen the research done on the behavior level of Kirkpatrick's model.

Created by Ajzen (1991), the theory of planned behavior actually identified a small set of causal factors that should permit explanation and prediction of most human social behaviors. Briefly, according to the theory, a central determinant of behavior is the individual's intention to perform the behavior in question (Fishbein & Ajzen, 2010). Per the theory, there are three different types of considerations that help people articulate their intentions. The connection among attitudes and behavior can be explained by an alignment to specific behavioral intentions (Bumguardner, 2014; Strong et al., 2013c). That is, attitudes about performing a behavior would predict behavioral intentions to enact the behavior, which would in turn predict behavior. Behavioral intentions are determined by attitudes towards the behavior, subjective norms surrounding the behavior, and perceived behavioral control (Ajzen, 1991). As such, according to the Theory of Planned Behavior, behavioral intentions are framed as the motivational component of the model, or one's conscious plan or decision to exert effort to perform the target behavior (Fishbein & Ajzen, 2010). The first consideration includes readily accessible or salient beliefs about the likely consequences of a contemplated course of action or performing the target behavior, beliefs which, in their aggregate, result in a favorable or unfavorable attitude toward the behavior (Fishbein & Ajzen, 2010). A second type of consideration has to do with the perceived normative expectations of relevant referent groups or individuals. Such salient normative beliefs lead to the formation of a subjective norm—the perceived social pressure to perform or not to perform the behavior (Fishbein & Ajzen, 2010). Subjective norms are “beliefs about whether others think one should engage in the behavior (Ajzen, 1991). Individuals are “assumed to take into account factors that may further or hinder their ability to perform the behavior, and these salient control beliefs lead to the formation of perceived behavioral control, which refers to the perceived capability of performing the behavior” (Fishbein & Ajzen, 2010, p. 32).

Purpose and Objectives

The purpose of this study was to assess the overall effectiveness of the Dr. Joe Townsend Leadership Fellows Program. Being a donor-sponsored program, another factor that influenced the purpose of this study was justifying its continuation to its current and future donors and university officials. The specific objectives were:

1. Describe the extent participants discerned the program achieved its objectives respective to Kirkpatrick's model.
2. Assess the level of Bloom's Taxonomy enforced through the program.
3. Define the top developed attributes, in relation to results, students strengthened while participating in the program.
4. Investigate the effects of reaction, learning, behavior, and results on program objectives.

Methodology

For this study, all 171 ($N = 171$) participants of the Dr. Joe Townsend Leadership Fellows Program planned on being surveyed and included in the evaluation. However, of the 171 participants in the program, only 108 were successfully contacted, while the other six were not reachable with the contact information we had access to. Seeing as this college program was and

still is very selective of their members, the number of students who have participated in the program are very few. With that being said, the study was most effective as a census study to get a more accurate data collection.

Conducting a census often results in enough respondents to have a high degree of statistical confidence in the survey results (Franekel et al., 2019). When it comes to program evaluations, it is imperative to give everyone the opportunity to provide feedback (Patton, 2021). The more people you have to participate in an evaluation questionnaire, the more statistically relevant your evaluation becomes. A disadvantage to census surveys is the lack of response rate. Seeing as you are trying to get everyone to respond to your survey request, not everyone is going to be able to respond and complete the survey. The most common use of a census study is through the U.S. Census Bureau.

The instrument used to conduct this study was a 24-question survey. The instrument was assessed for content validity by a team of researchers at Texas A&M University and deemed valid for the study's objectives. The evaluation contained mainly Likert-type questions, however, there was a few open-ended questions for the participants to elaborate their responses if needed (see Table 1). The questionnaire included participant personal characteristics, and the four levels of Kirkpatrick's (2006) evaluation model; reaction, learning, behavior, and results.

Table 1.
Questionnaire Questions and Section Created through Qualtrics

Survey Question Sections	Questions
Personal Demographics	The year the student participated. The year the student graduated. Age Race
Reaction	Overall thoughts of the program. Would they participate again? Their favorite part. Their least favorite part. What was the most impactful part of the program?
Learning	Current endeavors (student, graduate student professional, entrepreneur, other) Did the things they learned help their current endeavors? Are they holding any leadership positions? List and describe those leadership positions. Did the program help them prepare for their current endeavors? Did they gain any contacts through the program?
Behavior	Do they utilize the network in their current endeavors? Do they use any skills learned while participating in the program? Did their views of themselves as leaders change due to the program? How did being involved influence their current leadership positions? How well did the program help them to strengthen the Developing Self attributes?

Results	How well did the program help them to strengthen the Developing Others attributes?
	How well did the program help them to strengthen the Values attributes?
	How well did the program help them to strengthen the Organizational Management attributes?
	How well did the program help them to strengthen the Vision attributes?

Using the Likert-type questions and the open response boxes, the data collected was used to determine the overall success of the program. The survey was designed to help decide whether the program achieved all four stages of the Kirkpatrick’s evaluation model. Although their time at Texas A&M University and how Fellows affected that time is important, the objectives of the program are directly correlated to future successes. Therefore, the elements of the program, if any, which helped students in their future endeavors will be determined.

Surveys are a remarkably useful and efficient tool for learning about people’s opinions and behaviors (Dillman et al., 2014). Careful selection of survey questions through a tailored design and completing a census study helped with the data collection. Tailored Design is the development of survey procedures that work together to form the survey request and motivate various types of people to respond to the survey by establishing trust and increasing the perceived benefits of completing the survey while decreasing the expected costs of participation (Dillman et al., 2014). The survey was sent out through Qualtrics and the data was collected through Qualtrics as well. “For most surveys, for example, it is typical to receive only one maybe two contacts in a 10-day period; anymore begin to become irritating (Dillman et al., 2014). Although the “optimal timing sequence for web surveys has not, we believe, been determined yet, there are basic rules and timing sequences that should be followed (Dillman et al., 2014). When it comes to the pre-notice, the survey invitation, the thank you/reminder contact, and the final thank you email, each needs to be sent with enough time in between so that the communication is not annoying, but also so that the prior contact has not yet been forgotten (Dillman et al., 2014).

Out of the 171 students that participated in the Students program since 2009, 159 were capable of being contacted. Of the 159 contacted, 129 completed the survey and were able to be evaluated. After the initial contact was sent to the students, 71 participants completed the survey. After six days the initial contact was sent, the first reminder was sent to those participants who had yet to complete the survey. After the first reminder, 43 more participants completed the survey. Lastly, three days after the first reminder was sent, the second and final reminder was sent to those who had yet to complete the survey. After the final reminder, 15 participants completed the survey leaving our final number of respondents at 129 out of the initial 171. The response rate for the survey ended up being 81.48% (see Table 2).

Table 2.
Respondents after each Contact

Number of Respondents	<i>f</i>	%
After initial contact	71	44.65
After first reminder	43	27.04
After final reminder	15	11.63

Microsoft Excel and SPSS were used to analyze the data once it is all collected. By using Microsoft Excel, as well as SPSS, the respondent's answer choices were analyzed based on the five sections of the survey, personal characteristics, reaction, learning, behavior, and results. By analyzing the questions in the four sections of Kirkpatrick's model, the overall objectives of the Students program could be determined effective or not. Cronbach's alpha was utilized *ex post facto* to assess the reliability coefficients of each construct; reaction earned a .91, learning's reliability coefficient was .79, behavior scored a .84, and results earned a .83 reliability coefficient. Descriptive statistics are used to describe the basic features of the data in a study and provide simple summaries about the sample and the measures (Franekel et al., 2019). An advantage of descriptive statistics includes condensing a large amount of data into a smaller, simpler form of data. A disadvantage of descriptive statistics includes the fact that they don't go very in-depth (Franekel et al., 2019). Inferential statistics go beyond the surface of the data to find a deeper meaning of the statistics themselves (Franekel et al., 2019). The results found using Kirkpatrick's model were dependent on the other variables in the study.

When conducting the study, one of the main concerns was nonresponse error. Nonresponse error occurs when the people selected for the survey who do not respond are different from those who do respond in a way that is important to the study (Dillman et al., 2014). The best way to eliminate the possibility of a nonresponse error is to tailor the design to best meet the audience's needs. Making the survey as quickly as possible, creating an eye-appealing design, and giving good incentives as to why the respondents should participate are all ways to reduce the chance of nonresponse error (Dillman et al., 2014).

According to Lindner et al. (2001), there are three approaches to test for non-response error. The method used to test for non-response error in this study was method two. Method two consists of comparing early respondents to late respondents. Method two "is an extrapolation method in which non-respondents are a linear extension of the latest respondents, and a trend may be detected across respondents based on relative earliness or lateness to respond (Lindner et al., 2001). Early, after first contact, respondents were compared to late, second and third contact, respondents and no significance in the data existed. Therefore, nonresponse error did not exist in the data and results can be generalized to the population of Texas A&M University [Name] agricultural leadership program participants (Lindner et al, 2001).

Findings/Results

The Qualtrics survey was split into five categories that helped guide the objectives of the study using Kirkpatrick and Kirkpatrick's (2006) evaluation model. The five categories included, demographics, and the four portions of Kirkpatrick's model, reaction, learning, behavior, and results. Some of the questions pertaining to the reaction portion of Kirkpatrick's model were evaluated on a five-anchor scale, while the others were evaluated on a six-anchor scale. The learning portion was evaluated using a six-anchor scale and earned ($M = 5.24, SD = .03$). Behavior was evaluated using a four-anchor scale and a six-anchor scale. Lastly, the results were

evaluated using a four-anchor scale and earned ($M = 3.32$, $SD = .06$). The remaining data collected from each section of Kirkpatrick's model can be found in Table 3.

Table 3.

Four Levels of Kirkpatrick's Evaluation Model (N = 129)

Kirkpatrick's Four-Levels	<i>M</i>	<i>SD</i>
Learning	5.24	.03
Behavior	4.17	.23
Reaction	3.78	.29
Results	3.32	.06

Note. 1= *Strongly Disagree*, 2= *Disagree*, 3= *Somewhat Disagree*, 4= *Somewhat Agree*, 5= *Agree*, 6= *Strongly Agree*

The reaction section of Kirkpatrick's evaluation model, based on a five-anchor scale, possessed questions about specific aspects of the program. The participants overall thoughts on the program were very positive ($M = 4.18$), on a scale of one to five with one being far short of expectations and five being far exceeds expectations. Of the 88 respondents, 85 selected meets expectations or higher, while only three respondents selected short of expectations. No participants selected far short of expectations. When it comes to specific aspects of the students program, the impact of guest lecturers was the highest-ranking aspect ($M = 3.75$). The lowest-ranking aspect was the impact of other aspects ($M = 2.89$). However, it is to be noted that of the rest of the aspects all participants ranked the aspect on a scale of one to five with one being least impactful and five being most impactful, while only 18 participants ranked the "other" option on the same scale (see Table 4).

Table 4.

Data from the Reactions Level of Kirkpatrick's Model (N = 129)

Reactions	<i>M</i>	<i>SD</i>
Overall thoughts on Students program	4.18	.88
Impact of guest lectures	3.75	1.44
Impact of the field trip	3.51	1.22
Impact of fellow program members	3.36	1.27
Impact of the retreat	3.07	1.27
Impact of other aspects	2.89	1.45

Note: *Overall Mean* = 3.46, *Overall SD* = .21

The last question analyzed through the Qualtrics survey was past participants' willingness/desire to participate in students program again if given the opportunity. This question was asked using a six-anchor scale with one being strongly disagree and six being strongly agree. Students, on average, concurred that they would participate in the Fellow program again ($M = 5.67$). The data also had a standard deviation of 0.69 ($SD = 0.69$). In collecting this data, all participants selected agree or higher, with only three participants selecting somewhat agree and one participant selecting disagree.

The other two questions in the reaction section were frequency questions asking what the students' favorite and least favorite parts of the Fellow's program were. Of the different parts of

the program, most participants claimed guest lecturers to be their favorite part ($f = 37$). The retreat was the option the least amount of participants selected as their favorite part ($f = 7$). When it comes to the participants' least favorite part of the Fellow's program, the least amount of Students selected the field trip ($f = 6$). The majority of the participants selected "other" as their least favorite part ($f = 59$). The respondents who selected "other" were then given the option to explain what "other" part of the program was their least favorite. Of the 59 respondents, 34 of them used the "other" option to explain that they did not describe a least favorite part. Of the remaining 25 respondents, common themes in their responses included wanting more reconnection opportunities with other alumni, wanting more time in the program and throughout the week, and the tendency for some student members to be too social during class time by getting off-topic (see Table 5).

Table 5.

Data from the Frequency Questions in the Reaction level of Kirkpatrick's Model

Kirkpatrick's Model: Reaction	<i>f</i>	%
What was your favorite part of Fellows?		
Guest Lecturers	37	42.0
The Field Trip	21	23.9
Fellow Program Members	15	17.0
Other	8	9.1
The Retreat	7	8.0
What was your least favorite part of Fellows?		
Other	59	67.0
The Retreat	12	13.6
Fellow Program Members	7	8.0
Guest Lecturers	4	4.6
The Field Trip	6	6.8

After collecting data from the reactions portion of Kirkpatrick's evaluation model, *t*-tests were used to assess whether there was a significant difference between men and women when it came to their reactions of the program. Surprisingly, the results found were not as expected. The men who participated in the program showed to have a higher mean ($M = 3.59$, $SD = .49$) than the women who participated ($M = 3.34$, $SD = .46$). Tukey's analysis revealed the effect size was small $d = .29$ (see Table 6).

Table 6.

t-test Results Comparing Reactions Scores of Male and Female (N = 129)

Reaction Scores	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Male	50	3.59	.49	2.77	.01
Female	79	3.34	.46		

Note. $p < .05$

Per the participant's responses (see Table 7), students believed that being a part of the program not only helped their current endeavors ($M = 5.25$, $SD = .87$), but it also helped prepare them for their current endeavors as well ($M = 5.23$, $SD = .83$).

Table 7.*Data from the Learning level of Kirkpatrick's Model (N = 129)*

Learning	<i>M</i>	<i>SD</i>
The things you learned helped your current endeavors	5.25	.87
Did the program help you prepare for your current endeavors	5.23	.83

Note: 1= Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4= Somewhat Agree, 5= Agree, 6= Strongly Agree

Note: Overall Mean = 5.24, Overall SD = .85

Regarding behavior per Kirkpatrick and Kirkpatrick's (2006) model, some questions were asked with a six-anchor scale, while the others were asked using a four-anchor scale. The three questions asked using a six-anchor scale can be found in Table 8 ($M = 4.95$, $SD = .14$). When asked whether being involved affected their current leadership positions, the students who participated in the survey felt that the program was very useful ($M = 5.19$, $SD = .88$). Students' views of themselves as leaders, on average, changed due to their participation in the program ($M = 4.94$, $SD = .02$). Students also agreed that they gained contacts through their involvement in the program ($M = 4.70$, $SD = .17$). Since some of the behavior level data were collected using a six-anchor scale, while the others were collected using a four-anchor scale, the six-anchor scale questions can be found in Table 8, while the four-anchor scale questions can be found in Table 9.

Table 8.*Data from the Behavior level of Kirkpatrick's Model (N = 129)*

Kirkpatrick's Model: Behavior	<i>M</i>	<i>SD</i>
How did being involved in Fellows affect your current leadership positions	5.19	.88
Did your views of yourself as a leader change due to the Fellows program	4.94	.02
Did you gain any contacts through the Fellows program	4.70	.17

Note: 1= Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4= Somewhat Agree, 5= Agree, 6= Strongly Agree

Note: Overall Mean= 4.95, Overall SD= .14

Questions asked using a four-anchor scale had an average score of 3.01 ($M = 3.01$, $SD = .26$). Located in Table 10, most of the participants felt they currently use the skills they learned while participating in the program ($M = 3.60$, $SD = .56$), some participants felt they were utilizing the alumni network while others were not ($M = 2.42$, $SD = .93$). Of the 129 respondents, 53 claimed they probably or definitely utilize the alumni network, while 76 claimed they probably or definitely do not utilize the network.

Table 9.*Data from the Behavior Level of Kirkpatrick's Model (N = 129)*

Behavior	<i>M</i>	<i>SD</i>
Do you use any of the skills you learned while participating in Fellows?	3.60	.56
Do you utilize the Fellows network in your current endeavors	2.42	.93

Note: 1= Strongly Disagree, 2= Disagree, 3= Agree, 4 = Strongly Agree

Note: Overall Mean = 3.01, Overall SD = .26

After collecting the data from the Behavior section of Kirkpatrick’s Evaluation model, *t*-tests were run to determine if there was a difference between men and women and their behavior results after participating in the Students program. Table 11 shows that the men on average scored significantly higher in the Behavior portion of Kirkpatrick’s model ($M = 4.99, SD = .33$) in comparison to the women who participated ($M = 4.81, SD = .59$). The difference was significant ($p < .05$) and Tukey’s analysis indicated the effect size was medium ($d = .59$).

Table 10.

t-test Results Comparing Behavior Scores of Male and Female

Behavior Scores	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Male	32	4.99	.33	2.01	.03
Female	54	4.81	.59		

Note. $p < .05$

Overall, of the five pillars of the program, the responses show that the Students found the greatest growth in their values ($M = 3.37, SD = .05$), while they found the least amount of growth in the development of their organizational management skills ($M = 3.27, SD = .04$). When it comes to the developing self objective, leaders are successful by learning how to be dependable, dedicated, persistent, and the rest of the attributes under the developing self pillar. The developing others objective measures success by claiming that successful leaders foster an environment where leaders and followers are able to communicate, build consensus, and other developing attributes. Organizational management means that successful leaders are able to listen, manage time, as well as the rest of the competencies. Vision involves successful leaders who are able to set goals, be creative, and other numerous attributes. Lastly, values entail successful leaders who model maturity, commitment, and fifteen other attributes also.

The five pillars were evaluated on a four-anchor scale, with one being strongly disagree and four being strongly agree. However, the means in the five pillars showed satisfying improvement and awareness. All five of the pillars have relatively similar means and standard deviations, with the entire results section being a mean score of 3.32 and standard deviation of .06 (see Table 12).

Table 11.

Overall Data from the Results level of Kirkpatrick's Model for the Five Pillars of Fellows

Results	<i>M</i>	<i>SD</i>
Values	3.37	.05
Vision	3.32	.04
Developing Others	3.31	.06
Developing Self	3.29	.06
Organizational Management Skills	3.27	.07

Note. 1= Strongly Disagree, 2= Disagree, 3 = Agree, 4 = Strongly Agree

Note: Overall Mean = 3.32, Overall SD = .06

Conclusions/Implications/Recommendations

The participants found the most growth in learning and results portions of Kirkpatrick's evaluation model. The other three portions of the model and survey, reaction, behavior, and results, on the other hand, were all deemed statistically significant and reliable. Although these are notable statements, growth comes from improving the areas in which the program is lacking. All of the sections of Kirkpatrick's (1990) model had very similar means, however, reaction and behavior proved to have the lowest means. These are the sections of the model that should be addressed for improvement. Surprisingly, the men who completed the survey had higher scores in both reaction and behavior than the women who completed the survey. Although this goes against most research regarding men and women in leadership programs and situations, the data found is assumed that the men had further to increase in their skills and abilities than the women.

Kirkpatrick's evaluation model has provided a straightforward system or language for talking about training outcomes and the kinds of information that can be provided to assess the extent to which training programs have achieved certain objectives (Bates, 2004). When selecting this evaluation model, it was an obvious decision to assess all four levels of Kirkpatrick's model. Although it can be common to do so, "Kirkpatrick contends that it is a serious mistake to bypass Level 1 and 2 and only conduct Level 3 and 4 evaluations (Reio et al., 2017). The problem with dismissing the importance of evaluating levels 1 and 2 is that by doing so, one "could easily lead to the wrong conclusions about the effectiveness of the intervention and the training program's overall result (Kirkpatrick & Kirkpatrick, 2006). Seeing as the purpose of this study was to determine the overall effectiveness of the Fellow's program, all four levels had to be addressed. Additionally, "limiting an evaluation to one particular level almost certainly will not provide an adequate picture of the overall outcomes of any training program (Reio et al., 2017). Based on the data collected, it is seen that "favorable reactions to training do not, by themselves, guarantee that learning (Level 2), or improved performance (Level 3) has occurred, Kirkpatrick stresses that many organizations are overlooking the importance of Level 1 evaluation (Kirkpatrick & Kirkpatrick, 2006). Kirkpatrick also "emphasizes that there can be no guarantee that a favorable reaction to the training program assures learning, positive behavioral change, and favorable organizational results (Kirkpatrick & Kirkpatrick, 2006). Although all the levels of Kirkpatrick's model were assessed, it is crucial to see the importance of Levels 1 and 2 evaluations. When comparing the collected means of men and women, it was found that the men scored higher in the reaction and behavior sections of the survey. It was also found that 58% of the participants were women and 42% were men. This type of data found is very contradictory to what most leadership studies say about men and women participants. In fact, Dillman (2014) stated as is commonly the case, women responded to the survey at higher rates than men. Although women did respond at a higher rate in this study, the percentages of men and women were much closer than anticipated.

When analyzing the data from this research study, one recommendation that can be made for future researchers is to investigate the effects of Kirkpatrick's evaluation model on the program objective using a different type of research method. Seeing as this study was a quantitative research study, to get a better idea of the personal reactions and behaviors of the Students participants, a qualitative study would be very beneficial. Qualitative research could provide insight into various problems, such as identifying some of the underlying factors that account for the weak, but statistically significant relationships sometimes found in the literature. Qualitative research may also help to identify variables that have not yet been considered or quantitatively

tested (Reio et al., 2017). When evaluating the collected data per the study's objectives, another recommendation to be made is to perform a cost-benefit analysis to help better justify the program being donor sponsored. By merely conducting data analysis to determine the effectiveness of the program, some donors may be willing to continue funding, however, others may not.

Focusing more on improving the reaction and behavior portions of Kirkpatrick's evaluation model would help the Texas A&M University's Dr. Joe Townsend Leadership Fellows Program be more efficient in meeting its objectives. However, it is important to state that all the portions of Kirkpatrick's model were relatively close in mean. However, limiting an evaluation to one particular level almost certainly will not provide an adequate picture of the overall outcomes of any training program (Reio et al., 2017). Seeing as 72.7% ($n = 64$) of the students who participated in this study claim to be currently holding leadership positions, as discussed in the demographics section, it can be inferred that participation in the program has been beneficial both during their time in the program and also in preparation for their futures. The imperative the data indicates is to focus on the least developed leadership pillars when examining for ways to increase the effectiveness of the program (Strong et al., 2021).

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It's Complicated: Exploring the Internal Land-Grant Brand at Oklahoma State University

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Land-grant institutions (LGIs) are tasked with providing accessible education to the common people and improving their quality of life. This study examined faculty members' interpretations and opinions of the future of the land-grant mission at Oklahoma State University (OSU). Faculty members are the primary deliverers of university missions, and past studies have indicated some personnel are unaware of pieces of the land-grant mission. Purposive sampling was used to recruit participants for 11 focus groups conducted in the summer of 2020. Transcripts of the sessions were analyzed using Glaser's constant comparative method to identify themes, which were confirmed by assistant moderators. Results were triangulated with archival data. Faculty members actively integrated all three parts of the land-grant mission to provide quality outputs. Faculty members also reported their behaviors were affected by how they were evaluated, which they did not always believe aligned with the land-grant mission. Faculty often engaged in behaviors outside their official appointments, with varying levels of enthusiasm. Recommendations included hosting an annual summit where faculty members could discuss their efforts related to the land-grant mission, network, and learn more about the land-grant mission in action. Future research should explore the internal brand of other LGIs, and perceptions of university staff, administration, and student perceptions should be explored.

Introduction & Theoretical Framework

President Lincoln signed the Morrill Act of 1862 and initiated the most unique movement of public higher education, known as the democratization of education (Nevins, 1962). These institutions were to educate professionals to thrive in an industrialized nation, provide higher education to students, regardless of wealth or prestige, and enhance the well-being of the common man, farmers, and industrial workers (Gavazzi & Gee, 2018; Goldstein et al., 2019). This process is known as the democratization of education (Bonnen, 1998). Eventually the land-grant colleges and research universities merged to create land-grant universities, "creating constructive tension between knowledge creation and its use in society and between the intellectually elitist values of scholarly life and the egalitarian values of a democratic society" (Bonnen, 1998, para. 32). The land-grant ideal applies the highest level of scholarship to everyday societal problems (Gavazzi & Gee, 2018). In the last century, the role of higher education has experienced a shift known as the corporatization or commercialization of universities (Jarvis, 2001). In this transition, students are seen more as customers and researchers have collaborated more with industry partners to conduct research at a higher rate (Barnett, 2019). Since this shift, there have been reports of connections between industry and university resulting in biased research (O'Connor, October 31, 2016).

Every year more than 1 million students graduate from LGIs, and a vast majority of graduate education is delivered at LGIs (Sternberg, 2014). However, these important institutions are not well understood or recognized by the public they were designed to serve (Gavazzi & Gee, 2018). More alarming, however, is administrators' perceptions that faculty members do not understand

the land-grant mission (Gavazzi & Gee, 2018) and faculty member's lack of interest in engaging with communities (Holesovsky et al., 2020). A comprehensive understanding of LGIs' branding may increase the awareness of LGIs among both external and internal stakeholders.

Branding is a theory and a practice centered around distinguishing a corporation, organization, or product from others. A brand is an interrelated system of organizational decisions and consumer reactions that create the identity of a product, good, service or idea and build awareness of it (Franzen & Moriarty, 2009). A brand cannot be understood when isolated from the world in which it exists. Therefore, the study of brands and branding is multifaceted (Franzen & Moriarty, 2009). Strong brands come from the essence of the organization itself and should be "congruent with its mission, defined by its values" and "match the institution's personality" (Black, 2008, p. 2). The essence of an organization begins with employees. Therefore, internal branding is essential to a successful brand (Piehler et al., 2015; Punjaisri & Wilson, 2007). Internal branding is "how a business builds and packages its identity, forms its origins and values, what it promises to deliver to emotionally connect employees so that they in turn deliver what the business promises to customers" (Sartain & Schumann, 2006, p. vi). An employer needs to understand its employees' perceptions of the brand to be able to improve their investment in the brand (Bolman & Deal, 2008; Ind, 2008). A strong internal brand is especially important for service-based organizations which depend on customer and employee interaction (Schmidt & Baumgarth, 2018). Internal brands are formed and strengthened through interactions employees have with one another, a process known as co-creation (Dean et al., 2016).

Although the internal brands of universities need to be understood, faculty members' viewpoints are rarely studied (Chapelo, 2010; Leijerholt et al., 2019; Moorer, 2007; Whisman, 2009; Yang & Mutum, 2015). Faculty members have the most influence and control over the execution and brand of the land-grant mission (Flanagan et al., 2013), and have a responsibility to communicate the institution's brand effectively (Endo et al., 2019). For it to be carried out effectively, faculty members must understand and embrace the land-grant mission (Gavazzi & Gee, 2018). Only then can the land-grant mission be effectively fulfilled and communicated to the public. Trust is an important component in public's approval and support of an organization (Kang & Hustvedt, 2013). Trust is even more important when competing brands have similar offerings or rely upon emotional connections to ensure brand loyalty (de Chernatony, 2001b). Unfortunately, the public has become distrustful of organizations associated with the government and are intended to provide unbiased, scientific based knowledge (Birkland, 2011).

Living out the land-grant mission is an example of strong internal branding (Ind, 2008; Thomson et al., 1999). The end goal of internal branding is employee behavior consistent with the organizational brand, also known as brand-supporting behavior (Punjaisri et al., 2008). Other researchers refer to this type of behavior as brand citizenship behavior (Burmam & Zeplin, 2005). Universities that engage in internal branding are more likely to have higher levels of institutional commitment (Anwer et al., 2020). However, faculty members often view branding efforts negatively (Gray et al., 2003; Vasquez et al., 2013). If the internal brand of the land-grant mission at LGIs could be studied and improved, the external awareness of LGIs could increase.

LGIs are unique to their respective states and are fragmented organizations, making their branding particularly complicated (Campbell, 1995; Gavazzi & Gee, 2018). The branding and

perception of LGIs has been a concern for researchers for the past 40 years (Adkins, 1980; DeBord, 2007; Maddy & Kealy, 1998). External (Abrams et al., 2010; Baker et al., 2011; Smith & Oliver, 1991) and internal brands have been studied (Kirkwood, 2018; Ray et al., 2015; Settle et al., 2016; Zagonel et al., 2019), but research overall is still limited given the ubiquity of LGIs across the country. Of note in past research is that public awareness of the land-grant mission and its parts were varied (Baker et al., 2011), although those aware of the LGI being studied or the land-grant mission in general had positive perceptions (Abrams et al., 2010; Baker et al., 2011). Similarly, internal audiences were aware of the land-grant mission but did not have a uniform understanding of its concepts (Zagonel et al., 2019). Furthermore, past research has encouraged Extension to engage in communication with constituents via the internet to increase overall effectiveness and awareness (Tennessee et al., 1997)

Purpose and Questions

This study sought to understand how and if the land-grant mission was being intentionally carried out by faculty members at OSU. The following research questions guided the study:

1. How do faculty members translate the land-grant mission in their work?
2. What are faculty members' opinions regarding the future of the land-grant mission?

Methods

A qualitative approach was used to assess the perspectives of faculty members and the context of OSU's brand. This type of inquiry allows for follow-up questions to clarify points and reach the depth desired by researchers (Flick, 2009; Rubin, 2005). Qualitative research is suited to give "an understanding of why things are the way they are and how they got to be that way" (Morgan, 1998, p. 12). Focus groups were the technique used to collect data because meaning is derived from individual thought but is often manifested in the behavior of groups (Flick, 2009). These group discussions help to mitigate the chances of collecting data not indicative of the norm by providing an opportunity for participants to validate or refute others' points in real-time (Flick, 2009).

To capture sentiments from each college in a manner where participants had the greatest chance of being comfortable, homogeneous groups within five of the 10 colleges on the Stillwater campus were studied. These colleges were selected because they served both undergraduate and graduate students. The remaining colleges either only served graduate students or did not formally house faculty members. To increase participants' comfort level in the sessions, tenure track and non-tenure track faculty were studied separately. A purposive sampling method was used to recruit participants. Department heads in each of the five colleges were asked via email to suggest two to three faculty members to participate in focus groups. If recruitment emails were unanswered, email addresses were acquired directly from departmental websites. Participants were selected to be as representative of faculty rank, race, and gender as possible. All potential participants were invited to participate in a focus group via email three weeks prior to each respective focus group session. Reminder emails were sent two days prior to focus groups to those who had agreed to participate.

A moderator's guide was used to guide the discussion and was developed using recommendations by Bloor et al. (2001), Krueger (1998a), and Litoselliti (2003). Questions asked in the focus groups were based on the research questions. The ideal number of questions for each focus group is around 10, but this number can be increased slightly if the group is homogenous (Krueger, 1998b). The first questions were used to make participants comfortable and engaged. The best questions to begin with are factual questions, which are called opening questions (Krueger, 1998b; Litoselliti, 2003). In the present study, participants were asked to describe their role, home department, and appointment. Next, questions introduced the topic of conversation for the focus group session (Krueger, 1998b), such as "What comes to mind when you think of Oklahoma State University?" and "What do you think Oklahoma State University is known for?" Next, transition questions were used to advance the discussion toward the topics that directly addressed the research questions (Krueger, 1998b). Transition questions such as "What do you think Oklahoma State University values as an institution?" were used. These questions "make the connection between the participant and the topic of investigation" (Krueger, 1998b, p. 25). Subsequent questions were categorized into four sections: teaching, research, Extension, and the overall land-grant mission. These were key questions. Key questions often require more time for participants to properly articulate answers and fully discuss, which means they also require more time and attentiveness in analysis (Krueger, 1998b). To end the formal questioning portion of each focus group session, an all-things-considered question was asked: "Suppose you had 30 seconds to describe the land-grant mission to someone who is unfamiliar, what would you say?" This type of question encourages participants to reflect on everything they have heard during the session and provides an opportunity for participants to provide a final, clear, and succinct opinion if participants have been sharing contradicting opinions (Krueger, 1998b). The last question asked is known as an insurance question: "Is there anything that we haven't talked about that you would like to share before we finish up?" This ensures important points have not been neglected by the moderator's guide (Krueger, 1998b).

Eleven focus groups were conducted in the summer of 2020. Sessions were conducted via Zoom due to the COVID-19 pandemic. Online focus groups should use fewer participants than traditional focus groups to give participants adequate time to share their thoughts: Three to eight participants is the recommended size for online focus groups (Abrams & Gaiser, 2017; Poynter, 2010). Table 1 shows the breakdown of participants in each focus group. There were 51 total participants in the focus groups. Conflicts, summer schedules, and non-response to invitations lead to an overrepresentation of faculty in agriculture and an underrepresentation of non-tenure track faculty in general. The focus group intended to examine opinions of engineering non-tenure track faculty had only one participant. The second agriculture tenure track session was added because more individuals agreed to participate than anticipated in the initial inquiry, and we did not want to exclude them.

Each focus group lasted between one and two hours. This length of time was ideal as it allowed for persistent observation of the phenomenon being studied but was not overly intrusive for participants (Krueger, 1998a; Lincoln & Guba, 1985; Litoselliti, 2003). Persistent observation is important because it allows the researcher to recognize the most relevant elements of the topic being addressed and then focus on them. This can be done through probing and clarifying questions. Persistent observation is a technique used to establish the credibility of a study (Lincoln & Guba, 1985). At the conclusion of each focus group, the moderator summarized the

major points and asked participants if they viewed it to be an adequate summary, which served as a member check. Member checks provide participants the opportunity to clarify points that were made, to summarize preliminary findings, and to correct researcher errors and challenge interpretations (Creswell & Poth, 2017; Krueger, 1998a). To ensure accurate and reliable data collection, each focus group session was audio recorded (Flick, 2009; Krueger, 1998c). A moderator’s guide was used at each focus group to guide the discussion among participants. This guide was developed utilizing recommendations by Bloor et al. (2001), Krueger (1998b), and Litoselliti (2003). The protocol was audited by an external panel comprised of agricultural communications and education faculty members who were familiar with focus groups, as well as LGI experts from across the U.S. familiar with focus groups to increase the credibility of the study (Guba & Lincoln, 1982; Lincoln & Guba, 1985). Internal consistency was ensured through comparing moderator’s notes, assistant moderators’ notes, the audio recordings, and transcripts of participants’ responses (Flick, 2009). To protect participant confidentiality, all identifying information was removed and a code was assigned to each participant.

Table 1
Focus Group Participation by College and Tenure Status

Focus Group	Number of Participants
Agriculture Non-Tenure Track Faculty	4
Agriculture Tenure Track Faculty 1	5
Agriculture Tenure Track Faculty 2	9
Arts and Sciences Non-Tenure Track	2
Arts and Sciences Tenure Track Faculty	7
Business Non-Tenure Track Faculty	3
Business Tenure Track Faculty	4
Education and Human Sciences Non-Tenure Track Faculty	5
Education and Human Science Tenure Track Faculty	6
Engineering Non-Tenure Track Faculty	1
Engineering Tenure Track Faculty	5

The audio files from focus group sessions were transcribed using Temi, a web-based transcription app. Once the transcripts were completed by Temi, they were reviewed to ensure accuracy of transcription. Transcripts, moderator’s notes, and assistant moderators’ notes were used to confirm data collection and to triangulate data (Flick, 2009). Data were further triangulated by collecting artifacts from OSU’s website and new faculty orientation sessions. Triangulation is the combination of different methods, theories, or data sources to examine a phenomenon (Flick, 2009) and is used to mitigate the deficiency of a single strategy (Thurmond, 2001). Furthermore, triangulation is used in qualitative inquiry to ensure that data is rich and comprehensive (Thurmond, 2001). Triangulation is also a tool to help researchers establish credibility (Lincoln & Guba, 1985). Past research has assessed brands through triangulation (de Chernatony et al., 2007; Freling & Forbes, 2005). Triangulation was achieved by comparing how the university presented itself compared to the viewpoints shared in the focus group sessions, which is considered a triangulation of data sources (Carter et al., 2014; Jonsen & Jehn, 2009). The 61 artifacts were inputted into MAXQDA20 and analyzed for mentions for the following terms: land, grant, mission, purpose, and role.

Transcripts and artifacts were analyzed with MAXQDA20 using Glaser's constant comparative method (Glaser, 1965). Analysis was guided by the research questions (Litoselliti, 2003). The lead researcher indexed the transcripts by assigning codes to data. Index codes were broad and became narrower as analysis progressed (Frankland & Bloor, 1999). Codes are labels that assign meaning to a piece of the transcript (Miles & Huberman, 1994). Codes were used to break the data into manageable pieces. Those pieces were then put together with other data to create meaning (Flick, 2009). Next, codes were organized into categories around different phenomena related to the research questions. These categories were used to create themes (Flick, 2009). In this study, themes occurred in at least half of the focus groups. A theme is "an abstract entity that brings meaning and identity to a recurrent experience and its variant manifestations. As such, a theme captures and unifies the [data] into a meaningful whole" (DeSantis & Ugarriza, 2000, p. 362). To increase credibility, the assistant moderators reviewed and confirmed the established themes.

As part of the coding and theme finding process, extensive notes and summaries were created for each theme. These notes were helpful when describing the themes to external auditors and writing results (Lincoln & Guba, 1985). These process notes also added to the formal audit trail of the study. The full audit trail of this study includes audio files, transcripts, written field notes, assistant moderator notes, artifacts, coding matrix, structure of categories, theme descriptions, and instrument development information. This information provides rationale for research decisions and improves the confirmability of the study. A dependability audit of my study was performed by a panel of experts (Lincoln & Guba, 1985).

Results

RQ1: How do Faculty Members Translate the Land-Grant Mission in Their Work?

To understand how faculty members interpreted and expressed the land-grant mission in their everyday work, participants were asked to reflect on teaching, research, and Extension, and how the participants integrated the missions. The primary themes associated with this research question were evaluation and expectations guided faculty behavior; performing outside of their actual appointment; missions must be integrated; applied and practical research; industry connections; and difficulties in fulfilling the land-grant mission.

Although most faculty members were aware of the land-grant mission, many participants stated the *evaluation and expectations guided faculty behavior* rather than the overarching mission of the institution. A tenure-track faculty member in the College of Arts and Science (CAS) admitted, "I didn't have any idea what land-grant meant or that OSU was one when I came here." Faculty members from several colleges complained of unclear expectations and unwritten rules associated with their appointments. A tenure-track faculty member in the College of Education and Human Sciences (CEHS) said, "But then you would have to evaluate people based on their appointment. And currently we don't have that. If you evaluated people based on their appointment, that would be fine." A CAS tenure-track faculty member stated that there was little evidence to support OSU valued outreach, particularly within Oklahoma:

Whether the university actually values outreach, I'd say no. When it comes to research, you're expected to have stuff in your A&D documents that talk about international impact. And we've had to really fight to point out it's important to serve Oklahomans who are taxpayers . . . But the evaluation stresses international.

Faculty members routinely spoke about *performing outside of their actual appointment*. One College of Agriculture (COA) tenure-track faculty member was happy to contribute to Extension efforts: "Even though I don't have an Extension appointment, I'll tag along and give presentations." Other faculty members saw performing outside of their appointments as more neutral: "I don't have a research or an Extension appointment, but I feel like I am required to do research and Extension," said a COA non-tenure-track faculty member. A tenure-track faculty member in College of Business (COB) saw performing outside of their formal appointment as a natural product as academia: "My primary or focus, I guess you might say, is teaching, but obviously being a member of the faculty and a professor, I've had to do research and outreach service and all that other stuff." A COA non-tenure-track faculty member suggested the formal structure may not be necessary:

[The land-grant mission] was always described to me as a three-legged stool, and the stool will not stand without any one of the legs. But I feel like they try to peg you into one of those three legs . . . but then we're involved in every mission in some form, so I don't know that is it necessary to keep that structure.

Faculty members said *missions must be integrated* with one another as the best way to deliver quality education, cultivate meaningful research, and provide relevant information to non-academic stakeholders. A non-tenure-track faculty member in CEHS spoke to the advantages of attending an LGI as an undergraduate student: "Being able to learn about it, being able to experience it and then being able to use it . . . being able to apply learning is a great opportunity for a student." One of the ways faculty integrated missions together was by using student organizations as a form of outreach. A COA tenure-track faculty member said, "We rely on our student organizations to go into the community to provide services and school activities, things like that." One COA non-tenure-track faculty member described an LGI as a vehicle: "So it's kind of working like a vehicle where research is your engine, teaching is your oil, and funding is your fuel, Extension is your tires . . . Working together it all moves forward." A CEHS tenure-track faculty member admits it is not a perfect system:

Even though a lot of us are doing research with members of the community, sometimes there is a gap between what we study and what they're interested in. Or we're not providing findings in a way that the general population can learn what those are. Just publishing journal articles is not reaching the public.

Faculty members recognized *applied and practical research* as a cornerstone of LGIs. A CEHS non-tenure-track faculty member said, "One of the things we offer is an evidence-based approach with our research component and the land-grant mission." A COA non-tenure-track faculty member said, "You are doing science that means something, that goes out and is used in agronomy, used by community for health, and improving farm income and stuff like that. . . . Research at OSU is meaningful research." However, not all research is seen as practical or applicable. A COB non-tenure-track faculty member spoke to the varying levels of applicability based on discipline: "[Some] research is very practical, very concrete, and some fields definitely represent a much more tangible application of the land-grant mission to improve society, to

improve everything.”

When considering the land-grant mission, faculty members also referenced *industry connections*. A COA tenure-track faculty member spoke about the value to industry research paired with applicable research: “We have a really good connection with industry whether it’s doing Extension and research, but I think OSU is truly one of the institutions that is trying to strive to do things that are applicable to their stakeholders.” A College of Engineering (CE) tenure-track faculty members spoke about the value students see and gain from industry connections: “[Students] always value the connection and interaction with industry. They always are very interested in having guest lectures from the industry. Then they can have this kind of a network connection with the industry.”

Some faculty members experienced *difficulties in fulfilling the land-grant mission* due to expectations from other academics, departmental politics, and the changing needs of audiences. A COB tenure-track faculty member said, “In terms of getting tenure, the number one sort of requirement is publications. And in addition, preferably publications in top outlets, those don’t always lend themselves to doing research that is immediately relevant.” A COA tenure-track faculty member talked about the challenges of publishing applied research in academic journals: “At least in my field, it’s hard to do research that Extension and people value because the journals don’t appreciate it. So, for that to work you have to have administrators who value that type of research.” A CAS tenure-track faculty member was quite blunt about the land-grant pertinency in their department: “For better or worse, the land-grant perspective for our department is next to irrelevant.”

RQ2: What are Faculty Members’ Opinions Regarding the Future of the Land-Grant Mission?

Participants were asked what they envisioned as the future of the LGI, obstacles and challenges that LGIs would face, and goals for the future. The primary themes associated with this research question were concern for the future of LGIs; land-grant and the internet: a love hate relationship; communication of LGIs should increase; corporatization and commercialization of education; and what makes an LGI work.

Faculty members spoke of a general *concern for the future of LGIs*, with an emphasis on the future of Extension, the land-grant as whole, and higher education. A CAS tenure-track faculty member shared their concerns about the future of all higher education saying, “I’m actually apprehensive about our future in general based on how things are going, not just like the land-grant institution, but just how the amount of budget cuts that have happened in higher education over the years.” A COA tenure-track faculty member spoke about future challenges: “I think we have a big challenge of remaining relevant. We’re a model that has been around a long time. It’s had its ups and downs. Now, we have this struggle to get citizens to drive to Extension offices.”

In the theme, *Land-grant and the Internet: A love-hate relationship*, faculty members spoke about the internet and its advantages and disadvantages for LGIs. A tenure-track faculty member in COB who spoke about the challenges the internet presents for higher education said, “I don’t think places like OSU or other land-grant schools will close the doors anytime soon. But I think

it's certainly going to change things. You could argue Google is fulfilling the mission better than OSU is." On the other side of the coin, faculty members talked about how much social media has improved the prominence of some Extension programs. One COA tenure-track faculty member said, "Social media platforms have revolutionized Extension and getting that message out. It seems to me the stronger Extension programs are connected to a large number of followers. That's a good way of getting messages out immediately."

Faculty members expressed the *communication of LGIs should increase* to either increase awareness of the land-grant mission among external audiences or to increase communication among internal audiences. A tenure-track faculty member in the CE said, "We're trying to just have a better presence on social media, but the research hasn't quite made its way into that yet, except through maybe like student work or activities." A CEHS non-tenure-track faculty member gave an example of the lack of collaboration across campus and the redundancy of efforts. She had written a series of articles on a topic only to later learn an agricultural economist had published something similar: "Sometimes we miss the boat. We miss each other going this way and that. Sometimes we're doing the same work in different divisions or different departments, and we don't make connections with each other." Faculty members were also concerned about how the land-grant mission was being communicated to internal audiences. Participants mentioned branding several times during the focus group sessions. There were positive and negative sentiments shared regarding branding. A tenure-track faculty member in COA had similar ideas, saying, "I will say that 'being on brand' is probably the most annoying phrase I hear as an Extension person." A non-tenure track faculty member in CEHS spoke very positively of the rebranding efforts and described it as a point of pride among colleagues at other institutions:

We were having some meetings and I have a Zoom background that has the logo. A colleague asked me about it, and I said, 'Oh yeah it's the new logo.' So, then I told her, 'Yeah, there is a new branding campaign, they basically went away with all other logos and this logo is used by all of the colleges and programs.' And she was like, 'Oh my God, I'm so jealous of you guys' . . . That made me feel even more proud that we have one cohesive brand.

The *corporatization and commercialization of education* was a major theme within this study. Faculty members had concerns regarding students' expectations and the cost of higher education. Faculty members often mentioned students prioritized a letter grade above the actual learning that occurred in a course. A CAS tenure-track faculty member said, "I think there's just such a push about getting A's all the time and not really learning the material and maybe spending time on the feedback shared by the instructors." A CE tenure-track faculty member specifically mentioned the disadvantage of the fee structure of their college, "We're at a disadvantage for credit hours. I have students from other colleges interested in taking my class, then they find out engineering has these extra fees. Oftentimes that means they aren't going to take my class."

Although faculty members had to contend with several challenges, they also had insight about *what makes an LGI work*. Supportive administration, collaborative colleagues, everyone working toward a common goal, and establishing trust with stakeholders were some of the things that made the land-grant mission possible to achieve. A CEHS tenure-track faculty member spoke about the role administrators play in recognizing academic efforts of faculty members: "I mean the journals we publish in to try and get to our end user have some of the lowest impact factors. I

don't get dinged for that at the moment. And I hope that doesn't change." A COA tenure-track faculty member said all faculty members engage with every part of the land-grant mission: "All of us do every part of the mission. Some of us may have more focus on a certain area, whether it's teaching or research or Extension, but all of us do the land-grant mission." A COB tenure-track faculty member talked about the importance of working in collaborative teams to execute the land-grant mission, "Time is limited. For any one person to do all of it is impossible. It's unrealistic to think that every single person should do all of that. I think that's why we have good teams and departments."

Conclusions, Discussions, Implications, and Recommendations

Many faculty members believed integrating all three missions of LGIs was essential to deliver quality education, cultivate meaningful research, and provide relevant information to non-academic stakeholders, which is consistent with past research on improving the value of LGIs (Gavazzi & Gee, 2018; Goldstein et al., 2019). While many were integrating the different aspects of the LGI mission, faculty members also reported that their behaviors were affected by how they were evaluated, which they did not always believe aligned with the LGI mission. This is problematic as past research suggests a brand's values should be translated into everyday activities and standards (Punjaisri & Wilson, 2007). Many LGIs deal with this issue because research is readily rewarded and recognized, but community engagement is given "vacuous lip service" (Gavazzi & Gee, 2018, p. 214). While evaluation appeared to drive *what* faculty members did more so than the LGI mission, the LGI mission did affect *how* some of the faculty engaged in their duties. For instance, faculty members were quick to adjust the way they taught to be more inclusive of students with varying academic backgrounds. An organization's brand and how people feel about it affects the behaviors of employees (Smith & Oliver, 1991).

Part of meeting the LGI mission meant faculty members engaged in behaviors they believed to be outside of their official appoints. Some were more than happy to do so to serve the LGI mission, but others were not. Those who are willing to go above and beyond contractual obligations indicate support for the brand (Ind, 2008; Thomson et al., 1999). There are several possible explanations for this investment: The internal branding efforts at OSU are strong and well delivered, or the respective faculty members have similar values to the land-grant mission and identify closely with it (Anwer et al., 2020; Burmann & Zeplin, 2005; Punjaisri et al., 2008). But it is worth noting that not all were willing to do so, and given that evaluation drives their behaviors, adjusting job descriptions to be more explicitly inclusive of the LGI mission would likely benefit the organization.

In the present study, applied research was considered a cornerstone of LGIs, which past research has shown to be an underpinning aspect of the LGI mission (Gavazzi & Gee, 2018; Kirkwood, 2018; Settle et al., 2016). But while applied research may be important for the LGI mission, that type of research is not always perceived as being welcome in many academic journals, which is a key aspect of how faculty members are evaluated. Tension between applied and basic science is common among LGIs (Gavazzi & Gee, 2018).

There was a general state of concern for the future of LGIs. Faculty members were concerned for the future of Extension, higher education, and adjusting to changing audiences. Faculty members

also recognized key components that helped an LGI function and would help sustain LGIs in the future. Faculty members recognized a need for trust between employees of LGIs and external stakeholders. The major themes for this research question were a concern for the future; land-grant and the internet: A love-hate relationship; corporatization and commercialization of education; communication of LGI should increase, and what makes an LGI work.

Faculty members were concerned about the future of Extension and the LGI. They did not think it was widely understood or used by the public. The need for Extension to intentionally engage in branding has been noted for more than 20 years (Maddy & Kealy, 1998), but Extension is still often referred to as “the best kept secret” internally (DeBord, 2007, para. 1). In the present study, faculty members mentioned users of Extension found it to be highly useful and trustworthy, which aligns with past research (Baker et al., 2011; Ray et al., 2015; Settle et al., 2017), but Extension is likely to continue to struggle with funding and recognition if it cannot broaden its clientele base. Faculty members expressed concerns Extension was not properly serving all citizens of Oklahoma, particularly those in urban settings, a concern that dates back 40 years (Adkins, 1980). Participants were concerned free online resources would replace higher education and Extension. Past research has encouraged Extension to engage in communication with constituents via the internet (Tennessee et al., 1997).

How LGIs interacted with and competed with the private sector showed up in different ways depending on the mission. Faculty members were concerned with the corporatization of education (Barnett, 2019), especially the belief that students saw education as a transactional (e.g., focused on letter grade) instead of a transformational process (e.g., focused on learning). Outside of teaching, faculty members’ statements aligned with Bonnen’s (1998) assertion that private industry, especially in agriculture, is fulfilling some of the land-grant mission more effectively than LGIs themselves. While there were some aspects of the private sector that could be perceived as negatively impacting LGIs, the relationship can also be beneficial because many industry leaders who are interested in collaborating with research locate their businesses near LGIs (Gavazzi & Gee, 2018). Cultivating private sector partnerships can also lead to donations from industry partners and increased support via lobbying for better budgets for universities (Gavazzi & Gee, 2018). This is especially important because state-level funding of universities is a common issue. OSU’s state funding support has dropped 26% since 2002 (The Chronicle of Higher Education, 2021). But private sector connections also present a potential conflict of interest. For instance, there have been university studies funded by industry that reported no link between sugary beverages and poor health, which contradicted 26 other studies conducted by independent researchers (O’Connor, 2016).

Faculty members were concerned about communication of OSU’s work internally and externally. Participants recommended increasing interdepartmental, intercollege, interuniversity, and interinstitutional communication, which parallels recommendations suggesting collaboration and communication among university colleagues could increase the efficiency and value of LGIs (Campbell, 1995; Gavazzi & Gee, 2018). Faculty members also wanted external communication about the land-grant mission to increase, which aligns with past recommendations to communicate LGIs’ value, not just supply information (Baker et al., 2011). While faculty members believe communication needed to improve, they expressed some frustration with branding efforts. They were supportive of having a unified voice but did not necessarily want to

follow all guidelines. This finding of mixed feelings supports the findings of past studies where faculty may recognize the value of branding efforts but do not appreciate the top-down approach usually taken with university branding efforts (Gray et al., 2003; Vasquez et al., 2013). But while they were frustrated, the faculty members illustrated investment in improving the organization's brand, which is positive for the organization (Piehler et al., 2015).

A key aspect of this research is that the faculty members were still fairly positive in their perceptions of the LGI, which is similar to past research with university employees (Ray et al., 2015; Settle et al., 2016). Faculty members also spoke of the importance of public approval and trust in the execution of the land-grant mission (Kang & Hustvedt, 2013), which is particularly important in the current environment of distrust in science-related communications (Birkland, 2011). Trust and a strong internal brand are essential for organizations like OSU that are primarily service based and depend on the interaction employees have with customers (e.g., students, taxpayers, Oklahoma public, etc. (Schmidt & Baumgarth, 2018). While they recognized the importance of public engagement, the faculty members did not necessarily view outreach and engagement as being a priority in their roles, similar to past research (Holesovsky et al., 2020). If universities want faculty members to be more directly engaged in outreach, then including outreach as a part of clearly defined duty would likely be beneficial.

Faculty members should consider the way their work serves as brand building blocks. As not all faculty members felt their work was relevant to the land-grant mission, it is recommended faculty members are made to feel empowered and responsible for brand creation and the execution of the land-grant mission (Endo et al., 2019). When faculty members are involved in the building of a brand, it is more likely the brand will be successful (Moorer, 2007). Some faculty members were passionate about and valued the land-grant mission. Encouraging all faculty members to foster a deep investment in the mission would be beneficial (Gavazzi & Gee, 2018).

It is essential to understand employees' perceptions of the brand and help them to feel invested and interested in the brand (Bolman & Deal, 2008). One recommendation to create buy-in is to establish a summit of land-grant scholars for faculty members to discuss their LGI-related efforts, present relevant topics, and network with colleagues across the LGI. This could establish an award or recognition structure related to the land-grant mission to incentivize its delivery. Brand co-creation is a social process, therefore increasing opportunities where faculty members can socialize with one another in a meaningful way could help enhance the land-grant brand at OSU (Dean et al., 2016). It would be beneficial to host events where faculty members could present their work that integrates all the missions of LGIs.

The qualitative nature of this research means the results may not apply to all LGIs. Each LGI is intended to adapt its state's citizens' needs (Campbell, 1995; Gavazzi & Gee, 2018). This research should be repeated at other LGIs, including 1890 and 1994 LGIs. Because of the limited representativeness of qualitative research, a follow-up survey could offer a more generalizable view of faculty members' brand perceptions, values, and expression of OSU's brand (Leijerholt et al., 2019). Future research should also address perceptions of other stakeholders, including staff, administrators, and students.

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Implementing a Needs Assessment to Evaluate Extension Agent Onboarding and Training

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County Extension Agents offer non-formal education to the communities in which they live. Extension competencies support the work of agents and agents can gain or improve upon Extension competencies through training and onboarding that is delivered by State Extension Services at the beginning of, and throughout, their career. In Oregon, there are discrepancies in how training and onboarding are delivered. Therefore, a needs assessment was conducted on training and onboarding of Oregon Extension Agents. We employed Witkin and Altschuld's (1995) Practical Needs Assessment model to develop a survey instrument, collect data from agents in Oregon, and make recommendations to Oregon State University Extension Service. The results reveal that while training is offered, it is intermittent. We make recommendations to create consistent training materials and a centralized training and onboarding model for Oregon Extension.

Introduction/Theoretical Framework

County Extension Agents (or Extension Educators) serve as the liaison between the land-grant institution and the community, covering a wide span of content within their areas of expertise (i.e., agriculture) (Seevers & Graham, 2001). County Extension Agents undergo a variety of training from the beginning of their careers and throughout their time in the profession (Seevers & Graham, 2001) in order to meet many of the responsibilities for their roles and to serve as local liaisons for State Extension Services. Training is offered so Extension Agents are able to fulfil their job responsibilities. Agents are expected to possess a variety of *extension competencies*, which are “the basic knowledge, attitudes, skills, and behaviors for a given job” (Maddy et al., 2002, pp. 1) for the purpose of community outreach and engagement, which is often met by delivering educational programming. However, agents also have many responsibilities outside of teaching (Cooper & Graham, 2001).

Recent research synthesizing 20 years of Extension Agent competency research revealed the breadth of competencies (a total of 503 competencies) needed by Extension Agents in the profession (Knight, et al., 2019). The research revealed Extension Agent competencies included multiple non-teaching responsibilities such as keeping records, creating research field trials and demonstration plots, organizational effectiveness, evaluation, interpersonal skills and leadership, communication, publishing peer-reviewed research, using technology, organization skills, and many more (Knight et al., 2019). Having reviewed Oregon State University (OSU) Extension Agent job descriptions, it became clear that a county agent needs both content-specific skills (e.g., understanding of animal physiology or life-span development) and Extension-specific skills (e.g., developing education programming and conducting needs assessments) (Cooper & Graham, 2001). The content-specific skills are often learned from university education, evidenced by the expectation that persons applying for a position have a Bachelor's and a Master's degree in an area relevant to their program area. Extension-specific skills might come from a combination of university education, lived experiences, and trainings delivered by state

Extension services, such as onboarding and continuous professional development training. In this study, we explored training and onboarding of OSU Extension Agents. For the purposes of this study, *training* is defined as “any formal or informal material resources for the continuous professional education of newly-hired employees so [they] may meet the need of basic Extension competencies to ensure professional success” (Safrit & Owen, 2010, para 12). Further, training includes *onboarding*, which takes place at the beginning of a career, when they are learning basic technical skills needed to advance them forward in their Extension career (Rennekamp & Nall, 1994).

Rennekamp and Nall (1994) described four Extension career stages: (a) entry, (b) colleague, (c) counselor and (d) advisor. Additional research has added a “pre-entry” stage to the professional development model, which includes competencies necessary for new Extension Agents (Benge et al., 2011). In order for agents to advance from the entry stage to colleague stage, there are considerations of time in the position and development of competencies and organizational knowledge (Brodeur et al., 2011). The colleague stage is met when agents have further developed an area of expertise, a professional identity, and are more independent contributors to problem solving. Agents move to the next career stage when they are able to meet the professional development needs of their current career stage (Rennekamp & Nall 1994; Harder, et al., 2010). Still, some employees may never advance past the colleague stage because they may be satisfied with independent work and uninterested in the higher expectation of responsibility in the counselor or advisor stages. Brodeur et al. (2011) estimated that the entry stage is approximately the first three years of employment; however, we found limited literature that discussed how long it may take an Extension professional to move into the other stages. As mentioned, Rennekamp and Nall (1994) posit that some agents may not advance past the colleague stage, however, for the purpose of defining stages in this research project, we estimated that each stage is approximately three years. Therefore, we gauged that the entry stage is the first three years in the profession, the colleague stage is the fourth through sixth year in the profession, the counselor stage is approximately the seventh through ninth year in the profession, and the advisor stage is estimated as 10 or more years in the profession.

In many states, County Extension Agents undergo onboarding and continuous professional development training to gain knowledge and experience in Extension competencies. However, there are variations across the states in how onboarding is delivered. Some states have in-person training models that are organized into a few sequential days, multiple days divided over a series of months, or multiple trainings divided over a three-year span (Brodeur et. al, 2011; Garst et al., 2007; Harder et al., 2016; New Extension Agent: Onboarding Self Study Guide, 2019). Other states have adopted a blended approach of in-person sessions and online modules (Harder et al., 2016). Additionally, some states have training specific to Extension program areas, such as the 4-H New Extension Agent Training (NEAT) in Virginia (New Extension Agent: Onboarding Self Study Guide, 2019). While other models have onboarding for all program areas before separating for other training based on specific program areas (i.e., 4-H) (Garst et al., 2007). During this entry stage of the profession, agents are motivated to understand the organization's structure, gain basic technical skills, connect previous skills to their current work, and develop connections with their professional peers (Rennekamp & Nall, 1994). Looking beyond the entry stage of the profession, continuous professional development training can take place in any stage of an Extension agent's career.

In OSU Extension, objectives and delivery methods for training and onboarding offered to agents are determined by state program leaders, thus creating a decentralized onboarding protocol (L. Shirley, personal communication, February 6, 2019). Learning about the decentralized onboarding and training model within Oregon Extension led us to explore training and onboarding across the seven Extension program areas. These conversations revealed that some of the programs did not have an onboarding process. Additionally, one program leader shared that onboarding was limited as a result of minimal budget or personnel to conduct trainings (S. Angima, personal communication, March 6, 2019; R. Riportella, June 2, 2019; L. Davis, personal communication, January 22, 2020). Little information was shared about the continuous professional development training offered; however, we did learn that all agents and staff are given the opportunity to attend Extension Annual Conference (EAC). The EAC does include professional development workshops and sessions, although, this conference is not mandatory for agents to attend. After learning about the depth, length, and content that is covered during the trainings, we noticed inconsistencies between the different program areas. Yet, orientation and continued training for new *and* veteran agents is crucial for success in the field (Bulut & Culha, 2010; Holton, 1990; Swart et al., 2014). The discrepancy between what was reported in our review of the literature related to training and onboarding and our observations of training in OSU Extension lead our research team to employ a needs assessment approach to evaluate training and onboarding among Extension Agents within OSU Extension.

Witkin and Altschuld (1995) described *need* as a discrepancy between *what is* and *what should be* (Witkin & Altschuld, 1995). Kaufman (1988; 1992) pointed out that need is the missing link between the ongoing state and the desired state. A needs assessment (NA) is an approach to identify, analyze, and make recommendations about a need (Watkins et al., 2012). Watkins et al. (2012) further describes three levels of NA decisions, (a) strategic, (b) tactical, and (c) operational. A *strategic decision* focuses on the needs of the society and how the decisions impact the community; *tactical decisions* focus on how programs and projects and improve effectiveness; and *operational decisions* focus on team and individual achievement. The NA in this study lends itself to tactical decisions because training and onboarding are programs and the training can impact organizational effectiveness.

We utilized Witkin and Altschuld (1995) practical NA model, which identified three stages of a NA including, (a) pre-assessment, (b) assessment, and (c) post-assessment. The pre-assessment stage of a NA consists of defining the purpose, identifying the need areas, determining what data should be collected, and deciding methods for data collection. Phase two of a NA involves conducting the assessment, collecting the data, and analyzing the data. The final phase includes reporting the findings and distributing recommendations to internal and external partners. We know that OSU Extension currently trains and onboards employees under a decentralized model and the decentralized training is inconsistent between all the program areas. Therefore, the overarching objective of this NA was to identify gaps in the current training and onboarding model. Utilizing a NA approach allowed us to conduct an exhaustive investigation of the training and onboarding of OSU Extension Agents and make recommendations for future training models.

Research Questions

For this study, we employed Witkin and Altschuld's (1995) practical NA model for conducting an investigation of the training and onboarding of OSU Extension Agents. Our NA sought to address the following research questions, which guided this study:

1. What professional development competencies are accessible to OSU Extension Agents under the current training and onboarding procedures?
2. How does training and onboarding vary between the four career stages of an Extension Agent with OSU Extension?

This study aligns with the American Association of Agricultural Education's (AAAE) research priority five: Efficient and effective agricultural education programs (Roberts et al., 2016, 41-45).

Methods/Procedures

To address the research questions, we administered a survey instrument to all OSU Extension Agents. This research did not seek generalizable information as it was a state-specific study; however, we sought a census in hopes of a large sample size and robust understanding of the discrepancies within the training and onboarding protocols (Ary et al., 2002). This research was conducted during Fall 2019 through Spring 2020. During this time, we developed an original survey instrument through Qualtrics Survey Software. The developed questions and competencies were based on a combination of Extension competency findings, employee training literature from the fields of Personnel Psychology and Human Resource Development, and relevant needs assessment research. The instrument was vetted for content and face validity by administering a pilot survey to Extension Agents outside of Oregon. The instrument was distributed to eleven county agents located outside of OSU Extension and the pilot participants represented the 4-H, Agricultural and Natural Resources (ANR), and Family Consumer Sciences (FCS) program areas and the four career stages mentioned previously (Rennekamp & Nall, 1994). Additionally, the instrument was reviewed by expert faculty in Agricultural Education and Extension, graduate committee members, and doctoral graduate students for additional checks for validity.

At the beginning of the instrument, we defined *training* (Safrit & Owen, 2010, para 12) and *onboarding* (Rennekamp & Nall, 1994) for those responding to the instrument. Following, the instrument included four sections: (a) introduction questions, (b) individual competency questions, (c) additional training questions, and (d) demographic questions. The first section included ten introduction questions, such as "within the first year of your employment, did you receive any training?", and "was any of the training you received during your first through third years in the profession mandatory?" The second section asked specific questions about 20 competencies identified by past research (Cooper & Graham, 2001; Harder et al., 2010; Knight et al., 2019; Lakai et al., 2014; Cochran, 2009), and validated by Extension professionals. Previous literature has revealed a much larger number of competencies; however, the research team, and graduate committee, conferred the implications of sending an instrument with more than 20 competencies and how that might impact the length of the instrument and response rate. Ultimately, we agreed on 20 competencies, which were: (a) Communicating research, (b) Communications, (c) Conducting needs assessments, (d) Conducting applied research, (e) Ethics,

(f) History of Extension, (g) Leadership, (h) Learning theories, (i) Marketing, (j) Oregon Extension organizational leadership, (k) Professionalism, (l) Program development, (m) Program evaluation, (n) Risk assessment, (o) Teaching methods, (p) Teaching techniques, (q) Technology, (r) Theories of human development, (s) Volunteer management, and (t) Volunteer recruitment. Questions related to the 20 specific competencies asked participants to recall if they had received training on the topic, when they received the training, and if the training was provided by Oregon Extension.

The third section of the instrument included additional training questions, and asked participants to rate the perceived value and relevancy of training received by OSU Extension. In this section, we also gave participants the opportunity to add additional context through open-ended questions, such as “What are some ways OSU Extension can improve employee training?”, and “What are additional training areas that OSU Extension should provide training on?” The fourth and final section were demographic questions to help us better understand the participants and make comparisons related to training among career stages and program areas.

The instrument was sent to all OSU Extension Agents on an all-agent listserv. Regional operations coordinator, Marcia Dickson, shared there were 165 off-campus, unclassified faculty (i.e. agents) (M. Dickson, personal communication, March 10, 2020) and the 165 agents were included on the all-Extension listserv. One week after the first email was sent, Regional Directors and Program-area Leaders emailed their respective employees to encourage participation in the survey. A final reminder email was sent five days before the survey closed. The survey was open for 20 days. The raw data collected in the instrument were exported from Qualtrics Survey Software to Microsoft Excel. There were 60 usable responses resulting in a 36% response rate, however only 48 of the participants completed the entire instrument. Data were analyzed using the Statistical Package for Social Sciences (SPSS Version 26) to address the research questions for this study. To report the findings of our research questions, frequencies and descriptive statistic were used.

Results

This research sought to further our understanding of the professional development competencies currently accessible for Extension faculty in Oregon, as well as explore how training and onboarding varies between Extension career stages within Oregon Extension. With our data collected (i.e., NA stage one), we proceeded into the second stage of this NA.

Participant Demographics

Sixty agents responded to at least one survey question and 48 agents completed the full survey instrument. The highest account of responses were from agents in the entry stage (38%, $n = 23$) followed by the advisor stage (23%, $n = 14$) (Table 1). Further, with regard to the seven Extension program areas in Oregon, 59% ($n = 35$) of the respondents represented the most populous program areas of 4-H, Agriculture and Natural Resources (ANR), and Family and Community Health (FCH) program areas (Table 2). We note that 20% of responding agents ($n = 12$) did not identify their program area or years of working in OSU Extension (accounting for the

12 agents that did not complete the entirety of the survey). Over half of the participants (63%, $n = 38$) identified they received training during their first year of employment, 55% ($n = 33$) identified they received training during their second through third years of employment, and 31% ($n = 19$) identified the training they received during their first through third year was mandatory (Table 2).

Table 1

Distribution of participants by career stage (Rennekamp & Nall, 1994) ($n = 60$)

	<i>n</i>	%
Entry (year 1-3)	23	38%
Colleague (years 4-6)	9	15%
Counselor (years 7-9)	2	3%
Advisor (10+ years)	14	23%
No response	12	20%

Table 2

Training received during first through third years of employment, as reported by responding participants ($n = 60$)

	Yes	No	Maybe	I don't remember	I did not receive training
I received training by OSU Extension during my first year of employment	38	17	4	1	N/A
I received training by OSU Extension during my second and third year of employment	33	20	6	1	N/A
The training I received by OSU Extension during my first through third year was mandatory	19	24	5	5	7

Research Question One

The second section of the instrument narrowed the focus of training and onboarding to twenty Extension-related competencies. Each participant was asked if they had received training on each competency since the start of their employment. It is important to remember the instrument only asked participants to respond about the training they received *after* they started working for Oregon Extension. Table three includes the breakdown of responses for each competency. The instrument was organized by competency. As previously discussed, 48 participants completed the whole instrument, therefore, the number of responses (*n*) varies for each competency due to survey drop off. We decided to examine each competency by individual construct because the research is exploring if training was received or not. Of the 20 competencies, 15 competencies had a higher frequency of agents who *did not* receive training than those who *did* receive training on the competency. A higher number of respondents reported being trained on *Ethics, Leadership, Marketing, and Extension organizational leadership* than had not been trained. An equal number of respondents reported they had been trained as those who had not been trained on *Teaching techniques*.

Table 3

Frequencies of participants who had received at least one training on specific Extension related competencies since they started employment with OSU Extension

	Yes	No	Maybe	<i>n</i>
Communicating research ^a	11	41	4	56
Communications ^a	24	28	7	59
Conducting applied research ^a	6	49	1	55
Conducting needs assessments ^a	12	33	4	49
Ethics	28	16	5	49
History of Extension ^a	18	35	2	55
Leadership	25	22	2	49
Learning theories ^a	10	39	2	58
Marketing	29	23	2	54
Extension organizational leadership	27	21	5	53
Professionalism ^a	7	40	2	49
Program development ^a	19	31	3	53
Program evaluation ^a	21	28	3	52
Risk assessment ^a	15	31	5	51
Teaching methods ^a	19	29	3	51
Teaching techniques	24	24	3	51
Technology ^a	15	30	6	51
Theory of human learning ^a	7	43	1	51
Volunteer management ^a	13	36	3	49
Volunteer recruitment ^a	14	32	3	51

Note: Frequency is describing if participants had received at least one training in the competency-specific area since they started working for OSU Extension.

^a Competencies that had higher frequency of participating agents who identified they have not received training on the subject since the start of their employment with Oregon Extension.

At the end of the instrument, we asked participants to respond to the following open-ended questions: “What are some ways Oregon Extension can *improve* employee training?”; “What are additional training areas that Oregon Extension *should* provide training on?”; and, “Are there any additional training areas, provided by Oregon Extension, that you believe were missing from this survey?” Responses varied in length and perspective on the training provided by OSU Extension service.

We saw many participants who commented on the lack of training they received. Some agents mentioned having received no training, while others stated it was only a few hours in length and focused mostly on paperwork. One participant went as far to say, “I received no training whatsoever and had to learn everything on the job or use my past experience/common sense.” Participants also mentioned they had to pursue their own training, rather than training being offered to them. There were many participants, from all career stages, who reiterated this notion that their training was minimal, unhelpful, or non-existent. Agents also commented on the vagueness and irrelevancy of their training. Other participants mentioned they feeling overloaded during their training. Many also commented on how the competencies listed in the instrument should be taught regularly by qualified trainers and more materials should be available to attendees.

Lastly, there were some participants who had positive or neutral remarks about the training. One participant stated, “I started over 30 years ago. We did none of this [referring to survey competencies] and survived.” Further, other agents mentioned that perhaps training has been forgotten or they may have lost track of the training received, and that training has improved over the last 10 years. While there are far more comments about the lack of training and how training can improve, there were agents who thought the training delivered by Oregon Extension was “survivable.”

Research Question Two

There were 23 agents in the entry stage (1-3 years), and over half received some level of training during their first through third year in the profession. However, only 30% ($n = 7$) of the entry stage agents reported that the training they received was mandatory. Additionally, there were 14 agents in the advisor stage (10+ years). Over 50% ($n = 8$) of agents in the advisor stage reported they received some form of training during the first year of their employment, 71% ($n = 10$) reported they received training during their second through third year of their employment, and 14% ($n = 2$) reported the training was mandatory. As we further examined the results by each career stage, among those in the entry stage, 18 competencies had a higher number of agents *who did not* receive training in a competency area. Among the 14 agents in the advisor stage, eight of the 20 competencies had higher frequency of agents who *did not* receive training. Considering the results of the two research questions addressed in this study, we offer the following discussion and recommendations.

Discussion, Recommendation and Conclusion

The final phase of Witkin and Altschuld’s NA includes reporting the findings and distributing recommendations to internal and external partners. The data revealed over half of OSU Extension agents *do* receive training, however, a higher frequency of respondents indicated

they had not received training in 75% of the competency areas, compared to those reporting to have received training in those areas. It is important to bring attention to the gap between these two variables. While we can conclude that agents *are* receiving training, our findings show that the training in which they are participating does not align with what past Extension scholars have published as being critical to success in Extension. We found the responses from the open-ended questions to be especially revealing. Respondents acknowledged a lack of formal training and limitations of the training they had received. Comments about the lack of training and the misalignment between training received and expected job responsibilities lead us to ask, if OSU Extension Agents are not receiving training relevant to Extension competencies, how and where are they learning the basic skills not only needed for the job, but for advancement in career stage?

For participants who were in the entry stage of their career, there were 18 competencies which had a higher number of agents who reported they had not received training in the given competency areas. Considering Rennekamp and Nall's (1999) research, the entry stage is a critical stage for agents to receive training and, more importantly, that training *should* reflect the work they are expected to do in the profession (Swart et al., 2004; Harrison, 2000). Bulut and Culha (2010) emphasize that onboarding is one the most important investments an organization can make. As agents advance in their profession, they are gaining and acquiring more skills and competencies that reinforce their work in the profession (Brodeau et al., 2011). We acknowledge that responding agents in the advisor stage (10+ years) may not be able to recall onboarding training they received during their first through third year in the profession. Further, we would expect that onboarding training would be different in 2019 and 2020 than it was over 10 years ago. However, when we examined the agents in the advisor stage (10+ years), there were still agents who had *not* received training on over half of the competencies, which raises concern about the type and amount of training offered beyond the entry stage of Extension professionals in Oregon. Literature supports the importance of training new employees, but what about continuous training for those who have been in the profession beyond the entry stage? How is Oregon State Extension supporting middle career Agents meet the basic competencies needed for their jobs?

This study does not go without its limitations. Due to lack of statewide information, we were unable to obtain a breakdown of total agents in each career stage to know how representative our sample was of the whole agent population in OSU Extension. We acknowledge this instrument asked some participants to think about training that could have taken place over 10 years ago, which may have been difficult for participants to recall. Additionally, a limitation was the length of the instrument and the drop off rate of participants. Further, we recognize this study only asked *if* training on 20 competencies was received, we did not ask participants to identify if they believed they could complete tasks related to these competencies, as that particular question was beyond the scope of this study. A follow up to this study would be conducting a second round of data collection, such as interviews, with participants to garner a deeper understanding of how qualified participants feel in completing critical Extension competencies in their current positions.

Considering the date and the limitations to this study, we offer two recommendations for Oregon as well as some considerations for the profession as a whole. We recommend OSU

Extension Service create consistent onboarding materials for all program areas. This recommendation not only aligns with the work of researchers (Bulut and Culha, 2010; Swart et al. (2004), but it also echoes the results of the study. The intermittent training that participants identified they received in study does not align with the competency research and discussions by other Extension scholars. Consistent training materials should include a new curriculum (which aligns with Extension research), a new process for delivering the curriculum, and a uniform evaluation system for the training. Swart et al. (2004) emphasized the importance of alignment with goals and objectives for the overall effectiveness of an organization; so, it is our recommendation that someone internal to OSU Extension creates a set of onboarding protocols to resulting in alignment among all program areas.

Other states, such as Florida and Tennessee, have models that can be replicated in OSU Extension. University of Florida (UF) Extension offers an example with a three-year road map for when competencies should be taught during the entry stage (Brodeur et. al, 2011). This model addresses 12 broad competencies and has identified when the competencies are most critical to learn during the first three years of employment. For example, in the first month the new employee should learn to use email and get to know the office, and by their third year of employment, should be creating new curricula and networking with local, state, and national associations for professional growth (Brodeur et. al, 2011). In previous years, UF Extension has also initiated hybrid models of in person and online training modules (Harder, et al., 2010). The University of Tennessee (UT) Extension recently published an instrument that assess a base level knowledge of Extension competencies, such as communication and educational design skills. The UT Extension model assesses new hires and adapts relevant training based on skills that are being brought into the profession, and agents are connected with online resources (Berven et al., 2020). However, as mentioned earlier, OSU Extension currently has a decentralized training model. When we consider how the aforementioned models could be applied to OSU Extension, we believe onboarding training should be centralized and administered by Extension administrative personnel, or other qualified trainers, to ensure maximum effectiveness, which we expand on in the second recommendation.

The second recommendation is to establish a centralized onboarding model for all newly hired Extension Agents. A new, centralized, onboarding model should be carefully planned and delivered to ensure agents are actually receiving training that can support their success in the Extension profession. We offer these recommendations with the hopes that a centralized onboarding model would support agents throughout the remainder of their career, while also creating a pipeline of well-trained agents moving through the Extension career stages. There are multiple states that have well established and centralized training models that could be replicated in Oregon, such as North Carolina (NC) State Extension, University of Florida (UF) Extension, and University of Tennessee (UT) Extension. For example, North Carolina (NC) State Extension has an Extension Organizational Development (EOD) branch which has employees who implement training and work with new agents to meet personal, professional, and leadership aspirations for the overall success of their faculty and the organization (EOD, n.d.). The NC State Extension model includes onboarding training, which consists of online resources and an onboarding self-study guide (New Extension Agent: On-boarding Self Study Guide, 2019). The self-study guide must be signed and dated by the agents when completed and submitted to the EOD. In addition to the onboarding, face-to-face training is administered multiple times

throughout the year. These trainings are called “Fundamentals for New Extension Professionals,” and agents are required to attend within their first 6-8 months of employment. After the required face-to-face training, program areas can provide additional training for content that is more relevant to their program area. A thoughtful, centralized, onboarding model in Oregon would create a system that support agents as they move through the different career stages.

We recognize this study is state specific, yet, we affirm there are considerations that go beyond our state. We invite the entire Extension community to critically examine training and onboarding in your own states. Does it align with Extension competency literature? Is it effective in meeting Extension competencies needs? Perhaps a NA should be conducted to address these questions in other states. Highly qualified agents are in demand across the US and successful organizational training has impacts on socialization, organizational commitment, and employee turnover (Holton, 1996, Somers, 1995; Wanous, 1980 as cited in Bulut and Culha, 2010). With highest turnover rates in organizations among newly hired employees (Wanous, 1980 as cited in Bulut and Culha, 2010), we further ask the profession to consider how Extension Agent training supports those new to the profession, while helping agents stay in the profession and be successful throughout their career. What would it look like if training for agents was specific to each individual (similar to a program of study) and dependent on what experiences they already have, areas they want to improve, and their career aspirations?

Lastly, looking more broadly beyond the entry state, we encourage other Extension programs to consider what training looks like for those in the colleague, counselor and advisor stages. Just because an agent has been doing their job for years may not mean they are confident or competent in the various Extension competencies. Perhaps there are competencies that can continue to be refined with added years in the profession or there are competencies that are more relevant for middle career agents (e.g., mentoring, strategic planning, and state or national leadership roles). Some participants in this study mentioned the training they received was overbearing and not relevant until later in their career. Given this, we recommend aligning competencies taught to the appropriate career stage. It would also be beneficial to create a more personalized training experience by considering agent demographics and job expectations.

This study examined the training and onboarding available to Oregon Extension Agents as well as how training varies between the career stages. The mission of Oregon Extension Service is to “*Engage [with] the people of Oregon with research-based knowledge and education that strengthen communities and economies, sustain natural resources, and promote healthy families and individuals*” (Extension and Engagement, 2020). Highly qualified agents are needed to ensure Oregon Extension puts their best effort into meeting this mission. Results revealed disparities within current training procedures related to the 20 competencies explored in this study and evidence supports the need for improved training materials and a more consistent training model.

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Determining Perceived Influence of Challenges Faced by School-Based Agricultural Education Teachers on Their Ability to do Their Job

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Attrition is a documented cause for ongoing SBAE teacher shortages and is often linked with the number of challenges faced by teachers and their ability to overcome them. The purpose of this study was to identify challenges faced by SBAE teachers across the nation. By identifying challenges faced by SBAE teachers, university agriculture teacher education programs have the opportunity to increase human capital in the population. A descriptive national survey was employed to accomplish the purpose of this study. Challenges most negatively impacting SBAE teachers' ability to do their job included miscellaneous activities beyond teaching, FFA, and SAE as well as personal activities outside of school. We also found female SBAE teachers perceived challenges to more negatively influence their ability to do their job than their male colleagues. Recommendations for practice included providing additional training in the area of managing miscellaneous activities in SBAE programs and developing strategies to manage burnout. Further research should be conducted in managing burnout, developing an SBAE teacher job satisfaction instrument, and finding ways to remedy the differences in perceived influence of challenges faced by male and female SBAE teachers on their ability to do their job.

Introduction

Shortages of school-based agricultural education (SBAE) teachers have been a documented concern in secondary public schools dating back to the Smith-Hughes Act in 1917 and continuing forward to the present day (Eck & Edwards, 2019; Hillison, 1987; Smith et al., 2017). Studies in agricultural education research generally attribute the cause of this issue to either agricultural teacher education graduates not entering the field upon graduation or teacher attrition among those in the field (Hainline et al., 2015; Lawver & Torres, 2011; Murray et al., 2011; Parmley et al., 1979; Roberts et al., 2009; Sorenson et al., 2016). The focus of this study lies with teacher attrition. This topic has been studied from several different vantage points including the impact of job satisfaction on retention, factors impacting early career teachers, and why teachers chose to stay in the profession (Clark et al., 2014; Greiman et al., 2005; Walker et al., 2004).

However, according to Boone and Boone (2009), attrition often can be linked to the number and types of problems teachers face and a teacher's success or failure can be dependent on their ability to solve those problems. Problems or challenges can be linked directly to job satisfaction. Walker et al. (2004) proposed that unsatisfied individuals would likely not remain in the teaching profession. Numerous studies have examined SBAE teacher job satisfaction and found SBAE teachers were generally satisfied with their jobs (Castillo et al., 1999; Clemons & Lindner, 2019; Hasselquist et al., 2017; Kitchel et al., 2012). However, studies identifying challenges or problems faced by SBAE teachers generally focus on a particular area within agricultural education such as teaching, FFA, supervised agricultural experiences (SAE), or personal factors. These studies are often limited to one state or region and are not modern in their publication (Boone & Boone, 2009; Mundt & Connors, 1999; Myers et al., 2005).

Within the population of SBAE teachers, challenges can differ based on demographic characteristics. For example, female SBAE teachers have reported challenges such as having to prove they are qualified to teach agriculture to different individuals in the school system, having higher stress levels, difficulty balancing family and work, and higher burnout rates (Baxter et al., 2011). King et al. (2013) reported female teachers in the Southeast had stress caused from challenges of preparing proficiency applications, planning FFA banquets, preparing CDE teams, paperwork and reports, creating new curriculum, and a lack of teaching materials. Researchers have also reported that challenges faced by SBAE teachers can vary and change depending on age group and years of teaching experience (Bunch et al., 2012; Figland et al., 2019; Thornton et al., 2020). When considering certification type, alternatively certified SBAE teachers have been documented to have greater needs in professional development to overcome challenges compared to traditionally certified teachers (Coleman et al., 2020).

For agricultural teacher education programs to more effectively address the shortage of SBAE teachers, we must identify challenges teachers face. According to Joerger (2002), an assessment of teacher needs should be conducted regularly. This would provide university agricultural teacher education programs information to design and implement professional development for teachers in the field and adjust content taught to preservice teachers (Joerger, 2002; Mundt & Connors, 1999; Myers et al., 2005). Identifying challenges faced by SBAE teachers highlights areas where help through professional development may be needed. Boone and Boone (2009) recommended identifying challenges faced by SBAE teachers beyond the state or regional level, giving rise to the need for this study.

Purpose and Objectives

The purpose of this study was to identify challenges faced by SBAE teachers across the United States. The following research objectives were developed to accomplish this purpose:

1. Describe demographic characteristics of SBAE teachers across the United States.
2. Determine how challenges faced by SBAE teachers influence their ability to do their job.
3. Identify relationships between demographic variables and challenges faced by SBAE teachers.
4. Compare challenges faced by SBAE teachers among demographic groups.

Literature Review and Theoretical Framework

Human capital theory served as the underpinning for this study. According to Becker (1993), investments such as schooling and on-the-job training serve as a source to increase human capital. Increases in human capital can yield returns to individuals and society (Becker, 1993). The increased value in human capital can be used to describe teachers in public school systems (Smylie, 1996). When a person increases their human capital, they improve their competence for performing their trade or vocation (Heckman, 2000). To that end, agricultural teacher education programs can help improve human capital of teachers by providing professional development to increase teacher competence in areas that are challenging. The increased competence could then

lead to higher job satisfaction and in turn retention in their field. To accomplish this, challenges need to be identified.

Through a review of literature, we were able to identify specific challenges historically experienced by SBAE teachers. We found most challenges identified in previous studies were able to be classified into one of following areas: relationships between the SBAE teacher and others, classroom teaching activities, overall SBAE program activities and factors, miscellaneous job factors or responsibilities, professional development and advancement activities, and personal factors. Relationships between SBAE teachers and others included working with guidance counselors, other faculty members, teaching partners, administrators, the previous SBAE teacher, students in the program, university faculty, parents, and community members (Boone & Boone, 2009; Clark et al., 2014; Greiman et al., 2005; Ingersoll, 2001; Reeves, 2020; Rosser, 2020; Touchstone, 2015; Walker et al., 2004).

Challenges identified for classroom teaching activities were student motivation, discipline, working with special needs students, class size, low ability students, lesson planning, number of teaching preps, testing mandates, supplies and funding, classroom management, teaching methods, lesson planning, adult education, years of teaching experience, and lab instruction (Boone & Boone, 2009; Greiman et al., 2005; Ingersoll, 2001; Walker et al., 2004). Challenges related to overall SBAE program activities involved keeping up with FFA changes, maintaining an FFA chapter image, budgeting, fundraising, booster clubs, being competitive with livestock SAEs, FFA chapter management, advisory committees, summer programs, managing SAEs, overall program management, finding alternative funding, training LDE and CDE teams, attending fairs and exhibitions, and managing school farms or facilities (Boone & Boone, 2009; Clark et al., 2014; Greiman et al., 2005; Rosser, 2020; Touchstone, 2015; Walker et al., 2004).

Miscellaneous job factors or responsibilities reported in previous studies included challenges with low salary, time management abilities of SBAE teacher, volume of paperwork or record keeping, burnout, stress, organizational skills, school regulations, confidence, workload, state reports, and unsafe work environment (Boone & Boone, 2009; Chenevey et al., 2008; Greiman et al., 2005; Ingersoll, 2001; Kitchel et al., 2012; Smith & Smalley, 2018; Touchstone, 2015; Walker et al., 2004). Professional development and advancement activities included undergraduate preparation, professional organization activities, union activities, and professional advancement opportunities (Boone & Boone, 2009; Greiman et al., 2005; Ingersoll, 2001). Challenges tied to personal factors reported in the literature involved work and home life balance, health, marital status, life crisis, childbirth, family death, financial loss, and legal problems (Boone & Boone, 2009; Clark et al., 2014; Greiman et al., 2005).

Studies within agricultural education have identified many different challenges faced by SBAE teachers. This was certainly not a complete list of challenges faced by SBAE teachers; however, it provides insight into what teachers have faced in the past. This leads to the question do SBAE teachers still face these same challenges? Answers to this question could help agricultural teacher education programs better tailor their professional development opportunities and preservice teacher training techniques to more adequately meet the needs of teachers, keeping them in the field by increasing their human capital.

Methods

To accomplish the purpose and objectives of this study, a cross-sectional, survey design was employed (Fraenkel et al., 2019). Data for this study were collected as part of a larger experimental study exploring the influence of survey mode and incentive use on response rates. The topic of the questionnaire provided in the experiment was identifying challenges faced by SBAE teachers, thus providing the data for this study. The population considered for this study was all SBAE teachers in the United States. According to the National Association of Agricultural Educators (2020), there was approximately 12,000 SBAE teachers in the nation. The accessible population was all teachers working at an active FFA chapter as listed by the National FFA Organization. Stratified random sampling was used in this study. Participants were stratified proportionate to the number of FFA chapters in the state compared to the nation. Chapters were randomly selected, and contact information was obtained for a random advisor of each chapter. G*Power was used to estimate the desired sample size needed for the experimental portion of the study and resulting in a total sample size of $N = 1,096$. This sample size is more than adequate to describe the population according to Krejcie and Morgan (1970).

The instrument used was a 131-item, researcher designed questionnaire measuring challenges faced by SBAE teaching within six constructs: (1) SBAE teacher relationships with school and community personnel (25 items), (2) classroom factors, activities, and responsibilities (32 items), (3) agriculture program factors, activities, and responsibilities (26 items), (4) miscellaneous job factors, activities, and responsibilities (17 items), (5) professionalism and advancement factors, activities, and responsibilities (six items), and (6) personal factors, activities, and responsibilities (eight items). Each item selected to comprise construct scales was identified through the review of literature and were rated by participants measuring influence on ability to do their job. The scale ranged from $1 = \textit{very negative influence}$ to $6 = \textit{very positive influence}$ with an option of not applicable. Demographic information for each participant was also collected.

The instrument was reviewed for content and face validity by seven professors at five different institutions within three different states across the nation with expertise in SBAE teacher education and survey research methods. Members of the panel helped to ensure wording for clarity of understanding in different regions of the country and to ensure appropriate and an adequate number of items were present for each construct. To establish construct reliability, the questionnaire was pilot tested with 60 SBAE teachers in Texas who were not selected for the main study. A total of 40 SBAE teachers responded for a 66.67% response rate. A Cronbach's alpha was calculated for each construct and can be referenced in Table 1. Reliability for each construct was acceptable according to Field (2018).

Table 1

Construct Calculated Reliability for Questionnaire from Pilot Test (N = 40)

Construct	Cronbach's α
1. Relationships with school and community personnel	.86
2. Classroom factors, activities, and responsibilities	.94
3. Program factors, activities, and responsibilities	.94
4. Miscellaneous factors, activities, and responsibilities	.91
5. Professionalism factors, activities, and responsibilities	.89

After receiving IRB approval from Texas Tech University, teachers were either mailed a paper copy of the questionnaire or received mailed instructions to access an identical online questionnaire through Qualtrics. Half of the participants selected for this study received a \$2.00 incentive as required for the experimental study. After waiting two weeks, teachers were sent four reminders to respond, each one week apart. A final response rate of 40.85% ($N = 444$) was achieved. Due to the nature of the experiment, a comparison of construct summated scores of early and late respondents was conducted to control for nonresponse error (Lindner et al., 2001). Early respondents were defined as those responding in rounds one through three. Responses received after the fourth and fifth reminders were considered late respondents. There were no significant differences found between the two groups of respondents in any of the constructs.

Survey data were exported from Qualtrics for the online questionnaires into a Microsoft Excel spreadsheet. Data from the paper questionnaires were manually entered into the spreadsheet and then analyzed in IBM SPSS version 26. Descriptive statistics such as frequencies, percentages, means, and standard deviations were calculated for demographic information and individual item analysis. An average construct score was calculated for each respondent to provide for additional correlational analysis and a comparison analysis with an independent samples *t*-test. Significance was established *a priori* at $p \leq .05$.

Results

Responses were received from all states across the United States except from Maine. Slightly over half the respondents ($n = 227$, 51.13%) were male. The most frequently reported ethnicity was White or Caucasian ($n = 415$, 93.47%). Respondents had an average age of 38.69 years ($SD = 11.31$) and average teaching experience of 13.05 years ($SD = 10.17$). The education level most frequently reported by respondents was a bachelor's degree ($n = 219$, 49.44%) followed by a master's degree ($n = 216$, 48.76%). The majority ($n = 366$, 82.43%) were traditionally certified to teach agriculture through an in-person university teacher preparation program. Finally, teachers reported working an average of 51.97 hours per week ($SD = 14.80$). Selected demographic information is presented in Table 2.

Table 2
Demographic Breakdown for Survey Participants (N = 444)

Variable	Characteristic	<i>n</i>	%
Sex	Male	227	51.13
	Female	215	48.42
Ethnicity	White/Caucasian	415	93.47
	Hispanic/Latino	14	3.15
	Native American/Alaskan Native	7	1.58
	Black/African American	2	0.45
	Multiracial/Biracial	2	0.45
Highest Degree	Asian/Pacific Islander	1	0.23
	Associate's	3	0.68
	Bachelor's	219	49.44

	Master's	216	48.76
	Doctoral	5	1.13
Certification Type	Traditional	366	82.43
	Alternative	72	16.22

Note. Responses for each variable may not total to 444 due to item nonresponse.

Objective two was to determine how challenges faced by SBAE teachers influenced their ability to do their job. For scale interpretation of influence on ability to do their job, real limits were set at 1.00 to 1.49 = *Very Negative*, 1.50 to 2.49 = *Negative*, 2.50 to 3.49 = *Slightly Negative*, 3.50 to 4.49 = *Slightly Positive*, 4.50 to 5.49 = *Positive*, and 5.50 to 6.00 = *Very Positive*. Constructs 1, 2, 3, and 5 all have positive influences on SBAE teachers' ability to do their job. Constructs 4 and 6 had slightly positive influences on SBAE teachers' ability to do their job. This information is summarized in Table 3.

Table 3

Average Construct Scores for Influence on Teachers' Ability to do Job (N = 444)

Construct	N	M	SD
1. SBAE teacher relationships with school and community personnel	444	4.78	0.45
2. Classroom factors, activities, and responsibilities	444	4.51	0.56
3. Agriculture program factors, activities, and responsibilities	442	4.64	0.64
4. Miscellaneous job factors, activities, and responsibilities	441	3.98	0.70
5. Professionalism and advancement factors	442	4.57	0.72
6. Personal factors, activities, and responsibilities	440	4.03	0.95

Note. Some construct scores had slightly smaller sample sizes due to item nonresponse.

An individual item analysis was conducted for each construct to determine individual item influence on an SBAE teacher's ability to do their job. For construct one (relationships with school and community personnel) the item with the overall highest average score was relationships with students in the agriculture program ($M = 5.55$, $SD = 0.59$). This item was also the highest scoring item out of all constructs. The item with the lowest average was influences from the previous agriculture teacher ($M = 3.89$, $SD = 1.51$). Average scores for each individual item in construct one are presented in Table 4.

Table 4

Construct 1 Single Item Average Influence on Ability for Teachers' Ability to do Job (N = 444)

Item	N	M	SD
Relationships with Students in the Ag Program	444	5.55	0.59
Relationship with Custodians	438	5.53	0.67
Relationship with Other Ag Teachers in Program	234	5.48	0.87
Relationship with School Secretary	439	5.46	0.73
Competence of Other Ag Teachers in Program	235	5.34	1.06
Relationship with Local Community Members/Businesses	438	5.26	0.71
Relationship with Parents of Students in the Ag Program	443	5.22	0.70
Relationship with Other Teachers in the School	440	5.13	0.75
Relationship with Assistant Principals	290	5.11	0.85
Relationship with Principal	444	5.10	1.09

The Long-Standing Image of the Agriculture Program	431	5.06	0.97
Relationship with Transportation Director	364	5.00	0.93
Your Ability to Have Influence in the School	439	4.98	0.85
Relationship with CTE Director	283	4.98	1.15
Competence of Principal	441	4.92	1.14
Relationship with Superintendent	406	4.90	1.11
Relationship with Counselors	427	4.89	1.00
Relationship with University Faculty in Ag Education	381	4.88	0.88
Competence of Assistant Principals	289	4.87	0.96
Competence of CTE Director	286	4.86	1.31
Relationship with School Board	397	4.84	0.97
Competence of Superintendent	422	4.76	1.21
Competence of School Board	423	4.63	1.05
Competence of Counselors	427	4.51	1.28
Influences from the Previous Ag Teacher	371	3.89	1.51

Note. Total *N* for each item may not be 444 due to participants indicating N/A.

Individual item analysis for construct two (classroom factors, activities, and responsibilities) indicated years of classroom teaching experience on teaching ability had the most positive influence on SBAE teachers' ability to do their jobs ($M = 5.15$, $SD = 0.85$). SBAE teachers' ability to manage their classroom and use different teaching methods were also positive. Intrusions and interruptions on teaching time had the most negative impact ($M = 3.45$, $SD = 1.20$). Additional item averages for construct two are displayed in Table 5.

Table 5

Construct 2 Single Item Average Influence on Ability for Teachers' Ability to do Job (N = 444)

Item	<i>N</i>	<i>M</i>	<i>SD</i>
Years of Classroom Teaching Experience on Teaching Ability	433	5.15	0.85
Classroom Management	443	5.14	0.79
Ability to Use Different Teaching Methods and Strategies	442	5.07	0.79
Greenhouse Laboratory Instruction	297	4.94	1.11
Agricultural Mechanics Laboratory Instruction	346	4.92	1.05
Teaching Gifted Students	400	4.90	0.74
Animal Laboratory Instruction	284	4.84	1.04
Student Behavior	443	4.81	0.93
Student Academic Ability	433	4.76	0.80
Class Size	440	4.76	1.13
Land Laboratory Instruction	225	4.74	1.03
Engaging Students in Critical Thinking Activities	438	4.71	0.91
Student Motivation	443	4.70	1.07
Using New Technology	438	4.70	1.00
Curriculum Resources Adopted	414	4.60	1.00
Curriculum Development	428	4.57	0.94
Teaching Special Needs Students	431	4.48	0.95
Developing and Teaching New Courses	387	4.44	0.96
Managing Student Grades	438	4.43	0.99

Keeping Student Records	434	4.39	0.96
Lesson Planning	435	4.38	1.12
Instructional Budget	431	4.37	1.29
Individual Differences of Students	428	4.37	0.95
Record Book Instruction	401	4.34	1.02
Standards Alignment	424	4.33	0.94
Providing Adult Education	170	4.32	0.92
Course Load/Number of Preps	438	4.19	1.32
Amount of Time Allotted for Preparation	438	3.91	1.46
Common Core Integration	351	3.77	1.12
State Testing Requirements	333	3.52	1.20
Intrusions and Interruptions on Teaching Time	428	3.45	1.20

Note. Total *N* for each item may not be 444 due to participants indicating N/A.

In construct three (agriculture program factors, activities, and responsibilities) participants expressed that their role as the FFA advisor had the most positive impact ($M = 5.25$, $SD = 0.76$) on their ability to do their job while policy changes within the National FFA Organization had the most negative impact ($M = 3.87$, $SD = 1.00$). All item averages for construct three are presented in Table 6.

Table 6

Construct 3 Single Item Average Influence on Ability for Teachers' Ability to do Job (N = 444)

Item	<i>N</i>	<i>M</i>	<i>SD</i>
Role as the FFA Advisor	434	5.25	0.76
Managing the FFA Chapter	436	4.97	0.82
Managing the Total Agricultural Education Program	438	4.97	0.87
Attending Fairs/Showing/Exhibitions	403	4.95	0.99
FFA Officer Elections	430	4.87	0.93
Training CDE Teams	432	4.84	0.94
Being Competitive in CDEs	429	4.84	1.04
Livestock and Project Center Management	255	4.82	1.04
Training LDE Teams	419	4.76	0.95
Recruiting Students	431	4.73	1.00
Being Competitive in LDEs	410	4.72	1.06
Being Competitive with Livestock Projects	331	4.68	1.08
Running a Summer Program	304	4.62	1.01
SAE Programs	432	4.60	1.02
SAE Visits	397	4.59	1.10
Program Planning and Prioritization	431	4.58	0.96
Program Facilities and Equipment	424	4.56	1.12
Fundraising for FFA Activities	433	4.55	1.16
Planning a Summer Schedule	368	4.53	0.95
FFA Award Applications	420	4.47	1.03
Creating a Budget for FFA Activities	415	4.44	0.94
Managing the Advisory Committee	351	4.42	1.11
Managing the Booster Club/Alumni	265	4.31	1.19

Identifying Alternative Funding Sources	403	4.29	1.17
Creating a Budget for SAE Activities	339	4.24	1.09
Policy Changes within the National FFA Organization	366	3.87	1.00

Note. Total *N* for each item may not be 444 due to participants indicating N/A.

Table 7 shows individual item averages for construct four (miscellaneous job factors, activities, and responsibilities). Ability to manage finances had the most positive influence ($M = 4.95$, $SD = 0.87$) on teachers' ability to do their job followed by overall confidence in their ability as an agriculture teacher ($M = 4.92$, $SD = 0.97$). Teacher burnout ($M = 2.73$, $SD = 1.24$) and stress ($M = 2.86$, $SD = 1.26$) had slightly negative influences on their ability to do their job. Teacher burnout was the item with the lowest score out of all constructs.

Table 7

Construct 4 Single Item Average Influence on Ability for Teachers' Ability to do Job (N = 444)

Item	<i>N</i>	<i>M</i>	<i>SD</i>
Ability to Manage Finances	434	4.95	0.87
Overall Confidence in Ability as an Agriculture Teacher	436	4.92	0.97
Ability to Resolve Conflicts	437	4.81	0.90
Organizational Skills	441	4.58	1.13
Ability to Take Care of Yourself	435	4.57	1.13
Time Management Ability	439	4.50	1.15
Communicating with Students, Parents, & Colleagues	439	4.44	1.01
Salary/Compensation	433	4.21	1.21
Recognition Received for Work	411	3.72	1.43
School Regulations	411	3.67	1.15
Other School-wide Duties	421	3.66	1.16
Completing State Reports	393	3.64	1.13
Unsafe Work Environment	259	3.64	1.43
Having to Complete Paperwork for the School	439	3.36	1.15
Workload/Volume of Work	434	3.00	1.32
Stress	429	2.86	1.26
Teacher Burnout	401	2.73	1.24

Note. Total *N* for each item may not be 444 due to participants indicating N/A.

Concerning construct five (professionalism and advancement factors) state professional organization activities had positive impacts ($M = 4.84$, $SD = 0.93$) on teachers while teacher's union activities had slightly positive impact ($M = 3.84$, $SD = 1.16$). This information is summarized in Table 8.

Table 8

Construct 5 Single Item Average Influence on Ability for Teachers' Ability to do Job (N = 444)

Item	<i>N</i>	<i>M</i>	<i>SD</i>
State Professional Organization Activities	416	4.84	0.93
Professional Development Activities Attended	433	4.80	0.93
Undergraduate Preparation/Training	429	4.60	1.02
National Professional Organization Activities	388	4.60	0.91

Opportunity for Professional Advancement	401	4.44	1.02
Teacher's Union Activities	276	3.84	1.16

Note. Total *N* for each item may not be 444 due to participants indicating N/A.

The sixth construct (personal factors, activities, and responsibilities) revealed marital status had positive impacts ($M = 4.72$, $SD = 1.23$) on SBAE teachers' ability to do their job. Legal problems, financial loss, and death of a relative or close friend all had slightly negative influence on SBAE teachers' ability to do their job. Individual item averages are presented in Table 9.

Table 9

Construct 6 Single Item Average Influence on Ability for Teachers' Ability to do Job (N = 444)

Item	<i>N</i>	<i>M</i>	<i>SD</i>
Marital Status	389	4.72	1.23
Health	419	4.45	1.11
Birth of Children	261	4.30	1.39
Work and Home Life Balance	438	4.00	1.28
Life Crisis	275	3.75	1.33
Death of a Relative or Close Friend	265	3.27	1.24
Financial Loss	230	3.21	1.27
Legal Problems	140	3.14	1.45

Note. Total *N* for each item may not be 444 due to participants indicating N/A.

The third objective of this study sought to identify relationships between demographic variables and challenges faced by SBAE teachers. Correlations were calculated with the demographic variables: sex, certification type, age, and amount of time spent working each week. Constructs one ($r_{pb} = -.19$), three ($r_{pb} = -.11$), four ($r_{pb} = -.19$), and six ($r_{pb} = -.18$) all had low associations with participant sex and had the greatest coefficient magnitudes of any demographic variable. (Davis, 1971). Three positive, low associations were found between the construct scores and age. Two negative, low associations were found between construct scores and time spent working each week. All calculated coefficients for demographic relationships are presented in Table 10.

Table 10

Demographic Correlations with Average Construct Scores (N = 444)

Construct	Sex (r_{pb})	Certification (r_{pb})	Age (r)	Work Time (r)
1. Relationships	-.19	-.06	.13	-.08
2. Classroom	-.08	-.02	.14	-.07
3. Program	-.11	-.07	.04	.01
4. Miscellaneous	-.19	-.02	.14	-.15
5. Professionalism	.05	-.07	.02	.00
6. Personal	-.18	-.02	.05	-.15

Note. Sex was coded 1 = Male, 2 = Female. Certification was coded 1 = traditional and 2 = alternative. pb = point-biserial.

The final objective of this study was to compare challenges faced by SBAE teachers among demographic groups. Based on the magnitude of correlations reported for objective three, an independent samples *t*-test was calculated comparing average construct scores of male and

female SBAE teachers. Male SBAE teachers had significantly higher average construct scores in all constructs with the exception of professionalism. Calculated effect sizes were generally medium to large (Cohen, 1992). Refer to Table 11 for a complete breakdown of the independent samples *t*-test.

Table 11

Comparison of Average Construct Scores on SBAE Teacher Challenges by Sex (N = 444)

Construct	Male (n = 227)		Female (n = 215)		<i>t</i> ₄₄₀	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
1. Relationships	4.86	0.44	4.69	0.45	4.00	<.01	.44
2. Classroom	4.55	0.56	4.46	0.54	1.73	.04	.55
3. Program	4.71	0.65	4.56	0.60	2.37	.01	.63
4. Miscellaneous	4.11	0.75	3.85	0.59	4.08	<.01	.68
5. Professionalism	4.53	0.76	4.60	0.68	-0.95	.17	.72
6. Personal	4.19	0.97	3.85	0.88	3.84	<.01	.93

Conclusions, Implications, and Recommendations

From the demographic data collected in this study, it can be concluded the national population of SBAE teachers is becoming more evenly split between male and female teachers, aligning with findings of previous studies and indicating a representative sample of the population (Lawver et al., 2018). The profession is also largely made up of White or Caucasian teachers. When examining education obtained by SBAE teachers, we found there was a near even split between teachers earning bachelor's degrees and teachers earning master's degrees. SBAE teachers also were mostly traditionally certified.

The purpose of this study was to identify challenges faced by SBAE teachers so that agricultural education teacher preparation programs may be able to increase human capital by providing support or professional development in areas that are challenging teachers. Personal and miscellaneous job factors, activities, and responsibilities are two areas that have only slightly positive influences on SBAE teachers' ability to do their jobs. This confirms previous findings where items related to these areas negatively influenced SBAE teachers' ability to do their jobs (Clark et al., 2014; Touchstone, 2015; Walker et al., 2004). Within the miscellaneous job factors, teacher burnout was the item most negatively impacting SBAE teachers' ability to do their job, highlighting an ongoing problem identified by previous research (Boone & Boone, 2009; Chenevey et al., 2008; Kitchel et al., 2012; Smith & Smalley, 2018).

SBAE teacher relationships, agriculture program and classroom factors, activities, and responsibilities, and professional/advancement factors all positively influenced SBAE teachers' ability to do their job. This may indicate some improvement over findings from previous studies (Boone & Boone, 2009; Greiman et al., 2005; Ingersoll, 2001; Walker et al., 2004). Within each construct we find specific items or factors that have negative or slightly negative influences on SBAE teachers' ability to do their job, however the overall influence of these general areas is positive. The single item with the most positive influence on SBAE teachers was relationships with students in the agriculture program. This indicates SBAE teachers enjoy getting to know their students, and this may be a driving factor for keeping teachers in the field.

Demographic correlations revealed low associations between sex of participants and construct scores. Through a comparison of average construct scores, we found female SBAE teachers were more likely to perceive challenges impact them more negatively than their male colleagues in all constructs except for professionalism. This supports the findings of previous research, indicating this is a continuing problem (Baxter et al., 2011; King et al., 2013). Only negligible associations were found with certification type; however, each association was in the direction of greater challenges for alternatively certified teachers. Correlations were all positive with age, indicating as teachers gain experience, different aspects of their job become less of an obstacle to do their job effectively, particularly in the areas of relationships, classroom activities, and miscellaneous tasks. The relationships found with age support findings of previous studies related to needs of teachers at different points in their careers (Bunch et al., 2012; Figland et al., 2019; Thornton et al., 2020). When we look at the relationship between the amount of time teachers spend at their job each week and the impact of challenges, we see low to negligible negative relationships. This may indicate as teachers become busier and spend greater percentages of their time working, the impact of challenges faced become more negative. This was reflected the most in the miscellaneous activities and personal activities constructs.

Based on the findings and conclusions of this study, several recommendations for practice emerge so that we may be able to increase human capital in SBAE teachers. We recommend agricultural education teacher preparation programs provide additional training for current students and teachers already in the field on managing the miscellaneous activities related to teaching. With burnout identified as the most negative factor, strategies should be developed and taught to teachers to effectively deal with this challenge, thereby increasing their human capital, resulting in retention in the field. Communicating ways to deal with personal life factors may be useful for SBAE teachers. While we cannot control what happens in teachers' personal lives, we may be able to help them better prepare for how to deal with challenges as they arise related to their performance at work. Legal challenges were the most negative personal influence for SBAE teachers. This might be an area in which state professional organizations could help.

There are several opportunities for additional research related to challenges faced by SBAE teachers. Within the area of teacher burnout, we recommend identifying teachers who have had this challenge and determine strategies used to overcome it, resulting in retention in the field. The development of a job satisfaction instrument could also be useful to the profession to better predict when a teacher may be on the verge of quitting. Further research should also be conducted to determine best practices for dealing with negative miscellaneous and personal factors, activities, and responsibilities. Concerning the differences in challenges faced by male and female SBAE teachers, additional research should focus on effective ways to remedy this issue and insure equality among both sexes.

Studies identifying challenges faced by SBAE teachers should periodically be conducted in the future. Information from broad national studies can serve as a reference for establishing a research agenda related to SBAE teacher human capital. From this study specific items within each construct may help identify areas needing further exploration so that we may be able to help some of our most important stakeholders who are currently in the field and continue to improve our craft in training future SBAE teachers.

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Changes in Teacher Identity and Sense of Belonging among First-Year SBAE Teachers in Utah

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A shortage of SBAE teachers exists and teacher retention is critical, especially among early career teachers. The first year of teaching is difficult yet contains critical experiences contributing to teacher longevity. Exploring teacher's sense of belonging and teacher identity can unveil aspects that effect a teacher long-term. First-year SBAE teachers in Utah participated in this study. Pre-data were collected in Fall of 2019 and post-data were collected in Spring of 2020 during the COVID-19 pandemic. Data were collected to gain information regarding changes in sense of belonging and teacher identity with seven constructs: 1) global teacher identity 2) intrinsic satisfaction 3) knowledge and skill 4) perceived peer support 5) perceived faculty support 6) perceived comfort 7) perceived isolation. Constructs were measured at two points in time. All dimensions of teacher identity and sense of belonging dropped throughout the school year with intrinsic satisfaction and perceived peer support being the largest and most significant dimensions to decrease. The COVID-19 pandemic likely influenced the decrease in teacher identity and sense of belonging constructs. First year teachers indicated low levels of social isolation through their first year. Some dimensions of teacher identity and sense of belonging were significantly related to career longevity intentions.

Introduction and Need for the Study

One purpose of school-based agricultural education (SBAE) is to prepare students for careers in agriculture and STEM fields (Fraze & Briers, 1987; Phipps et al., 2008). Yet, School-based agricultural education (SBAE) has faced a teacher shortage for more than 50 years (Eck & Edwards, 2019) and that shortage continues to be a recurring issue among SBAE programs (Lawver et al., 2018). Every school year, SBAE programs close due to a lack of qualified educators to fill needed teaching positions (Foster et al., 2020). The lack of qualified SBAE teachers can result in fewer students motivated to pursue careers in agriculture and STEM related fields where shortages of skilled workers already exist (Goecker et al., 2015). Thus, solving the SBAE teacher shortage issue is critical in meeting the workforce demands within agriculture.

The SBAE teacher shortage issue can be solved by addressing two major areas: recruitment and retention. While both areas are critical, this research is situated in the lens of retention, with the goal of reducing teacher turnover. Recent supply and demand studies and literature within agricultural education indicate teacher turnover as an important issue needing to be addressed within SBAE (Foster et al., 2020; Sorensen, 2016).

Teaching agriculture is demanding and challenging (Torres et al., 2008) and can be particularly challenging for first-year teachers (Mundt & Connors, 1999; Myers et al., 2005). Many teachers leave the teaching profession within the first few years (Ingersoll & Smith, 2003).

Research indicates that the majority of first-year SBAE teachers do not intend to teach beyond three years (Warnick et al., 2010). The COVID-19 pandemic exacerbated the challenges faced by SBAE teachers (McKim & Sorensen, 2020; McKim et al., 2021). The increased social isolation and social distancing required during the pandemic likely had negative consequences on new teachers' sense of identity and sense of belonging, important factors contributing to teachers remaining in the profession (Arroyo, 2020; Cunningham, 2020; Freedman & Appleman, 2008). Yet, little is known about changes in agriculture teacher identity and sense of belonging during the first year of teaching. This study sought to describe the changes in first year agriculture teacher identity and sense of belonging as a result of the pandemic and its influence on teachers' career longevity intentions.

Literature Review & Conceptual Framework

Multiple theories help to explain how teacher identity and sense of belonging change among beginning agriculture teachers. For this study, we rely primarily on the sociocultural theory of Vygotsky (1986) and Communities of Practice (Lave & Wenger, 1991; Wenger 1998). Vygotsky's sociocultural lens explains teacher development as a process occurring through interactions with others while Lave and Wenger (1991) describe how identity and sense of belonging can be constructed through legitimate peripheral participation in a community of practice. In essence, new agriculture teachers develop a sense of identity and belonging as they participate in teaching practices and make sense of those experiences. Teacher identity development and a sense of belonging is essential for professional growth and longevity (Freedman & Appleman, 2008). Through this sociocultural lens, we can understand changes in first-year agriculture teacher identity and its relationship to longevity intentions.

One's senses belonging and identity are interconnected. Group participation and group exclusion within a community of practice can influence one's view of themselves and their perceived identity (Lave & Wenger, 1991). For example, some individuals change their identity to increase their sense of belonging within a community or group. Alternately, a strong sense of belonging can provide new experiences altering one's sense of identity. At the same time, one's identity, or sense of self, can influence the groups with which one chooses to participate. Teacher identity therefore is connected to a teacher's sense of belonging. Conceptually, new agriculture teachers enter a community of practice (e.g., like-minded practitioners with similar experiences) as they begin their first-year of teaching, which can influence their sense of belonging and identity as a teacher. Through this sociocultural lens, we can understand how social isolation and other consequences of the pandemic might influence a teacher's sense of belonging and identity within their school and community and ultimately influence their longevity intentions in the profession.

Sense of Belonging

Sense of belonging and teacher identity play key roles in teacher retention, but are different concepts. A sense of belonging within the school community can be conceptualized as

the degree to which one feels they share common interests, experience, expertise, and desires with others in the school community (Lave & Wenger, 1991). It can also be described to which an individual feels connected, accepted, supported, respected by others in a social setting (Baumeister & Leary, 1995; Hagerty, et al., 1992). According to Maslow's hierarchy of needs, sense of belonging is a basic human need (Maslow, 1962). Humans have a natural desire to feel as if they belong somewhere, which is vital for human motivation and development (Deci & Ryan, 2000). A sense of belonging is an important aspect of engagement in a community of practice (e.g., teaching profession), which can strengthen one's desire to remain in the profession (Lave & Wenger, 1991).

Sense of belonging is a critical variable related to first-year teacher's decision to remain in the profession. A sense of belonging creates purpose and meaning in one's career (Lambert et al., 2013). New agriculture teachers who lack a sense of belonging within their school or school district will be less satisfied and more likely to leave the profession early (Hasselquist et al., 2017). The pandemic induced isolation and a lost sense of belonging for teachers and students across the country (Heider, 2021). Yet, due to a lack of research, it is unclear how beginning agriculture teachers' sense of belonging changed during the first-year of teaching during the pandemic.

Teacher Identity

Teacher identity can be defined as the "beliefs, values, and commitments an individual holds toward being a teacher" (Hsieh, 2010). Teacher identity is developed at the beginning of a teacher's career and is critical during the first year of teaching. A variety of factors influence the development of a professional identity, like that of being a teacher. Molinero and Pereira (2013) suggested professional identity is developed through six factors. These factors include social experiences; learning experiences; aligned beliefs and values with the profession; demographic characteristics and background; professional image; and professional experience. Research shows that a strong sense of professional identity is related to a sense of belonging and attachment (Ashforth & Mael, 1989), professional mastery of skills and knowledge (Ronfeldt & Grossman, 2008), self-efficacy, motivation, and career commitment (Canrinus et al., 2012). Specific to teacher identity, research has shown a relationship between strong sense of teacher identity and teacher retention (Arroyo, 2020; Cunningham, 2020; Freedman & Appleman, 2008). Teacher induction programs have been shown to help new teachers develop a strong sense of teacher identity (Findley, 2006; McNalley et al., 2008).

Within SBAE, identity development is important in professional maturation of teachers (Roberts et al., 2020). The demands placed on SBAE teachers requires that a unique professional identity be developed among new teachers (Shoulders & Myers, 2011). Literature in teacher development connects aspects of the environment, such as school policies, with teacher identity development (e.g., Assaf, 2008). As COVID-19 required drastic changes in policies and teaching practices among SBAE teachers, identity development was likely hindered. However, it is

unclear how beginning agriculture teachers' identity changed during the first-year of teaching during the pandemic.

COVID-19

In the spring of 2020, COVID-19 was declared a pandemic. COVID-19 greatly impacted the economy and also the public educational system. Many educators and school districts were required to change the modes and methods of teaching they had become accustomed to (Daniel, 2020). As a result, many SBAE teachers faced a variety of challenges negatively impacting job satisfaction and increasing stress (McKim & Sorensen, 2020; McKim et al., 2021, Shoulders et al., 2021). One particular challenge of the pandemic was the increased isolation and lack of in-person interactions (Heider, 2021). participation in a community of practice fosters a sense of belonging and teacher identity among members of the community. As a result of the pandemic, it is possible therefore that new SBAE teachers did not develop a sense of belonging or teacher identity. It is unknown how COVID-19 affected new teachers, particularly in terms of teacher identity and sense of belonging.

Purpose and Objectives

The purpose of this study was to examine changes in first-year SBAE teacher identity and sense of belonging during the COVID-19 pandemic. Additionally, we sought to describe first year agriculture teachers' career longevity intentions. The following research objectives were developed to guide this study.

1. Describe changes in first-year SBAE teacher identity during the COVID-19 pandemic.
2. Describe changes in first-year SBAE teacher sense of belonging during the COVID-19 pandemic.
3. Describe changes in first-year SBAE teacher career longevity intentions during the COVID-19 pandemic.
4. Explain the relationship between first year teacher identity, sense of belonging, and longevity intentions.

Methodology

Population, Sampling, & Data Collection

We used pre-post survey methods to determine the changes in teacher identity, sense of belonging, and career longevity intentions among first-year SBAE teachers. The population for this study included a census of all first-year agriculture teachers in Utah that participated in the new teacher induction program ($n = 9$) during the 2019-2020 school year. The teachers all participated in a mentoring and professional development new-teacher induction program throughout their first year, from June 2019 to June 2020. We administered the first survey and collected pre-data face-to-face in November 2019, before the pandemic, at a new teacher

professional development meeting using a paper-pencil survey. We collected the second and final set of data (post-data) in May, 2020, during the pandemic, using the online survey system Qualtrics. Both sets of surveys were identical in content, only the delivery method was different. All nine of the participants in the new teacher induction program completed both sets of surveys yielding a 100% response rate of useable responses. Due to the low number of participants and the sampling methods utilized, the findings and conclusions of this study are not intended to be generalized beyond the scope of the study participants.

Instrumentation

As part of a larger study, the survey instrument for this specific analysis consisted of previously established measures for teacher identity and sense of belonging. Additionally a measure of career longevity intentions was included in the instrument. Face and content validity for the instrument were evaluated by a panel of experts which included research faculty and graduate students familiar with survey research methods and analysis.

Teacher identity was measured using the teacher identity scale developed by Starr et al., (2006) with the constructs of Global Identity (three items, Cronbach's $\alpha = .750$ [pre], .815 [post]), Intrinsic Satisfaction (four items, Cronbach's $\alpha = .743$ [pre], .709 [post]), and Knowledge & Skill (three items, Cronbach's $\alpha = .772$ [pre], .896 [post]) being measured. Global identity measured the overall sense of self in the teaching profession. A sample survey item included "I see myself as a teacher." Intrinsic satisfaction measured one's perceived intrinsic satisfaction from teaching. A sample survey item included "working with students is worth it." Knowledge & Skill measured one's perception of possessing knowledge and skill about teaching. A sample survey item included "I feel skilled as an agriculture teacher." Constructs were measured on a six-point scale (1 = *strongly disagree* to 6 = *strongly agree*). Larger means for each construct indicates a greater sense of professional teacher identity.

The survey instrument also consisted of a 17-item revised Sense of Belonging Scale (Hoffman et al., 2002) which consisted of four constructs slightly modified for this population: (1) Perceived Peer Support (six items, Cronbach's $\alpha = .754$ [pre], .751 [post]); (2) Perceived Comfort (three items, Cronbach's $\alpha = .727$ [pre], .827 [post]); (3) Perceived Isolation (four items, Cronbach's $\alpha = .902$ [pre], .759 [post]); and (4) Perceived Professional Support (four items, Cronbach's $\alpha = .866$ [pre], .938 [post]). Perceived peer support measures the level of support provided by peers (e.g., other agriculture teachers). A sample survey item included "other agriculture teachers are helpful to me." Perceived comfort measures one's comfort level with others. A sample survey item included "I feel comfortable sharing my ideas with others in the profession." Perceived isolation measures how socially isolated one feels. A sample item included "nobody in the agriculture teaching profession knows anything personal about me." Finally, perceived faculty/professional measured the level of support provided by state staff of university faculty. A sample survey item included "I feel that agricultural education state staff support my efforts as an agriculture teacher." Constructs were measured on a six-point scale (1 =

strongly disagree to 6 = *strongly agree*). Apart from Perceived Isolation, larger means for each construct indicates a greater sense of belonging.

To measure career longevity intentions, participants were asked to respond to the open-ended prompt, “how many years do you anticipate being an agriculture teacher?” Participants were asked to respond in whole numbers indicating to indicate the number of years they intended to remain in the profession.

For research objectives 1, 2, and 3 means and standard deviations were calculated for each construct of interest and then pre- and post-data were compared to determine changes across time. Due to a small sample size, pre- and post- means were compared using the non-parametric one-sample Wilcoxon signed exact rank *t*-test (Harris & Hardin, 2013). Effect sizes for the signed-rank test were calculated using the rank-biserial correlation by dividing the test statistic by the square root of the number of pairs (Tomczak & Tomczak, 2014). Finally, to analyze research objective 4, a Spearman’s Rank-Order correlation was conducted to determine the relationships between career longevity intentions and teacher identity and sense of belonging constructs (Myers & Well, 2003).

Results

The first research objective sought to describe changes in first-year SBAE teacher identity during the COVID-19 pandemic. Descriptive statistics for research objective 1 are found in Table 1. Overall, the high means for the dimensions of teacher identity indicates the participants maintained a strong sense of teacher identity throughout the school year. Intrinsic satisfaction was the highest rated dimension of teacher identity. Over the course of the year, all constructs of teacher identity dropped with global teacher identity and intrinsic satisfaction being statistically significant with medium and large effect sizes respectively (Cohen, 1988). The findings show that first-year SBAE teachers in Utah felt less satisfied with their jobs and perceived less of a sense of professional teacher identity at the end of the school year compared to the beginning.

Table 1.

Changes in First-Year Agriculture Teacher Identity (n = 9)

Construct	M (Pre)	SD	M (Post)	SD	W	p	Effect
Intrinsic satisfaction	5.45	0.42	4.75	0.31	-2.53	.012	.842
Global teacher identity	5.40	0.58	4.73	0.44	-2.20	.028	.734
Knowledge & Skill	4.82	0.76	4.40	0.41	-1.87	.062	.622

Note. Construct items scaled from 1 “Strongly Disagree” to 6 “Strongly Agree.”

Descriptive statistics for research objective 2 are found in Table 2. Overall, participants indicated having a sense of belonging within their professional community by agreeing they have perceived support from peers and faculty and feel comfortable within the profession. Participants also indicated low levels of isolation. All constructs of teachers’ sense of belonging dropped over

the course of the first year. The Perceived Peer Support and Perceived Faculty Support constructs showed a statistically significant drop with medium effect sizes (Cohen, 1988).

Table 2.

Changes in First-Year Agriculture Teachers' Sense of Belonging (n = 9)

Construct	M (Pre)	SD	M (Post)	SD	<i>W</i>	<i>p</i>	Effect
Perceived Peer Support	5.26	0.49	4.56	0.41	-2.37	.018	.790
Perceived Faculty Support	5.25	0.87	4.31	0.63	-1.97	.049	.657
Perceived Comfort	4.67	0.78	4.33	0.55	-0.95	.344	.315
Perceived Isolation	2.26	0.91	1.75	0.78	-0.98	.326	.328

Note. Construct items scaled from 1 “Strongly Disagree” to 6 “Strongly Agree.”

Research objective 3 sought to describe changes in first-year SBAE teacher career longevity intentions during the COVID-19 pandemic. Teachers in this study reported a non-significant drop ($p = .34$) in their Career Longevity Intentions from 25.38 years ($SD = 9.61$) at the beginning of the school year to 21.75 ($SD = 11.54$) at the end of the school year.

Research objective 4 sought to describe the relationships between career longevity intentions and teacher identity and sense of belonging among first-year SBAE teachers. All dimensions of teacher identity showed positive relationships with longevity intentions. Intrinsic Satisfaction ($r_s(9) = .82, p > .01$) and Knowledge & Skill ($r_s(9) = .71, p = .03$) were statistically significant large relationships (Cohen, 1988), while Global Identity ($r_s(9) = .37, p = .32$) was a medium but statistically non-significant relationship. All dimensions of sense of belonging showed positive relationships (r_s range = .56 - .74) to longevity intentions except perceived isolation, which was a negative relationship ($r_s(9) = -.31, p = .42$). Thus, a greater sense of belonging was shown to be related to intentions to remain in teaching longer. While effect sizes were mostly large (Cohen, 1988), only Perceived Comfort showed a statistically significant relationship ($r_s(9) = .74, p = .02$) to longevity intentions.

Conclusions and Recommendations

The purpose of this study was to provide an analysis of the change in sense of belonging and teacher identity throughout the first year of teaching agriculture. This research is unique as the pre-data were collected before the COVID-19 pandemic and the post-data were collected during the COVID-19 pandemic. Little is known about how the pandemic influenced teacher identity, sense of belonging, and career longevity intentions among first year agriculture teachers. This research helps to answer those questions. While findings for this study are not

generalizable beyond the study population, we believe this research is a critical first step in understanding the sociocultural importance (Wenger, 1998; Vygotsky, 1986) of developing a teacher identity and sense of belonging during the first year of teaching, particularly as it relates to teacher longevity. This research is also a critical step in understanding the impact of the COVID-19 pandemic on first year teachers' sense of belonging and teacher identity. COVID-19 was taken into consideration when drawing conclusions and recommendations. We have drawn three main conclusions from this study: (1) sense of belonging and teacher identity dropped during the first year (2) first-year SBAE teachers do not feel socially isolated (3) There is a relationship between career longevity intentions and sense of belonging and teacher identity.

Conclusion 1: Sense of belonging and teacher identity dropped during the first year

All dimensions of both sense of belonging and teacher identity dropped throughout the first year of teaching for these SBAE teachers. It is possible that the pandemic influenced the drop in first-year teachers' sense of belonging and teacher identity. For example, teachers likely experienced a decrease in satisfaction as they were required to move from in-person instruction to remote instruction in the spring of 2020. This finding aligns with recent findings showing SBAE teachers across the country experienced a drop in job satisfaction as a result of the pandemic (McKim & Sorensen, 2020). The teachers in this study had experienced a full semester of in-person instruction. During this time, it is likely the teachers developed a sense of teacher identity through various social, learning, and professional experiences (Molinero & Pereira, 2013). As a result, these teachers likely experienced a sense of success and self-efficacy as well as a sense of belonging and attachment to the SBAE profession (Ashforth & Mael, 1989; Canrinus et al., 2012). Due to the drastic changes in education during the pandemic, these first-year teachers had to change their teaching practices entirely, shifting from hands-on to remote learning almost overnight and cancelling core aspects of traditional SBAE activities like SAE and FFA events and activities (McKim & Sorensen, 2020). Perhaps the shift in social and professional experiences changed what it meant to be an SBAE teacher, and these first-year teachers were left trying to align their own sense of professional identity to the new set of teaching practices. It is not surprising therefore that intrinsic satisfaction and global teacher identity dropped over the course of the year.

Significant drops in peer support and faculty support were found in this study. This is not surprising as a primary response to the pandemic was to socially distance and isolate. While virtual technology was utilized to facilitate communication and maintain connections, any relationships and support networks that the first-year teachers had established through in-person interactions were no longer available. Perhaps the new teachers were unable to connect to peers and faculty for support like before the pandemic. This conclusion aligns with recent findings showing that SBAE teachers across the country struggled with all professional communication during the pandemic (McKim & Sorensen, 2021). The lack of communication with peers and faculty certainly influenced the level of support these new teachers experienced.

While these findings are interesting, one major question still remains unanswered. Are the observed changes from this study due to the pandemic or is this the natural development of first-year teachers? It is possible that first-year teachers' sense of belonging and teacher identity do indeed drop after their first year, which could help explain why so many intend to leave the profession within the first few years (Warnick et al., 2010). However, without more research examining changes in changes in teacher identity and sense of belonging among first-year teachers outside of a pandemic, it is difficult to know.

A limitation of this study is that data were only collected in November and June and not at midway points throughout the first year. This only allowed us to see change in a linear way. It is likely that teachers' sense of belonging and teacher identity follow the phases of a first-year teacher (Moir, 1990). In this regard, we first collected data after the anticipation phase and during the survival phase, where challenges are overwhelming. We then collected data after the school year during the reflection and anticipation phase, when teachers look forward with positive anticipation to the next year. Yet, if results are interpreted through this lens, it would make more sense to see an increase in teacher identity and sense of belonging rather than a decrease. As a result of these questions, it is important for future research to examine teacher identity and sense of belonging throughout the school year.

Conclusion 2: First year SBAE teachers do not feel socially isolated

Despite the social distancing and lack of in-person activities, teachers in this study reported low levels of social isolation at both stages of data collection. In fact, while not statistically significant, the respondents actually reported less social isolation during the pandemic than at the beginning of the school year. This finding suggests that first-year teachers continue to develop social networks throughout their first year. The first set of data was collected in November, so these teachers had been teaching for over two months. It makes sense that very few networks had been established and some sense of isolation still existed. It is also encouraging to know that despite the response to the pandemic, new teachers were able to develop a strong sense of belonging without feeling isolated. Perhaps this is because all teachers were in the same situation and the new teachers did not have to feel like they were alone in their challenges. Conceivably the pandemic may have leveled the playing field enabling new teachers with a variety of technology skills to mentor more experienced teachers, thus helping them feel valued as an important part of the school team. If this is the case, it could explain why the construct Comfort did not experience a significant drop. Perhaps the new teachers felt sufficiently comfortable with the technology required for remote learning. More research should be conducted examining social isolation changes and the roles and social interactions of first-year SBAE teachers.

Conclusion 3: Career longevity intentions, sense of belonging, & teacher identity relationships

We are encouraged by our findings that the new teachers in this study intend to teach for more than 20 years beyond their first year. This is different from much of the literature suggesting a majority of teachers intend to or actually do exit the profession after only a few years (Ingersoll & Smith, 2003; Warnick, et al., 2010). A small and statistically insignificant drop in career longevity intentions was observed, but given the educational environment during the pandemic, and the fact that teacher job satisfaction dropped across the country (McKim & Sorensen, 2020), finding that these first-year teachers still plan to remain in the teaching profession for longer than 20 years is quite encouraging. However, this study consisted of a small sample size, so conducting other studies in other states and with larger sample sizes would be beneficial.

We found the dimensions of sense of belonging and teacher identity were significantly related to teacher longevity intentions, which aligns with other research findings (Arroyo, 2020; Cunningham, 2020; Freedman & Appleman, 2008; Hasselquist et al., 2017; Lambert et al., 2013). While intrinsic satisfaction (identity), knowledge and skill (identity), and perceived comfort (sense of belonging) were statistically significant, all dimensions of teacher identity and sense of belonging showed positive relationships to career longevity with medium to large effect sizes. Intrinsic satisfaction had the largest effect size indicating the importance of job satisfaction in retaining SBAE teachers (e.g., Clemons & Lindner, 2019; Sorensen & McKim, 2014). As a result of this finding, helping teachers develop a strong sense of belonging and teacher identity within their community of practice (Lave & Wenger, 1991) is critical to keeping teachers in the profession. A number of factors contribute to teacher turnover, and this study has helped to identify the importance of sense of belonging and teacher identity as important factors related to teacher retention.

As a result of this study, we recommend more research be conducted with a larger sample size and without a pandemic to better understand the changes in teacher identity and sense of belonging in first-year agriculture teachers. This will help researchers to identify patterns and trends among SBAE first-year teachers across the profession. We also suggest qualitative research through a sociocultural lens to examine the nuances that influence the development of new SBAE teacher identity and sense of belonging. Data should be collected in intervals throughout the year so the phases of teacher identity and sense of belonging for first-year teachers can be charted.

In practice, state staff and district leadership should continue to support and foster programs for new teachers that specifically support the development of teacher identity and sense of belonging. A focus on maintaining positive levels of intrinsic satisfaction is critical for new teachers if they are to remain in the teaching profession. Since comfort yielded a significant relationship to career longevity intentions, teacher induction programs specific to first-year SBAE teachers should consist of peer mentoring and support to help new teachers feel comfortable in the profession. Additionally, as knowledge and skill were shown to be significant factors in career longevity intentions, new teacher induction programs should continue to focus on professional development activities specific to SBAE.

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Examining How Alternatively Certified Teachers Participate in Agricultural Education Community of Practice

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Utilizing Wenger's (1998) work of Communities of Practice and hermeneutic phenomenology, the purpose of this study was to examine the phenomenon of participation among alternatively certified agriculture teachers in the agriculture teacher community of practice. Two themes emerged as we interpreted the findings: (1) we're all in this together, and (2) belonging. The findings illustrate the advantages and challenges alternatively certified agriculture teachers identify as they take part in the agriculture teacher community through interactions and support. State leaders in SBAE should use the findings and recommendations as they welcome alternatively certified agriculture teachers into the profession and seek to provide support.

Introduction and Literature Review

The certification of agriculture teachers through alternative routes continues to persist as school districts and policymakers facing a shortage of qualified teachers seek to ensure enough teachers in classrooms (Foster et al., 2020; Ingersoll & Smith, 2003). Traditionally in school-based agricultural education (SBAE), agriculture teachers are certified through teacher education programs at universities focusing on agricultural education (Flowers & Martin, 2010). However, alternative routes to certification include programs that reflect traditional teacher preparation programs, licensure for those with industry experience in the subject area, and emergency certification subject to state policy. Alternative certification of agriculture teachers dates to at least the 1970s and 1980s (Bowling & Ball, 2018; Flowers & Martin, 2010; Moore, 1976) and continues with 16.5% percent of new agriculture teachers in the United States certified through an alternate during the 2019 school year (Foster et al., 2020). Agriculture teachers holding an alternative certification may have industry experience, a degree in agriculture, or are certified to teach in another content area (Flowers & Martin, 2010) and often chose to decide to teach after earning an undergraduate degree (Claflin et al., 2020). For this study, we defined an alternatively certified agriculture teacher as any individual who did not become licensed to teach through a traditional teacher preparation program in agricultural education and/or holds a provisional teaching license in agricultural education.

Researchers have taken various approaches to understand if alternatively certified agriculture teachers are effective and identify the support they need. Overall, alternatively certified teachers are noted to be less effective in the classroom (Doerfert, 1989; Moore, 1976; Robinson & Edwards, 2012). Although students did not perceive a difference between industry-prepared teachers and traditionally prepared teachers (Moore, 1976) and alternatively certified teachers could explain effective teaching even though they were not demonstrating those same techniques (Robinson, 2010). State supervisors of agricultural education believe alternatively certified agriculture teachers have high expectations for the classroom but are not competent in teaching strategies or understanding the expectations for FFA and supervised agricultural experiences (SAE; Rice, 2012). Granted, alternatively certified agriculture teachers recognize they have a basic understanding of SAEs (Robinson & Haynes, 2012) and feel capable of

advising an FFA chapter but admit there is more to learn and look to support from state staff (Kinney, 2011).

In seeking to provide support to alternatively certified agriculture teachers, teacher educators have investigated the professional development needs and efficacy of teaching and program management in their states, often comparing traditionally and alternatively prepared agriculture teachers. Findings indicate early career alternatively certified agriculture teachers are influenced by their background as they identify professional development needs, recognizing their education and potential lack of training (Roberts et al., 2020). Alternatively certified agriculture teachers and traditionally certified teachers sometimes differ in efficacy levels and professional development needs (Coleman et al., 2020; Duncan & Ricketts, 2008; Roberts & Dyer, 2004; Robinson & Edwards, 2012; Stair et al., 2019), while other studies indicating no statistical differences between traditionally and alternatively certified teachers (Rocca & Washburn, 2006; Swafford & Friedel, 2010). For those studies in which alternatively certified agriculture teachers rated a higher level of efficacy or ranked professional development needs lower, researchers posited that alternatively certified agriculture teachers may not be able to recognize their deficiencies due to lack of knowledge (Rocca & Washburn, 2006; Roberts & Dyer, 2004; Robinson & Edwards, 2012).

Previous research on alternatively certified agriculture teachers is grounded in the idea that alternatively certified agriculture teachers need additional knowledge and training to be successful. In regard to learning, Sfard (1998) denotes this approach to learning as a metaphor of acquisition. In this metaphor, individuals are consumers as they learn by acquiring knowledge, often via a teacher or facilitator (Sfard, 1998). While seeking to understand the needs and abilities of alternatively certified agriculture teachers remains paramount, we would benefit from expanding our view of learning. Sfard presents such an option as a contrast to learning by acquisition through the participation metaphor, which recognizes learning as a process that occurs within a community. As individuals come together in a community, they influence and inform one another, with the end goal of not possessing knowledge but instead belonging and participating (Sfard, 1998).

The participation metaphor advanced by Sfard (1998) aligns with research by Claflin et al. (2021), which examined how alternatively certified agriculture teachers learn in the community of agriculture teachers. The study participants learned from other agriculture teachers as they connected through phone calls, visiting at events, and social media, whether it was figuring out how to complete FFA paperwork, manage facilities, or ideas for teaching content (Claflin et al., 2021). The more alternatively certified agriculture teachers engaged with other agriculture teachers, they deepened their understanding and made meaning of what it meant to be an agriculture teacher (Claflin et al., 2021).

While there is a shortage of teachers, we will continue to see alternatively certified agriculture teachers enter the classroom. Prior literature on alternatively certified agriculture teachers provides insight into the needs of the population. However, alternatively certified agriculture teachers are not a homogenous group with the nuances in their industry experience, teacher preparation, academic degrees, and route to certification (Claflin et al., 2019; Claflin et al., 2020; Flowers & Martin, 2010). There are still many unanswered questions about alternative

certification in school-based agricultural education (SBAE), including how alternatively certified agriculture teachers learn about and participate in school-based agricultural education (Claflin et al., 2021). Bowling and Ball (2018) proposed SBAE establish “programming that develops a community of practice within these teachers that connects them to the larger teaching community and professional culture within agricultural education, that is unique to the practice of teaching school-based agriculture” (p. 118). Given this recommendation and the recognition that learning can occur through participation, this study seeks to understand how alternatively certified agriculture learn from and participate in the unique SBAE agriculture teacher community of practice.

Theoretical Framework

In taking up Sfard’s (1998) notion of learning through participation, we utilized Wenger's (1998) theory of communities of practice (COP), a social learning theory, as our theoretical framework. Wenger (1998) described COP as shared histories of learning that communities develop over time and influence how and what members learn (i.e., how members engage with each other, hold each other accountable). Communities of practice exist all around us and we may participate in the practices, norms, and routines without recognizing them (Wenger, 1998). Examples of COPs include school organizations, families, and colleagues who engage in similar tasks. However, not all groups are a COP. Wenger noted a COP is differentiated from other groups based on three characteristics: mutual engagement, joint enterprise, and shared repertoire. Mutual engagement constitutes the relationships and commitment to each other (i.e., interacting with other agriculture teachers), joint enterprise comprises the practices of the members and is mutually negotiated (i.e., the reason why they teach agriculture), and shared repertoire incorporates activities and symbols of the community (i.e., the FFA emblem and SBAE acronyms) (Wenger, 1998).

As we focused on the participation of alternatively certified agriculture teachers, we grounded our work on the ideas of practice, newcomers, and community membership (Wenger, 1998). Practice is related to how we make meaning, which we negotiate through participation and reification. Participation is the "action and connection" within a COP (Wenger, 1998, p. 56), while reification occurs when an abstract object or an idea becomes concrete. For example, agriculture teachers participate in training students for FFA contests as they stay after school to facilitate practice sessions and focus on their students’ winning competitions, and are often rewarded by banners and trophies, which are reified (Traini et al., 2019). Wenger (1998) described communities of practice as shared histories of learnings which the communities develop over time and influence how and what members learn (i.e., how members engage with each other, holding each other accountable, and cultivating or discarding routines). Newcomers to a community of practice learn how to participate as they observe others as legitimate peripheral participants and are mentored by experienced members or brokers. Brokers are individuals within a community of practice who assist newcomers in making connections, exposing them to practices, and assist in meaning making (Wenger, 1998).

Regarding an individual's community membership, which may or may not be explicitly labeled, Wenger (1998) noted our “membership in a community of practice translates into an identity as a form of competence,” (p. 153). Through mutuality of engagement, we understand the expectations of how we collaborate. Our perspective of the world and the choices we make

are also informed by our accountability to an enterprise or purpose of the community of practice (Wenger, 1998). Finally, in relation to community membership, as we continue to participate, we become more competent in the negotiability of the repertoire, becoming familiar with the language, terms, and stories, and creating our own associations regarding the community.

For this study, we argue that alternatively certified agriculture teachers participate in a community of practice consisting of other agriculture teachers who experience similar ways of engaging with each other, identify as agriculture teachers and are committed to their purposes, and understand SBAE terms and other shared repertoires. We also acknowledge that communities of practice are constant evolving and influenced by those who participate in the practices of the group. The use of Communities of Practice (Wenger, 1998) will build on prior studies (Traini et al., 2019), while providing a new lens to understand the experiences of alternatively certified agriculture teachers.

Purpose and Research Question

This study was part of a larger research project that explored the experiences of alternatively certified agriculture teachers and how they learn and participate within the agriculture teacher COP, grounded in the social learning perspective of Wenger's (1998) Communities of Practice. The specific research question for this study was *how do alternatively certified agriculture teachers participate in the agriculture teacher community of practice?*

Methods

This study sought to explore the lived experiences of alternatively certified agriculture teachers by employing a hermeneutic phenomenological approach focused on the phenomenon of *participation in the agriculture teacher COP*. Phenomenology is grounded in the study of everyday lives through meaning-making and reflection (Merriam & Tisdell, 2016; van Manen, 2014). Through the hermeneutic phenomenological approach, we adopted an ontological view that emphasized interpretation, recognizing the importance of personal knowledge to the research process, allowing researchers to acknowledge their own experiences and knowledge (Lopez & Willis, 2004; van Manen, 2014). Regarding the phenomenon under study, *participation in the agriculture teacher COP*, all three researchers are current teacher educators in agricultural education who were trained through a traditional teacher preparation program and are former agriculture teachers.

A phenomenological study should encompass only participants who have experienced the phenomena being examined (van Manen, 2014); therefore, we considered all secondary agriculture teachers who held an alternative license in agriculture and/or did not complete a traditional route to agriculture teaching. We aimed to include participants from across the United States and selected nine states based on prior research and anecdotal data relating to alternative certification. We all considered location within the American Association of Agricultural Education (AAAE) regions, aiming for participants from three selected states in each of the three AAAE regions (American Association for Agricultural Education, 2017). Agricultural education state staff and teacher educators from nine states were asked to recommend participants who met the criteria for the study. Contacts from eight states agreed to share a list of names and emails of teachers who were alternatively certified who were then recruited via email to participate in the study.

The thirteen individuals who chose to participate in the study were assigned pseudonyms. Six participants identified as females (Angela, Erin, Hannah, Karen, Mindy, and Pamela) and seven participants identified as males (Aaron, Cody, Evan, Hayes, Randy, Robert, and Wade). Seven participants had prior experience with SBAE as a student (Aaron, Cody, Evan, Hannah, Hayes, Mindy, Robert, and Wade) and taught SBAE for between one year (Evan) and 26 years (Randy). The participants varied in their path to the classroom, with three participants holding a teaching certification in a different content area before teaching agriculture (Angela, Pamela, Randy), three individuals who worked in the agriculture industry (Aaron, Karen, and Robert), and three individuals completed teacher education courses and either did not meet licensure requirements or accepted a teaching job before concluding the program (Cody, Hannah, and Wade).

Due to the importance of participants sharing their lived experiences and personal narratives in phenomenological studies, interviews were chosen as the source for data collection (Cohen et al., 2000; Merriam & Tisdell, 2016). We developed a semi-structured interview protocol to ensure questions were centered around the phenomenon and allowed for flexibility based on each participant's narrative they shared while being grounded in the theoretical framework and prior literature (Merriam & Tisdell, 2016). For example, participants were asked to describe the agriculture teacher community, describe their experiences interacting with the agriculture teacher community, and whether they considered themselves members of the community. Semi-structured interviews were conducted over Zoom in the winter and spring of 2020.

Interviews were transcribed verbatim, and the lead researcher's field notes were used as an additional data source. Throughout the analysis, we engaged with the *hermeneutic* circle, as we interpreted data "between part of the text and the whole text" (Sloan & Bowe, 2014, p. 1296) to uncover the meaning related to the phenomenon (Lopez & Willis, 2004). As we sought to locate meaning from the narratives of the lived experiences of our participants, which eventually emerged as themes after an extensive coding process (van Manen, 2014), we utilized eclectic coding—adopting both structural and in vivo coding—to highlight conceptual phrases, as well as short phrases verbatim from the participants (Saldaña, 2009). We adopted the framework advanced by Merriam and Tisdale (2016) to maintain trustworthiness in the study based on credibility, consistency/dependability, and transferability. Additionally, we aimed to establish transferability through "thick" description as we provided rich details of the participants, their context and made connections with themes, theory, and meanings (Geertz, 1973).

Findings

Through the analysis to answer the research question, *how do alternatively certified agriculture teachers participate with the agriculture teacher community of practice?* two themes emerged: (1) *we're all in this together*, and (2) *belonging*. The findings feature the lived experience of participants as they shared narratives of their participation with the agriculture teacher community of practice, including how they interact with other agriculture teachers (i.e., mutuality of engagement) and see themselves as members of the community (i.e., accountability to an enterprise).

We're All in this Together

As the participants discussed how they participated in the agriculture teacher community of practice, they overwhelmingly talked about the connections and support which fellow agriculture teachers provided. Three sub-themes developed as participants discussed how they interacted with agriculture teachers, the unique familial feeling of the group, and the willingness to help one another.

Sit and Mingle

Participation in the agriculture teacher community of practice centered on *where* and *how* the agriculture teachers in the study were connecting with others in the community, including sources of tension on some occasions. Over and over again, participants mentioned the value they placed on connections they had with other agriculture teachers. These connections were formed through repeated interactions at FFA events (i.e., conventions, contests, meetings) and agriculture teacher meetings (i.e., conferences and committees) throughout the year. Karen noted, "we're all at stuff together all the time. It's amazing how much we see of one another." Additionally, participants shared emails, text messages, phone calls, and interactions via social media were all crucial for them to keep in touch.

Many participants discussed how easy it is to relate to other agriculture teachers due not only to the same occupation but sharing similar values and interests outside of work. The agriculture teachers in the study talked with pride of their relationships with other agriculture teachers. Hayes related his experience talking with agriculture teachers from across the country at the National FFA Convention and National Association of Agricultural Educators (NAAE) Convention exclaiming, "it's ridiculous getting to sit there and talk to them and talk about their problems. We all have similar problems, and we all are in closely related areas and come from similar backgrounds." Participants look forward to the opportunities to meet up with agriculture teachers that usually included a chance to catch up both professionally and personally. Participants shared that when they saw other agriculture teachers, they wouldn't just catch up about teaching agriculture and their schools but would check in on their families. Erin shared how she used email to banter with other agriculture teachers, but they would also stop by and visit one another. She noted, "we would get together for coffee and talk about what we were teaching. We had a pretty open-door policy for stopping into our programs." Robert and Cody also mentioned how their interactions with other agriculture teachers transferred into their personal life, as they often get together with other agriculture teachers to go hunting or hang out.

One crucial component of the connections between agriculture teachers occurred at in-person events when agriculture teachers would "huddle up" or "sit and mingle". Participants shared that when they brought students to events, they would find other agriculture teachers, maybe around a pot of coffee. This time was used to bounce ideas off of each other, ask questions, and "sharpen the saw." Hannah talked about how she took advantage of this opportunity sharing, "I always make a point to go find an ag teacher that I know to talk about how things are going, and what's something new that you're doing?" As a fellow early-career teacher, Evan echoed the value found in taking the time at events to connect with others, highlighting how the conversations between agriculture teachers allowed them to share suggestions and help each other out. Professional development and state-level agriculture teacher meetings, usually run through the state agriculture teacher association, were a space where

participants visited with other agriculture teachers and gained information relevant to their positions. Mindy talked about the fall agricultural education professional development event she attends sharing noting, “I really, really love that cause that’s when you get to meet with all the teachers, and they share a lot of their experience.” Six of the participants commented that they tended to stick to the agriculture teachers they knew when networking, as they had a stronger relationship those individuals.

While the participants in this study overwhelmingly had positive experiences as they participated in the agriculture teacher community of practice, there were notes of tensions and non-participation shared by four of the participants. These participants were subtle as they shared how their participation was different from how they viewed the rest of the agriculture teacher community, either due to personal decisions or values. For instance, Aaron took part in professional development and took students to events but didn’t exude the same passion when talking about connecting with other teachers. He stuck to those agriculture teachers he knew and mentioned how at contests, “it’s not really a collaboration, it’s just more of someone to talk to while we’re waiting for the contest to get over.” For Pamela, it was challenging to commit to attending a multiple-day professional development conference during the school. However, she felt strongly about the value of connecting with other agriculture teachers and would try to attend for one day.

Erin and Angela both highlighted their interest in nontraditional agriculture as an impediment for connecting with other agriculture teachers. This difference was accentuated for Erin due to her experience in two different states. In the first state where she taught in, there were several non-traditional agriculture programs and the agriculture teachers willingly shared ideas and resources with each other. After Erin moved to another state, she found fewer agriculture teachers willing to collaborate with her due to her non-traditional agriculture focus. Likewise, Angela has found it more challenging to connect with agriculture teachers who were not as welcoming due because of her non-traditional agriculture background or did not recognize her experience teaching another content area. While she admitted having respect for the other agriculture teachers and was able to develop a rapport, Angela has really continued to grapple with the tensions that exist as she has negotiated meaning as a member of the agriculture teacher community. She shares, “It’s hard, I feel I’m in the Ag Ed world, but not often. And my students notice, my students know, they’re like, she’s just different.”

Ag Teachers are Like Family

The term, *family*, and especially descriptions of how the agriculture teacher community of practice is like a family, arose from six of the participants. The term first came as the agriculture teachers in the study tried to describe the agriculture teacher community. For many of the participants, there was a distinctive pause before answering, as Randy mentioned, “it’s hard to put into words.” Participants shared terms like tight-knit, collegial, clannish, and family, as they described the community, with Hayes adding, “it’s pretty surreal how tight we really are.” For this group of participants, they likened connecting with fellow agriculture teachers to connecting with their own family and mentioned checking in on each other’s families during interactions, before asking about school. Pamela compared this connection with that of a family holiday as she recalled her experiences at an FFA contest:

We're kind of like a family, you know what I mean? It's, like, you arrive, you sit down. 'How's the kids? How's your husband? How's your wife?' You know? Many of the ag teachers have side businesses, you know, "what do you know, how's your business going?" And it's more personal. It's like you're coming into Thanksgiving dinner with your family.

Beyond the support and togetherness felt, participants, noted that agriculture teachers not only wanted to know about your family, but they also stood up for you and, reached out to help during troubling times (car accidents, death, divorces, etc.). Hayes, Evan, and Angela all shared instances where the community emulated a family as they strived to take care of each other. Hayes mentioned the state-wide memorial for agriculture teachers and spouses that teachers contribute to so that flowers can be sent for the funerals of those in the community. Evan shared an example of how the agriculture teachers in his region were discussing how to help a fellow teacher who had been in an accident. When Angela suffered a loss in her family, she received a check from the Agricultural Educator Relief Fund coordinated through NAAE, while neighboring agriculture teachers dropped off food and sent notes.

Helpful, but...

As participants shared their interactions within the agriculture teacher community of practice, they not only discussed the networking or familial nature, but the sheer amount of assistance members provided to each other. The willingness of agriculture teachers to offer help or answer questions was prevalent throughout each interview, as if helping one another is expected. The more experienced agriculture teachers in the study referenced how they valued serving as mentors and giving back to the profession. The early-career teachers in the study shared how they were supported by other agriculture teachers through the sharing of curriculum, teaching strategies, fundraisers, and advising FFA chapters. Cody really credited his success to his network of fellow agriculture teachers and being able to call teachers who were willing to answer his questions. Similarly, the agriculture teachers in the study were also sharing budgets, helping with fundraising, and helping each other in other ways. Other agriculture teachers were also quick to offer help with whatever the participants needed. Many participants shared how other agriculture teachers encouraged them to reach out when they needed something. Likewise, the participants shared how they needed to be able to take up the teachers on their offers to help or be forthcoming and reach out themselves. Although the act of helping each other seemed to be woven into the fabric of the community of practice, both Karen and Hannah seemed to think the success of the profession was behind the drive to help. Karen highlighted the feeling of "we all succeed together" while Hannah expanded on that idea in relation to agriculture teacher retention,

Everybody has been fantastic and the ag [teacher] community is extremely welcoming. They want people to be successful because they don't want them to leave the career. They want them to stay in it because there's clearly a shortage of ag teachers. And so, I think that they're so positive and welcoming because we don't want to lose those people and we want them to have positive experiences because if they don't, they're not going to stay.

As helpful as agriculture teachers were, participants noted the competitive nature of agriculture teachers around FFA contests was often a hindrance to receiving assistance. While

there were different experiences among participants, the general concept remained the same - competition in FFA served as an underlying aspect of the community of practice. The “cutthroat” attitude of agriculture teachers regarding FFA contents was raised by several participants as they described agriculture teachers, but also how they interact with one another. Pamela shared the dualism she recognized in agriculture teachers,

I think they're extremely helpful, well, at the same time being competitive. What I've noticed about our ag teachers in our region -- we had a district competition yesterday -- Last night they're competitive there, but once we figured out who moved them, they kind of join you. We join forces and we invite their students to our schools, and we help each other out.

Pamela's experience showcased that competition does not necessarily equal rudeness but helps describe the certain aspects of the profession agriculture teachers are willing to help each other out with. Similarly, Hannah noticed at FFA contests, agriculture teachers are “harder for me to interact with than at professional development because they don't have students competing against something and so they can open up and they're easier to have discussions with.” Other participants, Karen and Mindy, how other agriculture teachers were helpful based on whether they saw them as competition. Karen noted that, while people shared contest materials freely, “maybe at some point if we get a little better that will dry up a bit.” Likewise, Mindy shared, I would say people are a little more open and willing to share ideas when you're not a competitor. But the more competitive you get in certain events; I feel like the less helpful people are. They're not standoffish, just we share a lot less ideas when we think that we're competing.

Belonging

The participants in this study agreed they were members of the agriculture teacher community of practice but acknowledged the amount of interaction with other members evolved over their time in the profession. Conversations regarding membership in the community of practice revolved around feelings of belonging, a notion Wenger (1998) indicated was a requirement for engagement in a community, as is the engagement itself. As participants were probed to explain their membership in the community, they talked of paying their dues (both literally and figuratively), their own ability to contribute to the group, as well as being recognized for their contributions and achievements by others. Throughout discussions of the agriculture teacher community of practice, many participants mentioned the state agriculture teacher associations they belonged to as a source of networking, but also camaraderie, which led participants to associate that group with membership in the community of practice. For instance, Evan first noted he considered himself a member because, “I had to pay my dues,” before elaborating on how his personal associations with other agriculture teachers were part of his membership in the community of practice.

Other participants referred to the felt need to “pay their dues” to the community of practice through gaining respect from more experienced members, helping other agriculture teachers, and being recognized by other members. As Wade shared why he considered himself a member of the agriculture teacher community of practice he emphasized, “I think it's just being able to contribute and help out those that need it. I think that's really what it's all about.” Pamela and Mindy agreed as they shared being able to give presentations or serve as a resource to other

agriculture teachers provided them legitimacy in the community. As Mindy talked about her membership, she was hesitant to call herself a full member. The doubt stemming from other members not seeing her as a member, even though they reached out to Mindy with questions - she still felt like she was on the low-end of the pecking order within the community of practice. For Pamela, simply being included encapsulated the feeling of membership, remembering:

The first time I walked into the conference, you know, you're looking around the room and you didn't know anybody. And then the next time you walk in, you have a seat saved for you. I think that's the point, you belong.

Unfortunately, not all participants shared in the feeling of belonging in the agriculture teacher community of practice. For those who came from outside of SBAE, they experienced a sense of being outsiders, due to their non-conventional agriculture focus and background. Pamela noted when she first started teaching agriculture she didn't feel as connected to other agriculture teachers, because she lacked the same level of experience in animal agriculture, but now she has animals and feels "embedded in it". Erin and Angela were still grappling with their participation and membership in the agriculture teacher community due to differing views of agriculture and experiences, such as not attending the same college as most other agriculture teachers in their state. Erin noted after moving to another state to teach, it was challenging to fit in and connect with others, commenting, "I just feel like I don't have a place at the table." For Angela, the tension between staying true to herself and trying to fit in with the group made things difficult, sharing,

I've developed a rapport with my local teachers.... We've come to a point where we respect each other enough to get along, but it's hard knowing we don't share the same vision for what we're teaching.

However, as participants continue to share their experiences related to participating in the agriculture teacher community of practice, belonging became less of a dichotomy (i.e., you either belong or you don't) and more of a continuum. Many participants noted how they did not identify as members of the community early in their careers, either due to lack of experience or knowledge of the community. For five of the participants, they only began actively participating in the community after their first few years of teaching and when they had gained a better understanding of how agriculture teachers interact with each other and including the expectations of them as new members of the community of practice. Karen described how she didn't start participating until after she felt her "head was above water" in regard to teaching and managing an agriculture program. Randy and Hayes both talked about how over time, they became involved in leadership roles within their state agriculture teacher's' association, while Evan noted that identified his long-term goal of serving in leadership roles. Once again, the idea of helping each one another was highlighted as a way the participants interacted within the community of practice. Randy shared, "I found a point in my life where I really felt it's important to give back to the organization and to the other ag teachers." Although Randy, the participant with the most agriculture teaching experience, also shared that how he considers himself a member, but is not as involved as he once was, affirming, "Even though I'm on the edges.... I'm still definitely part of the community."

Discussion

This study utilized hermeneutic phenomenology to study the phenomenon of participation of alternatively certified agriculture teachers in the agriculture teacher community of practice. The research presented in this manuscript is a component of a larger study that explores the lived experiences of alternatively certified agriculture teachers within the agriculture teacher community of practice. Two themes emerged in the findings: (1) *we're all in this together* and (2) *belonging*. The results of this study indicate alternatively certified agriculture teachers are actively participating in the agriculture teacher community of practice as they connect with agriculture teachers at FFA events and SBAE meetings, recognize the familial bond of the group, and the willingness of members to support each other.

While the participants all identified as members of the agriculture teacher community of practice, many noted their level of participation increased after their first years of teaching. Additionally, there were aspects of outsider status for the participants who did not experience SBAE as a student and did not share traditional views of agriculture and the values of the larger group. These findings are consistent with the ideas shared by Wenger (1998) in *Communities of Practice*, as members define the community through mutual engagement as they develop relationships and engage with one another, whether it is positive or involves conflict. Likewise, Wenger notes that being included, or belonging, is needed for participation in a community of practice.

Participants continually referred to the implied sense that agriculture teachers looked out for one another, apparent in the theme, *we're all in this together* and the subtheme, *ag teachers are like family*. The agriculture teachers in the study shared experiences of having other agriculture teachers reach out to them to offer advice and make sure they were available as a resource, whether they were in the classroom or at a FFA event. DeLay and Washburn (2013) found collaboration among agriculture teachers often occurs informally with the "sense of community, leading to the construction of shared knowledge and culture" (p. 114). In terms of *Communities of Practice*, the level of support provided, and familial nature can be equated to the mutuality of engagement in community membership (Wenger, 1998).

Regarding the subtheme, *helpful, but...* participants noted while other agriculture teachers were eager to help answer questions, share curriculum, and brainstorm ideas for the agriculture program, they weren't as helpful when it came to FFA contests, assuming that was due to the competitive nature of contests. The aspect of competition, another aspect of mutual engagement in the community of practice, has recently been explored in SBAE as a reification of the community and equated to a success trap (Traini et al., 2019; Traini, Roberts, & Yopp, 2020). The agriculture teachers in these studies felt pressure by other agriculture teachers to be successful, which was defined partly by the number of awards and contests won by students. While competitions were not the focal point of this study, contests and the competitive nature are clearly part of the agriculture teacher community of practice, as referenced by the participants in this study and prior research.

In the second theme, *belonging*, participants shared how they felt included by other agriculture teachers and how their levels of belonging and membership changed over time. Wenger (1998) noted inclusion is required for membership in a community of practice, although not all members are full members. Participants shared how they felt compelled to contribute to

the community to be seen as a member, which can be interpreted as their accountability to the enterprise of the agriculture teacher community of practice (Wenger, 1998). Accountability to an enterprise influences members to make certain decisions and act in specific ways they feel have value within the community of practice (Wenger, 1998). Additionally, participants noted they did not consider themselves full members of the agriculture teacher community of practice as soon as they started teaching. Reasons for the delay included a postponed introduction to the community, waiting until they felt more competent in the classroom, and time to figure out what was expected.

Recommendations

As SBAE researchers and teacher educators, we do not want to diminish the importance and value of traditional agricultural education teacher preparation but offer these recommendations to be proactive and meet the needs of alternatively certified agriculture. We echo the recommendation of Bowling and Ball (2018) that the profession should take "...a supportive and proactive stance," (p.118) towards alternative certification. As alternatively certified teachers enter the profession, we cannot presume they have no experience in SBAE or no teacher preparation. The majority of the participants in this study had traditional teacher preparation in agricultural education or another content area before becoming alternatively or provisionally certified; and each had slightly different experiences getting certified due to changing policies, which is supported in prior literature (Claflin et al., 2019, 2020).

While prior literature offers insight to the professional development needs (Coleman et al., 2020; Roberts & Dyer, 2004; Stair et al., 2019), the informal aspects of professional development and programming directly related to the implicit practices of the community, should also be considered. For instance, do alternatively certified teachers know the expectations for engagement at professional development and meetings (i.e., the method of introductions) and terminology that will be used? We also recommend those in SBAE be mindful of how to ensure teachers are welcoming and kind to teachers who may differ in their SBAE background or focus of agricultural education. The participants in this study recognized the agriculture teacher community had a sense of togetherness and helpfulness but highlighted underlying strains for "outsiders". What is the long-term impact of these strains on the SBAE profession? We call for SBAE leaders to be forward-looking and consider what changes need to be made to ensure a productive agriculture teacher community of practice.

The need for continued research on alternative certification in SBAE is justified to ensure a more robust understanding of this important population of educators. We recognize this study is but one piece of the puzzle. There are certainly limitations to this avenue of research, as anecdotal evidence highlights differences among states regarding levels and types of alternative certification, as well as types of programming, adding to the confusion. The focus of the most current literature in SBAE is on the *needs* of alternatively certified teachers, not from the perspective of the alternatively certified teachers and but based on how this valuable population of teachers is gaining entrance to and understanding the practices of the agriculture teacher community of practice. We do not currently have a sound understanding of successful programming (i.e., induction programs, mentoring) implemented across states and with teachers from varying years of experience or the positive effects of content shared at professional development by alternatively certified agriculture teachers. We recommend both qualitative and

quantitative studies to provide additional insight to ensure quality support of alternatively certified agriculture teachers. As long as there are policies that allow alternative certification, we cannot ignore this pathway into the SBAE profession.

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What is in it for me: Reasons to Join the Teachers' Professional Association

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Agricultural Education relies heavily on national and state professional associations to serve School Based Agricultural Education (SBAE) teachers. Because there is not 100% membership in these organizations across the country, it is vital to learn what is holding teachers back from joining and identify the needs of current members to encourage continued membership. The purpose of this descriptive survey study was to gain a deeper understanding of teacher motivations to join their state ag teacher professional association and identify priority areas for initiatives. Data were collected from 245 SBAE teachers through a Qualtrics survey using skip logic to gather information from members and non-members. Results indicated most members were joining for networking opportunities and professional savvy. Cost and communication were indicated as limiting factors for non-members. Current members identified that curriculum resource sharing, new teacher resources, and teacher retention efforts should be very high on the list of priorities for the association. State association leaders should utilize this research to focus on networking and professional development initiatives as well as opening the lines of communication with stakeholders. Future research investigating demographic differences in decision to join and qualitative follow-up with members who have left may also be warranted.

Introduction and Review of literature

Professional associations exist to support those employed within the association's field. According to Markova et al. (2013), for members to be enticed to join, professional associations must provide something of benefit to their members. The North Carolina Agriculture Teachers Association (NCATA) recognizes professional duty, benefits derived from additional membership to the National Association of Agricultural Educators (NAAE), access to an online resource library, relevant professional development opportunities, and priority FFA chapter registration for FFA camp as benefits to the association (North Carolina Agriculture Teachers Association [NCATA], 2021). Knowing there are many benefits of joining NCATA and the primary purpose of the professional association is to serve all members within a profession, why are North Carolina School Based Agricultural Education (SBAE) teachers not joining NCATA? What factors are influencing teachers to join and what topics are high priority to encourage renewed membership in future years?

Benefits of Professional Associations

Since professional associations are specific to their fields, all benefits are not relevant to all other associations. There are common benefits between many associations such as journals, professional development opportunities, legislative representation, networking opportunities, insurance coverage, and marketing for the profession (Bauman, 2008; DeLeskey, 2003; Markova et al., 2013). Many of these benefits can positively affect all professionals in a field, not just members of their association, like legislative representation, access to scholarly journals, and professional development opportunities (Bauman, 2008). For many early career professionals, membership in a professional association can provide a support system as well as help establish

them as a professional within their field (Markova et al., 2013; Mata et al., 2010). Conversely, more seasoned professionals can place a higher value on the more concrete benefits of membership such as publications, conferences, etc. (Markova et al., 2013). Ki and Wang (2016) used structural equation modeling to determine that both personal and professional benefits offered, and members' satisfaction with the benefits, impacted the behavioral intention to join a professional association. Professional associations must keep in mind that each professional in the field is at a different point in their career and personal lives, and many work in varying professional climates which all impact what professionals view as personal benefits (Bauman, 2008).

Issues Faced by Professional Associations

There are many issues that can keep potential members from joining a professional association. Often, cost of membership is a major factor in hesitancy to join and maintain membership over time in a professional association (Bauman, 2008; DeLeskey, 2003; Markova et al., 2013). Along with cost, some fields have multiple professional associations that serve them—such as a national teachers association and a national school counselor's association that maintain relevance for a school counselor, but a professional in that field may choose to join only one to save money (Bauman, 2008). Many professionals have indicated that their availability of time limits their ability to fully participate in a professional association, therefore it is not valuable for them to become a member (Bauman, 2008; DeLeskey, 2003). Lack of easily accessible resources or events can also create a barrier for potential members to struggle to see the point in maintaining membership due to the amount of time that it takes to access these materials (Deleskey, 2003). Clear communication within the association and about the association are also vital to show members and potential members that their time is valued within the association (Bauman, 2008; Markova, 2013). Due to the variety of ages and work experience among a target audience in a professional association, if the leaders are not actively working to serve all demographics there can easily be groups within the profession that do not feel their membership is necessary (Markova, 2013). Professional associations should be aware of potential issues barring those in their field from joining or renewing membership and work to combat these issues within their organization.

Agricultural Education Profession

There has been little recent research focused on SBAE teacher association membership and no known empirical work with this particular state association. Lawver and Lee (1990) identified four major factors that positively influenced a SBAE teacher's likelihood to join what is now the National Association of Agricultural Education. Those four factors included not being a member of a teacher union, having experience in production agriculture, teaching in a traditional secondary school, and having been student members of a professional organization (Lawver & Lee, 1990). There is reason to believe these four factors are not the major influences in current SBAE teachers' decisions to join their professional association because the demographics of SBAE teachers in North Carolina is significantly different today compared to previous years (Foster et al., 2020). The National Supply and Demand Project (Foster et al., 2020) identified that female SBAE teachers have outnumbered males in North Carolina increasingly since 2017. King et al. (2013) established that along with their long working hours and expectations at work,

the majority of female teachers in the southeast are also balancing family responsibilities. The National Supply and Demand Project (Foster et al., 2020) also identified that in North Carolina, between 20-30 (roughly 5%) SBAE teachers annually are alternatively certified. Because these teachers are not entering the profession through a traditional teacher preparation program, they are likely not exposed to the opportunity to become a student member of the professional organization. SBAE teachers are young-over 65% of current NC SBAE teachers have 10 or less years of experience in the classroom (Joshua Bledsoe, State Director, email communication, January 2022). Early career teachers need different support compared to mid and late-career teachers. It is valuable to learn the needs of SBAE teachers in North Carolina so that NCATA can work to meet those needs to ensure that all SBAE teachers are finding value in the organization, joining annually, and feel supported at a professional level to encourage longevity in the profession.

Theoretical Framework

The decision to join a professional association can be framed through multiple theories and all are valuable in understanding the human decision to join, and remain, a member. Exchange Theory (Ritzer & Goodman, 2003) postulates a person is making an economic decision when considering membership and must see more value (personal or professional) than cost (money, time, etc.). This is closely related to Bandura (1997) and the Expectancy Value Theory which would postulate that a person will make the decision to join a professional association when they anticipate a positive and valuable outcome. Lastly, membership in a professional organization can be framed through Social Identity Theory (Turner, 1982). This theory would postulate that a person affiliates with a particular organization if they see that group as a method to increase their self-esteem. This theory indicates membership is more likely to occur when the perception of the professional group is positive such that a person would want to associate with the group. When taken together, these theories help illuminate the complex decision-making process a person undertakes when choosing to join a professional association.

Purpose and Objectives

The purpose of this study was to gain a deeper understanding of teacher motivations to join their state ag teacher professional association. We also sought to understand how they wanted state leadership to prioritize new initiatives.

The specific objectives of this study were to:

- 1) describe why North Carolina SBAE teachers are choosing to join their professional association
- 2) describe why North Carolina SBAE teachers are choosing not to join their professional association
- 3) rank the priority tasks to be undertaken by the organizations' leadership team

Methods

This study utilized a descriptive survey design. The accessible population was all teachers in the North Carolina ag teacher directory ($N = 555$) as of May 2021. These teachers were contacted

with the survey link, regardless of whether they were members of the state professional association. First emails were sent via Qualtrics in May 2021 with two follow-up reminders sent via email in June. Upon completion of data collection, 245 complete responses were received for a 44% response rate. To assess the potential of non-response error, respondents were compared to available state population data and found to share similar demographic characteristics.

Instrumentation

The instrument was designed using skip logic to gather information from both members and non-members. The instrument contained four sections, after an initial screening question to determine membership. Section one, asked of members only, utilized scale items from an instrument validated and established as reliable by Price (1993). These scales contained items where members were asked to rank the importance in their decision to join on a scale from 1= Extremely important and 5= Not at all important. Since we did update the context of the statements to be agriculture teacher association specific, we also calculated post-hoc reliability. Values for the four subscales ranged from .83 to .92 (see Table 1) which are all acceptable values (Nunnally, 1978). Section two asked non-members to indicate all the reasons they were not joining from a pre-populated list. This list was established using information informally collected by the [State] teachers’ association in an earlier survey. We also included an “other” option and the opportunity to add open-ended responses. The third section was asked of all respondents regardless of membership status and utilized ranks to prioritize initiatives the state ag teachers’ association has received as suggestions in the past. Finally, in the fourth section, all respondents were asked some demographic characteristics including years teaching, level taught (middle school or high school or both), sex, and teaching certification type.

Table 1
Post-hoc Construct Reliabilities

Construct	Number of items	Cronbach's alpha
Networking	6	.87
Education	7	.86
Professional Savvy	8	.83
Leadership	10	.92

Of those responding to the survey, 74 were not current members and 155 were members. The proportion of respondents who were male and female aligned with the larger population data for the state and the average years of experience gathered from respondents aligned with available state data. The average respondent was 37 years of age (*SD* = 11.12) with the females averaging 34 years of age and the males averaging 41 years of age, again mirroring the wider state data.

Findings

When understanding why those respondents who were members were joining NCATA, the data indicated networking is the main driver of their decision, followed by professional savvy, then education, and lastly leadership (Table 2).

Table 2
Constructs impacting members decision to join

Construct	M	SD
Networking	2.25	0.79
Professional savvy	2.56	0.71
Education	4.04	0.79
Leadership	4.12	0.86

Note: Coded: 1= Extremely important, 2= Very important, 3= Moderately important, 4=Slightly important, 5= Not at all important

Examples of statements for the networking construct include “networking with other ag teachers” and “NCATA is where I get to see people I know.” Examples of items from the education construct include “NCATA is where I learn new skills” and “hearing speakers of national prominence in agricultural education.” Examples of items from the professional savvy construct include “making contacts that increase my employment opportunities” and “learning more about the profession including salaries and opportunities.” Examples of items from the leadership construct include “I want to serve in a leadership position (officer) within NCATA” and “influencing the future direction of NCATA.”

We also asked some individual items about the benefits offered through state membership to see how that might be impacting the decision to join. North Carolina passed legislation in 2017 whereby all SBAE teachers at the high school level shall be employed for 12 calendar months (North Carolina General Statutes 115C, 2017). Currently, 435 of 460 high school SBAE teachers in North Carolina are 12-month employees (Joshua Bledsoe, State Director, email communication, October 2021). It is important to note this legislation does not apply to the state’s 96 middle school teachers, 93 of whom are 10-month employees. The teacher professional association funded a portion of a lobbyist’s time and was instrumental in securing this legislation. Many people indicated that protecting 12-month employment was extremely or very important in motivating them to pay their membership dues (85.72%). The other benefits included liability insurance through NAAE, which 69% of teachers indicated was extremely or very important and funding a lobbyist in the legislature to focus on the interests of ag education which was rated as extremely or very important by 68% of members. Lastly, programs where 100% of the SBAE teachers are NCATA members get priority registration for the limited spots at the NC FFA summer camping program. This benefit of being able to register students early for FFA camp was widely varied with nearly 29% ($f= 44$) indicating it was extremely important while nearly 18% ($f= 27$) said it was not important at all. See Table 3.

Table 3
Importance of Benefits by Frequency

Item	Extremely important		Very important		Moderately important		Slightly important		Not important	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Protecting 12-month employment	98	63.64	34	22.08	11	7.14	4	2.60	7	4.55
Liability insurance	60	38.71	47	30.32	32	20.65	12	7.74	4	2.58
Legislative activist/lobbyist	59	38.56	46	30.07	35	22.88	11	7.19	2	1.31
Registering early for camp	44	28.76	38	24.84	31	20.26	13	8.50	27	17.65

We had a set of questions for those who completed the survey and were not current members. Specifically, we wanted to know why they were not joining, and they could check all statements that applied to them. This list was constructed from past open-ended responses from non-members. We also gave them the ability to indicate “other” reasons they were not joining. See Table 4. The top reason not to join was cost ($f=23$).

Table 4
Responses from non-members as to why they did not join

Response	<i>f</i>
The cost is too high	23
I missed my window to pay and/or I wasn't sure who or how to pay	18
I forgot to join	15
I do not see any value in NCATA	13
I was a member, but became unhappy	9
I am not looking for awards for what I do	9
I am only working part-time in SBAE and/or have another professional association serving my needs.	1
Other – please indicate	22

The “other item” provided a location to indicate what else was connected to their decision NOT to join. Those responses could be grouped into a few categories. Some talked about the impact of COVID (“COVID made things just crazy”) and indicated that “with no in-person NCATA for 2020-2021 school year” they “did not see the value this year.” Some indicated that cost was a challenge but used this open-ended opportunity to indicate more detail. Those explanations

varied from spending their money on a wedding this year to joining another professional association (NCAE) or not being reimbursed by their schools for dues. A few indicated they were so new to the profession they had not paid their dues yet but intended to pay soon. There were also a few comments indicating they did not know about the group and or had not been asked to join. A few items were especially concerning. These statements included “They seem out of touch with reality and work too hard to protect their traditions” and “Lack of Diversity across the board with awards and hiring of the state staff.”

The question asked, “Of these suggestions generated by NCATA in a survey in 2020, where should NCATA prioritize its efforts” (205 responses)? Participants were asked to rank the items from 1-15 (with 1 indicating a very high priority – do immediately and 15 was the lowest priority or an item that could wait/never be done, in their opinion). Table 5 shows the mean and standard deviation, but also the number of times the item was ranked number one by a respondent. The item with the lowest mean and therefore highest priority was creating programming specifically for new teachers ($M = 5.34$, $SD = 3.33$). The item that was ranked number one by the most respondents was increased curriculum resources and sharing on the website with 34 people indicating this would be their top priority for NCATA leadership. It is also worth noting the fourth item when ordered by mean value was improving the new teacher mentoring program ($M = 5.98$, $SD = 3.21$).

Table 5
All teacher rankings of association priorities (N = 205)

Statement	#1 rank	Mean	SD
Creating programming specifically for new teachers	26	5.34	3.33
Increased curriculum resources and sharing on the website	34	5.70	4.01
Coordinating regional or area NCATA workshops	15	5.91	3.33
Improving the new teacher mentoring program	12	5.98	3.21
Increasing teacher retention efforts (state level XLR8, addressing burnout)	22	6.97	4.39
Providing CDE specific workshops	15	7.03	4.28
Recruiting membership from all ag teachers	16	7.48	3.75
Monthly or on demand professional development for CEUs	6	7.49	3.99
Support for middle schools (a MS committee, MS rep on the board, MS specific PD)	15	7.88	4.43
Increasing transparency and communication	23	8.56	5.02
Compiling and maintaining a NC teacher directory with contact information	4	9.55	3.80

Statement	#1 rank	Mean	SD
Creating programming specifically for new teachers	26	5.34	3.33
Increased curriculum resources and sharing on the website	34	5.70	4.01
Coordinating regional or area NCATA workshops	15	5.91	3.33
Improving the new teacher mentoring program	12	5.98	3.21
Increasing teacher retention efforts (state level XLR8, addressing burnout)	22	6.97	4.39
Providing CDE specific workshops	15	7.03	4.28
Recruiting membership from all ag teachers	16	7.48	3.75
Monthly or on demand professional development for CEUs	6	7.49	3.99
“Teacher of the month” or “ag program of the month” program	2	10.29	3.68
Increasing diversity in NCATA leadership	7	10.42	3.74
Hosting a trade show with vendors	6	10.43	4.02
Increased engagement with NAAE	2	10.97	3.18

When looking at this same ranked data, selecting for responses from middle school teachers only, they ranked the support for middle school teachers as their number one priority by a large margin. After that item, the data then largely aligns with the whole group data presented in table 5 including focus on new teacher programming ($M = 5.32$, $SD = 3.71$) and mentoring ($M = 6.21$, $SD = 2.12$) as well as resources for all teachers ($M = 5.32$, $SD = 2.89$). See table 6.

Table 6
Middle School teacher rankings for priorities of the association (n = 22)

Statement	Mean	SD
Support for Middle schools (MS) (a MS committee, MS specific PD, MS rep on the NCATA board)	1.74	1.05
Creating programming specifically for new teachers	5.32	3.71
Increased curriculum resource sharing and improved resources on the website	5.32	2.89
Coordinating regional or area NCATA workshops	5.95	3.72
Improving the new teacher mentoring program	6.21	2.12
Recruiting membership from all ag teachers	8.63	3.53

Providing CDE specific workshops	8.74	3.84
Increasing transparency and communication	8.74	5.34
Increasing teacher retention efforts (state level XLR8, addressing burnout)	9.26	4.32
Monthly or on-demand professional development for CEUs	9.37	3.55
Teacher or Agriculture Program of the month program	9.42	4.48
Compiling and maintaining a NC teacher directory with contact information	9.74	3.49
Increasing diversity in the NCATA leadership	9.74	3.87
Increased engagement with NAAE	10.53	3.69
Hosting a trade show with vendors	11.32	3.11

Conclusions, Implications, and Recommendations

Members valued networking over the other categories of benefits. This aligns with a Stryker (1980) finding that members join to build their social network. When talking to teachers about the benefits of NCATA, leadership should play up the networking aspect of the organization and find ways to expand those opportunities. Efforts were begun at the 2019 state summer conference to have a social event for members and an “Owls’ Night Out” was added to this year’s winter conference on the evening before the professional development sessions. COVID has presented challenges in physically gathering together, but activities which build the ag teaching community should still be prioritized. Leadership should look to other state associations to identify programs and practices that are successful in providing networking opportunities for members.

Cost was indicated as a barrier. The current annual dues cost is \$160 for state and NAAE membership and \$280 for a membership that adds on national and state level ACTE membership. As indicated by Ritzer and Goodman’s (2003) Exchange Theory, members need to see what they are receiving is worth the money they are spending to become a member. Transparency in how dues are spent and how programs and students benefit from a legislative lobbyist in ways other than 12-month employment may make members more willing to join. Taking the time to educate members and potential members about where their dues go and the ways a legislative lobbyist benefits them may make the cost to join appear more reasonable. One example of the output of these efforts includes advocating successfully for a one-time infusion of \$1.5 million dollars in renovations to the NC FFA Center facilities and recurring funding for two more state staff positions to support state level agricultural education curriculum and student development in the 2021 state budget. Additionally, providing the first year members a reduced rate can help with the cost barrier for newly hired teachers and allow them to see the benefits of the association.

The organization needs to work towards transparency and organizational justice. In responding to the open-ended prompt about why they were choosing not to join, a few statements arose

about a lack of diversity or a commitment to tradition over the needs of members. This may indicate a potential issue with organizational justice as operationalized by Skarlicki et al (2000). An organization operating with organizational justice would be “applying decision rules with consistency, providing members with a voice in the decision-making processes, and ensuring that processes are representative of the views of the membership, rather than the interests of a select few” (Skarlicki et al., 2000, p. 69). Research should be conducted to explore this area further.

Teachers want resources. Respondents made clear the organization should prioritize resources and access to resources as well as support for new teachers. With the data in NC indicating that approximately 50% of all teachers are in years 1-5 and approximately 65% are in years 1-10, early career teachers hold the majority of positions within the state (Joshua Bledsoe, State Director, email communication, January 2022). NCATA maintains a digital repository of curriculum resources and professional development on demand for members only on their website, but communication about these resources and ease of access may be lacking. Similar to issues identified by Bauman (2008), SBAE teachers are a giving teaching community and if a non-member asked for a resource that was behind the member login, it would no doubt be shared with them in another way whether through the state’s Facebook group or via email. Keeping the resources behind a log-in does not make them truly member restricted. Touting this access as a benefit may not be generating membership.

Mentoring needs attention. Improving the new teacher mentoring program within the state was indicated by teachers as a high priority. There has been an attempt at a mentoring process within the state for years, but it has been unsuccessful in being effectively implemented. This may be due to lack of potential mentors as the majority of teachers in the state have less than 10 years teaching experience. It would be advisable to consider utilizing members in the 5-10 year range as potential mentors for earlier career teachers. These teachers have been through the beginning teacher years more recently, and should be able to empathize well while providing advice and resources that worked for them in similar situations. Mentors are more satisfied when assisting professionals less experienced than themselves and benefit from developing their own skills in the process (Leners et al., 2006). Therefore, it is recommended for NCATA to identify states where effective mentoring programs are being implemented to glean ideas to utilize as well as encouraging teachers with 5-10 years of experience to take on mentoring roles. Lastly, these mentoring efforts will never be successful unless a specific person or group takes ownership for implementing the programming. Perhaps a committee or officer role could be created with this priority in mind.

A sizable portion of teachers expressed teacher retention should be a priority ($f=22$). NCATA should encourage stronger member engagement at the regional and national levels. Through participation in NAAE programs like Teacher Turn the Key or XLR8, teachers receive specific professional development designed for early and mid-career professionals. There is also great value in attending regional and national conferences, but the cost to attend may be prohibitive for the majority of teachers. NCATA should investigate offering multiple scholarships to help more members attend these conferences annually. Assisting in providing these opportunities to members aligns with Turner’s (1982) Social Identity Theory in building a teacher’s self-esteem through participation could ultimately lead to greater job satisfaction and teacher retention.

Communication was a barrier. NCATA leadership should strive to increase lines of communication with SBAE teachers across the state. Strong communication aligns with the Expectancy Value Theory (Bandura, 1997) showcasing the value placed on member input in the overall association. Working closely with state agricultural education staff can assist in staying up to date on all new teachers and movement of teachers between schools so teachers are not inadvertently being overlooked. The current NCATA structure utilized a vice president within each of the eight regions to coordinate membership recruitment and dues collection. Regional Vice Presidents should be intentional in their communication with all teachers within their respective regions multiple times a year as a way to encourage participation from all teachers and help build a sense of camaraderie.

Many teachers indicated protecting 12-month employment was extremely or very important in their decision to join. NCATA should clarify their role in providing and maintaining twelve-month employment as a benefit to high school teachers, but use caution when touting this benefit as most middle school teachers are not eligible. In fact, many teachers may be choosing to teach at the middle school level to have the summer break. The percentage of middle school teachers in NC has exponentially increased in recent years and currently makes up 17% of all SBAE teachers in the state (Joshua Bledsoe, State Director, email communication, October 2021). More specific strides need to be made to serve the needs of middle school teachers. Specific suggestions could include having a middle school representative on the association board and within the committees, creating specific middle school teacher and program awards, as well as differentiating professional development sessions for middle school teachers during winter and summer conferences.

If Lawver and Lee's (1990) findings still hold true, student membership in their professional organization is a strong indicator of willingness to join once they are SBAE teachers. NCATA should strive to establish stronger communication with pre-service teachers and encourage student membership. It is advised to include specific opportunities at the state level for professional development for student members and to network between the various teacher preparation programs. In recent years, the state has been using a portion of their STAR grant funds from the National Teach Ag Campaign to send every spring student teacher to the winter teachers' conference from all five SBAE teacher preparation institutions.

Teacher preparation programs should be encouraging student membership in NCATA to expose them to the association. Teacher educators should also utilize NCATA leadership as guest speakers in classes regularly and encourage students to participate in NCATA and NAAE opportunities such as the National Pre-Service Agriscience Teacher Program and Future Agriscience Teacher (FAST) symposium which could help build enthusiasm for the association among pre-service teachers.

Current members can and should assist NCATA leadership in communication among their peers. Advocating for NCATA among SBAE teachers could encourage more non-members to join and reach those that stated they were not aware of the association. NCATA is designed to serve SBAE teachers, therefore current members should also actively participate in leadership opportunities and serve on committees to be an advocate for teachers' needs.

This study attempted a census, but was unsuccessful in gathering responses from all teachers in the state, therefore findings are not generalizable. This study should be replicated on a larger scale to gather more generalizable data. It is recommended research is conducted to identify if and how gender responsibilities are impacting the decision to join. It is also recommended for qualitative follow-up research with those who were once members, but have not renewed their membership.

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Cultivating Pedagogical Content Knowledge in Global Agriculture: *Assessing Educator Perceptions of Global Issues in the WPFGlobalGuides Program*

Abstract

Global learning in agriculture can be grounded in education for sustainable development utilizing shared strategic language like the United Nations Sustainable Development Goals (UNSDGs). Educators who participate in professional development to improve their instructional design capacity are often provided frameworks like the UNSDGs to assist in guiding instruction related to sustainable development. Gaps exist in the literature on the assessment of educator awareness, importance, and implementation of the UNSDGs. The understanding of educator perceptions is beneficial in establishing effective communities of practice amplified with authentic professional development opportunities. This descriptive study of a bound population of educators (n=25) opting into professional development on global concepts on the 17 UNSDGs showed highest awareness of (4) Quality Education. Significant discrepancies in the awareness and implementation in four other UNSDGs including: (8) Decent Work, (11) Sustainable Cities, (14) Life Under Water, and (17) Partnerships. These results will help inform future professional development efforts with more attention to areas that educators have identified a need for support. Further research is needed beyond awareness exploring educators' nuanced comprehension of these global issues.

Introduction

Sustainable development is both a popular phrase and a catalyst for remodeling initiatives in educational curriculum across many disciplines, but evidence of the implementation of tools like the United Nations Sustainable Development Goals (UNSDGs) has been scant despite their effectiveness. A study conducted by Petillion et al. (2019) with chemistry students at the post-secondary level found that the SDG framework was effective in promoting authentic learning of chemistry while presenting students with proof of relevance. The students responded positively and evidenced increased engagement in the material. The researchers reported observations of indicators are needed on the success of implementing SDG frameworks at the local level (Cochran et al., 2020) and on teachers in the early stages of learning how to integrate resources with content like the UNSDGs. Integration by educators is impacted significantly by professional development (Weiss & Pasley, 2006).

Studies (Borko, 2004; Snow-Geron, 2005) have commented on the benefits of professional development including the aiding delivering new ideas and pedagogy, but some (Cohen, 2001; Loucks-Horsley et al., 2003; Weiss & Pasley, 2006) note the need to study “deep level” changes in instructional practices and the effect of communities of practice in their effort. Communities of practice are a tool to support knowing and learning and be useful for improving the performance of the members of the community (Wenger, 2011). A contemporary example of a community of practice aimed more specifically at global learning in agriculture is the Global Learning in Agriculture (GLAG) program. GLAG, an event run by the Global Teach Ag Network (GTAN) has been curating global issue professional engagement and fostering relationships between global stakeholders in agricultural education since 2014. Since that time, GLAG has grown to offer professional development programming to over 1000 educators annually from all 50 US states and over 40 countries

with representation across sectors and disciplines. An additional program offered by GTAN extending this community of practice into deep level study in its third year conducted in collaboration with the World Food Prize Foundation is the World Food Prize Foundation Global Guides Program (WFPFGlobalGuides).

WFPFGlobalGuides is a nine-month hybrid professional learning community to develop capacity in educators in food security education and sustainable development through work with experts from universities, government agencies, and non-government organizations like the World Food Prize. This multi-sector approach highly values diverse perspectives and interdisciplinary engagement, thus selection criteria for participating educators takes into consideration years of experiences, geographic location, discipline, as well as personal demographic characteristics. The goal for WFPFGlobalGuides is to build an effective community of practice of educators to expand pedagogical content knowledge in global issues and support local implementation with participating educators' learners and communities.

The research collaborators selected the participants of the 2021-22 WFPFGlobalGuides program as the first of the multiple bound populations representing different aspects of the agricultural education continuum to explore the effectiveness of a community of practice in improving the pedagogical content knowledge related to global issues and sustainable development. For successful improvement to occur however, an assessment of the participant perceptions of sustainable development (as defined through the lens of "global issues") was needed to inform the design of future professional development interventions that serve educator communities like WFPFGlobalGuides. This study helps address the research priority area 7 "Addressing Complex Problems" in the most recent version of the American Association for Agricultural Education National Research Agenda (Andernoro, Baker, Stedman, & Weeks, 2015).

Review of Related Literature

Sustainable development education began early on with the goal to equip students with the ability to apply knowledge in a variety of unpredictable situations, where practical solutions for problems were necessary (Jucker, 2001; Johnson, 1999). The United Nations Decade for Education for Sustainable Development (2005–2014) was followed by the Global Action Plan (GAP) to promote Education on Sustainable Development (ESD). This directly led to the design and launch of the 2030 goals that we recognize today as the 17 Sustainable Development Goals. (Bezeljak et al., 2020). In 2015 United Nations member states shifted from the Millennium Development Goals (MDGs) and adopted the 2030 Agenda for Sustainable Development (2030 Agenda). Progress with implementation of the 2030 Agenda is monitored and reported by 17 interdependent thematic Sustainable Development Goals (SDGs), which have 169 specific targets and are measured through 232 indicators (Wilkinson, 2019). The UN SDGs are designed to be a measuring stick, but also pathways for more inclusive stakeholder involvement (i.e., women, children, civil rights groups) and push systems thinking to make a difference (Tomja, 2018; Bebbington & Unerman, 2020).

A study by Ayobolu (2019) however found that only 49.6% of the respondents had previous knowledge about the SDGs from a pre-test. This indicated that there was knowledge intake occurred to close the knowledge gap that existed prior. The research team conducted a

workshop centered on SDG awareness. A good understanding of the various themes provided by the SDGs was reported by 91.2% of the respondents after the workshop as where only 64.9% reported such level of understanding prior. Interestingly, the respondents had an agreement level of 91.2% on the need to disseminate the SDGs. In a report from 2014, UNESCO (p.10) stated that “Aside from learners acquiring skills and knowledge to comprehend sustainability issues, other social outcomes are also expected from education for sustainable development: it must prepare students and professionals not just to reflect about the current challenges, considering social, economic and environmental perspectives, but to make appropriate decisions and take action to address them.” Wicked problems such as climate change, poverty, and human rights – require knowledge and skills from different disciplines to come together using systems thinking. (Annan-Diab & Molinari, 2017).

Singmaster and Manise (2016) in a study conducted by the Asia Society and the Longview Foundation for Education in World Affairs & International Understanding found that 94% of the respondents felt that a global perspective should be taught in agriculture classrooms. The study also showed that well over half of those teachers do not explicitly teach with a global perspective, citing that they do not have the resources to fully integrate global issues and skills into their curriculum. Tichnor-Wagner et al. (2019) reported that definitions for many global competency training initiatives for teachers were understood, but the knowledge, skills, and dispositions needed to do so were unclear. One such method for addressing deficiencies in knowledge, skills, and dispositions is Continuous Professional Development (CPD). CPD is important for teachers particularly interested in sustainable improvement in pedagogical design. Studies on the impact of these experiences like that by Mohammadi and Moradi (2017) have investigated professional development workshops and their study found sustained professional growth across the board in positive participant beliefs thereby impacting their confidence in influencing student learning (Berglund & Gericke, 2016). Often, participating educators in CPD have a shared set of experiences, values, and focus on common practices; otherwise known as a Community of Practice (CoP) (Barab et al., 2003). Communities of practice emphasize relationships (Wenger, 1999) and are central to sustained improvement of the pedagogical design capacity that is cultivated during professional development (Brown, 2009).

McNeill et al. (2016) lays out a brief review of a component of the educator portfolio of resources called pedagogical content knowledge (PCK). PCK was studied initially by Shulman (1986) and brings together teacher education experiences to guide an understanding of strengths and weaknesses in teacher education. There are some studies that have critiqued the use of PCK however because of its lack of guidance into where teacher education should go (Park & Oliver, 2008; Settlage, 2013). Considering the need to provide direction in teacher education through the identification of the PCK of educators, the study sought to combine multiple frameworks to better capture multiple avenues for the continuing education of educators.

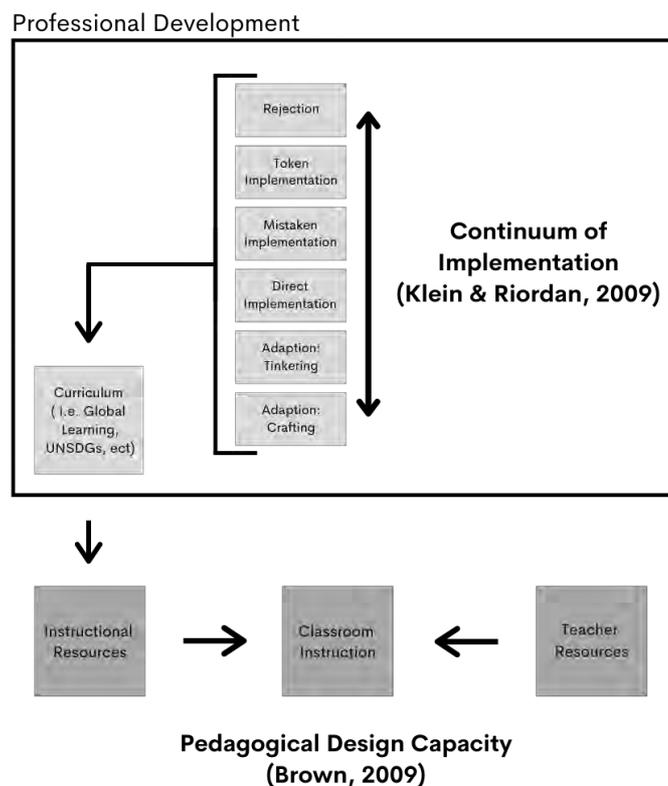
Conceptual Framework

The conceptual framework for the study is a model currently being explored by the GTAN where professional development is offered to educators to improve pedagogical content knowledge related to global agriculture and is presented in *Figure 1. GTAN Conceptual Framework for Effective Communities of Practice*. Development opportunities in

the space of global learning are offered to assist in the application of instructional resources which contribute to classroom instruction. Brown (2009) and Knight-Bardsley & McNeill (2016) have refined a theory for Pedagogical Design Capacity (PDC) that details “a teacher’s capacity to perceive and mobilize existing resources in order to craft instructional episodes” (Brown, 2009, p. 29). Knight-Bardsley & McNeill (2016) add that teachers use resources to support student learning and those instructional resources are a part of teaching design. Ball and Cohen (1999) confirmed that teaching design as well as the teacher training inventions needed to effectively use a resource like a piece of curriculum can be aided by professional development, specifically, authentic professional development that creates a pedagogy of investigation through the cultivation of communities of practice.

As a way of supporting and assessing professional development, the conceptual frame is aided by a Continuum of Implementation (CoI) (Klein & Riordan 2009). The continuum is not a hierarchy, but rather space to move through as they acquire new knowledge and assess their comfort and success in delivery because of professional development. Klein & Riordan (2009) found that contrary to findings stating that educators come in at one point and apply their knowledge in more and more rigorous means (direct implementation and adaption), they may move back and forth depending on instructional decisions and learner reception. Identifying prior training, awareness, perceived importance, implementation, and desire to use resources is crucial to develop effective instruction and sustainable communities of practice.

Figure 1. *GTAN Conceptual Framework for Effective Communities of Practice.*



Note. The Conceptual Framework for the study was developed by bringing together the PDC from Brown (2009) with the CoI Klein & Riordan (2009) as a lens to inspect the effectiveness of

professional development in building a CoP and teacher efficacy in the space of sustainable development education

Purpose and Objectives

The current study is part of a series of studies to identify the baseline of educator awareness, perceived importance, and implementation of lessons and activities based on global issues that are framed by the United Nations Sustainable Development Goals. The study is aimed at answering the following research questions:

RQ1 – What are the demographic variables of the cohort of 25 educators in WPFGlobalGuides?

RQ2 – What are the baseline values for awareness, perceived importance, and implementation of lessons and activities based on global issues by participants in the WPFGlobalGuides?

RQ3 – Is there a value for awareness, perceived importance, and implementation of lessons and activities for a particular global issue that is significantly different than the other global issues?

Methods

The following research methods were utilized in this descriptive study of educator perceptions.

Population

The participants (n=25) in the study were selected to be a part of the 2021-2022 cohort of the WPFGlobalGuides presented by GTAN in partnership with the World Food Prize Foundation. Participants ranged in age from 25 to 57 years old and each identified as educators with located in the United States. Participants in the WPF program participated in a hybrid program that included four preparation webinars prior to a week-long domestic immersion curated in conjunction with the Borlaug Dialogues in Des Moines, Iowa, United States. During the domestic immersion, participants worked through a programming to assist them in working as interdisciplinary teams to create reusable learning artifacts related to food security education.

Instrumentation

The “*Perceptions of Global Issues*” survey instrument is a researcher developed instrument grounded in existing instruments that were deemed as reliable and valid as being used on similar populations of secondary educators. The adapted instruments included the Global Perspectives Inventory (RISE, 2017), the Global Competency Measurement from Ariel Tichnor-Wagner (2019), and Global Competence Aptitude Assessment (Global Competence Associates, 2018). The final researcher developed instrument includes six parts: Global Issue Awareness, UNSDG Awareness, SDG Confidence, SDG Teaching, SDG Experience, and Demographics. Participants responded to questions on a 4-point Likert scale with Global Issue Awareness questions requiring a response between “1 – Very Little” to “4 – A lot.”

The list of global issues was guided by the United Nations Sustainable Development Goals. The list was integrated into the survey instrument by the research team and reviewed

by a panel of experts including three faculty members and a graduate research associate for content validity based on its adherence to the UNSDG goals. Terms in the survey asking participants to evaluate the issues included: “Awareness” which was defined as familiarity with the issue, “importance” as value given to the issue, and “implementation” as how often each global issue has been used in the participant’s classroom.

Internal validity was addressed for the study with two interventions: (1) construct validity and content validity were addressed by a panel of experts (including faculty of teacher education, food security, and international development) and (2) face validity assessment through cognitive interviews with members of the representative population who were not subjects in the study. The instrument was reviewed for face validity by a secondary educator to collect feedback on any poorly stated or ambiguous questions and clarity of instructions.

Data Collection and Analysis

During the second day of the domestic immersion at the Borlaug Dialogues the survey instrument was distributed in paper form to a census of the WFPFGlobalGuides participants with a 100% response rate. The collected survey data was entered into SPSS for analysis. Prior to data analysis, the data was assessed for statistical assumptions, and data met both assumptions of dependent variable normally distributed across different levels of independent variable (skewness and kurtosis = 1.5 to -1.5, non-significant Shapiro-Wilk test, and Q-Q plots matching ideal quantiles line) and homogeneity of variance ($p > 0.05$). Despite high kurtosis values for 7 fields, the data passed the Shapiro-Wilk test with all values falling under the significance threshold ($p > 0.05$) and a normal distribution observed across all Q-Q plots.

The Tukey test, also called Tukey's Honest Significant Difference Test, was used as a post-hoc test to explore specific group means beyond the ANOVA comparison. Despite the participant cohort being bound as a complete population and typically not requiring the use of an ANOVA test, the test was run in preparation to compare future groups against the current cohort. Considering the current population as a comparison group will allow the study team to begin inspecting broad groups of educators with a realistic expectation for values.

Limitations of the Study

The results of the study are limited to the participant group, and more work needs to be done on a wider scale to see if educators in other spaces are less aware of these topics. The team can suggest that given the nature of the participant group composed of educators who opted into a program focused on global learning some bias towards appreciation for global issues may be present, and thus other educator populations who have not committed to global learning initiatives may not be as inclined to seek awareness and identify importance of global issues as framed by the UNSDGs.

Results

The twenty-five participants completed the instrument and provided the following information to answer the three research questions.

RQ1 – What are the demographic variables of the cohort of 25 educators in #WFPFGlobalGuides?

Data collected from the survey instrument included demographic questions as well as questions designed to identify personal views towards the place of global issues in education and their classroom instruction. Participants reported gender, ethnicity, and geographic region to help illustrate the diversity of the cohort participating in WFPGlobalGuides. The 2021 WFPGlobalGuides cohort was comprised of 15 females, 9 males, and 1 non-binary individual. The cohort had representation from all 5 major regions of the United States and 24% of the participants identified as non-Caucasian. Participating educators came from a diverse background of subject areas including English, Math, History, and Science, with Agricultural Science representing the most common subject area taught. Results of the demographic questions were used to compare and draw possible connection to explain what factors might influence the sentiments educators have on the awareness, implementation, and importance of global issues as well as with the questions that followed which asked participants to expand on their preparation and sentiments on professional development.

RQ2 – What are the baseline values for awareness, perceived importance, and implementation of lessons and activities based on global issues by participants in the #WFPFGlobalGuides Program?

Participants were asked to identify their awareness of global issues, perceived importance of global issues, and current implementation of lessons and activities related to global issues (see Table 1).

The means for the three criterion variables (see Table 2) across the sample set ($n=25$) were 2.93 ($SD=.64$) for Awareness, 3.66 ($SD=.42$) for Importance, and 2.30 ($SD=.62$) for Implementation. Variability in the means for the three variables ranged from 1.60 to 3.88 ($range=2.28$). Further inspection of the criterion variables across each of the 17 Global Issue fields revealed moderate variance (.110 to 1.593) and all Kurtosis values fell between ± 3 except for 7 of the Global Issue fields, of which falling within the Importance category. Data was later checked for normality prior to ANOVA testing and was deemed to fall within threshold boundaries for testing.

Given the research questions stated previously, the team focused on identifying difference between the 17 Global Issues in respect to Awareness, Importance, and Implementation. Educators were asked to respond to awareness, importance, and implementation based on 17 Global Issues. The following hypotheses are derived from RQ2:

Ho: There is no difference in Awareness, Importance, and Implementation values across the 17 Global Issues.

Ha: There will be a significant difference between one or more of the Awareness, Importance, and Implementation values across the 17 Global Issue categories

Table 1.

Participant sentiments on 17 global issues

Global Issues	Awareness		Importance		Implementation	
	mean	SD	mean	SD	mean	SD
1. Poverty	3.12	.73	3.80	.58	2.44	.92
2. Hunger	3.24	.72	3.84	.37	2.52	1.08
3. Health and Well-being	3.16	.94	3.76	.44	2.20	.96
4. Quality Education	5.56	.71	3.88	.33	2.88	1.05
5. Gender Equality	3.08	.91	3.72	.46	2.52	1.12
6. Clean Water and Sanitation	3.08	.86	3.76	.44	2.32	1.18
7. Clean Energy	2.96	.98	3.56	.77	2.40	1.12
8. Decent Work and Economic Growth	2.60	.87	3.44	.77	2.08	1.08
9. Industry, Innovation, and Infrastructure	2.68	.99	3.60	.65	2.00	1.00
10. Reduced Inequalities	3.00	1.00	3.76	.66	2.48	1.26
11. Sustainable Cities and Communities	2.60	1.00	3.48	.92	1.92	1.04
12. Responsible Consumption and Production	2.88	1.01	3.72	.68	2.44	1.19
13. Climate Action	2.96	1.10	3.64	.70	2.64	.99
14. Life Below Water	2.48	1.12	3.48	.77	1.60	.91
15. Life on Land	3.20	.82	3.80	.65	2.56	1.08
16. Peace Justice, and Strong Institutions	2.76	1.09	3.44	.87	2.24	1.13
17. Partnerships for the Goals	2.44	.96	3.52	.71	1.84	.99

Note: 17 global issues framed by the United Nations Sustainable Development Goals.

Table 2.

Participant Perceptions of Awareness, Importance, and Implementation.

	N	Mean	Std. Deviation	Skewness		Kurtosis	
				Statistics	Std. Error	Statistics	Std. Error
Awareness	25	2.9294	.63966	-.283	.464	-.739	.902
Importance	25	3.6588	.42145	-1.609	.464	1.952	.902
Implementation	25	2.2988	.61599	.433	.464	.684	.902
Valid N (listwise)	25						

Note. Means across the population (n=25) on all 17 Global Issues were examined to provide a broad scope for the issues

The result of one-way ANOVA (see Table 3) at an alpha level of .05 revealed two statistically significant F ratio values (Awareness) =2.592, $p < 0.01$ and (Implementation) =2.32, $p < 0.01$, thus confirming the existence of significant difference between some of the variables.

Table 3.

ANOVA test results on Awareness, Importance and Implementation.

Awareness					
	Sum of Squares	df	Mean square	F	Sig.
Between groups	36.522	16	2.283	2.592	<.001
Within groups	359.360	408	.881		
Total	395.882	424			
Importance					
Between groups	8.809	16	.551	1.286	.202
Within groups	174.720	408	.428		
Total	183.529	424			
Implementation					
Between groups	42.409	16	2.651	2.318	.003
Within groups	466.640	408	1.144		
Total	509.049	424			

Note. Results of the ANOVA test showed significance in both Awareness and Implementation as illustrated by F and confirmed for effect through Cohen's test (Cohen, 1988)

RQ3 – Is there a value for awareness, perceived importance, and implementation of lessons and activities for a particular global issue that is significantly different than the other global issues?

A Tukey test (see Table 4) was performed as recommended by Salkind (2010) to parse out specific differences between Awareness, Importance, and Implementation across the 17 Global Issues. Within Awareness, Education ($\mu=3.56$) differed significantly from Partnerships ($\mu=2.44$), Aquatic ($\mu=2.48$), Work ($\mu=2.60$), and Communities ($m=2.60$). In addition to Awareness, Implementation displayed a significant difference between Education ($\mu=2.88$) and Aquatic ($m=1.60$). The effect sizes (Awareness: $\eta^2=0.09$, Importance: $\eta^2=0.05$, Implementation: $\eta^2=0.08$) for significant differences between student groups were interpreted as medium practical effect (Cohen, 1988). The survey concluded with identifying whether they needed additional professional development opportunities to integrate the United Nation's Sustainable Development Goals into their instruction. The participants responded with no dissent (21 yes; 4 unsure) that additional professional development was needed.

Table 4.
Tukey Test Results.

SDGs	N	Subset for alpha =		SDGs	N	Subset for alpha =	
		0.05				0.05	
		1	2			1	2
Partnerships	25	2.44		Partnerships	25	1.60	
Aquatic	25	2.48		Aquatic	25	1.84	1.84
Work	25	2.60		Work	25	1.92	1.92
Communities	25	2.60		Communities	25	2.00	2.00
Industry	25	2.68	2.68	Industry	25	2.08	2.08
Peace	25	2.76	2.76	Peace	25	2.20	2.20
Consumption	25	2.88	2.88	Consumption	25	2.24	2.24
Energy	25	2.96	2.96	Energy	25	2.32	2.32
Climate	25	2.96	2.96	Climate	25	2.40	2.40
Inequalities	25	3.00	3.00	Inequalities	25	2.44	2.44
Gender	25	3.08	3.08	Gender	25	2.44	2.44
Water	25	3.08	3.08	Water	25	2.48	2.48
Poverty	25	3.12	3.12	Poverty	25	2.52	2.52
Health	25	3.16	3.16	Health	25	2.52	2.52
Terrestrial	25	3.20	3.20	Terrestrial	25	2.56	2.56
Hunger	25	3.24	3.24	Hunger	25	2.64	2.64
Education	25		3.56	Education	25		2.88
Sig.		.183	.082	Sig.		.057	.057

Note. A Tukey range test (Abdi & Williams 2010) confirmed a significant difference between Education and 4 other global issue areas across two criterion variables

Discussion, Implications and Conclusions

The following conclusions and implications address each research question regarding educators who participated in WPPFGlobalGuides perceptions of the UNSDGs to assist in improving educator professional learning on global issues.

Discussion for Research Question 1 - What are the demographic variables of the cohort of 25 educators in #WPPFGlobalGuides?

The cohort serving as the population for this study was diverse in discipline, years of experience, ethnicity, gender and US geographic location. Given the data from the survey instrument, a majority (84%) responded that they are “in need of further professional development” to integrate global competency tools like the UNSDGs. Given the broad spectrum of subject areas covered in the cohort population, professional development that is not subject specific may be advisable to adequately address the needs of the educators in the population. GLAG currently focuses on a handful of global issues and in recent years has placed a priority on inclusivity based on area of focus.

Implications

Recognizing the diversity of the WPPFGlobalGuides cohort was important in determining the background and needs of the educators, more work however needs to be done to identify more than just location and subject area taught. For example, some teachers are using digital tools to build learning networks that approach global learning with the goal of giving their students tools to collaborate (Tichnor-Wagner et al., 2019) and other work in

study abroad research has shown that experiences abroad catalyze the improvement of global competency, intercultural awareness, and cultural responsiveness (Byker & Putman, 2019). Not all educators have access to funds for study abroad opportunities however, and the benefits of online professional learning communities are still being studied for use in education, but attention to those areas of pedagogical reinforcement in global learning will be important moving forward.

Discussion for Research Question 2- What are the baseline values for awareness, perceived importance, and implementation of lessons and activities based on global issues by participants in the #WFPFGlobalGuides Program?

Exploring the significant differences more closely within the 17 UNSDGs or “Global Issues,” the emergence of Issue #4: Quality Education appeared to be a sign of benchmark measurement against the other 17 Global Issues. Given the group’s identification as educators with current learners sets, this was not surprising to the research team and was expected informally during the design phase of the study.

Implications

Klein & Riordan (2009) reported that level of teacher engagement having a positive association with how much educators implement content from professional development opportunities. Many teachers are required by their school districts to complete a certain number of professional development hours and many districts offer these opportunities within their own district. Given the prior experience that educators in the GTAN have in the classroom, they were assumed to have had exposure to professional development related to “Quality Education” and thus their awareness, importance, and implementation of issues relating to it would naturally be higher. Future studies are planned with other populations of educators, allowing for a comparison to this highly select group where the WFPFGlobalGuides would serve as benchmark numbers for awareness, importance, and utility of global issues. By taking the pulse of educator awareness, importance, and utility of not only global issues, but any piece from the components of the PDC model, those entities like the GTAN who focus on the professional development of educators can more effectively plan programming from a starting point to a desired outcome in growth and achievement.

Discussion for Research Question 3- Is there a value for awareness, perceived importance, and implementation of lessons and activities for a particular global issue that is significantly different than the other global issues?

Global Issue #17 Partnerships, #14 Life Below Water (labeled as “Aquatic” for the statistical tests), #11 Sustainable Cities and Communities, and #8 Decent Work all stood out with significant difference in Awareness with respect to #4 Quality Education. Global Issue #14 Life Below Water also stood out in significant difference in Implementation with respect to #4 Quality Education. Considering that the participants felt both less aware and have less experience implementing instruction in the topic of “Life Below Water” the team can suggest immediate integration of concepts related to marine science in professional development institutes. Educators improve teaching and their sense of efficacy through skill acquisition (Hadar & Brody, 2010) and by identifying gaps in knowledge or shortcomings in preparation we can support teachers in higher quality and consistent implementation of lessons on those topics (Klein & Riordan 2009).

Implications

In addition to marine and aquatic science, training that includes exposure to best practices on the topics of partnerships, work, and sustainable community development would also greatly benefit educators. Once again, entities like the GTAN who focus on the professional development of educators can more effectively pivot existing programming to better serve the needs of their target populations.

Recommendations for Future Practice

The research team developed the study to improve understanding for the design and alignment of effective in global learning to the wants and needs as well as zone of proximal development of educators who participate in global learning by GTAN. This will allow for the development of customized programming that reflects the identified areas of concern. Educators from the sample set identified “Life Below Water” as an area in need of improvement in awareness and implementation and thus the GLAG can work towards integrating resources that include but are not limited to connections with research and relevant content in the field of aquaculture, marine science, hydrology, and limnology.

The study team recognizes that not all subject areas will have the same desire for content related to aquatic science given some educators who come from English or History classrooms. Future practice however will be to include all subject areas and focus professional development opportunities on concepts and strategies that are cross curricular and encourage collaboration across disciplines. For example, GTAN runs GLAGjr that guides students through modules on global issues. The modules are not subject specific, but issue specific, thus allowing any classroom to participate. Further refinement of the modules encapsulate themes like Life Below Water will be a priority.

Recommendations for Future Research

Future research should be conducted with more educators and lay the groundwork to identify correlations between experiences and interest in global learning communities of practice and the integration of sustainable development into instruction. As previously stated, due to the limited sample size, consideration should be taken to determine how educators can be served best and how to improve the community of practice that develops during professional development opportunities.

Educators vary in their needs depending on topic areas, location, and experience. Educators should also be reminded that there is rarely a clear cut “correct” answer in education for sustainable development and working towards improved efficacy in this area is more important than the attainment of a certification or credential. More work needs to be done in the space of global issue integration both with a wider range of educators from diverse backgrounds as well as with educators who are still training, educators who train future educators, and educators who work with non-traditional learners. The study team expects the members of each population along the continuum of education to have differing needs and further research in the space of global issue integration could help foster educator efficacy as well as move education forward towards the goals set forth by the United Nations by 2030.

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Impact of a Study Abroad Course to Mexico in Helping Pre-Vet Students Affirm Their Career Aspirations to Become Veterinarians: A Qualitative Inquiry

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Twenty-five students participated in a study abroad course tailored to veterinary medicine during the summer of 2019 and were the source of data for this study. Using photovoice and phenomenology research procedures, this qualitative study sought to explore, understand, and interpret the impact of a study abroad course on pre-vet students' aspirations to become veterinarians. Students perceived that veterinary medicine in Mexico was structured differently from the U.S. approach and the nation's socioeconomic and agroclimatology conditions impacted the delivery of veterinary care and affected the work settings and practice of veterinarians. They not only discerned the uniqueness of veterinary medicine in Mexico, but also recognized some of its universal components regardless of cultural differences. The students also perceived that socio-cultural views about the purpose of animals were significantly different compared to the United States, and veterinary medicine in Mexico was practiced in accord with such. The course contributed to enhancing students' understanding of application requirements to schools of veterinary medicine, practice options, and professional expectations of a DVM. In concert with the proposition of human capital theory, the course helped some students confirm their career aspirations and others realize that veterinary medicine was not the best career fit.

Introduction/Theoretical Framework

Veterinary medicine has grown significantly since its conception as a profession in the United States; it continues to be a demanding occupation, and a very competitive educational process for those aspiring to become veterinarians (American Veterinary Medical Association [AVMA], 2020; Bierer, 1955; Peters, 2007; Smithcors, 1963). Many students enroll in colleges and universities in the United States with an intention to apply to a school of veterinary medicine, but a significant number will not gain admission (Association of American Veterinary Medical Colleges [AAVMC], 2019, 2020; OSU College of Veterinary Medicine [CoVM], 2020). Some important considerations for these aspiring veterinarians include application and admission requirements to schools of veterinary medicine, practice options within veterinary medicine, and professional expectations of a Doctor of Veterinary Medicine [DVM] (AAVMC, 2019; Chan, 2019; Ilgen et al., 2003; Lau, 2018; Lenarduzzi et al., 2009; National Research Council [NRC], 2013; Sprecher, 2004). These aspiring veterinarians are often referred to as *pre-vet students*.

Pre-vet students invest significant time and effort to fulfill a range of application and admission requirements to schools of veterinary medicine such as required courses, standardized tests, and veterinary-related experience (AAVMC, 2014, 2019, 2020b, 2020c; Burzette et al., 2017; OSU CoVM, 2020; Jackson & Dawson-Saunders, 1987; Kogan et al., 2009; McRae, 2010; The GRE Test, 2020). They apply to an average of five institutions but only one in every two applicants may expect to be admitted to one (AAVMC, 2020a; AAVMC & Dabdub, 2020). Academic course-taking and related performance is among the more rigorous expectations because most institutions require a minimum letter grade on course prerequisites if applying to their programs (AAVMC, 2020b). Pre-vet students often take such courses more than once to meet the minimum grade requirement and some never achieve such (Burzette et al., 2017; Kogan

et al., 2009). Also, they may not have a competitive GRE score and GPA at time of application (AAVMC, 2019; Educational Testing Service, 2019). Some institutions offer a pre-veterinary (pre-vet) curriculum concentration, and many students take it before applying to schools of veterinary medicine (AAVMC, 2020b; AVMA, 2021). However, taking a pre-vet concentration does not guarantee admission and because it is not an application requirement, applicants may come from a variety of academic backgrounds (AAVMC, 2020a; AAVMC & Dabdub, 2020). Ample and broad veterinary practice experiences are also an important component to competitive applications but opportunities to attain such may be difficult for many students (AAVMC, 2014). Moreover, existing opportunities are mostly related to companion animal practice and limited options exist outside of that focus (Lenarduzzi et al., 2009; Sprecher, 2004).

Veterinary medicine is experiencing an imbalance in supply and demand of veterinarians in practice options such as food animals versus companion animals, especially in rural areas of the United States (Kondalsamy-Chennakesavan et al., 2015; Laven et al., 2003; Rolfe et al., 1995; Walker et al., 2012). About one-half of all positions held by U.S. veterinarians are in companion animal practices (AVMA, 2020). Furthermore, a surplus of veterinarians is projected for urban or suburban areas, especially for companion animals, but a shortage is expected for rural practice, which often involves treating large animals (NRC, 2013). Type of veterinary practice experience may dictate the focus areas veterinary students select in schools of veterinary medicine and the practice options they pursue after graduation (Amass et al., 2011). However, most veterinary practice experiences for pre-vet students mainly involve treating companion animals in urban or suburban areas (Ilgen et al., 2003; Lenarduzzi et al., 2009; Sprecher, 2004).

It is also important for pre-vet students to understand the professional expectations and challenges of a DVM. Increasing rates of practice-related stress, depression, and suicide have been reported for veterinarians and at levels substantially higher than the U.S. population overall (Brody et al., 2018; National Institute of Mental Health [NIMH], 2019; Nett et al., 2015; Norris et al., 2017). Veterinarians may be at increased risk of dying by suicide compared to the general U.S. population, especially female clinical practitioners working with companion animals, which is a majority of all practitioners and projected to increase (AAVMC, 2019; AVMA, 2020; NIMH, 2019; Stone et al., 2018; Tomasi et al., 2019). Several factors have been associated with stress, depression, and suicide rates of veterinarians but student debt is likely one of the main causes (Platt et al., 2012, Strand et al., 2005; Tomasi et al., 2019). And tuition costs at schools of veterinary medicine are projected to increase; therefore, veterinarians will likely need to retire at an older age to offset their educational expenses (Chan, 2019; Lau, 2018; NRC, 2013). Experts recommend that those aspiring to join the profession have a broad understanding of the occupational expectations of veterinarians (AAVMC, 2019; Chan, 2019; Lau, 2018; NRC, 2013). They have proposed to deglamorize the profession (Lau, 2018). For example, a social worker who developed a suicidal prevention program for the company Banfield stated: “[The veterinary profession is] not all puppies and kittens and wonderful experiences. There’s a lot of pain involved” (Chan, 2019, para. 12).

This study was undergirded by human capital theory (HCT) which comprises the array of abilities individuals can acquire that may positively impact their well-being (Becker, 1962, 1994; Mincer, 1958), including work-life and career-related pursuits. These abilities or skills are attained through the knowledge gained from formal and informal education, training, and other experiences, and are also shaped by individuals’ personality traits (Becker, 1962, 1994; Mincer,

1958). The experiences of undergraduate students who participate in a study abroad course may help them affirm professional aspirations while also impacting their overall well-being regarding future careers. Study abroad courses can be an important contributor to human capital development depending on the students themselves, their respective career motivations and aspirations, and the learning contexts they experience (Arghode et al., 2020; Jon et al., 2018; Kronholz & Osborn, 2016; Paige et al., 2009).

Interest-based motivation theory (IBMT) (Hidi & Anderson, 1992; Krapp et al., 1992; Renninger et al., 1992) served as the primary theoretical lens through which to understand and interpret the study's findings. According to IBTM's proponents, interest is the preference of an individual over a range of choices, and is, therefore, the main motivation to execute an action (Hidi & Anderson, 1992; Krapp et al., 1992; Renninger et al., 1992). IBMT researchers have conceptualized two components of motivational interests: *personal interest* and *situational interest* (Hidi & Anderson, 1992; Krapp et al., 1992; Renninger et al., 1992). Personal interest can be defined as an individual's long-term preference of one action over other possibilities (Hidi & Anderson, 1992; Krapp et al., 1992; Renninger et al., 1992), and situational interest is operationalized as the condition during which an individual's interaction with a context and moment-specific activities may capture their attention (Hidi & Anderson, 1992; Krapp et al., 1992; Renninger et al., 1992). Situational interests may only have a short-term effect on an individual's preferences, but, in some cases, can have a longer effect and thereby influence one's personal interests in the future (Krapp et al., 1992). In this study, personal interest was represented by students' preferences to become veterinarians (career aspirations), and situational interest was exemplified by their participation in a study abroad course. The extent to which situational interest influenced personal interest was demonstrated by the impact of the students' participation in the study abroad course on their aspirations to become veterinarians, i.e., career choice affirmation. The effect of the interaction between an individual and his or her environment also has been highlighted in the person-environment fit theory (P-E Fit) [Edwards et al., 1998; Rauthmann, 2021]. These frameworks aimed to contextualize the relevance of a study abroad course on pre-vet students' understanding of the veterinary profession, including the cross-cultural experiences and differences they encountered.

Studies have reported academic and career benefits due to students studying abroad, and short-term, study abroad courses may be valuable learning experiences for pre-vet students. They would likely benefit from opportunities to explore, as early as possible during their collegiate experience, whether veterinary medicine is an appropriate career fit for them. Because a study abroad course could help pre-vet students not only understand better the different practice options in veterinary medicine but also affirm their career aspirations to become veterinarians (Geyer et al., 2017; Jon et al., 2018; Paige et al., 2009), this inquiry was warranted.

Purpose and Research Questions

As part of a larger investigation, we sought to explore, understand, and interpret the experiences of pre-vet students who participated in the course AG 3803: International Study Tour in Agricultural Sciences and Natural Resources. Three research questions guided this study:

- 1) What were the students' perceptions regarding the practice of veterinary medicine in Mexico?
- 2) What were the students' perceptions about the influence of culture on the practice of

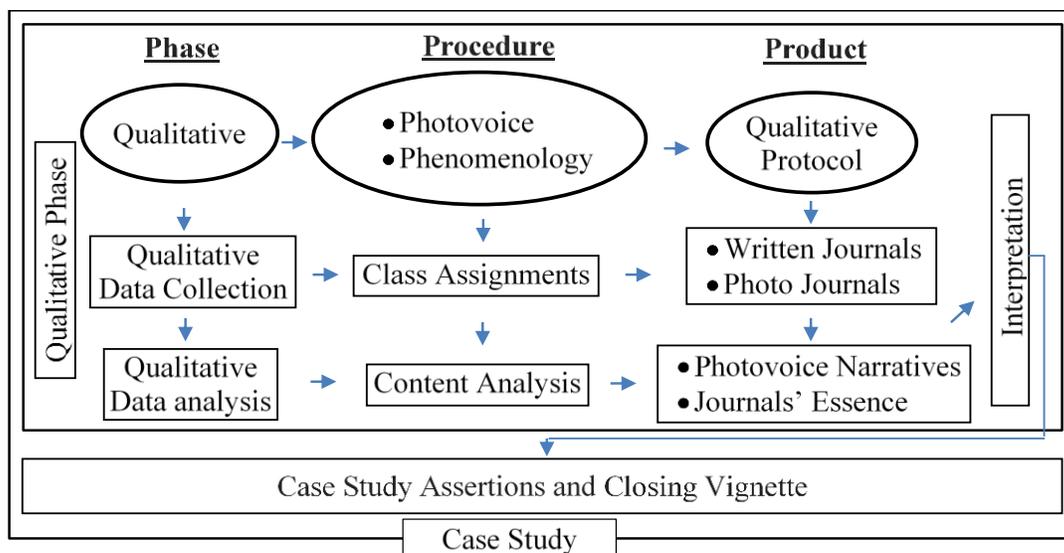
veterinary medicine in Mexico? and 3) How did the study abroad course impact students' decisions to affirm or disconfirm their career aspirations to become veterinarians?

Methodology/Procedures

Tracy's (2010) eight big-tent criteria were followed for achieving excellent quality in the study: worthy topic, rich rigor, sincerity, credibility, resonance, significant contribution, ethics, and meaningful coherence. The lead researcher acknowledges that his level of involvement in designing, promoting, administering, teaching, and evaluating the course could have influenced his understanding of and reporting on the phenomenon. Therefore, he maintained a reflexive approach during the collection, analysis, and reporting of the study's data to inform and guide the research process (Shaw, 2010), and introspectively examined his actions and decisions throughout it. And bracketing was done to mitigate the potential effects of potential biases (Tufford & Newman, 2012). A case study, mixed methods [CS-MM] approach (Guetterman & Fetters, 2018) was used as the research design for the larger investigation. The case study consisted of an intrinsic single case (Guetterman & Fetters, 2018; Stake, 1995) with priority given to the qualitative phases of the embedded, mixed methods design (Creswell & Plano Clark, 2011). The study's research procedures included several approaches to triangulate an understanding of the phenomenon and support its interpretation (see Figure 1). The research procedures we followed are displayed in Figure 1. We used photovoice (Delgado, 2015; Wang & Burris, 1997) and phenomenological methods (Creswell & Poth, 2018; Groenewald, 2004; Guba, 1981; Moustakas, 1994) to collect data and guide data analysis (see Figure 1). Two course assignments consisting of students' photo journals and written journals served as the sources of data. Textual content analysis was used to identify codes and frequencies in the data that led to the emergence of significant statements and themes.

Figure 1

The Study's Design, Methodology, and Analytical Procedures



Phenomenology is a qualitative research approach that allows researchers to understand the essence of a shared experience as described by its participants (Creswell & Creswell, 2018;

Creswell & Plano Clark, 2011; Creswell & Poth, 2018; Merriam, 2009; Moustakas, 1994). Data analysis in phenomenology focuses on identifying significant statements, meaning units, and textural and structural descriptions about the phenomenon as clustered into themes. These themes contextualize the essence of the shared experience manifested by a phenomenon, which is usually reported as a written statement, i.e., a vignette (Creswell & Creswell, 2018; Creswell & Plano Clark, 2011; Creswell & Poth, 2018; Merriam, 2009; Moustakas, 1994). Through their phenomenology study, Mukembo et al. (2017) were able to investigate the experiences of young, aspiring female agriculturists from Uganda who were members of Young Farmers' Clubs. Their findings indicated that participation in the Clubs' activities had transformative impacts on students regarding their choices to study agriculture (Mukembo et al., 2017). The findings and meanings derived from a phenomenology study may be transferable to other groups experiencing a similar phenomenon (Lincoln & Guba, 1985; Tracy, 2010). Transferability "is achieved when readers feel as though the story of the research overlaps with their own situation and they intuitively transfer the research to their own action" (Tracy, 2010, p. 845).

Photovoice was used as another qualitative research tool (see Figure 1). Photovoice involves photography that empowers people to express themselves more openly and more fully tell their stories (Delgado, 2015; Wang, 1999; Wang & Burris, 1997; Wang et al., 1998). Photos can enhance and enrich our understanding of social phenomena (Harper, 1988). For instance, Uscanga et al. (2019) reported that photovoice allowed the researchers "to gain in-depth information from students who expressed in images what may have been difficult to explain in words" (p. 26) regarding business opportunities. Also, a higher level of credibility can be expected in research involving photos compared with only words because photos are more about showing than telling, and their content may be more difficult to modify in ways that challenge validity (Delgado, 2015; Tracy, 2010).

Twenty-five undergraduate students from [Name] University traveled to Mexico from June 16 to June 25, 2019, as part of a study abroad course and they were the subjects of this investigation. The course had a higher participation of students who are usually underrepresented in study abroad at colleges and universities in the United States. Fifty-two percent of the participants were minority students compared to a 29.5% participation rate at [Name] University and 29.8% in the United States overall ([Name] University, 2021a). Also, 36.0% of the participants were freshmen compared to a 1.3% participation rate at [Name] University and 4.0% for the nation ([Name] University, 2021a). Moreover, 20.0% were first generation college students compared to a 9.0% participation rate for the United States overall (National Survey of Student Engagement, 2020).

For the written journals, the students were required as a course assignment to choose topics of interest related to culture, the veterinary profession, or other related topics before traveling to Mexico. They were instructed to collect information during the trip and submit a written journal of at least five pages in length within two weeks after the trip ended. For their photo journals, the students were required to submit at least 10 photos related to culture and/or the veterinary profession in the context of Mexico that included a written description of what each photo represented to them. Because this assignment was part of the course's evaluation, the topics of the photos were circumscribed to Mexico's culture and its veterinary profession, but the researcher did not intend to overly condition the students' expressibility (Delgado, 2015). No other guidelines or examples for taking and submitting the photos or writing the descriptions were provided. The students were only encouraged to compare and contrast the cultures and the

veterinary professions of Mexico and the United States while taking and choosing their photos for submission and writing the descriptions.

The first step of data analysis was to classify the students' journal submissions according to their contents: culture, veterinary medicine, or a mix of both. As a second step, a word frequency analysis was conducted on the content of students' written journals using the online site Browserling (n.d.) to identify the more frequent words written by students in the aggregated text of their journals. As a third step, significant words used with a frequency of more than 10 times in the aggregated text, including grammatical variations, e.g., plural, or singular, were identified. According to Sandelowski (2001), qualitative researchers may uncover more meaning of a phenomenon by obtaining counts of words in addition to narrative descriptions. More frequently used words served as qualitative data codes for analysis. "A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2016, p. 4). These codes were assessed to determine their contextual relevance and significant statements were identified in the journals to give meaning to the students' most frequent written words. The statements were organized according to their fitness for achieving the study's purpose, i.e., the statements were grouped together to support the emergence of themes. These themes served to derive the students' lived experiences based on their written journal entries, i.e., a distillation of the *phenomenon's essence* (Moustakas, 1994).

Regarding the analysis of students' photo journals, the strategy postulated by Tsang (2020) for photovoice data analysis was followed. Tsang (2020) proposed four stages in photovoice data analysis: 1) a photograph analysis based on the researcher's interpretations; 2) a photograph analysis based on the participants' interpretations; 3) a cross-comparison between the researcher's and participants' interpretations; and 4) a theorization of themes developed during the cross-comparison stage. For the first stage of this analysis, the lead researcher coded the photos according to their visual similarities in three categories: a) culture; b) veterinary profession; or c) other. To minimize distortion of the photo interpretation procedures, the photo narratives were not used as a reference during this stage (Tsang, 2020). For the second stage, a word frequency count of the photo descriptions was conducted (Leech & Onwuegbuzie, 2007) using Browserling (n.d.). The most frequent words found in the narratives were used to outline potential themes, i.e., as based on the students' interpretations of their photos. Both sets of data were cross-compared and contextual information was added to support emergent themes (Tsang, 2020). Representative photovoice interpretations consisting of visual themes and their respective narratives are reported.

Constant comparative analysis, keywords in context, word counts, and classical context analysis were among the techniques used to give meaning to word clusters appearing in the students' written journals and photo journals (Leech & Onwuegbuzie, 2007). The lead researcher reviewed the data several times and refined and rearranged significant statements and themes as needed, similar to *lean coding* by which significant codes and information expand as review and re-review of the data continues (Creswell & Poth, 2018). Finally, and in accord with the recommended format for presenting a case's findings (Creswell & Creswell, 2018), an overall closing vignette was derived, i.e., the *phenomenon's essence* (Moustakas, 1994).

Results/Findings

Most of students' written journals featured a mix of observations on culture and veterinary medicine, and five focused exclusively on culture. At least 180 words, i.e., qualitative codes, were used with a frequency of more than 10 times in the aggregated text of students' written journals, with the top 50 words ranging from 233 to 28 occurrences. These top 50 words culminated in 33 clusters according to their contextual relevance and occurrence in the aggregated text of the students' written journals. Regarding photo journals, one-third of the photographs and their written descriptions were associated with veterinary medicine, one-fourth to culture, and almost one-tenth were classified as other related topics. More than 100 words were used with a frequency of more than 10 times in the aggregated text of students' written descriptions of their photographs, with the top 50 words ranging from 118 to 15 occurrences. These top 50 words culminated in 29 clusters according to their contextual relevance and occurrence in the aggregated text of students' written descriptions of their photographs. A total of 668 significant statements emerged from the aggregated text of the students' assignments, from which 340 corresponded to their written journals and 328 to the photo journals. Sixty-two themes were derived from these significant statements; 32 associated with students' written journals and 30 with their photo journals. Ten themes emerged from students' assignments as related to research question one, eight themes related to research question two, and six themes came from students' assignments as related to research question three (see Table 1). Significant statements, photographs with written descriptions, and a range of supporting words, e.g., qualitative codes, helped contextualize these themes. See representative examples in Table 2.

Table 1

Summary of Emergent Themes, Sources of Emergent Themes, Number of Students' Assignments from which the Emergent Themes Arose, and the Number of Significant Statements in Assignments related to the Study's Research Questions

Emergent Themes	Source(s) of Emergent Themes		Assignment(s) Supporting the Themes		Statement(s) Supporting the Themes	
	WJ ^a	PJ ^b	WJ ^a	PJ ^b	WJ ^a	PJ ^b
<u>Research Question One</u>						
Access to Care ^c	Yes	Yes	7	4	10	6
Animal Condition	Yes	Yes	7	12	14	15
Animal Productivity	No	Yes	0	7	0	7
Climate Influence	Yes	Yes	6	6	7	11
Comparison with the United States	Yes	Yes	9	14	14	27
Humane Treatment	No	Yes	0	9	0	9
Mexican Schooling	Yes	Yes	6	8	9	8
Range of Veterinary Procedures	Yes	Yes	8	15	12	39
Socioeconomic Influence	Yes	No	10	0	16	0
Work Settings for Veterinary Practice ^c	Yes	Yes	3	6	7	9
<u>Research Question Two</u>						
Animal Caretakers	Yes	Yes	4	1	4	1
Animals for Work ^c	Yes	Yes	13	4	20	8
Animal Functionality	Yes	No	6	0	6	0
Context-based Welfare Practice ^c	Yes	Yes	10	7	20	9
Give-back to the Community Tradition	Yes	Yes	5	4	12	6
Naming Animals	Yes	Yes	2	4	3	5

Presence of Animals	No	Yes	0	4	0	4
Traditional Practices	Yes	Yes	8	2	17	2
Research Question Three						
Broadening of Career Perspectives ^c	Yes	Yes	1	2	1	3
Hands-on Learning Experiences ^c	Yes	Yes	8	4	13	4
Learning of Medical Judgement	Yes	Yes	5	6	6	6
Learning on a Range of Veterinary Procedures	Yes	Yes	11	18	34	39
Recommended Unique Learning Opportunity	Yes	Yes	5	6	5	7
Unique Learning Opportunities	Yes	Yes	7	13	15	28

Note. ^aWJ = Written Journals; ^bPJ = Photo Journals. ^cSupporting evidence for theme is provided in Table 2.

Table 2

Students' Representative Written Journal and Photo Journal Entries with Descriptive Statements Supporting the Study's Emergent Themes

Representative Statements from the Students' Written Journals	Representative Photographs and Descriptive Statements from the Students' Photo Journals
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Emergent Theme: Access to Care

Student 13: "Another difference in the medical practices of rural Mexico and the cities of Mexico is the basic care given to the animals. What is considered basic care typically is only food and shelter, the underlying basic care such as hoof trimming, brushing, and proper exercise is often overlooked in the rural communities. The exercise for most of the animals comes from working on the farm and pulling carts."



S21P8: "The local people of the village . . . patiently await their turn for a veterinarian or veterinary student to evaluate and treat their equids. This clinic provides much needed free veterinary care for these animals that their owners could not travel [for] or afford to receive"

Emergent Theme: Work Settings for Veterinary Practice

Student 5: "The field days really demonstrated how important it is to be flexible in the area of veterinary medicine. The day was long and hot, animals kept coming to be treated, but they [, the veterinarians,] never once stopped to complain; the vets went with the flow even when they were tired."



S3P7: “. . . This picture also shows that despite being within a rural environment, a surgery could be successfully completed. We took all measures possible to be safe and clean; however, you are still outside of a sterile environment”

Emergent Theme: Animals for Work

Student 19: “When visiting Mexico, I noticed that practically everyone that lived in the rural communities owned livestock animals which they used for work purposes.”



S3P2: “. . . Horses and donkeys are both usually working animals that perform very similar jobs. The dogs; however, are usually thought of as mostly companion animals. Even though working dogs are not rare. The dogs in Mexico are more part of the work ethic. They protect the donkeys, horses, and mules. They even act as herding dogs.”

Emergent Theme: Context-based Welfare Practice

Student 2: “The problem in Mexico is that the welfare of the animal is often tossed out the window due to the need to work.”



S12P1: “This horse has been like this for fifteen years. She has been able to work with her leg like this for the entire fifteen years. We would think that this horse needs surgery when we would see this. However, to the owner, she is fine. The owner doesn’t see a problem because she is still able to work.”

Emergent Theme: Broadening of Career Perspectives

Student 18: “Needless to say, [after watching the veterinarians work with the elephants] I walked away seriously considering becoming an elephant specialist.”



S1P5: “The visit to the tilapia research portion of the ranch was a very pleasant surprise to me. I think that as students with interest in veterinary medicine, we forget that our job doesn’t just lie within dogs, cats, horses, and cattle. Veterinarians do so much more than clinical work.”

Emergent Theme: Hands-on Learning Experiences

Student 11: “I have worked in a shelter before, and I did more hands-on training in Mexico than I have ever done in America.”



S4P3: “This is a picture of me checking the upper molars after the teeth were floated. The teeth had to be floated because they can cause an array of health issues. Before the procedure the teeth were sharp and pointy and cause lesions inside the mouth and on the tongue. After floating, the teeth were back to proper anatomical shape and no longer posed an issue to the equid.”

Conclusions/Recommendations/Implications

The students were able to compare and contrast the practice of veterinary medicine between Mexico and the United States, as well as contextualize the differences and similarities (Jon et al., 2018; Kronholz & Osborn, 2016). They highlighted that access to veterinary care as well as animal condition and productivity were highly dependent on socioeconomic and

agroclimatology conditions in Mexico. These contextual factors impacted the quantity, quality, and overall access to veterinary care, and affected the work settings of veterinarians and the veterinary procedures they performed (Arghode et al., 2020). Access to veterinary care in rural communities is not only restricted by what people can afford but also by the availability of services. Often times, the only care animals receive in rural communities are the free clinics such as the one offered during the study abroad course and in which the students participated. The condition of animals also depends on socioeconomic and agroclimatology factors. In some cases, animals may have been underweight or exhibited injuries, including significant scars and cuts or even deformities (see Table 2). Students not only discerned the uniqueness of veterinary medicine in Mexico, but they also distinguished some of its universal components and benefited from those experiences (Arghode et al., 2020; Geyer et al., 2017). In this regard, a student asserted: “Veterinary [practice] is different down under the U.S. but the language is something each veterinarian [sic] can understand, and that is the constant care for the welfare of each animal that enters their clinic.” This ability to conceptualize veterinary medicine in Mexico as a highly context-specific practice demonstrated the importance of providing pre-vet students with learning opportunities such as the study abroad course (Abrams, 1979).

The students also reflected on their own culture while learning about the influence of culture on the practice of veterinary medicine in Mexico. They contrasted the ways culture influences the practice of veterinary medicine in their nation and in Mexico (Jon et al., 2018; Kronholz & Osborn, 2016). The role of animals in Mexican society was new to many of the students and differed from their previous normative understanding and worldviews (Mumford, 1998; Oberg, 1960). They described the role of animals, especially their purpose and functions, as significantly different compared to the United States, and the practice of veterinary medicine, care, and welfare of animals was informed by cultural traditions and norms (Jon et al., 2018; Kronholz & Osborn, 2016). Although students saw the treatment of animals from a different cultural perspective or lens, they still attached the meaning of medical care and attention to animal health. Another important cultural component of veterinary medicine in Mexico identified by students was the tradition of giving back to the community (Kronholz & Osborn, 2016; Paige et al., 2009). Veterinarians and veterinary students offer free services to rural communities in Mexico. Students also contrasted the education system of Mexico with the United States. A student commented: “The students here [in Mexico] come to the vet school out of high school, instead of obtaining their undergrad like we do here in the US.” Based on this, some students realized that their own interests in animals were more about the role animals play culturally in society than only the clinical aspects of veterinary medicine. This realization reinforced the value of the study abroad course to help students expand their perceptions of veterinary medicine from a mostly exclusive clinical view to a more holistic, societally rooted and culturally influenced profession. The students saw veterinary medicine from a broader and more realistic perspective (AAVMC, 2019; Chan, 2019; Lau, 2018; NRC, 2013), and perhaps beyond an often-glamorous view or point of view (Lau, 2018).

Kronholz and Osborn (2016) highlighted the value of study abroad courses in helping students develop a positive view of career options. For admission requirements to schools of veterinary medicine, broad and sufficient veterinary practice experience is one of the requirements pre-vet students often have the most challenges fulfilling (Amass et al., 2011; Lenarduzzi et al., 2009; Sprecher, 2004). The study abroad course to Mexico provided students with valuable hands-on practice experiences supporting their understanding of the various practice options they could pursue. This attests to the impact of the study abroad course in

helping students to consider the broad range of practice options within veterinary medicine. Moreover, considering that practice experiences of pre-vet students usually presage their choice of practice options as veterinarians (Amass et al., 2011; Ilgen et al., 2003; Lenarduzzi et al., 2009), exposing them to different opportunities may help address the existing imbalance between demand and availability of veterinary practitioners within different options in the United States (NRC, 2013). Future study abroad courses should feature hands-on learning experiences exposing students to the realities of the different practice options.

Overall, the students' course participation and related situational experiences influenced and, in some instances, reinforced their career motivations and aspirations as postulated by HCT, IBMT, and P-E Fit theories (Becker, 1962, 1994; Edwards et al., 1998; Hidi & Anderson, 1992; Krapp et al., 1992; Mincer, 1958; Rauthmann, 2021; Renninger et al., 1992). Institutions of higher education should create or facilitate appropriate and timely learning opportunities for students to fully understand their interests in the veterinary profession while undergraduates, which may save aspirants time, money, and the experience of career dissatisfaction. Other investigations should also seek to determine factors likely to influence pre-vet students' understanding of the profession, including its opportunities and challenges.

Case Study's Closing Vignette

Nothing is more important to the profession of veterinary medicine than the individuals who seek to enter it, their preparation for such, their performance as veterinarians, and their long-term personal satisfaction and wellbeing. *The study abroad course helped its participants affirm or, in some cases, disconfirm their practice option interests and aspirations to become veterinarians by actively engaging in culturally and contextually specific practices of veterinary medicine. In some instances, these experiences challenged their preconceived notions of the veterinary profession.* This encapsulated the *essence* of the students' shared lived experience (Moustakas, 1994) of the study abroad course.

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Influencing the Next Agriculturalists: Impacts of Study Abroad Experiences in Ag Ed Classrooms

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With the increasing globalization of companies and the workforce, specifically within the agricultural industry, educators seek to prepare workers with technical and soft skills that will allow employability in multicultural environments (Heinert and Roberts, 2016). Using the lens of Transformative Learning Theory and Self Determination Theory, the researchers sought to examine the impacts from an undergraduate study abroad experience and how that experience motivated agricultural educators to include their study abroad experiences into their agricultural education curriculum and instruction. A narrative qualitative approach guided the study with twelve agricultural educators. Semi-structured interviews yielded the emerging of six themes: Power of Storytelling, Broadened Perspective, Influence of People, 21st Century Skills, Reflection and Application, and Food and Agriculture as a Universal Language. “A-ha” moments during their study abroad gave teachers the initial reflection leading to the need to apply international agriculture concepts within their curriculum. In addition, today, these teachers desire to lead their own students through those “a-ha” moments and encourage them to one day participate in a study abroad experience just as someone had influenced them to participate. Through their exposure to diverse perspectives, these teachers see the value in teaching students from diverse backgrounds and cultures.

Introduction

With the increasing globalization of companies and the workforce, specifically within the agricultural industry, educators seek to prepare workers with technical and soft skills that will allow employability in multicultural environments (Heinert & Roberts, 2016). In addition to these technical and soft skills, educators are tasked with preparing graduates who possess 21st century skills such as communication, creativity, critical thinking, collaboration, technology literacy, flexibility, and leadership, skills identified as essential for success in the 21st century (Rotherham & Willingham, 2010; Saaverda & Opfer, 2012). To accomplish this task, university faculty carefully plan curriculum, instructional strategies, assignments, field trips, and course components that allow students the opportunity to embark on a college journey that will lead to a career in which they are prepared to enter.

The concept of globalization is not only important to companies but is even more important within the education system. Classrooms are becoming increasingly diverse, mirroring the changes in the workforce with differing values, belief systems, and cultural norms (Interis et al., 2018). For teachers to promote and provide instruction regarding the importance of globalization and cultural intelligence, the teachers themselves must be competent in these areas (Conner & Roberts, 2013). Throughout the United States, teachers are evaluated annually, and these evaluations often include components related to diversity, equity, inclusion, cultural

competence, and globalization. Specifically, in North Carolina, teachers are evaluated on their efforts to display, integrate, and promote global awareness within their curriculum. For agriculture teachers, multicultural education is a two-pronged approach. First, their students are often increasingly diverse making it imperative for the teachers to relate to their students. Second, teachers are responsible for the learning content in their classrooms and there is a need for student understanding and appreciation of globalization in the context of agriculture and the cultural differences of the people they will encounter in this industry.

As colleges and universities continue to develop programs designed to promote cultural competence, inclusivity, and globalization, students are provided with multiple opportunities to expand their perspectives and learn valuable skills that will benefit both their personal and professional lives. One such opportunity that is widely available is the participation in study abroad programs. These programs vary in length and are located throughout the world, often emphasizing different topics of study. Study abroad as a technique for K-12 teacher preparation is well documented as a best practice in several areas including the change in perspective of self and others; increased global mindedness and cultural intelligence; and offering insights into creating culturally responsive classrooms (Cushner & Brennan, 2007; Gunay, 2016; Stachowski et al., 2015; Sharma, 2020). Dewey (1938) stated, “The previous experiences, situations, and interactions of learners today will continually resound in their present constructions of knowledge and future reconstructions, decisions, and actions based on that knowledge” (Perry et al., 2012, p. 680). Furthermore, Geyer and Misra (2016) found that studying abroad impacted both leadership skills and career aspirations, though not in equal measure explaining that students with lower GPAs were more likely to change their career aspirations because of study abroad than students with higher GPAs. Rowan-Kenyon and Niehaus (2011) found that a year after participation, all students indicated lasting effects from their abroad experience, including integrating their experiences into their lives in varying degrees.

Evidence supports that well planned international experiences can create a powerful transformation among pre-service teachers that “informs their teaching practice, interpersonal relations, and worldview” (Stachowski et al., 2015, p. 35) and expands professional impacts such as “increased empathy, openness toward their pupils, greater flexibility and adaptability in the classroom, and integration of international perspectives and practices” (p. 40). In addition to these transformations and impacts, those pre-service teachers who participated in study abroad experiences are often given more consideration as they are viewed as more culturally competent and adaptable (Harder et al., 2015).

With numerous studies indicating the benefits of studying abroad, longitudinal benefits (Cushner & Brennan, 2007; Gunay, 2016; Sharma, 2020; Stachowski et al., 2015), and the impact of study abroad on teachers in various disciplines, a common trend among the research was the focus on pre-service teachers just returning from their study abroad experience (Geyer et

al., 2017; Hartley et al., 2019; Rowan-Kenyon & Niehaus, 2011). Research lacks surrounding the study abroad impacts on educators within the agricultural discipline (Hartley et al., 2019) and the impact of studying abroad specifically on agricultural educators after a year of teaching in the classroom.

Theoretical Framework

Research specifically focused on study abroad integration into agricultural education curriculum is limited. Using the lens of Transformative Learning Theory and Self Determination Theory, the researchers sought to examine the impacts from an undergraduate study abroad experience and how that experience motivated agricultural educators to include their study abroad experiences into their agricultural education curriculum and instruction. The findings from the study contribute to the gaps in the literature and further assist those study abroad leaders in the planning and facilitation of an experience that would benefit students as future agricultural educators. Furthermore, this research was designed to support the National Research Agenda with a focus on the development of efficient and effective agricultural education programs (Research Objective 5) that are designed to create a meaningful and engaging learning environment (Research Objective 4) which leads agricultural educators to play a role in establishing vibrant and resilient communities (Research Objective 6).

Transformative Learning Theory was first introduced by Mezirow in 1975 as a cognitive-rational approach to assist in defining how learners interpret their experiences and make meaning of those experiences (Stupnisky et al., 2018). This learning occurs when new experiences challenge us to change our preconceived thoughts or practices (Mezirow & Associates, 2000). According to Mezirow (1997), “transformative learners move toward a frame of reference that is more inclusive, discriminating, self-reflective, & integrative of experience (p.5).” Through evaluating their past perspectives, learners gain new understanding which allows them to engage in reflection leading to a challenge of their previous thoughts. The phases associated with Transformative Learning Theory help learners evaluate past ideas and shift to a new perspective.

The first phase, the disorientating phase, is often viewed as the “A-ha” moment where new learning is initiated. This phase may relate to the teacher’s initial interest as a student to attend the study abroad meeting. Often during these meetings, students hear stories from past participants and in the self-examination phase, students think about their past assumptions, perspectives, and experiences. Moving into the critical assessment of assumptions, individuals engage in a deeper reflection that allows them to understand why some of their previous viewpoints were wrong. After gaining this understanding, individuals move into planning a new course of action that encourages the individual to seek out opportunities to further increase their knowledge, skills, and experiences which leads them to the next phases of the acquisition of

knowledge and skills. To complete the phases, individuals directly act on these new experiences which allows them to increase their self-efficacy and create relationships.

Every day, individuals are in situations where motivation is an important factor. Some of these situations serve as motivators for us while others motivate us to move others. Deci and Ryan (1985) developed a theory of motivation that stated that we as individuals are driven by the need to grow and gain fulfillment (Cherry, 2021). According to Self Determination Theory, different types of motivation exist including intrinsic and extrinsic motivation. The need for growth drives behavior. SDT theory continues to emphasize that people need to feel autonomy, competence, and connectedness to achieve psychological growth. Autonomy refers to the direct action that will result in real change. To gain a mastery of tasks and learn different skills needed for success, competence is needed. This competence tends to lead individuals to take action as viewed as a pathway to the achievement of goals. Lastly, people need to feel connected. This connectedness allows individuals to experience a sense of belonging and attachment to people.

Purpose and Objectives

The purpose of this study sought to examine the impacts from an undergraduate study abroad experience and how that experience motivated agricultural educators to include their study abroad experiences into their agricultural education curriculum and instruction. The specific research questions included:

1. How did participation in the study abroad experience impact incorporation of global and international concepts into the agricultural education curriculum?
2. How did participation in the study abroad experience impact interactions with students from various cultures?
3. What additional components from the study abroad experience were incorporated into your agricultural education program?

Methods

Patton (2002) suggested reflecting on the purpose and the types of answers you seek when selecting a research design. Therefore, a narrative qualitative approach was used to design and complete this study. Ollernshaw and Creswell (2002) describe the purpose of a narrative approach is to focus on stories told by individuals which allows the researcher to describe experiences and offer interpretations. This study utilized this approach to understand how agricultural educators use their study abroad experiences in their classroom and when interacting with their students. Learning from the experiences of the research participants provides a way to explore the impacts of study abroad experiences as a student and how they benefit not only the individuals in their careers but their own students as well.

Following IRB approval, all [State] agricultural educators who had participated in a study abroad experience and who had taught for at least one year were sent an email requesting their participation in the research study. The 14 teachers that expressed interest were sent an approved IRB consent form and were given an option of a time to set up an interview. Data were collected from the agricultural educators using a semi-structured interview protocol. To guide the semi-structured interview, eighteen questions were developed and reviewed by a panel of experts with expertise in both agricultural education and study abroad. Interviews were conducted by the researchers through zoom and lasted no more than an hour.

According to Glaser (1965), data saturation is an appropriate method for determining sample size in qualitative research, and researchers concluded reaching data saturation with 12 teachers. The interviews were recorded and transcribed via zoom software. Researchers reviewed transcripts making notes and fixing any transcription errors. According to Merriam and Tisdell (2016), it is the researchers' responsibility to conduct the study and disseminate findings in an ethical way. Therefore, participants were given pseudonyms to maintain confidentiality and to enhance the credibility of the study, member checking was conducted (Merriam & Tisdell, 2016). The researchers employed axial coding to allow the organization of patterns and analyzation of themes. The researchers met after coding and themes were discussed to ensure accuracy amongst the themes and interpretation, concluding with six emerging themes.

Findings

Teacher Demographics

The names of the educators were changed to pseudonyms to maintain confidentiality. There were 11 females and one male that participated in the study. The agricultural educators were from a variety of diverse high and middle school agriculture programs including those located in rural, urban, and suburban areas with students of various backgrounds and ethnicities. The agricultural educators in the study participated in a wide range of study abroad experiences as well. Ten of the educators were a part of short-term study abroad programs that lasted two weeks or less and consisted of students from their university. Two of the educators participated in study abroad experiences in which they were the only ones from their university for 10 months or more. Four of the educators participated in more than one study abroad program. The locations of study abroad experiences ranged from Costa Rica, Scotland, Ireland, New Zealand, England, Spain, Chile, Czech Republic, Prague, Paris, and Finland. Ten of the 12 programs were specifically focused on agriculture whereas the other two programs had agricultural components.

Theme 1: Power of Storytelling

One of the major themes that emerged from the interviews was the educators' use of stories. All of the educators indicated that they use stories in their classroom based on their experiences abroad to get students interested. John indicated, "I feel like this is true for a lot of teachers. We can better explain a concept or a subject better with a story or experience rather than just reading the content to the students. For example, I talk about the different breeds of cattle and how you wouldn't find Highland Cattle in Eastern North Carolina." Amy said, "I use stories to get them interested. Then I try to get them to think outside of NC. I also use pictures and videos, not just from my experience either." Lis also indicated that she shares her study abroad experiences with "powerful stories told through humor, and some are about sadness. They listen to the story, and it makes the lesson more engaging. As an ag teacher you get the bonus of being a storyteller." The students tend to listen to the personal stories as well. Gina said, "I always ask students what their favorite unit was and it is me sharing my study abroad or pictures or the book I made in the class and having that global viewpoint."

The agricultural educators don't just tell the stories but listen to others as well. It was clear that the educators' have had their experiences shaped based on stories they had heard from others. Gina said, "I think naturally I am a teacher that teaches through stories, and I still remember my Intro to Horticulture professor telling us stories about when he was traveling [that] related to the content and so now I think let me tell a story that relates to the content." Amber said, "One of my teachers was telling us about studying abroad, then one of my friends was talking about study abroad and then we attended an interest meeting together and that is why I decided to go."

Additionally, the agricultural educators are not the only ones telling the stories in the classroom. They invite students to open up about their experiences abroad as well. Emma indicated that she has many people from her school that are from various countries and travel extensively. She said, "I always invite them to share their experiences and I learn a lot from that as well." Mallori indicated, "very few travel outside of the country- maybe one or two students travel outside of the country, and I always welcome them to open up about that".

Theme 2: Broadened Perspectives

The next significant theme that emerged from the interviews was that the agricultural educators that studied abroad expanded their own perspectives and now play a significant role in broadening the perspectives of their students. Some of the educators came from small towns so the study abroad in college brought them new understandings and appreciation. Monica said, "It just really opened up my own mind as I had never even been on an airplane before study abroad so even that was an experience in itself." Lis said, "the experience just shaped me as a person as I was from a small white rural neighborhood." Emma also indicated that growing up in a rural area heavily impacted her and now her students. She said, "I came from a small town and

Raleigh was a culture shock to me and once I got comfortable with Raleigh, I realized there were other things out there for me and now I tell my students there are a lot more things out there in the world for them too.”

In some cases, the agricultural educators might provide the most international experiences to students that might never leave the country. There was an overwhelming number of educators that indicated their students might not even leave the county in which they are located. Lexi said, “most students haven’t left NC so they are blown away by travel experiences.” Julie also indicated, “they are interested that I’ve been somewhere other than our county. Maybe it encourages them to think about other opportunities outside of this city that they can take.”

The experiences abroad allowed the educators to broaden their perspectives in terms of education and agriculture specifically. Mallori said, “I can appreciate educational systems we have here in the US and to see that one size doesn’t fit all. Seeing the different pace in which they learn abroad allows me as an educator to be aware and enables me to bring that awareness to my own students.” Julie said, “it gave me a different perspective of what it looks like from being in New Zealand looking back to American culture.” The educators can then share these perspectives with students, Gina said, “Now I can tell about my experiences in Europe about why they don’t like GMOs. My study abroad experience gave me an outlook about understanding different viewpoints of the Ag Industry. We all see life through a different lens.” Emma said, “Grocery stores are really abundant here and food deserts are hard for students to understand but now I have an extreme example like Iceland where you have to drive two hours. That is a different perspective I can share in class.”

Theme 3: Influence of People

Additionally, the influence of people was important for several reasons. First, the study participants indicated that they wanted to study abroad because of others. Gina said, “The study abroad professor spoke in one of the ag ed classes and my friend and I talked about it and really wanted to go.” John said, “I remember when I was a freshman in college, my professor told us if you ever have the opportunity to leave this country and go somewhere else to study abroad, he said that will be the most valuable lesson you ever have.” Since then, John has also told several of his students to study abroad if the opportunity arises.

John is not the only educator that now encourages his students to study abroad as all of the agricultural educators also said they now encourage their own students to study abroad. Lis said, “I encourage all my students - studying abroad is a must - make it a part of your plan - there is no better time than when you are young. I tell my students that studying abroad is the most powerful learning opportunity you are given.” Brooke said, “When I describe my experience

abroad, I talk about how eye-opening it was as many of my students have not even traveled outside of the county. I encourage them to study abroad, and I know that at least one of my students has.”

In addition, throughout the interviews, the participants kept indicating the impact of the people during their study abroad programs. The way the locals in the countries welcomed the study abroad participants and now ag educators was very impactful. Mallori said, “The matriarch of the house was so welcoming to us.” Gina also indicated, “when we went to the highland cattle farm and the lady there was so sweet and down to earth, I was blown away they offered their home to us.” The educators were also impacted by the people on the program they were traveling with as well. Lexi said, “I enjoyed being able to meet new people both program participants and people in the country;” Brooke said, “Her favorite thing about her experience was meeting people from everywhere. I met people abroad at the University and other students from a different University in the US. “Amber said, “I think I like traveling for me personally because it helps you to get to know the people you are traveling with.”

Theme 4: 21st Century Skills

The next significant theme was that the educators have been able to and are more likely to incorporate 21st century skills, especially global citizenship because of their experiences abroad. Mallori said, “the global piece is always there with the 21st century skills.” Gina said, “How can I teach about global ag if I have never been.” Additionally, Gina uses the opportunity to talk about global agriculture and build communication skills in her classroom “during global ag I normally ask where you have been and share your experiences - what did you see with ag- and that helps to build communication skills.” Lis also has her students share in class, “my students share about their own culture in class, if we do a potluck, they bring in something they cook at home and most others haven’t heard of.” Amy said, “I read the agriculture news around the world,” after studying abroad and this helps her to bring it back to the classroom. The educators also use different techniques involving global agriculture to teach skills such as problem solving and thinking/reasoning. John said. “I talk to my ag mechanics class about different measurements of electricity, and I show them a converter and have them figure out what it is.” Amy said, “We talk about heritage breeds, and I get them to think outside of the box. “Emma said. “In the classroom we talk about commodities in [State] and now I challenge them to find another country and think about the main commodities there and then compare and contrast. I even have pictures of grocery stores and I have them compare and contrast.”

Theme 5: Reflection and Application

Reflection and application were another recurring theme throughout the interviews. The traditional study abroad programs had students complete reflections and journals that the

students found very beneficial. Mallori said, “Each day while we were traveling, we did reflective pieces. Reflective pieces are a big part of being a teacher. Looking back and really resonating with whatever experience there was that day and taking what you can from it or realizing what could have been done differently, I use that daily in my life.” Emma indicated, “They did encourage us to document the trip and reflect on what we saw and compare those things. I think that really helped me to think about what I was seeing and think about what I know about that specific production practice in America and reflect on it.” However, some educators that did write journals wish that they did more. Monica said, “I wish I would have took more pictures and put more in my journal.” There are also some of the participants that studied abroad but did not complete reflections and they all suggested incorporating reflections as there are many benefits. Lexi said, “Reflection and debrief sessions would be helpful. Discussion about how to talk about study abroad would also be helpful.” Lis said, “I think that it would be good after you get back from your trip to do a decompression session to do a half day or something.” Jenny said, “There was no debrief session at the end or talk of how to incorporate study abroad professionally which would have been helpful.”

The educators also kept indicating that after they studied abroad, they have been able to apply it to their life. One of the participants expressed how studying abroad he found more applicable than just traveling abroad. John traveled to the same location first with his family as a tourist and then on the study abroad program. But he really enjoyed the study abroad portion as he got to go to the farms and ask about the food and production. He said, “I actually got to have my questions answered when I studied abroad, and it helped to make more sense of what I was seeing.” Amy said, “It also makes you appreciate the US more when you get back. I think that is important and that is what I want my students to understand.” In a more unique application, Lis said, “I can’t tell you how many times I have had to speak in Spanish,” and is thankful for the opportunity to strengthen her Spanish skills through study abroad. Several of the agricultural educators also used their experience abroad when interviewing for their position. Lis said, “I used my experience all the time - it was a selling point for me in an interview - it was something especially back then that differentiated me from others.” Monica and several other participants also indicated how life changing the study abroad experience was for them. She said, “I tell my students it was life changing for me. I learned a lot about myself.”

Theme 6: Food and Agriculture as a Universal Language

Throughout the interviews the educators kept bringing up food and agriculture, even when talking about the cultural visits or extra activities they did while abroad. It is important to note the educators found that food and culture are so deeply connected that it makes it easier to learn about agriculture in other countries and how it differs with the culture. Emma said, “It was interesting even some of the cultural sites we visited still talked about the impact of agriculture.” “Now when I go on a trip anywhere, I just go into the grocery stores and look around to just see

the similarities and differences and how it relates to agriculture.” John said, “I just like the whole concept of agricultural literacy and knowing where our food is growing and where it is coming from, everything like that.” He also indicated, “There are differences but there are also similarities I noticed with the culture, a similarity is that there is a huge focus on food in both places. There is a big focus on understanding where the food you are eating comes from. And I think this is something important as these problems we face and solve together globally. Being able to share that these challenges are universal are really good talking points with students. Food was one of my favorite aspects of the program.” Julie simply said when she talks about her study abroad in her classroom, “I talk about foods more than other things.”

Several of the educators also incorporate food into their instruction. Lis brings in actual food dishes from the country when she talks about global agriculture. She said, “Every other Friday I do Food Fridays - my host mom taught me how to make different sandwiches in a tortilla and I share that with my students.” Gina incorporates an activity with her students in which she brings in different international food and has the students think critically about what it is and where it is from.

Conclusion, Recommendations, and Implications

According to Rosenshine and Furst (1971), effective teachers should possess the following characteristics: enthusiasm, clarity, business-like behavior, variability, and the opportunity to learn; however, a value of diversity and recognition of inclusive learning strategies would be two additional characteristics that are important for today’s classroom. Study abroad experiences provide pre-service teachers the opportunity to explore international agriculture while gaining cultural awareness and an exposure to diverse perspectives and experiences. When planning a study abroad experience, university faculty should evaluate their study abroad experiences through the lens of Transformative Learning Theory and consider providing experiences that will expose students to opportunities that will guide them through those TLT phases. In hopes that their experiences through those phases will prepare pre-service teachers to lead in classrooms through the lens of Self Determination Theory. Study abroad experiences provide pre-service teachers opportunities for those a-ha moments which lead to relationship building and increased efficacy ultimately impacting their autonomy, competence, and connectedness in their future classrooms.

Students who participate in study abroad experiences are more likely to have moments that lead to critical thinking and reflection, thus broadening their perspective and in many cases fostering a changed perspective. Their experiences led them to desire more opportunities to travel that would allow them to gain more knowledge and seek out opportunities to create relationships with individuals from different backgrounds. The “a-ha” moments gave the then pre-service teachers the initial reflection leading to the need to apply international agriculture

concepts within their curriculum and classrooms in which they are teaching in today. These teachers who participated in study abroad desired to lead their own students through those “a-ha” moments and encourage them to one day participate in a study abroad experience just as someone had influenced them to participate. It was through their exposure to diverse perspectives that they see the value today as they teach students from diverse backgrounds and cultures. The teachers seek out instructional strategies such as storytelling and the use of food to expose students to a global curriculum before leading them through more in-depth global concepts.

Recommendations for Practice

There were several recommendations for practice that emerged from the interviews. As discussed in the results, the agricultural educators that did not complete reflections wished they did and those that did complete them wished they did more. Therefore, study abroad program directors need to place more emphasis on this while abroad. This is the same for taking videos and pictures. When encouraging students studying abroad to take more pictures, videos, and reflections it may be helpful to share this research with the students and encourage them to think about their future careers and applications. Based off the findings, it was clear that the agricultural educators' study abroad experience had a major influence on how and what they now teach. Study abroad is such a valuable tool for educators that extends the reach far beyond the individual. Therefore, it would be beneficial to find ways for more pre-service and current agricultural educators to study abroad while in college or in their teaching role. Another recommendation is to create a community amongst agricultural educators that have studied abroad. These educators can share their lesson plans, stories, and experiences with other educators to encourage more global knowledge in the classroom. Some of the educators were doing similar activities while some were doing more than others. There currently is no formal training or connections of how to use their experiences in the classroom and trainings are needed. University faculty could facilitate these meetings, and this would help when speaking with curriculum development stakeholders about incorporating global agriculture into the curriculum.

Recommendations for Future Research

This study focused on agricultural educators specifically. It would be interesting to reach out to others that participated in the same study abroad programs but are not teaching to see how they apply it in their careers. Another possible study could be to follow up with the students from the agricultural middle/high school classes to see if they can express how their teacher studying abroad impacted them.

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Covering Climate Change: A Content Analysis of Agricultural Magazines
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Climate change will have an increasing impact on agriculture through both on-farm weather impacts and the impact of related regulation. However, many farmers, while perceiving the climate as changing, do not believe in a fundamental component of climate change, its anthropogenic (i.e., human-caused) nature. This presents challenges as farmers need to bolster their operations against climate change and occupy a seat at the regulatory table to represent the diverse needs of agriculture. Because agricultural magazines have been established as a widely utilized source of information for farmers, this study investigated the nature of the coverage of climate change in 271 articles from three agricultural magazines from 2000-2020. Through a quantitative content analysis, we determined the articles frames, the sources, and the determined cause of climate change. This analysis revealed the dominant frame of scientific certainty, followed by political, conflict, and scientific uncertainty. The most frequently used sources were university scientists/Extension, followed by government officials and government research organizations. Articles were most likely to not mention the cause of climate change. This study contributes to the burgeoning research efforts to communicate this contentious topic and encourage adoption of climate smart agricultural practices.

Introduction

In 1997, the USDA published a detailed report from the Agricultural Research Service on the impact of global climate change on U.S. agriculture determining farmers would need to adapt production practices including new crop varieties in the face of increasing atmospheric CO₂ concentrations (Stelljes, 1997). More recently, the Food and Agriculture Organization (FAO) of the United Nations deemed 2010-2019 the “most turbulent decade” (p. 2) with natural disasters steadily on the rise (FAO, 2021). In regard to agriculture, these disasters swiftly destroyed acres of structures, crops, and livestock. Less obviously, the steady increase in atmospheric temperature also has slow-progressing yet detrimental impacts on agricultural productivity. These include the spread of disease and pests as well as unpredictable weather and planting dates, with impact varying by geographic region (Adams et al., 1998; Havstad et al., 2018).

In addition to and perhaps in response to climate change's impact on agricultural production, public policy has focused its attention on the agricultural sector in the climate change discussion. In November 2021, President Biden unveiled his U.S. Methane Emissions Reduction Action Plan which challenged the USDA to pursue multiple avenues to reduce agricultural methane emissions (White House, 2021). Ongoing administrative initiatives also centrally involve agriculture and “will provide major financial support to farmers and ranchers who adopt ‘climate smart agriculture and forestry’ practices that reduce greenhouse gas emissions and sequester additional carbon stocks in soils and vegetation” (White House, 2021, para. 27). Some of this attention can be attributed to agriculture’s unique ability to both mitigate industry emissions and sequester carbon from the atmosphere, through techniques such as reduced tillage, cover cropping, and reforestation, essentially reversing emissions (Arbuckle et al., 2015). These carbon-trapping practices will be central to approaching government regulation and have already been incentivized by the private sector (Hillyer, 2020).

Despite the scientific consensus (NASA, 2021) and the policy and private sector's increasing pressure, farmers, like the general American public, form two camps of climate change perceptions. Some producers agree with the scientific consensus that human activity causes climate change and will have dire consequences if left unchecked. Most other producers generally do believe the climate is changing but attribute climate variability to natural patterns, with few who do not perceive the climate as changing at all (Arbuckle et al., 2015; Hoffman, 2011b; Morrison, 2017). This division can be attributed to the finding that one of the strongest predictors of an American's beliefs regarding climate change is their political party affiliation (Hoffman, 2011a,b). A 2019 PEW research report found that 45% of Republican respondents believed human activity contributes "not too much/not at all" to climate change compared to 11% of Democratic respondents (Funk, 2019). It is no wonder, then, that farmers have been central to the climate-skeptic movement, as a 2016 Agri-Pulse survey of farmers with at least 250 acres of farmland found 70% of respondents identified as Republican or leaning Republican. One of the most recent studies on American farmers' acceptance of anthropogenic (i.e., human-caused) climate change showed between 55-70% of American farmers disagree with a fundamental concept—that human activity, including agriculture, contributes to climate change and greenhouse gas emissions (Arbuckle et al., 2015). Other research also offers evidence of skepticism and variability by geographic region (Houser, 2018). Rejesus et al. (2013) found 47% of North Carolina farmers, 42% of Wisconsin, 36% of Mississippi, and just 26% of Texas farmers believe in humans' causal role. Gramig et al. (2013) found similar results among farmers in Indiana. Aside from political ideology, other factors impacting climate change perception include prior beliefs and values, as well as demographics and risk perceptions (Cole & Watrous, 2007; Corbett, 2005; Leiserowitz, 2006).

With this variability in the farmer population, communicating with farmers about climate change is difficult but essential. Farmers' skepticism of human's role in climate change creates a barrier for communication aimed to foster an understanding of its impacts on the industry and encourage adoption of adaptation or mitigation practices to decrease operation's vulnerability to the changing climate and lower agriculture's contribution to greenhouse gas emissions (Morrison, 2017). This skepticism also prevents them from participating in policy discourse, resulting from potential top-down regulation with little input from the diverse agriculturalist perspective.

These high levels of skepticism are rooted in complex beliefs connected to political ideology, risk perceptions, and values, but research has also indicated that the nature of media coverage influences how the public perceives an issue. Farmer perception of climate change has been connected to trust in sources (Morrison et al., 2017; Prokopy et al., 2015) with Cummins et al., (2018) and Rohling et al. (2016) suggesting farmers trust and prefer other farmers as sources of climate change information. Arbuckle et al. (2015) found farmers who trusted farm groups and the farm press were less likely to perceive climate change as anthropogenic.

In the case of media that farmers consume, agricultural magazines have maintained a high level of readership across technological generations and in 2018 were considered "the most important information resource, reaching and influencing the most farmers/ranchers" (Agri Media Committee, 2018, p. 6). Despite the chasm between the scientific and farmer opinion coupled with the established reach of agricultural magazines, no American studies have reviewed agricultural magazines to document the nature of climate change coverage. Identifying how journalists cover the contentious topic with a farmer audience in mind can help us understand

how we arrived at the current state of farmer perception and leverage further scholarship on effective messaging techniques. Research of this nature also contributes to the growing body of literature surrounding high-impact, complex problems such as climate change and agriculture, while also aligning with the AAAE National Research Agenda (Andenoro et al., 2016).

Theoretical Framework

While there are other ways to document the nature of media coverage, framing has been used extensively in agricultural communications and climate change research (Asplund et al., 2012; Irlbeck et al., 2011; Steede et al., 2018). Goffman (1974) first described frames as mental constructs of meaning shared between individuals through various language transactions. Framing is at play on the individual-human level and the community, political level (Van Gorp, 2010). The employed conceptualization of framing follows the constructionist approach (Van Gorp, 2010), which supports that individuals and collective groups construct social reality from many information sources, including each other and the media. Journalists play an active role in this reality-shaping process by identifying common idea packages (i.e., frames) and employing them in their own stories. Framing casts issues in a certain light and suggests to readers who or what is responsible and what should be done about it (Iyengar & Simon, 1993). Identifying message frames allows for subjective, methodological analysis of the nature of news discourse, as seen in other agricultural communication research (Irlbeck et al., 2011; Lawson & Meyers, 2020; Lundy, 2018; Steede, 2018).

Within news media framing research, many have focused on climate change communication (Boykoff, 2011; Happer & Philo, 2013; Li & Su, 2018) due to the varying interests public actors (i.e., politicians, journalists, research organizations, etc.) have in the “success” of persuasive messaging campaigns. Climate change media coverage has been extensively criticized for its “lack of clarity on the basic scientific arguments” (Happer & Philo, 2013, p. 329). Journalists have been shown to be compelled by journalistic and economic norms to emphasize the debate and controversy between the small number of climate change-skeptical scientists and the scientific consensus to create profitable, attention-grabbing headlines (Boyce & Lewis, 2009). Research has distinguished several recurring frames in mass media coverage of climate change with dominant themes of scientific uncertainty and skepticism (Antilla, 2010; Hoffman, 2011a). Early climate change framing research of McComas and Shanahan (1999) and Brossard et al. (2004) identified the apparent frames of new evidence of research, scientific background, consequences, economics, domestic politics, international relations, and current weather in newspaper coverage of climate change. Soon after, Antilla (2005) identified four main frames in U.S. newspaper coverage of climate change, which were valid science, ambiguous cause or effects, uncertain science, and controversial science. Li and Su (2018) published a meta-analysis of climate change message framing research that included 10 studies from 2010 to 2017. They outlined five major frames present: morality, environment and biodiversity, geographical identity, public health, and economy (Li & Su, 2018). The review of literature identified only one analysis of message framing in specialized farm magazines which was completed in Sweden (Asplund et al., 2012). The researchers analyzed the frames presented in coverage of climate change in two Swedish specialized farming magazines from 2000-2009. They found three frames of coverage: conflict, scientific certainty, and economic burden. Despite framing’s wide application, no studies have applied a frame analysis of climate change messages to American agricultural magazines. The current study recognizes this research gap and the

powerful influence of message framing as it investigates American agricultural magazine coverage of climate change.

Purpose/ Objectives

The purpose of this study was to explore the coverage and framing of climate change messaging in agricultural magazines published between 2000-2020. The following research objectives were addressed:

RO1: Describe the most frequently employed frames present in the agricultural magazine coverage of climate change over time.

RO2: Report sources used in the magazine articles.

RO3: Determine how the magazine authors discuss the cause of climate change.

Methods

This study used a quantitative content analysis approach to study the selected magazine articles between 2000 and 2020 in three agricultural publications. Content analysis has been used across academia and commercial research to investigate media coverage of relevant issues (Neuendorf, 2017). Content analysis research can identify patterns in news coverage and has been used extensively to guide news framing analysis (Van Gorp, 2010).

Sample

This study included three agricultural publications: *Beef*, *Farm Journal*, and *Farm Industry News*. For magazines to be included in this sample, the archive must have been accessible online, and the magazine must have been agriculturally focused. Some magazines could have had higher readership but did not have an online archive. In addition to the sample's reach (having the highest readership levels in the archive platform), another reason for choosing these agricultural magazines is that they pride themselves on delivering helpful, objective information to benefit producers. While they are not immune to political influence or other private organization vulnerabilities (i.e., advertising pressures and self-censorship), the selected magazines' mission statements mentioned an adherence to updating producers on research, policy, technology, and/or weather. The "Gale Business Insights: Essentials" online platform was used to access digital archives of each magazine. The archive of each magazine was searched for the following keywords: "climate change," "greenhouse gas," and "global warming." This resulted in an initial sample of 120 articles from *Beef*, 139 from *Farm Journal*, and 162 from *Farm Industry News*. Of the total 421 magazine articles, 150 were removed from the sample due to irrelevance. Many that were removed referenced climate change passively or entered the sample due to having the words "climate" and "change" present in the article, but not connected as "climate change." Once these were removed, *Farm Journal* had 66 relevant articles, *Beef* had 89, and *Farm Industry News* had 116. Due to the manageable number of relevant articles, all 271 articles were included in the sample and coded by the lead investigator after establishing intercoder reliability, discussed in the Codebook Formation section.

Codebook Formation

To begin creating the utilized codebook, we went through both an inductive and deductive process as outlined by Van Gorp (2010). Even though this study is a quantitative content analysis with variables specified *a priori*, the fundamental step of specifying frames and

other variables involves collecting and analyzing the media under scrutiny and relevant literature (Van Gorp, 2010). As there is no American research surrounding climate change message framing in agricultural magazines, and frames have been shown to be influenced by time and place (Scheufele, 2006), attention was given to framing literature of magazines and climate change messages generally as well as to the sample. This explorative process allows the researcher to reason with existing frames prominent in the literature as well as the unique characteristics of the messages under scrutiny (Neuendorf, 2017). We also reviewed the codebooks and variables of interest researched in other climate change content analysis/framing studies (Antilla, 2005; Asplund et al., 2012; Brossard et al., 2004; Ford & King, 2015; Hoffman, 2011a; Li & Su, 2018; McComas & Shanahan, 1999).

Through this review, we created an initial codebook with 10 variables. This manuscript reports solely on three variables: frame, source, and cause of climate change. The research team consisting of faculty with expertise in content analysis and climate change communication research reviewed this codebook to ensure face validity (Krippendorff, 2004). Minor revisions were made when we entered the deductive phase (Van Gorp, 2010) where we completed a pilot test to measure the extent to which these frames were actually applied in a sample from a magazine not included in this study but otherwise similar to the sample. This pilot study consisted of two coders who analyzed 11 articles. The initial codebook was refined to four frames (*conflict*, *scientific certainty*, *scientific uncertainty*, and *other*).

Coding

In line with recommendations from Neuendorf (2017), Krippendorff (2004), and Riffe et al. (1998), much time, attention, and research were invested in the coder training process. Coder training consisted of an explanation of the climate change and agricultural landscapes with attention to topics such as greenhouse gas emissions and carbon sequestration that were relevant in the media coverage. Although this step was taken, coders did not need to know anything specific about climate change or agriculture. Each variable was explained through a presentation and example articles not included in the sample were provided for each. Two example articles not included in the sample were coded independently during the training session, and the coding team discussed the rationale behind each coding selection.

To establish intercoder reliability, three coders analyzed 10% of the sample ($n = 42$) (Lombard et al., 2004). We used an online reliability calculator called “ReCal3” (Freelon, n.d.) to calculate a Krippendorff’s agreement coefficient alpha (Krippendorff, 2004). An acceptable level was considered to be an alpha of 0.80 or higher, as recognized by Neuendorf (2017) and Riffe et al. (1998). We did not reach an acceptable level of intercoder reliability on the variables of *frame* ($\alpha = 0.66$) and *cause* ($\alpha = 0.54$). A review of the articles and discrepancies led to the identification of a *political* frame to capture regulatory updates and political discussions. All articles were then recoded, and this revision led to a Krippendorff alpha level of 0.94 for the frame variable. Additionally, when discussing the sample, we added a source category of *journalist* after all coders had documented this initially unnoticed source pattern. The 10% sample was re-reviewed for these characteristics and the categories of *cause* were more explicitly defined. Intercoder reliability was then met on the variables of *frame* (0.94), *cause* (0.83) and *source* (0.90).

Variables of Interest

Frames

Framing analysis has been challenged with consistently demonstrating the relationship between the posed frame and the patterns and characteristics of the text that prompt a coder to choose the appropriate frame (Van Gorp, 2010). It must be acknowledged that content analysis is inherently subjective—although systematic techniques and clear definition of frame elements and devices as well as formatting devices can provide more reliable analysis of news text (Van Gorp, 2010, p. 91). Van Gorp (2010) also insisted that quality, replicable frames have characteristics that are mutually exclusive (p. 99). Based on this guidance, the following frames were utilized: *scientific certainty*, *scientific uncertainty*, *conflict*, *political*, and *other* (see Table 1). Coders chose the dominant frame for each article.

Table 1

<i>Frame Descriptions and Examples</i>		
Frame	Description	Examples
Conflict (1)	Article focuses on agricultural contributions to GHG emissions or contrasts production systems, sectors, or industries.	Keywords: war, fight, vs., against Sample titles: <i>Meat Eating Vs. Driving: Another Climate Change Error? & War on burgers continues with false environmental impact claims</i>
Scientific Certainty (2)	Article has dominant “matter of fact” tone & presents stories as unquestionable evidence that contribute to a culture of acceptance; little to no attention to uncertainties; mentions climate change impacts on agricultural production to suggest climate change is certainly impacting agriculture; and focuses on how agriculture can mitigate climate change.	Key characteristics: likely to cite scientific sources or the scientific consensus and mention mitigation Sample titles: <i>Major USDA Research Underway on Crops and Climate & Benefits of conservation agricultural practices</i>
Scientific Uncertainty (3)	Article questions the cause of climate change, agriculture’s contributions, climate change manifestations, etc. Focuses on lack of scientific consensus.	Keywords: hoax, natural cycles, Mother Nature Sample titles: <i>Who says climate change isn't a natural process?, Science Is No Longer the Only Answer, and Fighting the Global Warming Scam</i>
Political (4)	Article focuses less on climate change and more on policy or regulation. Has little or no attention to cause or skepticism. Can emphasize positive or negatives to regulation, political actors, etc.	Keywords: regulation, election, Washington, D.C. Sample titles: <i>Senate Climate Bill: Ag Unimpressed & Where do Clinton, Trump land on ag issues?</i>

Other (5)	Article is obviously not framed in any of these perspectives.	Sample title: <i>New film celebrates environmental benefits of cattle grazing & How will corn dry down this year?</i>
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Sources

This variable identified both direct quotes and direct sources the author used regarding climate change. Coders recorded each use of source in the article, in a “check all that apply” style option. The source options were *university scientist/ Extension* (1), *industry scientist* (2), *governmental scientist* (3), *government research organization* (4), *government official* (5), *human or animal medical doctor* (6), *farmer/rancher* (7), *agricultural interest group or NGO* (8), *environmental interest group or NGO* (9), *business/corporation* (10), *journalist* (11), and *other: please describe*. The “other, please describe” data was analyzed *post hoc* and revealed two additional source classifications of *author* (12) and *celebrity* (13).

Cause of Climate Change

As the root of the skepticism in the agricultural community is not whether climate change is happening but whether it is human-caused (Arbuckle et al., 2015), this variable identified the cause of climate change the article posed. This variable prompted coders to place every article into one category regarding the presented cause of climate change, either: *human activity* (1), *natural variations* (2), *inconclusive science* (3), *multiple viewpoints and perspectives* (4), or *no mention of cause* (5).

Data Analysis

All data were processed in Microsoft Excel to calculate frequencies. Qualitative *source* data recorded in “other, please describe” were also categorized into apparent themes *post hoc*, and these frequencies were also calculated in Excel.

Results

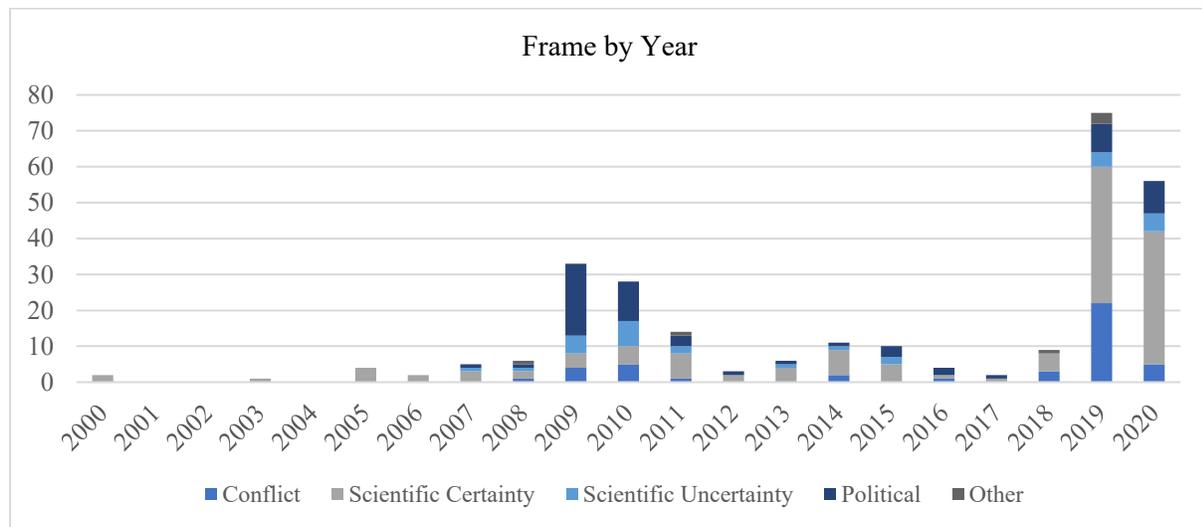
RO1: Describe the most frequently employed frames present in the agricultural magazine coverage of climate change over time.

This research objective sought to identify the frequency of apparent frames in the sample. Table 2 reports the results stratified by each magazine in the sample. The most common frame was *scientific certainty* with 130 articles (48%) categorized as this frame. The next most identified frame was *political* with 62 articles (23%) classified this way. The third most frequently employed frame was *conflict*, which represented 16% of the sample ($n = 44$). The most seldom employed frame was *scientific uncertainty* with 11% of articles ($n = 29$) categorized this way. Figure 1 categorizes the frequency of each frame by year to show that in the first two years of heightened coverage (2009 and 2010) the most frequently used frame was *political*. In the next peak of coverage in years 2019 and 2020, the *scientific certainty* frame was mostly used, totaling 57% of the articles in these two years ($n = 131$).

Table 2
Frames Identified in Magazine Articles (N = 271)

Frames	Frequency (n)			Total
	<i>Farm Journal</i>	<i>Beef</i>	<i>Farm Industry News</i>	
Scientific Certainty	35	22	73	130
Political	28	17	17	62
Conflict	2	30	12	44
Scientific Uncertainty	1	18	10	29
Other	0	2	4	6
Total	66	89	116	271

Figure 1
Frequency of Frame by Year (N = 271)



RO2: Report sources used in the magazine articles.

The second research objective’s purpose was to report the sources used in agricultural magazine coverage of climate change. Some articles contained multiple sources, and all are reported in Table 3. The most frequently used sources in the sample were university scientists/Extension ($n = 81$), followed by government officials ($n = 66$) and government research organizations ($n = 61$). Industry scientists were used as sources 52 times in the sample, followed by 46 uses of agricultural interest groups/ NGOs. Notably, each magazine had a unique most frequently used source.

Table 3
Sources Used in Magazine Articles (N = 271)

Sources	<i>Farm Journal</i>		<i>Beef</i>		<i>Farm Industry News</i>		Total
	(n)	%	(n)	%	(n)	%	
University Scientist/ Extension	18	15	26	15	37	23	81

Government Official	23	19	21	12	22	14	66
Government Research Organization	18	15	34	20	9	6	61
Industry Scientist	16	13	16	9	20	12	52
Agricultural Interest Group/ NGO	11	9	17	10	18	11	46
Business	13	11	7	4	18	11	38
Journalist	1	1	22	12	11	7	34
Farmer/ Rancher	9	8	7	4	12	7	28
Environmental Interest Group/ NGO	1	1	10	6	9	6	20
Governmental Scientist	7	6	5	3	3	2	15
Author ^a	2	2	3	2	2	1	7
Celebrity ^a	0	0	3	2	0	0	3
Human or animal medical doctor	0	0	2	1	0	0	2
Total	119	100%	173	100%	161	100%	453

Note. Total does not equal 100% of the sample. ^a represents variables that were analyzed *post hoc* from qualitative data recorded in the “other, please describe” category.

RO3: Determine how the magazine authors discuss the cause of climate change.

Table 4 displays the frequency of articles that mentioned a cause of climate change. Each article was attributed to only one category, defined as human activity, natural variations, inconclusive science, multiple viewpoints and perspectives, or no mention of cause. Slightly less than half ($n = 123$, 45%) of articles in the sample made no mention of the cause of climate change. Of the categories that mentioned cause, 91 articles (34%) mentioned human activity as the explicit cause of climate change, 27 articles (10%) mentioned multiple viewpoints and perspectives, 27 (10%) mentioned climate science is inconclusive, and 3 articles (.01%) mentioned natural variations in the climate as the explicit cause of climate change.

Table 4
Attributed Cause of Climate Change (N = 271)

Cause	Frame (n)			Total
	<i>Farm Journal</i>	<i>Beef</i>	<i>Farm Industry News</i>	
No mention of cause	39	30	54	123
Human activity	17	28	46	91
Climate science inconclusive	4	17	6	27
Multiple viewpoints/ perspectives	6	13	8	27
Natural variations	0	1	2	3
Total	66	89	116	271

Conclusions & Implications

The most frequent frame of scientific certainty ($n = 130$) presented climate change as a matter of fact, with little to no attention given to inconclusive science or skepticism. These articles were considered to contribute to the overall culture of climate change acceptance and often contained information related to research reports or ways to participate in the climate-smart movement as well as the impact of climate change on agricultural production. A *Farm Industry News* article considered to be framed in scientific certainty was headlined “Climate change expected to increase cost of farm programs” (Farm Industry News, 2019). This frame was also apparent in previous content analysis framing analysis research of national newspapers (Antilla, 2005) as well as Asplund et al.’s (2012) analysis of Swedish specialized farming magazines, the only climate change coverage review of agricultural media. Based on the current study’s sample, before 2019, *conflict* was the dominant frame, but in 2019 *scientific certainty* became the most frequently used frame, with 51% of articles in 2019 framed this way. In 2020, the same was true with 66% of articles framed in *scientific certainty*. This shows over time, agricultural magazine coverage of climate change has shifted toward scientific certainty.

The second most identified frame was *political*, found in 23% of the articles. This indicated the close connection between climate change and the political and regulatory landscape, especially regarding agriculture. In 2009 and 2010, the first two years of substantial climate change coverage, the most frequently used frame was *political*. The next most employed frame was *conflict*, which appeared in 16% of the sample. Articles framed in conflict posed two economic sectors against one another, often in the light of contribution to greenhouse gas emissions. For example, one headline in *Beef* magazine read, “How NYC’s Meatless Mondays campaign is hurting poor communities” (Radke, 2019). In fact, of the 44 articles framed in conflict, 30 of them (68%) were from *Beef* magazine. These articles represent the theme of conflict between cattle production and other groups such as consumers, the environment, and transportation companies. Additionally, the conflict frame experienced its highest use in 2019, with 29% of those 75 articles being framed this way. Asplund et al. (2012) also found the dominant presence of conflict frames in Swedish agricultural magazines. The public’s criticism of the agricultural industry has positioned many agriculturalists on the defensive (Telg et al., 2018) and presents the opportunity for this frame to emerge as journalists compare the emissions of agricultural production to other industries.

Finally, *scientific uncertainty* was the least employed frame with only 11% ($n = 29$) of the sample framed this way. Articles framed in scientific uncertainty emphasized the perceived scientific debate and focused on natural variations being the cause of any change in climate in addition to inconclusive or otherwise faulty science. A *Beef* article in the scientific uncertainty frame was titled “Have we been lied to on global warming?” (Beef, 2009). This frame has prevailed in framing analysis of U.S. news reporting (Boykoff, 2007), but Asplund et al. (2012) did not find it to be a prevalent frame in Swedish specialized farming magazines. Although it was not a prevalent frame in this study, it did experience a peak in 2010 with 24% ($n = 7$) of its total use being in this year. Even though this was the most seldom employed frame, the historical use of this frame contributes to the culture of skepticism in the agricultural community in an intentional attempt to undermine sound science.

The most frequently used sources were *university scientists/Extension* ($n = 81$), *government officials* ($n = 66$), *government research organizations* ($n = 61$), *industry scientists* ($n = 52$), *agricultural interest groups/ NGOs* ($n = 46$), *business* ($n = 38$), *journalist* ($n = 34$), and *farmer* ($n = 28$). The use of university and industry scientists as well as government research

organizations supports the predominant presence of the scientific certainty frame as agricultural magazine coverage of climate change appears to be largely based on the scientific process and consensus regarding climate change. Using scientific sources also supports agricultural climate change messaging recommendations from Morrison et al. (2017), Arbuckle et al. (2015), and Prokopy et al., (2015) as these studies showed farmers and general audiences have high levels of trust in these sources. Furthermore, scientific sources are more likely to perpetuate the scientific consensus.

Prior research has found Extension agents to be a primary source producers trust and prefer (Borelli, 2018; Prokopy et al., 2015; Telg et al., 2018), specifically when communicating about climate change. In the current study, Extension was coded under university scientists, which was the most frequently used source classification. This finding supports the qualitative data Prokopy et al. (2015) gathered that suggested farmers' trust Extension due to their "down the middle of the road" approach and scientific nature (p. 264). The use of university scientists/Extension as the leading source indicates journalists are perpetuating the scientific viewpoint, as Extension has been disseminating climate change science for the agricultural community for years.

The presence of government officials as a major source also supports the second most frequently used frame of *political* because many articles included quotes from politicians and other government officials to bolster points on regulation, elections, and policy. This again highlights the almost inseparable nature of climate change, agriculture, and the government, especially as the American economy works toward net zero emissions by 2030 (White House, 2021). However, consideration should be taken when implementing government officials as sources considering the politically divisive nature of climate change (Dunlap, 2013). Citing politicians on either "side" could reduce message effectiveness for a considerable amount of the population, seeing how political party affiliation is one of the strongest predictors of an American's belief in anthropogenic climate change (Hoffman, 2011a,b).

Agricultural interest groups/ NGOs being cited 46 times in the sample shows that groups such as Farm Bureau and commodity organizations play a role in the modern climate change conversation. As these groups have been historically anti-climate change policy and somewhat skeptical toward climate change (Dunlap & McCright, 2010), they could be contributing to the culture of skepticism in the agriculture community. Arbuckle et al. (2015) found farmers were more skeptical of information from environmentally-oriented interest groups but placed more trust in agricultural interest groups.

Businesses were used as sources 38 times in the sample. No literature has scrutinized farmers' trust in businesses regarding climate change, but these businesses ranged from emerging carbon sequestration businesses to artificial meat companies. Journalists were used 34 times as sources, which suggests that climate change is so culturally relevant that journalists are recruiting information from other journalists' coverage of the issue. Finally, farmers/ranchers were used 28 times as sources. This infrequent use opposes Cummins et al. (2018) and Rohling et al.'s (2016) finding that farmers both trust and prefer other farmers as a source of climate change information.

Notably, slightly less than half (45%) of articles made no mention of cause. This could be due to the apprehensiveness of journalists to address this more contentious aspect of climate change. In fact, not mentioning the cause of climate change is a major

recommendation for climate change messaging to farmers (Arbuckle et al., 2015; Morrison et al., 2017; Prokopy, 2015; Rohling et al., 2016.) This has been posed as a messaging best practice based on the theory of planned behavior (Ajzen, 1985) by increasing the positive attitude toward the issue and message by avoiding “controversial but correct aspects of climate change” (Morrison et al., 2017, p. 17). Of the articles that did mention cause, 91 (34%) mentioned human activity as the explicit cause of climate change, 27 (10%) mentioned multiple viewpoints or perspectives (including human activity and either inconclusive science *or* natural variation), 27 (10%) also mentioned climate science is inconclusive. The high number of articles that mentioned human activity as the explicit cause contribute to the culture of scientific certainty and take the issue head on by supporting the scientific consensus. However, when it is considered that a combined 54 articles (20%) mentioned inconclusive science or natural variation, it is no surprise the culture of skepticism lingers. Six articles (.01%) mentioned natural variations as the only cause of climate change, suggesting that this is seldom the case in agricultural magazine coverage of climate change.

Recommendations

As research about agricultural media’s coverage of climate change expands, future research should gather farmers’ views about anthropogenic climate change, trust in sources, sentiment to climate change terminology, and how willing they are to modify their operations with climate-smart practices. A qualitative study investigating farmers’ perceptions of these topics and their media seeking behavior would provide a clearer understanding of the current landscape. Rich messaging insights could come from data on agriculturalists’ motivations to address climate change, as motivation and values are key indicators of likelihood to centrally process messages and be influenced by them (Petty & Cacioppo, 1986). Furthermore, the journalists in this sample could be interviewed to understand how and why they make the decisions on who to source and how to cover climate change. Additional content analyses of social media discussions relevant to climate change within agriculture could document the sentiment and influencers around this topic.

Another major need for research in the scope of climate change communication to agriculturalists regards audience segmentation *within* the agricultural community, as different segments of agriculture are better suited for certain climate change mitigation efforts. There should be a more concerted effort to identify distinct segments of farmers, perhaps by aggregating many characteristics (e.g., risk perception, demographics, type of operation, geography, values, etc.) into farmer profiles. This can allow for more strategic message creation with a higher likelihood of message effectiveness. Eventually this line of inquiry should involve message testing to understand which characteristics are most effective at fostering a belief in anthropogenic climate change as well as increasing likelihood to change behavior. This could be done through eye-tracking or dial-testing a myriad of messages from videos, websites, and articles.

The study highlights the need for collaboration between scientists and journalists, perhaps presenting an opportunity for science communicators to rise to the occasion. Generally, more research building on the study at hand is needed to examine the intersection of agriculture and climate change in U.S. media as most studies identified through the review of literature were from an international context. The increasing shift towards portraying the scientific consensus in agricultural magazines suggests research of this type will continue to be relevant as audience perceptions and media coverage interact.

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Teacher Perceptions of Administrator Actions in COVID-19 and Its Impact on Emotional Exhaustion: A Moderation Analysis of Teacher Self Efficacy

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School districts, administrators, and teachers faced an unprecedented challenge as schools closed due to COVID-19. SBAE teachers were no exception to this and faced the unique challenge of teaching technical content through virtual platforms. The purpose of this study was to explore SBAE teacher emotional exhaustion amid the shared trauma of the COVID-19 pandemic. This study examined emotional exhaustion, teacher self-efficacy, technological pedagogical content knowledge (TPACK), and perceived supportive actions from administration in Ohio SBAE teachers. Paired samples t-tests indicated increases in emotional exhaustion – with a medium effect size – in participants from spring to autumn of 2020. A serial multiple mediator model indicated that supportive administrator actions significantly predicted TPACK and emotional exhaustion, while TPACK significantly predicted teacher self-efficacy at the time of measurement. Within the mediation model, no significant indirect effects were found. Further research should examine the factors behind administrative support for teachers to help mitigate emotional exhaustion in the teacher population.

Introduction

Ohio, like any other state, had its typical K-12 learning environment thwarted in March 2020. What started as a three-week break turned into not returning to school until the spring of 2021. During this time, Ohio School-Based Agricultural Education (SBAE) teachers experienced challenges delivering content through remote platforms. The pedagogical method most difficult to deliver through a remote platform was the hands-on learning for which Career and Technical Education (CTE), and more specifically SBAE, is known (Clark et al., 2010). Hands-on learning, prior to this, had typically not been offered through video conferences and other virtual learning platforms. However, a few of the shifts to online learning had been utilized by teachers previously and had research to support and guide the decisions that teachers and administrators made during this time (Kiray, 2016). Specifically, the shift from lecture and modeling-based instruction to integrating technology had been explored through research (Kiray, 2016). The systematic changes to shift instruction online were only one of the novel facets of this public health crisis. The other piece of the crisis was the trauma (Griffin, 2020) each community was experiencing while these decisions were being made.

The impacts of the COVID-19 pandemic are further complicated due to the ongoing status of the pandemic, the ever-changing policies, and procedures. However, one of the most novel characteristics impacting the outcomes surrounding the COVID-19 pandemic has been the individuality of the circumstances facing each person. Further, the barriers and challenges that

faced teachers were incredibly unique and based on each individual school, school district, community, county, and state. These become important considerations as they related to the development of this study.

The teaching profession has been studied for a considerable period of time regarding their experience within the profession, and school-based agricultural education (SBAE) teachers are no exception. However, due to the novelty of the shared trauma of the COVID-19 pandemic (Griffin, 2020), there is a lack of research examining teachers' experiences during such an event. Due to the manifested consequences of the COVID-19 pandemic, we determined that the following theoretical concepts were appropriate to evaluate as a part of this study: emotional exhaustion (EE), technological pedagogical content knowledge (TPCK), teacher self-efficacy (TSE), and supportive actions by administrators (SAA).

The connection between EE, TPCK, TSE, and SAA and the experiences of SBAE teachers during the COVID-19 pandemic were of interest to establish the impact of the pandemic on those aspects of their teaching experience. EE is associated with the feelings of overall fatigue that are related to burnout (Maslach, et al., 1996). TPCK is associated with confidence in knowing how to present knowledge to students (Mishra & Kohler, 2005). TSE represents teachers' confidence in their ability to be effective in instructing students (Tschannen-Moran & Hoy, 2001). Administrative support has been suggested to be essential in making teachers feel more supported in their profession amid COVID-19, and lack of support has been seen as a predictor of burn-out (Pressley, 2021). Given the limited research available regarding teacher experiences in the COVID-19 pandemic, these constructs were determined the most impactful to examine within the experiences of SBAE teachers because existing research supports these relationships from before the 2019-2020 school year. These constructs were selected because of their level of importance for teaching during the pandemic in being comfortable in their ability to teach their students, feeling comfortable teaching about their content in the online modality selected by their school district, observing good morale in their profession, and feeling supported by their school administrators.

The novel issues faced by SBAE teachers during the pandemic were a priority area of research over the past months. At the time this research was conducted there was no clear picture of the experiences of SBAE teachers. As the research conducted during that time becomes published and disseminated, the findings will begin to tell the story of the pandemic through the lens of agricultural education, including both SBAE teachers and students. A study focused on SBAE teachers explored the specific challenges that posed the most problematic situations for them during the pandemic, which included both written and verbal communication to students and parents, advising and planning FFA activities, managing program facilities and activities, maintaining Supervised Agricultural Experiences (SAE), student motivation, technology and internet usage, and work-life balance (McKim et al., 2021). More generally, SBAE teachers expressed their initial dissatisfaction stemmed from extremely specific parts of the pandemic experience including school operation changes, the required changes imposed on their program activities, and the negative impact the changes had on teacher well-being (Easterly et al., 2021). McKim & Sorensen (2020) found that the pandemic caused several shifts to the SBAE teacher role in both professional and personal roles that resulted in a *work domain decline* and a *job satisfaction slump* for the teachers. This meant that SBAE teachers saw a decrease in the

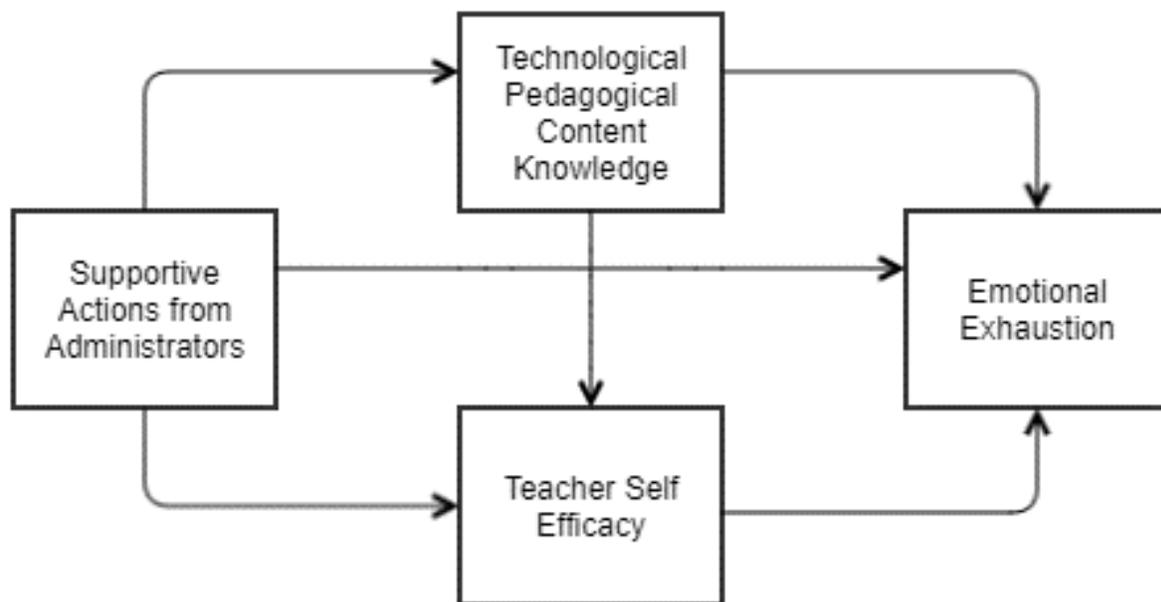
presence of their work roles and a decreased satisfaction in their job as well. Whereas further research demonstrated that SBAE teachers were aware of and used school-approved synchronous online instruction tools and applications during the periods of school closure, the level of comfort with those tools varied within the participants (Eck et al., 2021). These recently published studies have begun to help us gain even further understanding of the impacts the pandemic had within SBAE program; however, the long-term impacts and the continued research will help to gain even more understanding in the future.

This study seeks to add to the existing literature by providing a better understanding of the SBAE teacher experience during the COVID-19 pandemic. The study will provide clarity in areas that have yet to be discussed about the SBAE teacher experiences, which include EE, TSE, TPCK, and SAA. The study is meant to help us learn about the novel experiences that teachers have had over the past year in order to help inform practices within the profession to retain and support teachers in the profession as the pandemic continues.

Theoretical/Conceptual Framework

We explored the impacts of the COVID-19 pandemic on SBAE teachers through the lens of EE, while examining TSE, TPCK, and SAA through the pandemic; the conceptualized relationship among these four variables can be found in Figure 1. Maslach, et. al. (1996) defined EE as the feeling of emotional and physical fatigue that reveals low energy and attributes to burnout. The psychologically drained teacher lacking emotional resources is not able to perform job capabilities and shows signs of EE (Maslach, et al., 1996). Signs of EE include the development of reduced personal accomplishment, feelings of excessive demands from a lack of resources, which leads to the coping mechanism of cynicism (Alarcon, 2011) and depersonalization (Maslach, et al., 1996).

Figure 1
Conceptual Framework



Teacher EE can be mitigated when a teacher believes in their competence and ability to successfully teach content through instruction, otherwise known as TSE (Tschannen-Moran & Hoy, 2001). TSE is born from self-efficacy (Bandura, 1977, 1997), the internal belief of capacity to be successful. This is essential for individuals to set goals, plan logistics, and complete tasks relating to any of their own abilities and is connected to, academic performance, motivation, and a desire to succeed (Pajares, 1996). Some external supports that might be considered influential for TSE and EE include support from others and professional development as a mode of shifting professional knowledge (Croom, 2003; Maslach, et. al, 1996; McKim & Velez, 2016). It should also be noted that administrative support has specifically been ranked in the past as the most prominent issue facing SBAE teachers (Boone & Boone, 2007), and has been shown to be a component of job satisfaction impacted by COVID-19 (McKim & Sorensen, 2020). This indicates that administrative support may be influential to TSE and EE as it pertains to SBAE teachers.

Finally, the pedagogical integration of technology into the virtual delivery of instruction presented a new challenge for teachers during COVID-19 and was arguably a vital piece to the success of teachers transitioning away from traditional classroom instruction. An SBAE teacher's competence in the unification of distance learning and SBAE curriculum should include TPACK. Developed by Mishra and Koehler (2005, 2006), the TPACK framework was designed to clarify teacher's technology perceptions and integration into content knowledge, pedagogy, and curriculum.

This study aims to provide insight into teacher's perceptions prior to and during the COVID-19 pandemic, and to map EE, TSE, and TPACK in relation to administrative support during the COVID-19 pandemic. By examining the self-reported perceptions provided by SBAE teachers, we hope to provide insight into the impact that TSE, TPACK, and EE had on teachers as they experienced COVID-related challenges between the spring and fall of 2020. More broadly, this study also tests the connection that has been supported between TSE and among these variables under a pandemic condition (Skaalvik & Skaalvik, 2014).

Purpose and Objectives

The purpose of this study was to examine if school district administration responses to the COVID-19 pandemic impacted levels of EE in SBAE teachers when accounting for TSE and TPACK. This research aligns with AAAE research priority 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century (Stripling & Ricketts, 2016). This study was guided by the following objectives:

1. Describe how supportive Ohio SBAE teachers perceived support from their administrators through the COVID-19 pandemic.
2. Describe Ohio SBAE teachers' current TSE, EE, *retrospective* EE, and TPACK.
3. Compare EE levels from February 2020 to current levels as measured in November 2020.
4. Describe the relationship between administrator supportive actions and emotional exhaustion, using TSE and TPACK as mediators.

Methods

This study's population of focus was SBAE teachers who had been at minimum in their second year of teaching in Ohio during the Spring 2020 of the initial COVID shutdown so that participants would have experienced a full year of "Pre-COVID" teaching. The target population was identified from the Ohio SBAE teacher directory ($N = 499$). For this population size, Krejcie and Morgan (1970) recommend a sample of 217, thus a random sample of this size was drawn from the Ohio SBAE teachers identified above.

Before the full study was conducted, there was a need to create and validate a summated rating scale designed to assess teacher perceptions of administrator support amid COVID-19 school shutdowns. To begin, items related to administrative support were drafted into an item pool that sought to describe a variety of potential support given to teachers by administration (i.e. "after the COVID shutdown, my administration communicated clearly to teachers"). The item pool was then evaluated by the researchers, removing items that seemed relatively unimportant or that unintentionally duplicated others, resulting in 28 items, all measured on a five-point Likert-type scale with anchors reading from "not at all" to "a great extent". The instrument was then submitted for feedback to a panel of experts in the field of Agricultural Education ($n = 6$) who provided feedback on item wording and added 6 additional potential items to the item pool, resulting in a total of 34 items. After expert recommendations and edits were implemented, the instrument was distributed via Qualtrics software in a pilot study to 102 Illinois SBAE teachers and garnered a response rate of 53% ($n = 54$). Results were then analyzed using SPSS v. 26. After finding no outliers, a principal factor analysis was completed, examining the factorability of all 34 items by utilizing principal axis factoring as the extraction method with a direct oblimin rotation. Initial factor analysis indicated desirable Kaiser-Meyer-Olkin and Bartlett's calculations, indicating sampling adequacy (Field, 2018). Upon initial analysis, every item contained a factor loading of at least .33, falling between Comrey and Lee's (1992) designations for "poor" ($< .32$) and "fair" (.45 - .54). The initial factor matrix extracted eight factors with eigenvalues greater than one, but upon further examination the scree plot indicated a point of inflection at factor three, indicating that the final analysis should result in only two extracted factors.

Following the first iteration of the factor analysis, items were removed from the pool one by one based on 1) having the lowest factor loading, and 2) loading into multiple factors, or some combination of these two criteria. After removing 17 items, the final factor analysis indicated two primary factors where all items indicated factor loadings of at least "good" ($> .55$) (Comrey & Lee, 1992). This final iteration indicated a KMO value of .79 and extracted two factors accounting for 62.58% of the total variance. All final items can be found in Table 1.

Factor one, accounting for 47% of total variance, consisted of 12 items, all consisting of "very good" (.63-.69) or "excellent" ($\geq .7$) factor loadings (Comrey & Lee, 1992). This factor contained items that all indicated actions that administrators would do; thus, it was named the "supportive actions scale" and calculated a desirable Cronbach's alpha of .95 (Carmines & Zeller, 1979). Descriptive statistics showed a mean score slightly above the mid-point of the scale for pilot participants, indicating that administrators moderately supported SBAE teachers ($M = 3.38$, $SD = .93$).

Table 1*Results From Factor Analysis of Administration Response to COVID-19 questionnaire (N = 43)*

Item	Factor Loading	
	1	2
<i>All items begin with “After the COVID shut down, my administration...”</i>		
Factor 1: Supportive Actions ($\alpha = .950$)		
- communicated clearly to teachers	.91	
- communicated clearly to students	.89	
- supported teachers	.89	
- reminded me to focus on personal wellness	.87	
- reminded me to focus on self care	.86	
- communicated clearly to parents	.81	
- expected high levles of teacher well being	.80	
- was quick to respond to issues that arose in the shutdown	.76	
- epected teachers to put their health first	.76	
- expected high levels of teacher self preservation	.70	
- expected teachers to complete tasks outside of their capabilities (R)	.66	
- encouraged me to have patience with students	.60	
Factor 2: Supportive Expectations ($\alpha = .796$)		
- expected teachers to work at the school (R)		.80
- expected teachers to work from home		.69
- expected high academic results (R)		.60
- expected teachers to use school internet access (R)		.60
- expected teachers to give leniency in grades		.58

Note. Reverse-scored items denoted with (R). Bold factor loadings denote “good” or above ($> .55$) (Comrey & Lee, 1992).

Factor two, accounting for 15.58% of the total variance, consisted of five items, with a range of factor loadings from .58 to .80. This factor contained items that all indicated actions that administrators would *expect* from SBAE teachers; thus, it was named the “supportive expectations scale” and calculated a desirable Cronbach’s alpha of .80. Descriptive statistics indicated that administrators had substantial rates of supportive expectations of teachers’ duties, particularly when it came to lowering what some would consider “traditional” teaching expectations related to work location and grading student work ($M = 4.1$, $SD = .84$).

While both the *supportive actions* scale ($\alpha = .95$) and the *supportive expectations* scale ($\alpha = .796$) indicated reliable Cronbach’s alpha calculations above .7 in the pilot study (Carmines & Zeller, 1979; Nunnally & Bernstein, 1994), only supportive actions (SAA) calculated an alpha below .7 in the study sample, thus administrative expectations, while included on the full study instrument, were not included for further analyses.

The remainder of the instrument for this study utilized summated rating scales from previously published studies measuring TSE ($\alpha = .9$) (Tschannen-Moran & Hoy, 2001), EE ($\alpha =$

.95) (Maslach et al., 1996), and TPCK ($\alpha = .95$) (Kiray, 2016). The EE scale was used twice – once to measure present levels, and again asking teachers to reflect and report what they felt their answers were 8 months earlier, before their schools closed due to COVID-19. All study scales from our sample calculated Cronbach’s alphas of .92 or greater, well above the minimum of .7 to be considered reliable.

This study utilized a quantitative cross-sectional survey design. The questionnaire was hosted by Qualtrics and distributed via email according to the tailored design method for online-only questionnaires (Dillman et al., 2014). The original distribution was followed by six reminders, resulting in a response rate of 25% ($n = 54$). Non-response error was addressed by distributing a second survey to a random sample of 15% of nonrespondents ($n = 24$) (Dooley & Lindner, 2003; Lindner et al., 2001; Miller & Smith, 1983). Independent-samples *t*-tests were conducted to compare nonrespondents to respondents on all study variables and no differences ($p > .05$). Variables were thus considered generalizable to the sample and population. The data from the nonrespondents were combined with the original sample, resulting in an overall response rate of 36% ($n = 78$). From these responses, the average participant in this study was 39 years old ($M = 38.67$, $SD = 9.89$), taught for 13 years ($M = 12.67$, $SD = 8.56$), and participated in 26 hours of instructional technology professional development ($M = 26.33$, $SD = 28.2$).

We utilized descriptive statistics to analyze the data for objectives one and two which sought to describe SBAE teachers’ SAA, TPCK, EE, and TSA. For objective three we used paired samples *t*-tests to measure pre and post EE of SBAE teachers after all assumptions for *t*-tests were confirmed to be met by the data (Field, 2018). Finally, to address objective 4, the SPSS add-on program PROCESS (Hayes, 2018) was used to run ordinary least squares regression procedures to estimate direct and indirect effects within the conceptual model. All assumptions were met for the above statistical procedures and were conducted using SPSS v. 27.

Findings

Objective one was to describe how Ohio teachers perceived SAA amid the COVID-19 pandemic. This objective was assessed through descriptive statistics that indicated participants felt their administration showed supportive actions just over the halfway mark of the five-point scale ($M = 3.30$, $SD = 1.04$), which was very similar to the pilot study participants. However, while study participants also indicated similar levels of supportive expectations ($M = 3.10$, $SD = 1.22$). This scale calculated a lower alpha ($\alpha = .68$) indicating that it was unreliable with this sample, and thus removed from further analyses. Participants exhibited a range of summated values that comprised the entire length of the scale from 1 – “not at all” to 5 – “a great extent” for both variables. Thus, it should be noted that participants had a wide variety of experiences during COVID-19 school closures as it pertains to administration support and expectations. Summarized results from these scales can be found in Table 2.

Objective two was to describe TSE, current and *retrospective* levels of EE, and TPCK of Ohio Teachers, the summaries of which can be found in Table 2. On a nine-point scale ranging from 1 – “None” to 9 – “A Great Deal”, participants reported *Quite a Bit* of TSE ($M = 6.63$, $SD = .98$) indicating that they felt quite confident in their ability to accomplish a variety of tasks related to teaching. On seven-point scales, measuring the frequency of symptoms of emotional

exhaustion from 1 – “never” to 7 – “every day”, participants indicated averages for both measures that fell within the category of “moderate” emotional exhaustion ($M = 2.89$ to 4) with *retrospective* levels ($M = 3.27$, $SD = 1.43$) scoring lower than present levels ($M = 3.94$, $SD = 1.44$). Finally, on a 5-point scale ranging from 1 - “I don’t know at all” to 5 - “I know very well”, participants indicated that they have moderate levels of TPCK ($M = 3.50$, $SD = .67$), indicating that participants felt fairly confident about their use of learning technology alongside their pedagogy skills and content area knowledge when teaching.

Table 2
Psychometric Properties for Study Scales

	<i>n</i>	<i>M</i>	<i>SD</i>	Range	Cronbach’s α
Technological Pedagogical Content Knowledge ^a	5	3.5	.67	1.71 – 5	.93
Current Emotional Exhaustion ^b	9	3.94	1.44	1.22 – 6.89	.94
Past Emotional Exhaustion ^b	9	3.27	1.43	1.22 – 7	.96
Teacher Self Efficacy ^c	12	6.63	.98	3.33 – 8.67	.92
Admin Supportive Actions ^a	12	3.30	1.04	1 – 5	.93
Admin Supportive Expectations ^a	5	3.10	1.22	1 – 5	.68

Note. ^a 5-point scale; ^b 7-point scale; ^c 9-point scale

Objective three sought to compare participant EE levels from before school closings and at the time of the study. To accomplish this, a paired samples *t*-test was conducted, indicating that pre-COVID EE was significantly lower than current EE levels, showing a medium effect size, $t(73) = 5.74$, $p < .001$, $d = .67$. These results are summarized in Table 3.

Table 3
Paired Samples t-test results comparing emotional exhaustion levels.

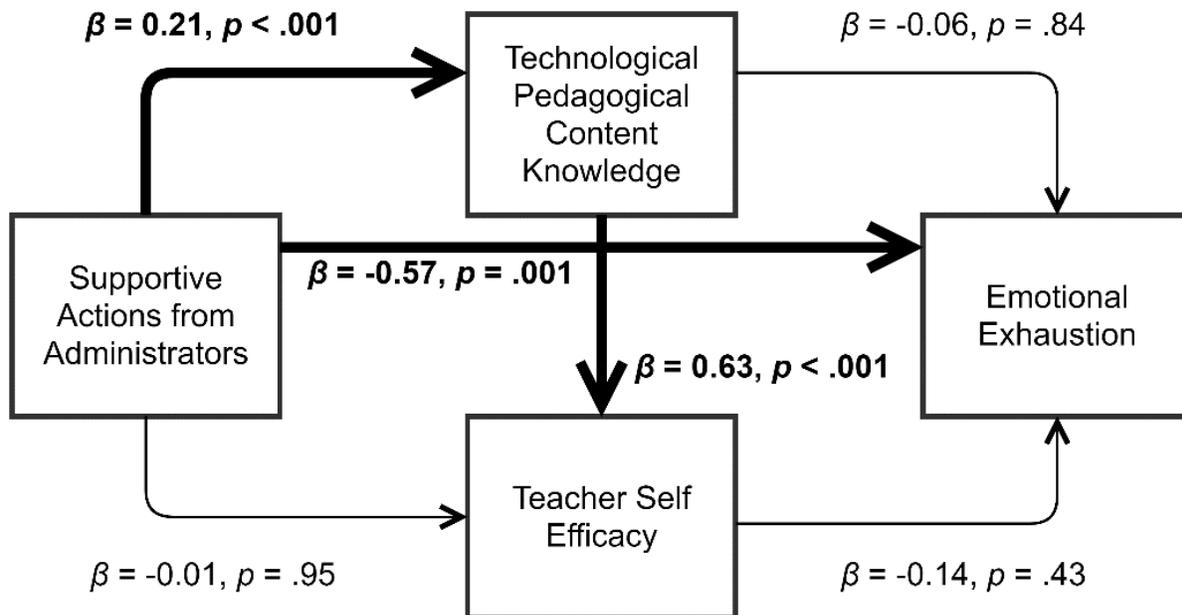
	Time	<i>M</i>	<i>SD</i>	<i>t</i> -cal	<i>df</i>	<i>p</i>	<i>d</i>
Emotional Exhaustion	Pre-COVID	3.26	1.45	5.74 ^a	73	< .001	.67
	Current	3.97	1.41				

Note. ^a t -crit = ± 2.00

Objective four was to describe the relationship between SAA and current EE, using TSE and TPCK as mediators. To examine this relationship, a serial multiple mediator model was utilized within the PROCESS add-on to SPSS to analyze the relationships between the study variables, the results of which can be found summarized in Table 4. While no significant indirect effects were found, Supportive Administration Actions served as a significant predictor for both TPCK, $\beta = .21$, $p < .001$; and current emotional exhaustion, $\beta = -0.57$, $p = .001$. Additionally, TPCK served as a significant predictor for teacher self-efficacy, $\beta = .63$, $p < .001$. Other than these three direct interactions, no other significant relationships between variables were found, but all model direct effects can be found summarized in Table 3 and visualized over our theoretical framework in Figure 2. This final mediation regression model calculated an R^2 value of .19, indicating that about 19% of variance in participant emotional exhaustion can be accounted for via the three analyzed variables.

Table 4*Regression values of study variables using SPSS Process (Hayes, 2018).*

Predictor	β	SE	<i>t</i>	<i>p</i>	95% CI
Tech. Pedagogical Content Knowledge as outcome variable; $R = .33, R^2 = .11$					
Admin Actions***	.214	.074	2.9	< .001	[.07, .36]
Teacher Self Efficacy as Outcome Variable; $R = .41, R^2 = .17$					
Admin Actions	-.007	.114	-0.06	.95	[-.24, .22]
TPCK***	.627	.176	3.56	< .001	[.28, .98]
Current Emotional Exhaustion as outcome variable; $R = .43, R^2 = .19$					
Admin Actions**	-.568	.165	-3.44	.001	[-.9, -.24]
TPCK	-.055	.277	-0.2	.84	[-.61, .5]
TSE	-.138	.175	-0.79	.43	[-.49, .21]

Note. ** $p < .01$, *** $p < .001$ **Figure 2***Serial multiple mediator model indicating direct relationships between study variables from conceptual framework.**Note.* **Bold** figures and arrows indicate significant relationships, $p < .05$. No significant indirect effects found.

Conclusions, Implications, and Recommendations

From the analysis of data in regard to objective one, teachers indicated that administrators, overall, provided support amid the shared, chronic trauma of the COVID-19 pandemic with the mean score sitting slightly above the midpoint of the scale representing

“neutral” in response to the scale questions ($M = 3.30$, $SD = 1.04$). While not overtly positive, this is promising as administrative support has been ranked in the past as the most prominent issue facing SBAE teachers (Boone & Boone, 2007), and has been shown to be a component of job satisfaction impacted by COVID-19 (McKim & Sorensen, 2020).

From objective two findings, we can conclude that Ohio SBAE teachers perceived they experienced high levels of TSE and moderate levels of TPCK in the fall of 2020, 8 months after initial school closures, while participants also possessed moderate (as defined by Maslach et al., 1996) levels of EE at both points. This was supported by prior research that has demonstrated teacher comfort with technology was impactful on their overall feelings of frustration during this time (Eck et al., 2021). As the COVID-19 pandemic is likely still impacting the TSE and TPCK levels of the teachers involved, given the changing policies and procedures over time, further research should be conducted late in the pandemic and after the pandemic to see if the levels are stable or continue to shift. Additionally, seeking further information about what experiences and sources have been most impactful in the shifts the SBAE teachers have felt in TSE and TPCK.

We conclude, from objective three, that teachers possessed a significantly higher EE score in late fall of 2020. Teachers’ EE increased over the first 8 months of the pandemic, and this finding supports earlier research showing that the unprecedented shift in aspects of their professional life impacted teacher beliefs in their professional abilities and their job satisfaction (McKim & Sorensen, 2020; Sorensen, 2020). Future research should continue to examine the ongoing changes in EE that SBAE teachers might be experiencing as the COVID-19 pandemic continues to be a meaningful factor in the operations of our schools and school-related activities.

From objective four we can conclude there were three significant relationships among study variables. SAA had a significant impact on teacher TPCK and EE, and teacher TPCK had a significant impact on TSE, which can be found in Figure 2. One relationship that did not result in a significant finding was that of TSE and its effect on EE. While this relationship did carry a small negative coefficient ($\beta = -0.14$, $p = .43$), our findings contradict previous literature that supported this relationship (Friedman, 2003; Schwarzer & Hallum, 2008; Skaalvik & Skaalvik, 2014); this indicates that while this may be an important relationship, the effects of the COVID-19 pandemic may mitigate the role that TSE has in preventing EE. Additionally, future researchers might consider exploring the relationships explored in this study; as the pandemic continues to be impactful for SBAE teachers and programs, the relationships might continue to change.

The COVID-19 pandemic continues to impact SBAE teachers’ levels of emotional exhaustion, so it is recommended that further research seeks to uncover how SBAE teachers have coped with this collective trauma, and what sources of support exist for them outside of their administration, if any. Although there is a small collection of research regarding the overall experience of SBAE teachers during the COVID-19 pandemic thus far, there are still many other areas left to explore. While we have learned more about about the “job satisfaction slump” and the shift of personal and professional roles for SBAE teachers in the time of COVID (McKim & Sorensen, 2020; Sorensen, 2020), further research should be conducted. These studies should consider focusing directly on the challenges that CTE administrators, school administrators, and

SBAE teachers face, as well as their perceptions surrounding the COVID-19 shutdown and transition to online learning in addition to the continued stressors caused by the pandemic.

Eck et al. (2021) explored the comfort of SBAE teachers with technology during the COVID-19 pandemic. Thus, researchers who seek to continue research in this topic could include the long-term impacts of this technological experience on learning in the classroom. Additionally, research could be conducted to examine if teachers' use of technology changes after relying on technology in their classrooms for the length of the pandemic. Research following the 'end' of the pandemic should consider exploring the interest of SBAE teachers in professional development centered around technology. One final research idea regarding the technology impacts of the COVID-19 pandemic could be access to the internet and school-owned devices because of the shift to online learning, and how the presence or lack thereof could contribute to teacher and student motivation and efficacy.

Outside of technology, research should also be conducted surrounding additional characteristics of the work environment that might have influenced teacher EE and TSE over the COVID pandemic. As previously mentioned, some research has looked at the role shifts for SBAE teachers (McKim & Sorenson, 2020), but research into how those shifts have impacted their EE and TSA specifically would be impactful in understanding how to positively impact these phenomena for SBAE teachers during the school year. Finally, it is recommended that further research should examine the factors behind SAA for teachers to help mitigate EE in the teacher population. The intentional examination of the actions that school administrators can take to have impactful support for SBAE teachers is important, even outside of the COVID-19 pandemic. Anecdotally, all teachers can attest to the importance they feel toward experiencing support from their school administrators. Therefore, intentional research into the perceptions of both CTE administrators and SBAE teachers on the phenomenon of SAA would be beneficial.

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School-Based Agricultural Education Teachers' Lived Experiences and Motivational Factors Amid COVID-19

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School-Based Agricultural Education teachers faced a unique challenge during the COVID-19 pandemic as they continually tackled state and local health mandate decisions while teaching technical skills in a variety of settings, advising FFA chapters, and supervising work-based learning experiences. These challenges could influence teacher motivation in a variety of ways. Thus, the purpose of this study was to explore the essence of SBAE teacher motivation during the shared trauma of the COVID-19 pandemic. This phenomenological study consisted of eight solo interviews and two focus group interviews (n = 14) that focused primarily on teachers' motivation within their teaching role. Participant responses resulted in four themes: 1) stronger teachers emerging from the chaos, 2) triumphs and challenges of working with students in the three-circle model, 3) always the scapegoat, rarely allowed to graze, and 4) forced reconciliation of work-life priorities. These themes consisted of both motivational and demotivational factors in the teachers' past year, and provide insight for state staff, teacher educators, and professional development providers as they support teachers as the pandemic continues.

Introduction

The preparation for the 2020-2021 school year was met with uncertainty, as school districts stood waiting for Governor Mike DeWine to announce guidelines for the opening of K-12 schools in Ohio. Relying heavily on Ohio's history of local control over how each school operates, on July 2, 2020, DeWine provided a set of guidelines that each school district must follow when developing its local school reopening plan (Ohio Legislative Service Commission, 2015). Local school districts were charged to design their reopening plan to fit the needs of their students, employees, and school district while still adhering to the directives outlined by the state (Ohio Department of Education, 2020). As such, there were vast variances in the school districts' approaches due to educational delivery models, internet connectivity and technology accessibility, changes to school district funding, increased district costs, and building capacity (Ohio Department of Education, 2020). State department of education guidelines were again modified for the 2021-2022 school year, however vast variances due to local school board and administrative decisions continued.

School-Based Agriculture Education (SBAE) programs faced a unique challenge during COVID-19 as educators were faced with teaching technical skills outside of the classroom/laboratory and virtually engaging students in Career and Technical Student Organizations (CTSO) (Gordon & Xing, 2020; McKim & Sorensen, 2020). The pedagogical and programmatic challenges impacted SBAE teachers in a variety of ways. Additionally, SBAE teachers experienced a decrease in well-being due to the exhaustion of virtual teaching but experienced professional growth as they explored new methods and resources for virtual teaching (Easterly et al., 2021). Florida SBAE teachers exhibited reduced efficacy when teaching virtually as compared to teaching in-person (Barry & Easterly, 2021) and South Carolina

teachers felt less efficacious to supervise SAEs, manage the FFA chapter, and teach Career Development Event teams as the pandemic continued (Eck, 2021). Finally, SBAE teachers displayed positive motivation towards their roles as teachers and desired to make positive changes related to the FFA and Supervised Agricultural Experience (SAE) but were less efficacious in their ability to make these changes (Clemons et al., 2021). In addition, previous research with SBAE teachers has found that many teachers fail to maintain a balance of work and life, as exemplified by participants agreeing that effective teachers are willing to put in extra hours (Eck et al., 2019). Early career teachers find themselves in a “success trap” that eclipses their personal lives (Traini et al., 2020), and teachers even state that being an excellent teacher is *incompatible* with having a satisfying personal life (Solomonson et al., 2018). Recently, due to COVID-19, SBAE teachers experienced a decline in overall work hours with a shift in emotional attention away from their work role to their family/life domain and a decrease in job satisfaction (McKim & Sorensen, 2020).

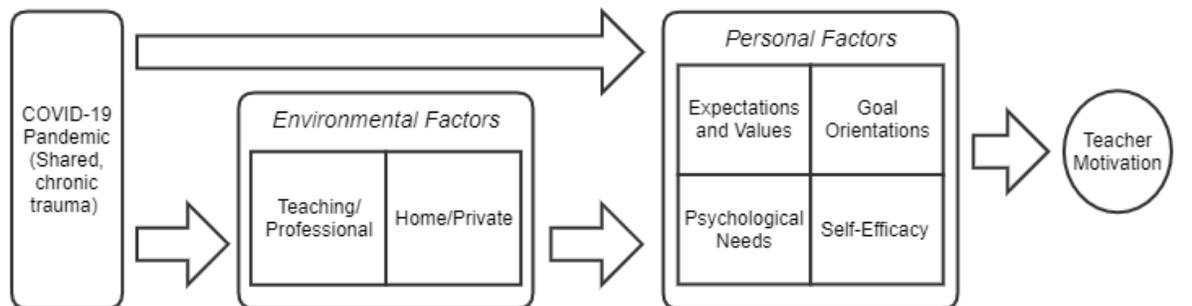
While much focus within the literature has explored virtual teaching and teacher efficacy, there has been little research on total SBAE programs or teacher motivation. Additionally, there is a lack of literature examining COVID-19 and SBAE teachers. Because much of the research has focused on the time and place of the pandemic, this study provides a view of how COVID-19 has impacted teacher motivation, as well as details some changes in teacher motivation and practices that may persist after teachers return to “normal” teaching.

Conceptual Framework

This study was guided by a conceptual framework (see Figure 1) which captures concepts from different motivation theories to indicate how COVID-19 could have potentially influenced teacher motivation via its influence on environmental and personal factors. This framework guided our methodology to best understand teacher motivation within this context and allows for the inclusion of shared chronic trauma as defined by Masiero, et al. (2020) within the analysis.

Figure 1

Conceptual framework of COVID-19's potential indirect influences on teacher motivation, indicating relationships between motivational concepts.



Motivation as a phenomenon has been modeled in many ways within educational research. A motivational research review by Pintrich (2003) describes five generalizations that can be made across motivation theories despite their varying definitions of and relationships between constructs. These five generalizations state that one can be motivated through self-belief in personal competence, control beliefs, having goals, and holding high levels of both interest

and/or value. Some ways that these variables can be found in the literature include the four-phase model of interest development (Hidi & Renninger, 2006), a four-quadrant framework of achievement goal orientations (Elliot & McGregor, 2001), and the three psychological needs of competence, autonomy, and relatedness that can foster intrinsic motivation (Ryan & Deci, 2000). Additionally, when examining external motivation factors, employees and instructors at East Carolina University ranked work environment as a major motivational factor alongside other factors such as pay and coworkers (Mani, 2002). While teachers' environmental motivation factors have not been largely studied, there is evidence that students' learning motivation is influenced by sensory distractions (Hanrahan, 1998) and involvement and task orientation within their classes (Waxman & Huang, 1996). Further, adult trainees perceived motivation is likely influenced by external factors such as the reputation of their trainers (Facteau et al., 1995).

When examining teachers' motivational factors, it's important to note that teaching is one of the social service careers that have been indicated to have high rates of secondary traumatic stress (STS) – where you take on stress because of interacting with those who have experienced trauma (Hydon et al., 2015). It has been indicated in the literature that teachers incur high rates of STS and burnout (Hydon et al., 2015; Watts & Robertson, 2011). In addition to this, the COVID-19 pandemic could be examined within the lens of shared trauma – where those who work directly with others experience the same trauma as their students or patients (Tosone et al., 2003; Tosone et al., 2012). The effects of shared trauma have not been fully examined, but clinicians have indicated difficulty in separating their experiences with those of their clients, professional boundaries being stretched, and avoidance of processing the event for themselves when exposed to acute trauma (Day et al., 2015). Trauma in and of itself has been shown to predict an increase in drinking and depressive symptoms among undergraduate students (Borsari, 2018). While some recent studies have examined COVID-19 within the professional environment, no studies could be found examining teacher motivation or other mental health effects within this shared trauma as they relate to motivation in professionals.

Purpose and Research Questions

The purpose of this qualitative study was to explore the essence of SBAE teacher motivation during the shared, chronic trauma of the COVID-19 pandemic. This research aligns with AAEE research priority 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century (Stripling & Ricketts, 2016). This inquiry was guided by the following research questions:

- 1) What is the essence of SBAE teachers' motivation through COVID-19?
- 2) What are the COVID-19 related lived experiences which influenced SBAE teachers' motivational factors?
- 3) What are the COVID-19 related lived experiences which influenced SBAE teachers' work and home environments?
- 4) What are the COVID-19 related environmental changes which influenced SBAE teachers' motivational factors?

Methods

We utilized a phenomenological approach (Moustakas, 1994) to explore the lived experiences of SBAE teacher motivation during the COVID-19 pandemic. We used a

constructivist lens to allow for the emergence of the teacher motivation through the participants’ understanding, as we believe knowledge is constructed through individual and group experiences (Creswell, 2013). Additionally, as researchers, we must acknowledge that we are all former SBAE teachers and address our biases accordingly. Two of us are current agricultural education faculty members and one is a graduate student – all at the same large Midwestern land grant university. Throughout this research, we purposively identified our biases where applicable and worked to bracket them within the research (Creswell, 2013).

A Qualtrics questionnaire was distributed to all Ohio SBAE teachers to collect data related to pandemic modes of teaching, general feelings about pandemic teaching, and demographic information. From this data, participants were purposively sampled in order to maximize variation based on consistency of teaching modes (asynchronous vs. synchronous; online vs. face to face), school type (defined by participants), number of teachers in the program, and family structure. Eight teachers participated in individual interviews, and six participated in focus groups, providing a total of 14 SBAE teachers who participated in the study (see Table 1).

Table 1
Summary of study participants

Pseudonym	Phase	Gender	Age	Years Taught	School type
Andrew		Male	34	7	Career Center
Brad	Interview	Male	43	20	Rural
Caitlyn	Round #1	Female	51	28	Rural
Diana		Female	51	3	Urban
Wendy*		Female	42	18	Rural
Xandra	Focus	Female	27	5	Rural
Yvette	Group #1	Female	26	2	Rural
Zarah		Female	37	12	Suburban
Eric		Male	28	6	Rural
Frances	Interview	Female	42	19	Suburban
Gerald*	Round #2	Male	30	8	Rural
Hannah		Female	50	22	Rural
Vince	Focus	Male	43	21	Rural
Ulrich	Group #2	Male	26	2	Rural

Note: * = teach at the same school

Data were collected using phased interviews, focus groups, and field notes. Interviews and focus groups were conducted over Zoom or in-person - averaging one hour each – and were audio and video recorded, transcribed verbatim, and served as the primary data source. To begin phase one, we conducted four one-on-one interviews using semi-structured questions to allow individuals to discuss the essence of their motivation during the pandemic. After the interviews, interview and focus group guides were altered based on emerging codes. We then conducted one focus group in June 2021 with 4 participants, using semi-structured questions to allow for both individual and group discussions around their motivation during the pandemic. The focus group allowed us to identify shared or contradictory statements across participants. Following the first

focus group, the interview questions were again adjusted to align with emerging codes. Phase two began with the second round of four one-on-one interviews, followed by another focus group with two participants in October of 2021 (four participants were planned, but due to unforeseen circumstances two participants did not join the zoom call). In all interviews and focus groups, participants were asked to reflect on the time period between March 2020 and May 2021. Data saturation was estimated to occur during the seventh interview. During all interviews and focus groups, field notes were documented by the researchers and served as ancillary data sources.

Data were analyzed using horizontalization, identifying meaning units, and clustering themes to determine the essence of teacher motivation during COVID-19 (Moustakas, 1994). One researcher reviewed the phase one interview and focus group transcripts for horizontalized statements and open-coded the primary and ancillary data sources. Next, they identified emergent meaning units from the open codes for the primary data sources. Lastly, they triangulated the ancillary data sources and combined like meaning units to allow for the emergence of themes and subthemes. We then peer-reviewed the themes and subthemes. We analyzed phase two data together and compared phase 2 meaning units to the emerging themes from phase 1 to finalize the emerging themes presented in the findings.

We utilized a variety of validation strategies to uphold trustworthiness (Lincoln & Guba, 1985). Credibility was upheld through prolonged engagement in the field, data triangulation, peer debriefing, negative case analysis, and member checking. We upheld transferability with thick, rich descriptions of the findings. Dependability was upheld through data triangulation and maintaining a dependability audit. We utilized a confirmability audit to uphold the confirmability of the findings and recommendations.

Findings

Results from the two rounds of interviews and focus groups indicate the presence of four themes and seven subthemes through the participants' lived experiences relating to their motivation to teach through the pandemic. Shared instructional context across all participants included the use of asynchronous instruction in the spring of 2020, and an overall feeling of "not knowing" how the 2020-2021 school year would go. This was described by participants switching frequently between the environments of online vs. face to face, and the timing of synchronous vs. asynchronous learning.

Theme 1: Stronger Teachers Emerging from Chaos

Our first theme consists of three sub-themes: 1.1) positive reflection of instruction, 1.2) prepared pedagogues, and 1.3) the double-edged sword of technology. The first of these, positive reflection of instruction, was found with all 14 participants. Andrew said that he was "more cognizant" of how he was ensuring his content was accessible to his students across the board. Diana similarly found that because her lessons were more individualized, her students were better able to handle the content. This reflection of being a stronger teacher was compounded within the focus group with Zarah emphasizing that she learned a lot about adapting, while still

trying to make learning fun. Her indicator of success was her enrollment numbers for the next school year: “they’re huge. We had to turn students away.” All fourteen participants also indicated at some point during their interviews that this was a motivator for teaching. Particularly, Yvette described that she “felt more comfortable” in her classroom, allowing her to feel much more relaxed than she had during her first year of teaching when the pandemic began. Ulrich, who also began teaching in autumn of 2019, said that he felt great success through the first year of the pandemic, especially since they “ended up doubling our fruit sale income...our farm...[and] our FFA participation.”

The second subtheme, prepared pedagogues, was found in two forms: direct comments about having extra time within the school day and indirect comments relating to the teachers being able to accomplish other tasks because of an increase of free time. For example, while Caitlyn felt that it was “really nice to have more time but when you’re a[n] ag teacher, and you’re used to be[ing] so busy, it’s also weird.” Brad felt that he “did a better job.” He “had that extra time in the school day to work through some of those things [lesson planning] and help my colleague out” when referring to assisting his co-teacher in extracurricular management of their program. Multiple participants nodded to lower stress and higher motivation as they reflected on their preparedness. Focus group members Yvette and Xandra stated that they felt “like I had a lot more time” and “I used my free time differently...to finish my masters,” respectively. Wendy followed up this exchange, saying that the transition back to a full in-person school week at the end of the year was “really rough...I was worn out, but up until then, yeah, I had more time.” This may indicate that there were major stress and motivation differences between pandemic schedules and what we would consider a “traditional” school day. Eric appreciated the new flexibility that virtual school days offered him. “I had more time at home, trading off with [my] night-shift wife during the shutdown.” Eric went on to state that this was his “best year ever for [statewide end of year exams]” because he was able to focus on content to a greater extent than he had been able to in the past during the first full school year of the pandemic.

The final subtheme was that of the double-edged sword of technology. This was a consistent force through the pandemic and was evenly split between what the teachers considered good and bad experiences. Teachers overwhelmingly felt that technology was overall a worthwhile investment in terms of time and school district money. Diana was excited for her students to experience one-on-one technology. Although the technology dissemination for students (Chromebooks and broadband receivers, if needed) was managed well, Diana did not feel the same way about the professional development (PD) provided by her school district. In this PD, online tools such as software were introduced by the school district. Unfortunately, some of these tools required being purchased, which the administration then refused. Teachers felt that even though the technological tools allowed them to educate via distance during the pandemic, it felt incomplete. Notably, Caitlyn stated that “technology can’t ever beat the meeting in person, and the connections that you’re building” which she felt impacted her motivation. While Eric learned to utilize Google Classroom and plans to continue using it, he also noted that he did not love the lack of direct interaction with students. This idea was echoed in the second focus group by Ulrich when he said that he “probably use[s] more technology now” and went on

to qualify that “being a young teacher, I probably was using a little bit more technology than the average teacher who had been there for 20 years like Mr. [Vince].” Vince, who took humorous offense to Ulrich’s comment, went on to say that “I probably learned how to use them better, but the tech guy would refer folks to me to use Google classroom because I was already using it” to illustrate his technological abilities in the classroom. At some point in all interviews, participants expressed an increased ability to work with technology, even despite the negative experiences.

Theme 2: Triumphs and Challenges of Working with Students in the Three-Circle Model

Our second theme works directly to describe how teachers perceived working within the Three-Circle Model and aligns directly with our three subthemes: 2.1) Persisting with pupils in the classroom, 2.2) Uncertainty when trying to lead, and 2.3) Splitting the check for success with no receipts.

Across all participants, teachers indicated that in a “normal” year, the three pieces of a total SBAE program would overlap much more than the pandemic allowed. Our first subtheme of persisting with pupils was the most present. Teachers felt conflicted here because, on the one hand, hybrid teachers could “pick those key hands-on activities...to get the topic addressed” which led to an overall feeling of accomplishment that they were able to properly teach their content. There was also a feeling of frustration as their class enrollment depends on student interest in their elective classes. There was a struggle to “make things fun and exciting” to recruit students into their programs. Even when teachers were able to create hands-on experiences, it was demotivating to constantly monitor the intense pandemic guidelines as exemplified when focus group member Zarah was frustrated when she was “constantly saying ‘stay six feet apart’ and ‘move your chairs back’” during lab activities where kids wanted to be together. Although Yvette felt she was on the opposite end of the spectrum from Zarah because she found solidarity with the science teachers in her building. They as a group met with the superintendent and were eventually allowed to “do our group work and all that stuff, as long as [students] had their masks on.” Wendy went on to explain that she was worried for her students now because she noticed that they struggled in her class. She felt that these students would need much more than just education from the school system, particularly needing more therapy and mental health support. She detailed where she had seen her teaching partner Gerald “spend his whole class period of them just talking...need[ing] to get things out.” While course content was important, she felt that working to provide students with everything they needed was also worthwhile. Because Wendy specifically mentioned Gerald in her answers, he was specifically sought as a participant in the second round of interviews. Gerald’s experiences largely mirrored Wendy’s descriptions, calling these class periods that Wendy described above as “real talk days.” These real talk days were important to Gerald’s students since they did not have many adults they could turn to, with one student even appreciating these days because “we know you don’t judge us.” Something similar had happened in Eric’s classroom during the first COVID shutdown in 2020 where he adjusted his content: “I don’t think it was very creative stuff...even if they weren’t learning standards, they were getting real-life knowledge.” Participants, while identifying places where they struggled, emphasized the importance of their connections with their students and persisting, even if that meant not following the usual standards.

The second subtheme, uncertainty when trying to lead, reflects both teachers' feelings toward advising their FFA chapters, as well as their FFA officers leading the chapter. For one example, Diana was unable to facilitate any FFA activities. Because this was supposed to be her first year implementing FFA, she was never able to get it off the ground with "all the kids" signing up for FFA, but then "really nothing" because the pandemic took away all opportunities for events to get students interested – which she cited as a demotivator for even "doing" FFA in the first place. For Andrew, even though his FFA chapter continued to operate, he felt that FFA had "been hell...the toughest part of the year" feeling that he picked up extra responsibilities that were typically done by students to "make sure things didn't fall to the ground to pieces this year than I've ever had to do." Teachers were also very frustrated that there were no consistent rules on extracurricular activities. Particularly, "sports" was brought up in most of the interviews as a point of comparison. Some teachers claimed that their FFA chapter was treated as a sports team with administration stating that "if athletics can do this, this, and this, I don't see why FFA can't either" in Brad's case. Some teachers, however, indicated the opposite, with administration limiting their travel opportunities because they were not a sport. Xandra's chapter was limited this way but blamed the state department of education because neither they nor the Ohio FFA Association had put out guidelines for safe travel and activities like the Ohio High School Athletics Association provided for their stakeholders. Eric agreed with the other participants, stating that "my kids were working their tails off trying to make it as normal a year as possible, but then we're told six months out that [State Convention] is going to be virtual." These frustrations, however, were not as strong when teachers were able to host events in person. Participants often felt that it had an "overwhelming number of students" when compared to pre-COVID in-person events, which served as a major motivator, especially because of the lackluster involvement from the current school year. Teachers were all motivated to make the most of their situations, even though viewpoints varied between individuals. For example, Eric was conservative on what events they attempted to host, stating "if we get the stamp of approval from the local side, we're gonna run ahead and do it" proverbially valuing permission over forgiveness. However, this was not shared by all teachers and is best illustrated by Vince stating that for local events he "looked at the rules...and figure[d] out...how to make it happen at the end of the day," taking advantage of gray areas left by their administration, while also indicating that he hadn't needed to ask for forgiveness...yet. Regardless of the approach, many teachers' thoughts were summarized by Xandra's final statement in the first focus group: "It was the FFA stuff...being able to do those in-person activities that I wasn't able to do in person last year. That's what made me motivated."

The final subtheme - splitting the check for success with no receipts in SAEs – is named such because in this theme there was no consensus. About half of the teachers felt that it was an above-average year for their students and the other half felt it was below average. Yvette, being a second-year teacher, found that it was exceedingly difficult to get SAEs off the ground. Xandra agreed, saying that her students' "SAE involvement this year was very limited." Not only was she not able to complete visits to evaluate student SAEs, but her teaching partner could not teach introductory SAEs like usual where all first-year SBAE students would complete job shadows.

These teachers shared that this was demotivating, wondering why they should even try to get SAEs started when they couldn't supervise them. On the opposite end of the spectrum, some teachers found that they couldn't keep up with their students' progress and this motivated them. Wendy found that her students "worked a lot, a lot, a lot...they were working more than their parents." Similarly, Caitlyn's students continued with their SAE projects, even going on to say that she had what "was probably one of the most awesome SAE visits" because she was able to visit a student who worked behind the scenes at a local Zoo. She went on to share that "virtually, I personally didn't really have those connections" with other students. Andrew and Brad both had students continuing to work for local companies, with Brad indicating that the pandemic was good for those students with horticultural jobs because "people are home now, and they want their yards mowed and their landscaping done." The idea of 'no receipts' within this subtheme comes into the picture with the fact that all teachers who indicated it was a better-than-average year also felt that they couldn't get their students to keep their records updated! As put succinctly by Yvette: "I did have kids that did a lot of working, but tracking it, keeping a record? Yeah, none." Eric also stated a similar sentiment, stating that "all bets are off if kids are turning in records...being virtual made it tougher I guess." Similarly, Gerald's students "still did fair projects last year, even though we knew there was no fair show *per se*."

Theme Three: Always the Scapegoat, Rarely Allowed to Graze

The third theme was that of the feeling that as SBAE teachers, they were always the scapegoat, but rarely allowed to graze – meaning that while they were limited in how they could operate as teachers within their buildings, they were often the ones who were blamed when things went wrong. One example of limited operating, Diana felt as if she did not even know some of her coworkers because of the virtual environment she had taught in for half of her teaching career – noting that there were cliques among the other teachers at the school. Meanwhile, Wendy, Xandra, and Zarah all had some points of contention with other teachers within their building that did not exist out of the pandemic. Xandra spoke about how the "ag kids...didn't follow the rules of COVID," for example when they were caught in the building not wearing a mask. In the eyes of her coworkers, she was "solely responsible for disciplining them" using her as a scapegoat and pressuring her to monitor and discipline her students even outside of her classroom. Zarah and Xandra shared similar experiences where teachers felt that it was inappropriate for them to pull students out of academic classes for live-streamed FFA events – feeling so strongly that some would come into the gymnasium where the students were watching the event and yell at Xandra in front of her students. Fearing that something similar would happen to her, Yvette only allowed students to watch these events during their time with her, circumventing any anger that other teachers may have had. Finally, many interactions with the community were identified as being demotivating to the participants. These interactions included frustrations that were expressed *at* – not *to* – them. Yvette detailed being frustrated at comments on social media after posting pictures of her students facilitating a fourth-grade ag day; parents of remote learners would comment things like, "man, it really sucks that these remote learners weren't invited to come to participate." All four of the focus group members felt that they saw examples of similar situations, with Wendy referring to it as an ethical dilemma. The community at large was somewhat of a mixed bag of support for teachers. For Caitlyn, she often felt very

supported, with her community supporting a fundraiser that may not happen: “they sold tickets and said ‘we’ll have it in person if we can.’” Others felt less supported, particularly when they would see or hear comments like “I can’t believe I still have to deal with my kids like these dirty rotten teachers” in Andrew’s case.

Theme Four: Forced Reconciliation of Work-Life Priorities

The fourth and final theme arose from the second round of interviews. Most codes in this theme were initially placed in the above themes, but further comparative analysis eventually brought to light the idea of our participants being forced by the COVID-19 pandemic and their individual life circumstances to examine how they operated between their roles in and out of the capacity as SBAE teachers. While this theme does not have any specific subthemes, participants expressed both positive and negative emotions with this forced perspective. On the lighter side of this theme, Ulrich indicated that during the past few years “COVID...helped create a little bit healthier of a [work-life] balance”. Before COVID “with me being at work from seven to seven.... I wouldn’t have had time for a relationship, nothing would have worked out.” Because of this newfound balance, he “made new friends” in addition to beginning a long-term relationship. Vince agreed with a balance at the beginning of the pandemic, detailing that he “turned the computers off at 3 [PM] and spend the evening with the family.” However, as he began to teach in person again, “that shut off at 3:00 just doesn’t work again because from 7:30 until 3:00 every day there are students here, and then you’ve got other things.” Gerald shared a similar experience of his time commitment slowly creeping back: “like last year...you weren’t as busy, but now I’ve already noticed... I’ve got stuff on the weekends again.” This, however, was seen in a positive light, with Gerald going on to say that “I think it’s a good change because I feel like I’m doing my job again.” Caitlyn, in our first round of interviews, reflected a lot on the benefits to her personal life since she found herself with more time. “I did some individual projects...bake and take things to the neighbors. We usually have a pretty nice garden, but it was the best garden of my life last year.” Through these activities, Caitlyn was forced to reflect on those “cup filling” activities that allowed her to simply enjoy life – something difficult to do, especially at the height of the first COVID lockdown.

Discussions

From the results of this study, we concluded that teachers’ lived experiences through the COVID-19 pandemic consisted of both motivating and demotivating factors as it pertained to 1) teaching ability, 2) working with students within the three-circle model, 3) interacting with other adults in the school building and community, and 4) reconciling their work-life priorities.

Relating to teaching ability, participants found across the board that they were not only more reflective of their teaching practices, but that this reflection allowed them to pinpoint specific details and interactions that they would then use as evidence of stronger teaching. When probing the differences between now and the past, teachers felt that this was a by-product of having more time to plan and prepare for the school day. Another by-product of this increased preparation time also led to having more time to spend with family or recreational activities. While this was seen as positives, instructional technology was seen as both positive and negative

in the eyes of the teachers. On one hand, we see that the technology allowed teachers to improve their teaching when flung into the virtual classroom. However, on the other hand, we see that technology was seen as a demotivator in the sense that the connections they had with students were not nearly as strong, and students seemed to be less engaged over the technology.

When working with students in the three-circle model, teachers found that the only overall “bad” portion was that of advising the FFA chapter. Ranging from indifferent feelings to “hell”, FFA events did not operate as usual over the year, with a few teachers not advising or working with their chapters at all. However, the experiences with students in the classroom and within work-based learning were both considered by teachers to be a mixed bag. Positives arose from each such as more impactful lab activities and students expanding their work-based projects beyond what would be expected in a regular school year. Negatives also arose, with much frustration surrounding the ideas of being unable to complete lab activities because of social distancing, students refusing to maintain project records, and even some teachers being lost on how to get students to even set up new work-based learning projects.

Teachers were also vocal about the negative experiences they had with their administration, other teachers, and even the parents of their students. Experiences within this theme included many negative experiences like being called names on social media posts, being accused of excluding distance learning students, and being yelled at by other teachers within their buildings. While there were some positive experiences, like the support that one teacher felt from their community fundraiser, these were rare.

Finally, it emerged that SBAE teachers were forced to reconcile their work-life priorities during the pandemic. Due to canceled events and remote learning teachers were able to find motivating personal factors and were able to build personal relationships that did not exist under the normal requirements of being an SBAE teacher. While some found motivation in focusing on personal factors, others found motivation as they became “busy again” with their schedule filled with traditional classroom instruction, FFA events, and SAE visits. As schedules continue to move back to normal, the SBAE profession will need to reconcile that many SBAE teachers need to be constantly busy to feel like they are fulfilling their job requirements.

While teachers underwent many negative demotivating experiences during COVID-19, there were positives from their experiences as well, which aligns with Clemons et al.’s findings of Alabama SBAE teachers neither agreeing nor disagreeing that they were positively motivated (2021). In considering our pandemic’s influence on environmental motivation factors, we see that the lines were blurred between professional and private lives. This could have been worrisome if FFA continued operating as if in a ‘regular’ year, but since teachers were not supervising these experiences, their free time was increased as seen in their teaching preparation and recreational activities. Preparation and reflection were key aspects in teachers’ professional motivation factors with the additional preparation and recreational time, which again aligns with Alabama SBAE teachers agreeing that they spent more time in critical reflection across all three circles in the SBAE program (Clemons et al, 2021).

In evaluating COVID-19's influence on personal motivational factors, we see that many motivational terms have been mentioned by the teachers. For example, a few teachers noted that they maintained their autonomy, a psychological need, though the content they taught even though they were restricted by healthy guidelines in the pandemic. This aligns with Easterly et al.'s findings where SBAE teachers were frustrated by the adjustments they had to make to the three-circle model, while still retaining all three elements (2021). In evaluating participants' goals and self-efficacy, we see alignments with previous studies as well, where teachers agreed that they were planning to implement positive changes to their instruction upon returning to the classroom (Clemons et al., 2021). Finally, existing literature also supports that teacher motivation was a mixed bag, containing both positive and negative influences on teacher motivation amid the pandemic (Clemons et al., 2021; Easterly et al., 2021).

Recommendations

The emerging themes demonstrated how the pandemic forced the SBAE teachers to take new pedagogical approaches. PD sessions should be developed focusing on the dissemination of these practices to other in-service teachers. Additionally, teacher educators should seek out SBAE teachers whose teaching thrived during the pandemic to supervise field experience students and engage with pre-service teachers in methods courses. Further, this study demonstrated some of the good and adverse effects that technology can have in the classroom, particularly for distance learning. PD facilitators should consider examining the tools and programs most utilized by teachers amid COVID and developing programming to help deepen teachers' understanding of these tools. Teacher educators should also examine if there are any ways to increase the technological skills of teacher candidates within their programs. Finally, SBAE professionals should consider how they could continue to help teachers address work-life balance. This could be addressed through reflective PD sessions where teachers identify the home-based environmental factors which were more abundant and motivating and the SBAE program activities that decreased but did not reduce student success during the pandemic. This information could then be used to develop a plan to increase motivating life experiences while decreasing unnecessary work requirements. Additionally, state staff and the teacher professional association could work together to select virtual events that teachers and students maintain as still valuable. This could increase work-life balance by minimizing travel.

The COVID-19 pandemic has had undeniable effects on SBAE teacher experiences and motivation. Further research should be completed to determine if these effects are universal, or if they vary based on teacher or school demographics – particularly since the urban and suburban teachers in this study had slightly different experiences than their rural counterparts. Further research should seek to further describe the hurdles that SBAE teachers needed to overcome amidst the pandemic and the potentially lasting effects these might have on both teachers and the teaching profession. Lastly, no literature could be found detailing SBAE *students'* experiences or motivation amid COVID-19. This would be a valuable source to determine if teacher perceptions of students are accurate, or if students have much different experiences than they let their teachers know about.

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What Explained Nonprofit Organizations' Satisfaction with Volunteer Retention During the COVID-19 Pandemic?

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The purpose of this quantitative study was to investigate nonprofit organizations' satisfaction with volunteer retention during the COVID-19 pandemic. The participants were 74 nonprofit organizations' leaders who participated in the online survey. The response rate was 10.6%. We found that the overall mean score for satisfaction with organizational retention of volunteers during the COVID-19 pandemic was 3.50 (SD = .98), the importance of volunteer management practices was 3.52 (SD = .96). Most nonprofit organizations were proactive (38.8%) and reacted promptly (52.2%) while addressing the organizations' response to the pandemic. Approximately 10.3 % of the variation in satisfaction with organizational retention of volunteers during the COVID-19 pandemic could be explained by the importance of volunteer management practices and organizational response to the COVID-19 pandemic. However, within the final model, only one factor was a significant predictor of satisfaction with organizational retention of volunteers during the COVID-19 pandemic, namely, organizational response to the COVID-19 pandemic ($\beta = -.304$; $p = .014$). Recommendations for future research discussed. Implications for volunteer management and leadership studies faculty, university Extension educators, human resources practitioners, and local nonprofit organizations' leaders are also presented.

Introduction/Theoretical Framework

The importance of volunteers has never been more evident than in the last year during the COVID-19 pandemic. Important nonprofit organizations like food banks, meal delivery services, homeless shelters, and free clinics have dramatically increased the demand for their services. In contrast, uncertainties about health and safety have caused many volunteers to reduce their hours or stop volunteering altogether (Fidelity Charitable, 2020). Nearly 70% of human services organizations and 50% of arts and culture organizations expect to experience or have already experienced a decline in the number of volunteers due to the COVID-19 pandemic (Nonprofit Organization Research Panel (NORP), 2020), making recruitment and retention more difficult. Even under normal circumstances, the relationship between an organization and its volunteers is paramount to maintaining a consistent and reliable volunteer pool. Many nonprofit organizations rely on volunteers to play significant roles because their work is crucial in functioning and carrying out their mission. Without volunteers, many nonprofits would cease to exist. In 2020, the average value of a volunteer's time in the United States was estimated at \$28.54 per hour to organizations, increasing from \$27.20 in 2019 and \$25.43 in 2018 (Independent Sector, n.d.). The value of a volunteer's time is reduced by recruitment and training costs, especially for new

volunteers. However, nonprofits can maintain efficiency and consistency in their programs and services by retaining volunteers. Because of this, nonprofits are consistently looking for ways to improve volunteer retention (Waters & Bortree, 2012). An organization's ability to retain its volunteer pool is impacted by several factors, including organizational trust (Sefora & Mihaela, 2016), the nonprofit's ability to meet volunteers' expectations (Kim et al., 2007; Walker et al., 2016), the volunteer's relationship with their supervisor (Reamon, 2016), the richness of communication used to promote organizational identification (Bauer & Lim, 2019), specific management practices (Cuskelly et al., 2006), and the volunteer's personal intention to continue volunteering (Bauer & Lim, 2019).

Volunteer retention (or the attempt to prevent volunteer turnover) can be a struggle for nonprofits, but during a pandemic, that struggle intensifies. During the COVID-19 pandemic, not only did the demand for many nonprofit services increase, but the rate of volunteer dropout and turnover also increased, putting extreme stress on nonprofits. Many nonprofits could not retain volunteers and were forced to reduce or cut their services (Nonprofit Organization Research Panel, 2020). Yet, some nonprofits persisted and thrived (BDO USA, 2020). To better comprehend and evaluate nonprofits' current situation, this study examines organizational satisfaction with volunteer retention during uncertainty, specifically the impacts of best volunteer management practices and the nature of the organizational response.

"Best" volunteer management practices may be used to reduce volunteer turnover, hence increasing volunteer retention (Cho et al., 2020; Skoglund, 2006). Best practices include processes by which an organization recruits, trains, supports, and retains its' volunteers (Einolf, 2018). Managing volunteers presents a significant challenge to organizations with issues like developing meaningful roles for volunteers who have limited time, recruiting enough volunteers, and finding individuals with the right skills for the organization (Moore & Rehnborg, 2013). This study utilized two widely used volunteer management models, ISOTURE and GEMS.

The ISOTURE model (Boyce, 1971) is a linear model that outlines seven steps in volunteer management (identification, selection, orientation, training, utilization, recognition, and evaluation). Identification involves finding individuals who have the required qualifications and skills to fill specific positions in the organization. The selection consists of interviewing potential candidates to better understand their interests, motivations, and experience to identify the possible fit within the organization. Orientation involves the clarification and definition of the volunteer's role in the organization and an introduction to the organization (characteristics, values, mission). Training involves providing applicable and relevant skills to volunteers based on individual needs. Utilization ensures that volunteers are put in positions to succeed and are provided sufficient support and opportunities to utilize their knowledge and skills effectively. Recognition involves the acknowledgment of volunteer achievements and efforts. Finally, evaluation involves the proactive provision of feedback from the organization and volunteers regarding performance and organizational policies. The GEMS model identifies four distinct

concepts associated with managing volunteers: generating, educating, mobilizing, and sustaining. The generating phase involves conducting an organizational needs assessment, creating specific job descriptions, and identifying potential volunteers. This is followed by targeted recruitment, volunteer screening, and finally, the selection of new volunteers. The educating phase involves providing necessary resources and information to volunteers through orientation, training, and teaching. Mobilizing involves engaging volunteers with their roles and tasks, motivating and supervising volunteers to help them carry out the assigned tasks to the best of their ability. Finally, the sustaining phase involves evaluating, recognizing, promoting, retaining, or disengaging volunteers.

To examine the pandemic's organizational response, we utilized Roger's *Diffusion of Innovation theory* (1962). Rogers explains how new ideas, practices, or technologies are adopted among individuals or groups. As one of the seminal crisis management theories, Rogers Diffusion of Innovation theory is widely applied in times of uncertainty (Singh & Chahal, 2015) and has been used to assess emergency preparedness in organizations (Shiels, 2018). In community outreach and management, the Diffusion of Innovation theory has been used to design and develop community extension programs related to agriculture technology adoption and development for farmers (Ozcatalbas, 2014). Rogers identifies the rate of adopting an innovative decision using five segments, each determining the degree to which a person or group is ready to embrace something new (an idea, technology, product, etc.). The five segments are innovators, early adopters, early majority, late majority, and laggards.

Innovators are characterized as those who actively seek to try and adopt new practices or technology. Innovators are the least represented group with only around 3% of the population. The next segment is early adopters. Early adopters are aware of a need to adapt and often show the ability to influence others, take on leadership roles, and embrace new ideas. This segment represents roughly 14% of the population. The third segment is the early majority composed of people who typically require success before adopting a new practice. The early majority represents 34% of the population. The fourth segment is the late majority, representing 34% of the population. The late majority is generally characterized by skeptical people of change and new practices. As such, they typically will not adopt a new approach until most people have tried it first with documented success. The last segment is the laggards, representing 16% of the population. Laggards are very traditional and conservative, skeptical of change, and the last to adopt a new practice. We use Rogers' (1962) work to frame how new policies and ideas regarding COVID-19 may be acknowledged and presented by an organization's leadership to volunteers as an organizational response to COVID-19. Organizations able to proactively react to environmental and societal situations can ensure their continued existence and success, while those who fail to respond often experience difficulties adapting and surviving during times of crisis and uncertainty (Miles et al., 1978).

Purpose/Research Objectives

This study aims to explore volunteer retention. Because of the unique circumstances caused by the COVID-19 pandemic, this exploratory study examines the relationship between volunteer management practices, organization response to the pandemic, and volunteer retention under the current uncertain conditions. The knowledge gained through this study should expand current understandings regarding the nature, scope, and value of organization retention of existing volunteers within the nonprofit organization leader's role. Two research objectives guided the present study:

1. Describe the importance of volunteer management practices, organizational response to the COVID-19 pandemic, and satisfaction with organizational retention of volunteers during the COVID-19 pandemic.
2. Describe to what extent satisfaction with organizational retention of volunteers during the COVID-19 pandemic can be explained by the importance of volunteer management practices and the organizational response to the COVID-19 pandemic.

Methods

We used a survey method to address the two research objectives of this study. We used an online questionnaire administered via Qualtrics to explore local nonprofit organizations' leaders' perceptions of (1) Satisfaction with organizational retention of volunteers during the COVID-19 pandemic, (2) the Importance of volunteer management practices, and (3) Organizational response to the COVID-19 pandemic.

Participants and Data Collection

The target population for our study was approximately 700 nonprofit organization leaders, all from Centre, in Pennsylvania. Our study used a census approach and followed Dillman et al.'s (2014) online data collection technique. The list of nonprofit organizations in our population was created from the IRS Charity database found using this weblink: <https://www.irs.gov/charities-non-profits/tax-exempt-organization-search>. We identified over 1,500 nonprofit organizations in the County. We then Googled each organization on this list to locate each organization's website to the extent possible. We gleaned the names of Board Presidents, executive directors, and key leaders from there. We also reached out to and used our local networks to connect with these organizations as possible. We distill email addresses for 696 organizational leaders, where an organizational leader is a Board President or Executive Director. We sent an invitation email to all of these nonprofit organizations' leaders and asked these leaders to participate in our voluntary study. We sent four email reminders. Data collection occurred during the Spring of 2021. We received survey responses from 105 leaders. After removing responses with missing data, the final data set included responses from 74 nonprofit organizational leaders, providing a response rate of 10.6%.

Instrumentation, Validity, and Reliability

We developed a one-item scale *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic*. This variable was measured using a five-point Likert scale ranging from 1 to 5, whereby 1 (not at all satisfied), 2 (slightly satisfied), 3 (moderately satisfied), 4 (very satisfied), and 5 (extremely satisfied). The second variable of interest was a nine-item scale *Importance of Volunteer Management Practices* developed using current literature specifically discussed both ISOTURE and GEMS models (Boyce, 1971; Culp et al., 1998). This variable was measured using a five-point Likert scale ranging from 1 to 5, whereby 1 (not at all important), 2 (slightly important), 3 (moderately important), 4 (very important), and 5 (extremely important). The mean score of the nine-scale instrument was calculated and used in further statistical analysis. The Cronbach alpha coefficient for the newly created *Importance of Volunteer Management Practices during the COVID-19 pandemic* scale was .92. We asked participants to indicate the importance of the suggested activities related to volunteering management practices during the COVID-19 pandemic. The example of scale items: Having a specific volunteer recruitment plan, Matching the skills, experience, and interests of volunteers to specific roles, Providing training for all staff and volunteers, Screening potential new volunteers, Formally recognizing efforts of individual volunteers

To measure "*Organizational Response to the COVID-19 Pandemic*," we adapted Roger's theory of innovation model to develop one survey question "*Which of the following best represents your organization's response to the COVID-19 pandemic?*" Five response options were provided using a 5-point scale: 1 (the organization proactively acted to address the situation ahead of time), 2 (the organization actively collected external data and reacted promptly), 3 (the organization waited on others' early success stories before reacting), 4 (the organization was reluctant to respond and waited for the majority to respond before it acted), and 5 (the organization was skeptical and one of the last to react).

Before administering our survey, we asked a panel of seven people – Penn State Extension educators, Extension administrators, academic faculty members with expertise in survey methodology, and a graduate student in Extension education – to review our instrument for face and content validity. The panel of experts determined that the device was sufficiently valid. A pilot test was conducted to further assess the validity of the created instrument. For the pilot study, we selected 18 Penn State Extension educators from around our state who frequently work with their community's leaders of volunteer-based organizations. The response rate for individuals completing the pilot study was 61% ($n = 11$).

We conducted a principal component analysis with direct, oblique rotation to identify the factor loadings for the newly developed nine-item scale "*Importance of Volunteer Management Practices*." The initial principal component analysis yielded one factor as eight out of nine items highly loaded onto the same factor (Factor 1). The Kaiser-Meyer-Olkin statistics of sampling

adequacy for these nine variables was .891. That indicates that we should proceed with Exploratory Factor Analysis. The Bartlett's Test of Sphericity was 382.63 with a significance level of < .001. Only one component has total initial eigenvalues greater than one, and, in our case, it explains 59.6% of the variance. We compared the rotated matrix with the unrotated solution. The result of the unrotated matrix showed that most variables (8 items) loaded highly onto the first factor. The remaining item, "*Formally recognizing efforts of individual volunteers*," had a low factor loading .248. This item was eliminated from the newly created scale for further statistical analysis. We justified that the newly developed scale is a one-factor model.

Control for Non-response Error

Early and late responses were compared to evaluate non-response errors in this study (Miller & Smith, 1983). The first forty respondents were assigned as an early phase respondent group, and the last forty respondents were identified as a late phase respondent group. Respondents' early and late phases were determined based on the day and time their questionnaire was submitted. We conducted an independent *t*-test to determine if group means for total scores on the four measured constructs differed between the two groups of respondents (early and late). The independent samples *t*-test (alpha level of .05, two-tailed) for equality of means for scale scores of constructs between early and late respondents showed no statistically significant differences between early and late respondents. The results of the *t*-test suggesting non-response bias was not an issue (Lindner et al., 2001; Miller & Smith, 1983). It reveals that the data collected from leaders of local nonprofit organizations were representative of the entire study population (Table 1.)

Table 1.

Independent Samples t-test for Equality of Means on Scale Scores of Construct between Early and Late Respondents.

Scale	Respondents				<i>t</i>	<i>p</i>
	Early (<i>n</i> = 30)		Late (<i>n</i> =30)			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Importance of Volunteer Management Practices	3.59	.94	3.56	.81	.137	.891
Satisfaction with your organization's retention of volunteers during the COVID-19 pandemic	3.60	1.07	3.38	1.01	.812	.420

Data Analysis

We used SPSS® version 26 to conduct the data analysis for our study. Our dependent variable – *Satisfaction with Organizational Volunteer Retention During the COVID-19 Pandemic* – and our independent variable – *Importance of Volunteer Management Practices* – were treated as interval

data. A descriptive statistic was utilized to describe the first research objective. For research objective two, we used an application of the Pearson correlation coefficient to measure associations between *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic*, *Importance of Volunteer Management Practices*, and *the Organizational Response to the COVID-19 Pandemic*. A multiple linear regression analysis was conducted to explain the relationship between overall *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* (dependent variable) and independent variables, such as the *Importance of Volunteer Management Practices* and demographic variable *Organizational Response to the COVID-19 Pandemic*. Also, we used standard Davis Conventions (1971) to describe the magnitude of the correlation between independent and dependent variables.

Results/Findings

The first research objective was to describe local nonprofit organization leaders' perceptions of their *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic*, *Importance of Volunteer Management Practices*, and *Organizational Response to the COVID-19 Pandemic*. The mean summative score for *Importance of Volunteer Management Practices* was 3.52 ($SD = .96$, $n = 74$). Results for the eight items comprising this variable are shown in Table 2. Higher scores indicate a higher level of importance in the particular area of volunteer management. Lower scores indicate a lower level of importance in the particular area of volunteer management. The survey items scoring the highest mean values were the importance of (a) Matching the skills, experience, and interests of volunteers to specific roles ($M = 3.95$; $SD = 1.02$), (b) Supervising volunteers ($M = 3.74.70$; $SD = 1.05$), and (c) Providing trainings for all staff and volunteers ($M = 3.70$; $SD = 1.20$). The survey items scoring lower importance scores were (a) Evaluation volunteers. ($M = 2.80$; $SD = 1.20$), (b) Having a specific volunteer recruitment plan ($M = 3.21$; $SD = 1.34$), (c) Screening potential new volunteers ($M = 3.42$; $SD = 1.41$).

Table 2.
Importance of Volunteer Management Practices

Item	n	1	2	3	4	5	M	SD	
		Frequency (Percentage, %)							
Evaluating volunteers	74	3(4.1)	6(8.1)	15(20.3)	28(37.8)	22(29.7)	2.80	1.20	
Having a specific volunteer recruitment plan	72	11(15.3)	13(18.1)	10(13.9)	26(36.1)	12(16.7)	3.21	1.34	
Screening potential new volunteers	74	9(12.2)	13(17.6)	13(17.6)	16(21.6)	23(31.1)	3.42	1.41	
Identifying volunteers according	74	3(4.1)	8(10.8)	16(21.6)	31(41.9)	16(21.6)	3.66	1.06	

to organizational needs								
Providing orientations for new volunteers	74	9(12.2)	7(9.5)	6(8.1)	28(37.8)	24(32.4)	3.69	1.34
Providing training for all staff and volunteers	74	5(6.8)	8(10.8)	13(17.6)	26(35.1)	22(29.7)	3.70	1.20
Supervising volunteers (building relationships, mentoring volunteers, checking the status of work)	74	3(4.1)	7(9.5)	13(17.6)	34(45.9)	17(23.0)	3.74	1.05
Matching the skills, experience, and interests of volunteers to specific roles	74	3(4.1)	4(5.4)	10(13.5)	34(45.9)	23(31.1)	3.95	1.02

Note. The scale's items were measured using a five-point Likert scale ranging from 1 (*not at all important*), 2 (*slightly important*), 3 (*moderately important*), 4 (*very important*), and 5 (*extremely important*).

The descriptive statistics of *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* are shown in Table 3. The mean score of *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* was 3.50 (*S.D.* = .98). Approximately 51 % of participants indicated that they were very and extremely satisfied with their organization's retention of existing volunteers.

Table 3.

Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic

Item	Not at all Satisfied	Slightly Satisfied	Moderately Satisfied	Very Satisfied	Extremely Satisfied	<i>M</i>	<i>SD</i>
Satisfaction with your organizational retention of volunteers during the COVID-19 pandemic	4 (5.6%)	3 (4.2%)	28 (38.9%)	27 (37.5%)	10 (13.9%)	3.50	.98

The descriptive statistics of the *Organizational Response to the COVID-19 Pandemic* variable are shown in Table 4. Most non-profit organizations were proactive (38.8%) and reacted promptly (52.2%) while addressing the organization's response to the COVID-19 pandemic.

Table 4.
Organizational Response to the COVID-19 Pandemic

Items	Frequency	Percent
The organization proactively acted to address the situation ahead of time	26	38.8
The organization actively collected external data and reacted promptly	35	52.2
The organization waited on others' early success stories before reacting	2	3
The organization was reluctant to react and waited for the majority to respond before it acted	3	4.5
The organization was skeptical and one of the last to react	1	1.5
Total	67	100

The second research objective was to describe to what extent *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* can be explained by the *Importance of Volunteer Management Practices and Organizational Response to the COVID-19 Pandemic*. Application of the Pearson Correlation Coefficient (Freedman, 2007) showed a significantly low negative association between *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* and *Organizational Response to the COVID-19 Pandemic* ($r = -.28, p = .011$). The correlation between *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* and *Importance of Volunteer Management Practices* was not significant ($r = -.06, p = .612$). No significant correlation was found between the *Importance of Volunteer Management Practices* and *Organizational Response to the COVID-19 Pandemic* ($r = -.14, p = .268$). A multiple linear regression model was conducted to determine the relationship between our dependent variable *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* and independent variables, namely, *Importance of Volunteer Management Practices* and *Organizational Response to the COVID-19 Pandemic*. Multiple R^2 indicated that approximately 10.3 % of the variation in *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* could be explained by the *Importance of Volunteer Management Practices* and *Organizational Response to the COVID-19 Pandemic* (Table 5).

Table 5.
Multiple Regression Analysis Between Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic, Importance of Volunteer Management Practices and Organizational Response to the COVID-19 Pandemic

Model Fit				
	<i>R</i>	<i>R</i> ²	Adj. <i>R</i>	<i>S.E.</i>
1	.321	.103	.074	.911

Note. $p < .05$

Analysis of variance in overall *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic* is presented in Table 8.

Table 8.

Analysis of Variance in Support for Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic.

Model	Sum of Squared	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>
Regression	5.991	1	2.995	3.610	.033
Residual	52.267	63	.830		
Total	58.258	65			

Note: $p < .05$

Within the final model, only one factor was a significant predictor of *Satisfaction with Organizational Retention of Volunteers During the COVID-19 Pandemic*, namely, *Organizational Response to the COVID-19 Pandemic* ($\beta = -.304$; p -value = .014). Multiple relations' coefficients are presented in Table 9.

Table 9.

Multiple Regression Coefficients

Model	<i>B</i>	<i>SE</i> <i>R</i>	β	<i>p</i> -value
Constant	4.683	.513		.000
Importance of Volunteer Management Practices	-.145	.115	-.152	.212
Organizational Response to the COVID-19 Pandemic	-.343	.136	-.304	.014

Note. $p < .05$

Discussion, Implication, and Recommendations

Nonprofit organizational leaders are tasked with developing and implementing appropriate and effective management policies toward retaining volunteers (Boezeman & Ellemers, 2014). The need for retaining volunteers is more critical during times of crisis than otherwise (VolunteerMatch, 2020). Leaders must be prepared, decisive, collaborative, and transparent to respond to uncertainty and lead their employees and volunteers through difficult periods (Gilstrap et al., 2016).

This study makes a unique contribution to nonprofit leadership and management research by examining the relationship between volunteer retention, "best" volunteer management practices, and organizational satisfaction with the retention of their volunteers during the COVID-19 pandemic. By focusing on retaining existing volunteers and not on recruiting special volunteers who may be of assistance, especially during a crisis (Steerman & Cole, 2009), we can extend previous research findings that "best" volunteer management practices are generally commendable but, during a crisis, such as a global pandemic, these practices are not as valuable to an organization's ability to retain existing volunteers compared with the value gleaned from being an early, proactive responder to the crisis. Also, the omission of a critical item in the "best practices" literature – *formally recognizing efforts of individual volunteers* – may not have loaded onto the one factor because offering formal recognition was not an option with the County during the lockdown, forcing people not to hold traditional face-to-face ceremonies. This leads us to believe that future researchers may question the applicability of each "best practice" item given the environmental circumstances at play and consider the overall value of the "best practices" in general. That is, the "best practices" may have greater applicability at a given time and place than at other times and places, and future research may further delineate this time and place.

Organizations that proactively responded to the COVID-19 pandemic were more apt to retain their existing volunteers than organizations considered laggards in addressing the pandemic's health implications. Volunteer retention is a significant challenge for many nonprofit organizations, and the COVID-19 pandemic exacerbated this challenge. The results of this study showed that despite most nonprofit organizations (60%) reducing their service during the COVID-19 pandemic and some nonprofit organizations (27%) increasing their services, the ability to retain existing volunteers was more of a function of being an early, proactive responder (i.e., organizations who did not hesitate to take adaptive measures to protect themselves and their workers at the beginning of the pandemic) than it was due to anything else. The relationship between "best" volunteer management practices for retaining volunteers and satisfaction with volunteer retention suggests that volunteer management practices alone are insufficient to predict satisfaction with maintaining an existing pool of volunteers.

Our study is not without limitations. First, generalization is limited by our sample, which is location-specific. We focused only on respondents from one County in our State. The COVID-19 pandemic manifested itself differently at different times across the County. Some counties were hit harder than others. We acknowledge that the extent to which COVID-19 was present in our community could have played a significant role in our findings. Also, our survey was administered in the Spring of 2021, and the pandemic's uncertainty was more rampant and tumultuous in early 2020, giving our respondents the advantage of hindsight to some extent. Lastly, although we learned that being an early, proactive responder to the COVID-19 pandemic resulted in a greater likelihood of retaining existing volunteers, following up with a qualitative assessment of what exactly being an early, proactive responder "looks like" could be immensely

helpful. Using Rogers' *Diffusion of Innovation* model is an excellent first step, but articulating what was going on in the minds' of the nonprofit organizations' leaders who responded early to the pandemic can help us better understand how to carry out an early response strategy in an effective way. Follow-up studies should be conducted to refine (1) how our dependent variable is measured (not simply as a leader's perception of volunteer retention like in our study, but possibly measuring the actual percentage change in the number of volunteers being retained), (2) how Rogers' theory can be further refined and measured, (3) how other change management practices or strategies may influence volunteer retention, and (4) the timing of when a leader carries out the organization response to change, to name a few ways to extend our research. Lastly, our study surveyed the leaders of nonprofit organizations. Future scholars may wish to interview leaders in the for-profit sector, governmental leaders, and institutional leaders (such as those working for public schools, college administrators, etc.)

Volunteer management and leadership studies faculty, university Extension educators, and human resources practitioners can use our study's findings to help create more advanced curricula for educating nonprofit leaders for change. The COVID-19 pandemic was a jolting, severe crisis that represented a massive change in how people and organizations carried out their work. Change is inevitable with some changes, like the pandemic and other disruptive events (e.g., war/conflict, cybersecurity, and technological progress) being sudden. Other modifications may occur more gradually over time (e.g., freshwater quality and availability, climate change). Yet all changes will impact people and hence organizations. How organizational leaders deal with crisis-level changes may determine an organization's survival. Having leadership and volunteer management education scholars, University Extension faculty, and human resources practitioners working collaboratively in both research and leadership change-education initiatives, such as formal classes, outreach programs, training, and by offering other professional development opportunities not only provides shared learning but also informs future research needed to advance our understanding. The importance of change-management education for nonprofits could not be greater than it is right now as educators, practitioners, and nonprofit leaders should themselves follow Rogers' model to be proactive, early adopters of advancing change-management curricula.

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A Content Analysis of Crisis Response by Agricultural News During the COVID-19 Pandemic

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Declared a pandemic by the World Health Organization, the public's need for information during COVID-19 has been unprecedented compared to any recent crisis. News serves as a primary source of crisis information sought out by the public, especially by those working in agriculture. With agricultural publications the most frequented source of information by farmers and ranchers, analyzing crisis response by agricultural news outlets is an important consideration. The purpose of this study was to explore crisis frames used by agricultural news sources specific to the dairy industry during COVID-19. A quantitative content analysis was conducted on five agricultural news outlets from February 1, 2020 to June 1, 2020 regarding the effects of COVID-19 on the dairy industry. The results indicated most articles utilized a bolstering crisis response strategy on behalf of the dairy industry while a notable number did not use a crisis response strategy. Additionally, the study found most articles were written with a communicative function of information. These strategies can increase the favorability of an organization, or in this case, an industry by stakeholders. Based on these results, communication practitioners should prioritize creating strategic partnerships with agricultural journalists, especially during times of crisis.

Introduction

Agricultural industries, specifically dairy, were hit hard by supply chain disruptions, labor shortages, and product perishability caused by COVID-19. When the World Health Organization (WHO) declared COVID-19 a pandemic in March 2020, the world experienced unprecedented disruptions in every industry (WHO, 2020). So much uncertainty about the pandemic was accompanied by an 'infodemic,' defined by the WHO as an "over-abundance of information – some accurate and some not – that made it hard for people to find trustworthy sources and reliable guidance when they need it" (WHO, 2020b). The emergence of an infodemic in conjunction with a pandemic made it highly important for consumers to find trustworthy, credible news sources.

Since the onset of COVID-19 in December 2019, many studies have been conducted on its impacts, such as economic, health, and social. Social science research was fundamental in managing pandemic responses (Van Bavel et al., 2020). Journalism researchers have analyzed fake news coverage during the pandemic (van Der Linden et al., 2020), news politicization and polarization (Hart et al., 2020), and news sentiment (Buckman et al., 2020). Although current studies exist on the virus and subsequent news coverage, they lack a focus on agricultural coverage during the pandemic. Agriculture was covered mainstream news sources such as *The New York Times* (Yaffe-Bellany & Corkery), *Washington Post* (Reiley & Reinhard, 2020), and *USA Today* (Schrotenboer, 2020), in addition to many others including local, regional, and agriculture-specific media. Agriculture's economy accounted for \$1.109 trillion (5.2%) of the U.S. gross domestic product in 2019 (United States Department of Agriculture [USDA], 2019). As the world's top food exporter, this is an important industry to focus (USDA, 2019).

While the inclusion of agriculture in mainstream news is important, the significance of this study lies in its focus on agricultural news sources and its attribution to the literature in the area. The

need for this research is evident in its readership. Two-thirds of farm owners, operators, and managers report reading agricultural newspapers and magazines on a weekly basis (Connectiv Ag Media Council, 2018). Additionally, agricultural newspapers and magazines are the most used media channel by farmers (Connectiv Ag Media Council, 2018). With a captive audience, it is in the best interest of agriculture to explore how agricultural journalists frame news stories, especially during a crisis. This study analyzed articles in agricultural publications that discussed COVID-19's impact on the dairy industry. Its purpose was to provide researchers and practitioners insight on the use of agricultural news as a crisis communication tool.

Purpose and Research Objectives

The purpose of this study was to explore crisis frames used by agricultural news sources specific to the dairy industry during COVID-19. Additionally, this study sought to describe the communicative function presented in news articles from agricultural sources. The following research objectives guided this study:

RO1: Explore what Situational Crisis Communication frames were present regarding COVID-19's impact on the dairy industry in news articles from agricultural news outlets.

RO2: Describe newspaper articles based on communicative function and sources.

Literature Review

News provides information to its audience, allowing them to make informed decisions about issues and purchases (Barnurst & Nerone, 2001). Additionally, it creates communities and builds networks of relationships through its readership (Barnurst & Nerone, 2001). During a crisis, the role of news becomes even more critical due to the public's desire to seek out information (Pavlik, 2003; Austin et al., 2012). It connects the public to crisis events as they unfold, increasingly so after the attack on the World Trade Center on September 11, 2001 (Pavlik, 2003).

News and mass media are vital sources of agricultural information for the public (Terry et al., 1996) such as food safety and pesticides (Graves, 2005). However, these are typically reactive stories that do not always portray agriculture in the most favorable light (Graves, 2005). One national survey found the system between agricultural news and mainstream news to be flawed, finding agricultural news was uncritical and mainstream news was stereotypical of agriculture (Reisner & Walter, 1994). Despite this, trade publications, including those in the agriculture industry, remain the least studied (Sweeney & Hollifield, 2000). The study of agricultural news has become even more relevant now, with the ranking of farming as the most trusted industry during COVID-19 (Saad, 2020). Because of this increase in trust, the need for effective agricultural communicators and journalists is emphasized by the industry (Graves, 2005).

The agriculture and food industries are familiar with crises. Calley et al. (2019) examined the framing of Blue Bell's 2015 *Listeria* outbreak in news articles and press releases and found Blue Bell to be an effective partner to news outlets. Ashlock et al. (2006) examined the framing of the 2003 bovine spongiform encephalopathy (BSE) crisis in the beef industry. The study found that articles written by major news publications framed the beef industry negatively. Lawson and Meyers (2020) analyzed frames used by popular news outlets when covering stories on the rural opioid epidemic and found the most common frame used was "growth or spread" of the epidemic, noting that if the issue was not addressed, effects could be devastating to rural America.

Within agriculture, the dairy industry has experienced its share of newsworthy crises. The most recent crisis facing the dairy industry is COVID-19. Stories from mainstream news sources such as *The New York Times* informed consumers of the impacts of COVID-19 on agriculture, such as the need to dump milk due to supply chain disruptions (Yaffe-Bellany & Corkery). Whereas stories surrounding the impacts of COVID-19 from agricultural news sources such as *Lancaster Farming*, a Northeast and Mid-Atlantic farm newspaper, typically have a target audience of farmers. Both variations of news coverage serve an essential purpose for their audiences. However more research is needed on the content and framing of agricultural news sources.

Agricultural journalism dates to 1810 (Graves, 2005). Since their inception, agricultural publications have played an integral role in communicating with producers (Boone et al., 2000; Connectiv Ag Media Council, 2018). With the development of technology like the telegraph, more prominent mainstream newspapers such as *The New York Times* began employing farm journalists and featuring farming stories (Boone et al., 2000).

With multiple farm crises sprinkled throughout the last century, agriculture experienced many changes (Lamberti, 2007). Changing agricultural dynamics has also led to change and advancement in agricultural communications (Boone et al., 2000). Despite a decrease in farm numbers, production is still increasing, and farmers are dependent on the information farm publications provide (USDA, 2021b; Connectiv Ag Media Council, 2018).

The literature shows a deficiency in news coverage from agricultural sources. Many studies analyzed agricultural topics in mainstream news (Steede, 2018; Lawson & Meyers, 2020; Regusci, 2020). Journalistic and story bias, as well as framing of agricultural topics, found mainstream news platforms present bias in stories about agriculture (Reisner & Walter, 1994; Steede, 2018). These biases have led readers to make ill-informed decisions regarding agricultural topics (Reisner & Walter, 1994; Steede, 2018). However, little research exists on the framing of stories from agricultural news sources. Dyer and Whitaker (2000) compared biases in agricultural news reporting from both mainstream news sources and agricultural news sources. In their comparison, they found both to have biases (Dyer & Whitaker, 2000). More than 20 years later, it is important to take another look at the reporting styles of agricultural news outlets.

Theoretical Framework

Framing Theory

Framing theory has often been used to understand how mass media frames a story (An & Gower, 2009). Frames are the categorization and interpretation of occurrences (Goffman, 1974). Gamson (1989), says the media suggest what is at issue. Within news, frames provide patterns that allow for evaluation and assessment of developments (Norris et al., 2003). Framing is described by Entman (1993) as “the power of communicating text” (p.51). Specific frames are selected to make information more salient in a communication text (Entman, 1993). Framing alters how an individual may interpret or perceive a message (Hallahan, 1999). The effect framing has on how a message is perceived and interpreted provides staunch support to analyze news framing.

In his study on framing as a theory of media effects, Scheufele (1999) explains his process model of framing research. He organizes the process into categories of inputs, processes, and outcomes (Scheufele, 1999). The process is also separated by media and audience in which frame building and frame setting occur (Scheufele, 1999). Figure 2.2 displays Scheufele's (1999) conceptual process model of framing research.

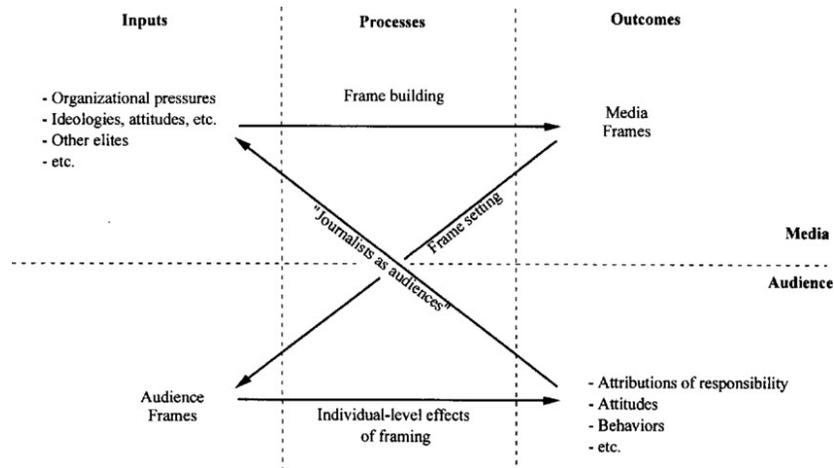


Figure 2.2
Scheufele (1999) Process Model of Framing Research

When analyzing framing in the news, it is important to note what a media frame is. Tuchman (1978) describes news media frames as essential to news. They organize everyday reality. Gamson and Modigliani (1987) suggest media frames put forward what should be controversial in a story. Gamson (1989) notes that although the objectives of media frames may be intentional, they may also be an externality. This study used framing theory to analyze media frames through a content analysis of agricultural news coverage. Framing is an essential factor in how a crisis evolves (Schultz et al., 2012). Because of this and the crisis nature of COVID-19, it is important to understand how agricultural news coverage informs its readers, especially agriculturalists.

Methodology

Quantitative content analysis is a widely used tool within the social sciences. Riffe et al., (1998) says quantitative content analysis is “The systematic and replicable examination of symbols of communication... to draw inferences about its meaning, or infer from the communication to its context, both of production and consumption” (p. 20). Some of the first quantitative content analysis studies were of newspapers (Krippendorff, 2004). Although the method has shifted to other disciplines, quantitative content analysis has journalistic roots (Krippendorff, 2004). This descriptive study analyzed news articles from agricultural news sources during the early months of the COVID-19 pandemic to explain and describe framing by measuring frequencies of frame elements.

Data were collected using Nexis Uni, an academic search engine. Search criteria used the terms “COVID milk.” Search terms “COVID” and “dairy” were used to search within the results. Search criteria limited article results to those published by agricultural news sources in the U.S. between

February 1, 2020, and June 1, 2020 to include articles published from the start of COVID-19 in the U.S. This provided a total of 67 news articles. After looking through each article, five were not relevant to the study, leaving 62 new articles to be coded.

The unit of analysis for this study was the news article. News articles were selected from *Southeast Farm Press*, *Southwest Farm Press*, *Farm Industry News*, *The Corn and Soybean Digest*, and *Delta Farm Press*; the only agricultural publications present in the Nexis Uni database. Both news stories and opinion editorials were considered. Analysis of the entire article was conducted, as a story can be analyzed more holistically than line by line or paragraph analysis (Trumbo, 1996). The following were variables used for analysis:

- **Article Title:** The title of each article was recorded.
- **Article Number:** Each article was assigned a number 1-62.
- **Article Source:** Title of the publication
- **Word Count:** The article's word count was recorded.
- **Story Type:** The type of story was recorded, either News or Op-Ed.
- **Situational Crisis Communication Theory Frames:** Each article's crisis response was recorded according to Coombs (2007) Situational Crisis Communication Theory (SCCT). If no crisis response was present, it was recorded as no crisis response.
 - *Denial:* Responses that attack the accuser, denial, or scapegoat
 - *Diminishment:* Responses that are excuse or justification
 - *Rebuilding:* Responses that are compensation or apology
 - *Bolstering:* Responses that are reminder, ingratiation, or victimization
- **Sources Used:** Sources mentioned within each article were coded. If no sources were used in the article, it was coded as no sources used.
 - *Producers:* Agricultural producers and dairy farmers
 - *Government agencies:* USDA, U.S. Dairy Export Council, DMI, others
 - *Extension:* Extension agents, branches, and offices
 - *University:* Universities, professors, university faculty and staff
 - *Interest Groups:* Advocacy groups such as American Farm Bureau, American Dairy Association, etc.
 - *Food manufacturers:* Companies that make dairy products
 - *Grocery stores:* Any grocery store or grocery chain
 - *Schools:* Any K-12 school or school district
 - *Politicians:* Includes local law makers, congress, or president
 - *Parents:* Any parent or parent group such as the PTA
 - *Input providers to farmers:* Entities that provide an input for dairy farmers
 - *Transportation:* Entities that transport milk
 - *Meat processors:* Meat processing companies
- **Communicative Function:** Each article's communicative function was recorded as defined by Lovejoy & Saxton (2012). If the communicative function was unidentifiable, it was recorded as so.
 - *Information:* The article contains information about the description of processes, current news, financial data, performance statistics or facts, historical statistics or facts, policies and political interventions, or ethical points.

- *Community*: The article serves to interact, share, and converse in a way that facilitates the creation of an online community. It deepens, builds, and strengthens ties to the online community without involving an expectation of interactive conversation.
- *Action*: The article explicitly tells the reader what to do, know, and/or feel. Tools such as hyperlinks and hashtags are frequently used in conjunction with mobilization messages. It is less about creating dialogue than it is about mobilizing resources and supporters to fulfill financial and strategic goals.

Reliability is the agreement between coders on the categorization of content for confidence in research measurement (Riffe et al., 2014; Ary et al., 2018). Three agricultural communications graduate students served as coders to complete a pilot test of 10% of the articles in the study (n = 7) (Lombard et al., 2004). Coders were trained, and independent coding was completed. Using Krippendorff's alpha, past studies have accepted levels of reliability in nominal variables as low as .667 through .8 (Riffe et al., 2014). High levels of reliability were established in the variables of story type (a = 1.0) and source (a = .96). Acceptable levels of reliability were reached in the variables of communicative function (a = .7) and SCCT frames (a = .78), but in a meeting after the pilot reliability coding, researchers reached a consensus in the few cases of discrepancies.

Student coders coded the SCCT frame and communicative function present in each article. Additionally, they coded for the publishing organization of the article, word count, story type, and types of sources used within the article. Coding sheets were saved in two locations to minimize the risk of losing data.

Face validity, the rationality of ideas, is a common measure for validity of content analysis (Riffe et al., 2014). To ensure face validity, frames for this study were taken from previously published studies. SCCT frames were developed from Bartman's (2018) study and Coomb's (2007) seminal study. Coder training and codebook revisions from experts in the discipline also added to the study's face validity. This study also assumed content validity due to similarity of samples, representative of the population (Krippendorff, 2004). Data were coded using a researcher-developed codebook using variables adapted from previous studies, existing literature, and reviewed by experts in agricultural communication. Codes for each variable within each level of inclusion were recorded in Microsoft excel and later analyzed in SPSS for descriptive statistics.

Results

Research Objective One

Research Objective One sought to explore which Situational Crisis Communication frames were present regarding COVID-19's impact on the dairy industry in news articles from agricultural news outlets. Of the 62 articles analyzed within the sample, 9.7% (n = 6) utilized a diminish crisis response strategy, 17.7% (n = 11) utilized a rebuilding crisis response strategy, 41.9% (n = 26) utilized a bolstering strategy, and 30.6% (n = 19) did not have a crisis response strategy present.

None of the articles within the sample utilized a denying crisis response strategy. Situational Crisis Communication frame frequencies and percentages are outlined in Table 2.1.

Table 2.1

SCCT Frame Elements Used by Agricultural News Covering COVID-19 Impact on the Dairy Industry (N = 62)

Frame	Total	Percentage
Bolster	26	41.9%
No crisis response	19	30.6%
Rebuild	11	17.7%
Diminish	6	9.7%
Deny	0	0%

Additionally, SCCT frames found in this study were analyzed based on the publication date. All articles were placed into pre-crisis (March 2020), during crisis (April 2020), and post-crisis (all remaining months) phases, a common crisis management segmentation practice (Coombs, 2007). This timeline was based on a study on the impacts of COVID-19 on the dairy industry (Mulvey et al., 2020). Despite the onset of the pandemic beginning in March, the study depicts April as the height of crisis for dairy farmers because of rising concern for product storage, milk dumping, and economic predictions of industry decline (Mulvey et al., 2020). Results found the largest percentage of no crisis response strategy 44% (n = 4) occurred in the pre-crisis phase. Additionally, the largest percentage of rebuilding 30% (n = 5) occurred in the post-crisis phase. The diminish frame was only utilized in the during crisis and post-crisis phases. The largest number of articles published also occurred in the crisis response phase (n = 36) (See Figures 2.3, 2.4, and 2.5).

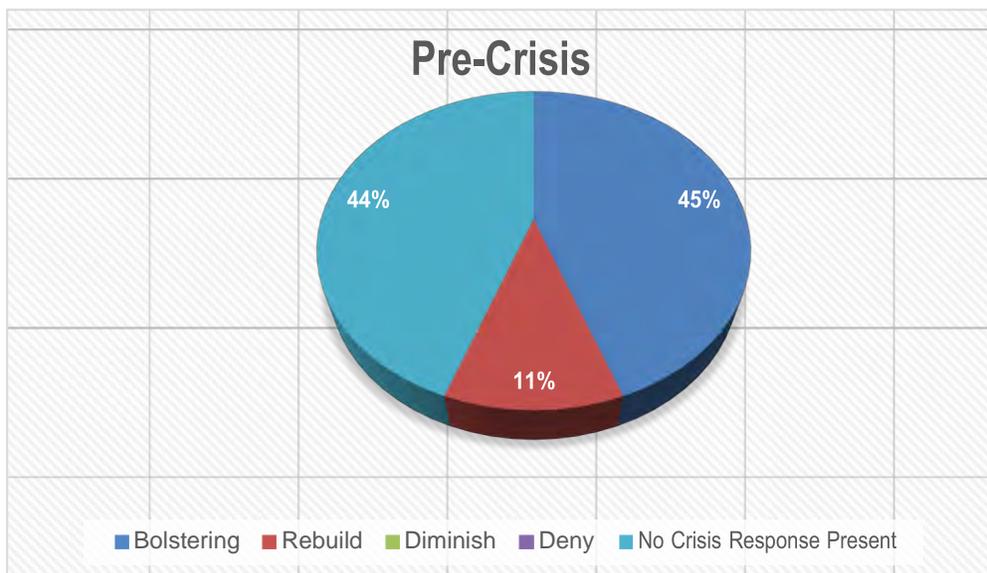


Figure 2.3

Pre-Crisis SCCT Frame Usage in News

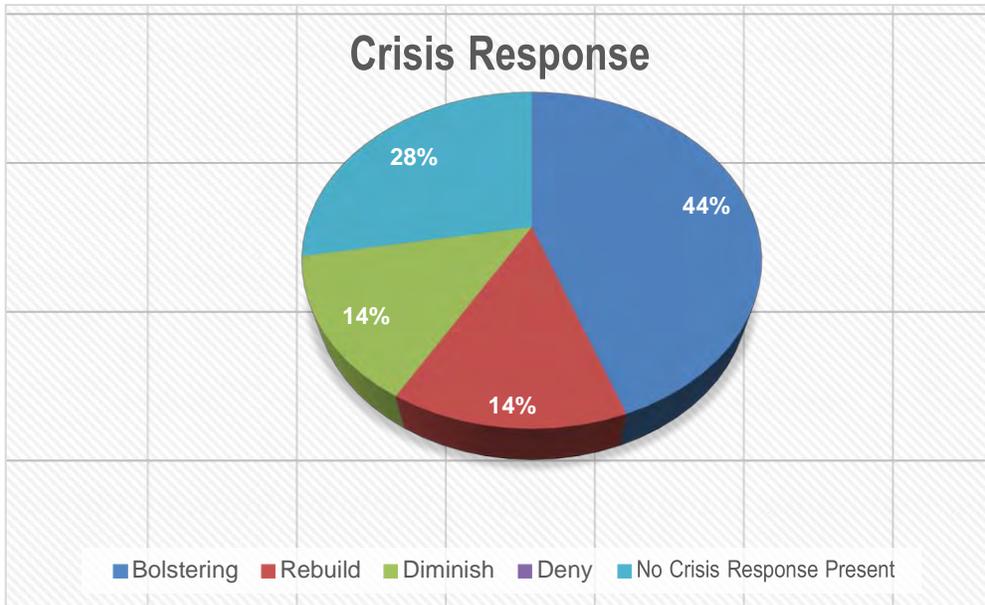


Figure 2.4
Crisis Response SCCT Frame Usage in News

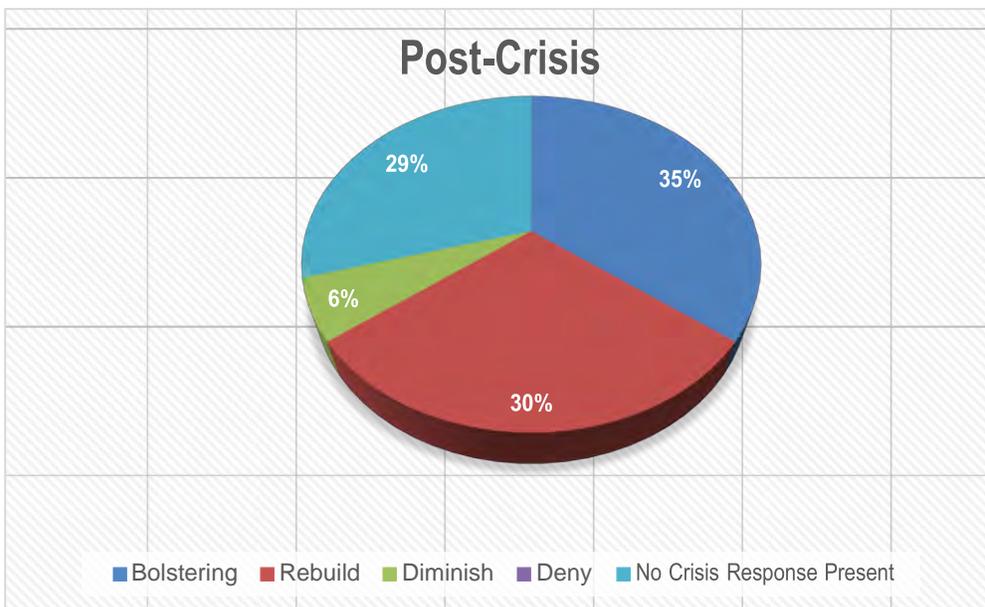


Figure 2.5
Post-Crisis SCCT Frame Usage in News

Research Objective Two

The second research objective was to describe newspaper articles based on communicative function and sources. Only one article within the sample did not have an identifiable communicative function present. A large majority of articles, 75.8% (n = 47) identified information as their communicative function. Action was the next most used communicative

function, 14.5% (n = 9), of articles. Of the three identifying communicative functions, community was least used, 8.1% (n = 5), of the article sample. Communicative function frequencies and percentages are displayed in Table 2.2.

Table 2.2

Communicative Function Used by Agricultural News Covering COVID-19 Impact on the Dairy Industry (N = 62)

Communicative Function	Total	Percentage
Information	47	75.8%
Action	9	14.5%
Community	5	8.1%
Not Identifiable	1	1.6%

Communicative Function was also categorized into pre-crisis, crisis response, and post-crisis phases based on each article's date of publication. The only article with no communicative function present was found in the post-crisis response phase. The largest percentage of action 45% (n = 4) was used in the pre-crisis phase. The during crisis and post-crisis phases had similar use of communicative function. The results of this breakdown are featured in Figures 2.6, 2.7, 2.8.

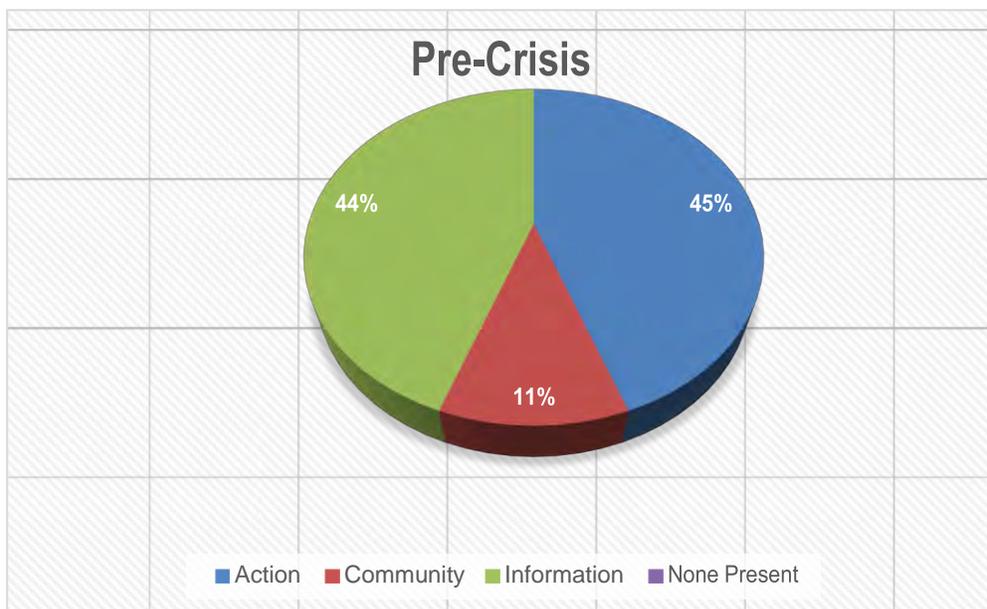


Figure 2.6

Pre-Crisis Communicative Function Usage in News

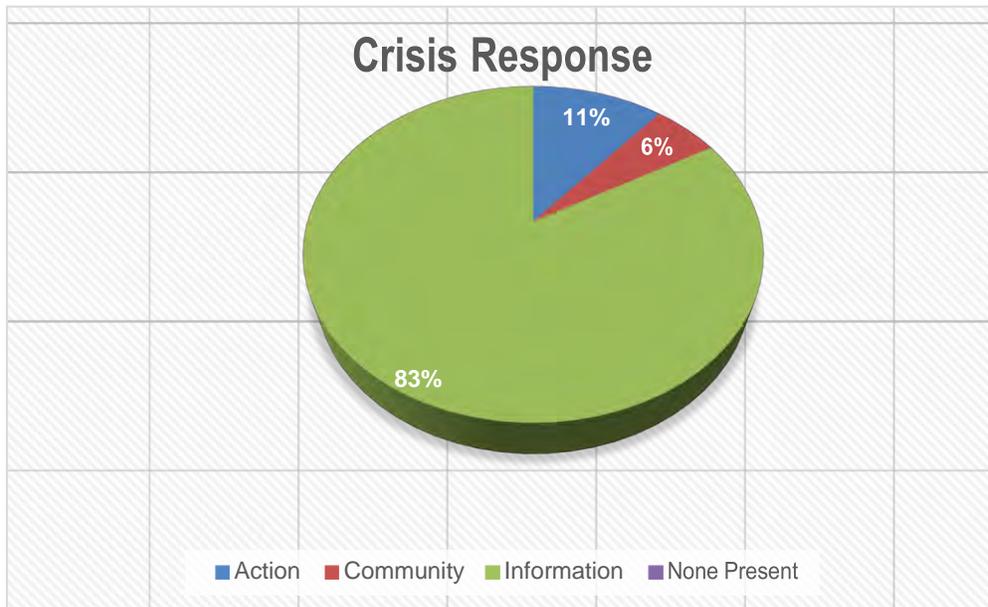


Figure 2.7
Crisis Response Communicative Function Usage in News

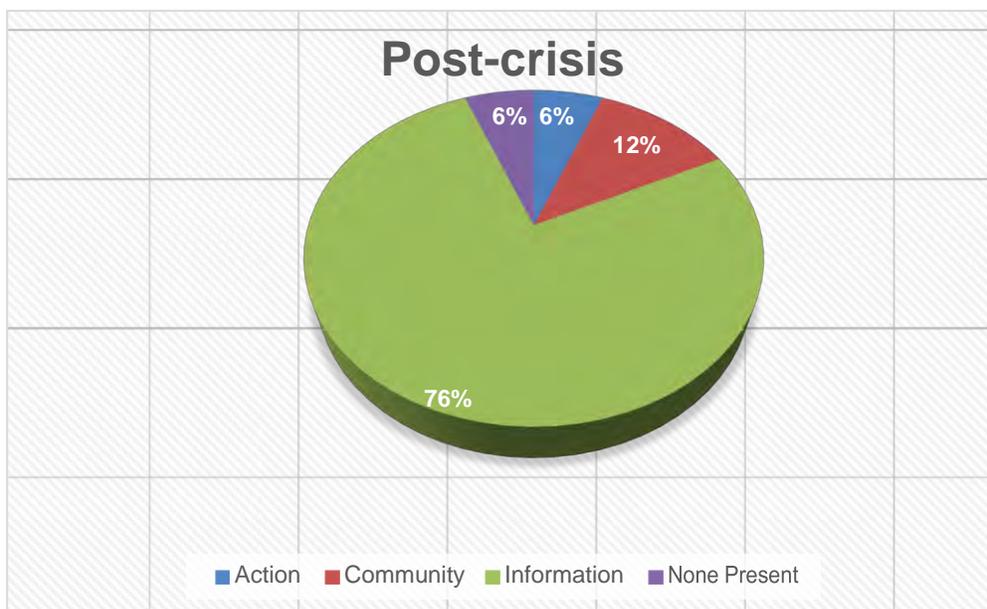


Figure 2.8
Post-Crisis Communicative Function Usage in News

Of the 13 source types analyzed, the most used was interest groups 56.5% (n = 35). Government agencies were mentioned in 35.5% (n = 22) of articles. Following closely behind, producers were mentioned in 27.4% (n = 17) of articles. Extension, universities, and politicians were used in the same percentages of articles 19.4% (n = 12). Food manufacturers were introduced in 3.2% (n = 2) of articles. Grocery stores, parents, input providers, and transportation were all mentioned only once 1.6% (n = 1). Meat processors and schools were not mentioned

in any articles within the sample. The frequencies and percentages of sources used are presented in Table 2.3.

Table 2.3

Sources Used by Agricultural News Covering COVID-19 Impact on the Dairy Industry (N = 62)

Source	Total	Percentage
Interest groups	35	56.5%
Government agencies	22	35.5%
Producers	17	27.4%
Extension	12	19.4%
University	12	19.4%
Politicians	12	19.4%
Food manufacturers	2	3.2%
Grocery stores	1	1.6%
Parents	1	1.6%
Input providers	1	1.6%
Transportation	1	1.6%

Conclusions and Discussions

News has long been a tool to disseminate crisis information (Pavlik, 2003). Amidst the chaos of COVID-19 and what researchers have called an ‘infodemic,’ finding trustworthy news sources has become paramount to consumers (WHO, 2020b). As the most popular source of information for farmers, ranchers, and managers, the framing of stories from agricultural news outlets is an important consideration (Connectiv Ag Media Council, 2018). Despite the many content analyses on agricultural topics in mainstream news (Steede, 2018; Regusci, 2020; Lawson & Meyers, 2020), researchers rarely conduct content analyses covering agricultural publications. Results from this study help fill that gap.

The results of ROI showed that agricultural news outlets used bolstering on behalf of the dairy industry as their primary crisis response strategy to the threat of COVID-19. Although a considerable amount 30.6% (n = 19) chose to use no crisis response strategy at all, not taking a stance on the crisis facing the industry, most of these occurred post-crisis. Additionally, none of the articles from the variety of agricultural news outlets utilized deny as a crisis response strategy. Coombs (2007) states that when news media choose the crisis frame of denial and deny connection to a crisis, no crisis is projected, and reputational harm is spared. Due to the evident detrimental effects of COVID-19 on every industry, utilizing the denial posture could have resulted in a lack of trust from news readership. The goal of SCCT frames is to protect against adverse reactions to a crisis from stakeholders (Coombs, 2007). Through a journalist's selection of frames, intentional or unintentional, they have the power to shape public opinion and industry reputation (An & Gower, 2009). By utilizing bolstering as a primary crisis response frame, agricultural news outlets are providing few reputational assets to the dairy industry. Bolstering relies on the goodwill they already have with stakeholders to protect reputation without

developing additional assets (Coombs, 2007). Results also found the largest number of articles published occurred during the crisis response phase of crisis.

RO2 found an overwhelming majority of articles were written with a communicative function of information. Communicative function is a tool used by organizations to engage stakeholders (Lovejoy & Saxton, 2012). Information messages are used to attract followers, community messages focus on follower engagement, and action messages call upon that community (Lovejoy & Saxton, 2012). While not originally applied to crisis communication, analyzing communicative function in crisis response can provide insight into crisis response strategies and how stakeholders may respond. When looking at the mission statements of each newspaper analyzed in this study, all five stated their target audience was farmers, ranchers, and/or producers. In this case, information messaging was used to attract additional farmers, ranchers, and/or producers. While this was the primary communicative function used, results found a fairly equal percentage of the action frame used in the pre-crisis phase.

Results from this study are similar to those found in Lovejoy and Saxton's (2012) original study, in which most articles were written with a communicative function of information. Additionally, more than half the articles in the sample used interest groups as a source. About one-third of articles used government agencies and producers as a source, giving their stories credibility through external sources (Dimitriova & Stromback, 2009).

By utilizing framing to guide this study, results show how agricultural journalists become important industry partners during a crisis. Frames provide patterns that allow for evaluation and assessment of developments in the news (Norris et al., 2003). Through their use of crisis framing, agricultural journalists have contributed to how a crisis evolves (Schultz et al., 2012).

Recommendations

Through the findings of this study, the researcher recommends strategic relationships between agricultural journalists and communication practitioners are formed. As agriculturalists' most frequented source of information (Connectiv Ag Media Council, 2018), agricultural news outlets are beneficial partners to agricultural organizations during a crisis. With a large and loyal readership, agricultural journalists are great partners in reducing reputational damage in an agricultural crisis. Their use of external sources makes them reliable and trustworthy to their readers (Dimitriova & Stromback, 2009).

Based on the communicative function results found in this study, agricultural journalists looking to attract farmer, rancher, and/or producer readers should use a communicative function of information. However, with this set as the target audience of many agricultural publications, future research should be done on the segmentation of community. In the case of the articles used in this study, community refers to the farming community. Other publications with wider target audiences may need to consider how community is segmented differently for farmers versus consumers and determine if it is their role to advocate for that community.

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A Quantitative Analysis of Consistency Between CTE Administrator's on the Importance of Employability Skills Integration into Agricultural Education

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Preparing students for the workforce is a foundational pillar of modern education. This study sought to assess the consistency of CTE administrators in Alabama and Georgia on the importance of agricultural educators integrating employability skills development into agricultural education. Traditionally, the relationship between the CTE administrator and the agricultural educator has been viewed as important. An understanding of the consistency of perceptions of the CTE administrator can be beneficial to ascertain if CTE administrators in Alabama and Georgia value employability skills differently. This study utilized the Perkins Collaborative Resource Network Employability Skills Framework to develop the instrument. CTE administrators were asked to rate each individual employable skill on a 1 to 5 Likert scale with 1 = "Not Important at All" and 5 = "Extremely Important". Each individual employable skill's rating was combined into a construct score for the employability skill being measured. A Multivariate Analysis of Variance (MANOVA) was used to evaluate the perceptions of the CTE administrators. The results suggest that CTE administrators in Alabama and Georgia value all employability skill areas equally.

Introduction

Providing students with the necessary skills to be successful in the workforce is a basic function of modern education (Symonds, et al., 2011). Unfortunately, industry leaders have reported that there is a technical and employability skills gap among young adults (Casner-Lotto, et al., 2006; Jaschick, 2015; McNamara, 2009; Robinson & Garton, 2008). In fact, 73% of employers claim that they have issues finding qualified employees that value their organization and 51% of employers claim that "education systems have done little or nothing to help address the skills shortage" (Society for Human Resource Management [SHRM], 2018, par. 8). The most common solution posed to close the skills gap is to increase education on employability skills through Career and Technical Education (CTE). As agricultural education and CTE continue to evolve and adapt to the 21st Century, continuance and improvements to the instruction on employability skills will be necessary to ensure the development of a successful and prepared workforce.

Review of Literature

The employability skills gap is currently an issue with young adults of all educational levels, including high school graduates, technical school graduates, and college graduates (Casner-Lotto et al., 2006). In addition, employers report that high school graduates are deficient in the basic knowledge and skills of writing, mathematics, reading comprehension, written communication, critical thinking/problem solving, and professionalism/work ethic (Casner-Lotto et al.). In fact, a report published in part by the Partnership for 21st Century Skills (2006) claims that "[t]he results of this study leave little doubt that improvements are needed in the readiness of new workforce entrants, if 'excellence' is the standard for global competitiveness" (Casner-

Lotto, p. 11). Although this skills gap effects a multitude of industries, the agriculture industry is not immune (Easterly III, et al., 2017; Hendrix & Morrison, 2018).

To resolve this dilemma, education officials have partnered with industry leaders to determine exactly what skills employers desire in their employees and what skills students need to possess to be successful in the workforce. The idea that CTE at the secondary, post-secondary, and adult levels should provide industry with a prepared workforce is at the core of its development (Martinez, 2007; Fristoe, 2017). This idea has been praised by leaders in both sectors. In relation, Bancino and Zevalkink (2007) note, "These [employability] skills are a "must have," Employers and business leaders are demanding that technical professionals not only master their technical disciplines, but participate as full partners in the mission of the organization" (p. 22).

The development of employability skills, such as verbal and nonverbal communication, is critical for success in industry (Coffelt, et al., 2016; Lear, et al., 2016). This critical role of CTE to develop employability skills in our culminating students will challenge CTE instructors, teacher educators, and CTE administrators. For CTE and agricultural education to remain relevant throughout the 21st century, effective models of employability skills integration must be developed and efficiently integrated into School Based Agricultural Education (SBAE).

According to Free (2017), Teachers agree that employability skills integration is a vital part of agricultural education. It is the mission of agricultural education to prepare "students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resources systems" (National FFA Organization, 2020, Par. 2). While preparing students for careers is a main focus of agricultural education, teachers do not value all employability skills the same (Free, 2017). In addition, agricultural teachers report that they integrate employability skill development on a daily or weekly basis in their classrooms (Free, 2017). This varying level of perceived importance demonstrates where agricultural teachers direct their instruction.

The relevance and necessity of CTE and agricultural education has given it a strong presence in American public education. This can be seen in its growth over its 120+ year history and the popularity of its courses (Martinez, 2007; Friedel, 2011). Public education's stakeholders have associated preparing students for careers through employability skills development as the responsibility of CTE (Sharma, 2009; McKim, et al., 2018). The importance of students being prepared for the workforce can be seen through the needs of industry (Verma & Bedi, 2008; Sharma, 2009). Industry leaders have made it clear that their incoming workforce is not currently prepared in these areas (Casner-Lotto et al. 2006; Jaschick, 2015; McNamara, 2009; Robinson & Garton, 2008; Ortiz, et al., 2016; Sharma, 2009). This successful integration of employability skills development is critical for CTE's relevance in the 21st century. A knowledge of CTE administrator's perceptions regarding employability skills integration into SBAE could help guide agricultural education in a positive direction that better allows us to prepare students for the workforce.

Conceptual Framework

In 1994, Lent, Brown, and Hackett modified Albert Bandura’s (1986) Social Cognitive Theory to create the Social Cognitive Career Theory (SCCT) (Figure 1) which aimed to portray (1) “how basic academic and career interests develop”, (2) “how educational and career choices are made”, and (3) “how academic and career success is obtained” (p. 751). The theory depicts that career and academic interests and career success is a function of three main areas including self-efficacy, outcome expectations, and goals. The formation of these three areas are closely related to the employability skills sought after by industry leaders. Ascertaining the perceptions of CTE administrators on the value of employability skills development in agricultural education and which employability skills are most valuable will help further the knowledge of “how academic and career success is obtained”. To accomplish this, the employability skills framework developed by the Perkin’s Collaborative Resource Network (Figure 1) was used to develop the questions used in the instrument.

The various iterations of the Carl D. Perkins Act all sought to expand and improve CTE and workforce development in the United States and is coincidentally the main source of federal funding to CTE and Agricultural Education programs. This employability skills framework portrays the employability skills that CTE programs should develop into their students.

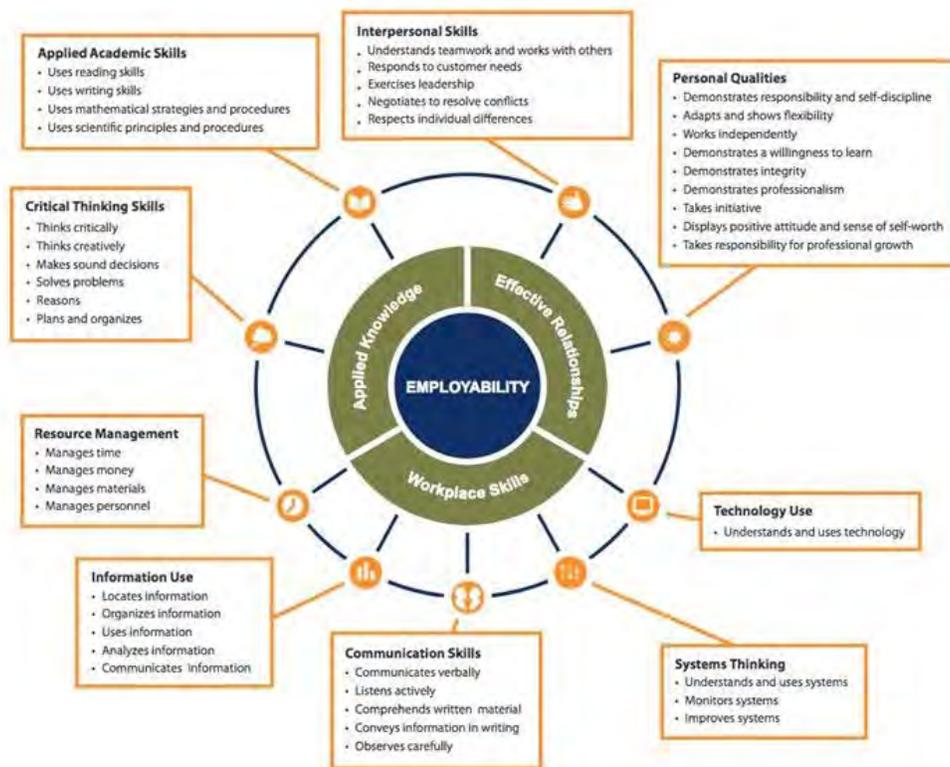


Figure 1. Perkin’s Collaborative Resource Network

Purpose of the Study

The purpose of this study was to 1.) assess the demographics of CTE administrators in Alabama and Georgia and 2.) assess the consistency of CTE administrators in Alabama and

Georgia on the importance of agricultural educators integrating employability skills development into agricultural education. This assessment has the potential to provide insight into if CTE administrator's in Alabama and Georgia are consistent and congruent on the importance of employability skills integration into agricultural education. The following research questions were assessed:

- 1) What were the demographic characteristics of CTE Administrators in Alabama and Georgia?
- 2) How did the perceptions of the importance of employability skills integration into agricultural education differ among CTE administrators in Alabama versus CTE administrators in Georgia?

Methods

The researcher utilized a descriptive correlational research design. The research instrument consisted of two sections, section one measuring the perceptions of Alabama's and Georgia's CTE administrators on the integration of employability skills education and section two collecting demographic data. Perceptions of the integration of employability skills utilized a five-point Likert-type scale ranging from 1 = "Not Important at All" to 5 = "Extremely Important". Employability skills included applied academic skills, critical thinking skills, resource management skills, information use skills, communication skills, system thinking skills, technology use skills, interpersonal skills, and personal qualities.

A pilot study was conducted with [State C] CTE administrators to determine face validity and reliability of the survey instrument. The instrument was deemed suitable for the purpose of the study. Reliability coefficients (Cronbach's alphas) for scales measuring the integration of employability skills ranged from .845 to .950, which indicate that the scales are extremely reliable (Gliem & Gliem, 2003).

A list of CTE administrators was compiled using resources from the Alabama State Department of Education, Georgia State Department of Education, school system websites, the Association for Career Technical Administrators (ACTA) mailing list, and, if necessary, a phone call to the local district to identify who managed CTE for that respective district. The list included the name of the administrator, the school system where employed, and their email address. This list contained 137 administrators from Alabama and 178 administrators from Georgia ($N = 315$).

A census was used to collect data which alleviated any sampling bias. According to Gay and Diehl (1992), a response rate of 10% is necessary for quality descriptive research. In this study, a response rate of 41% ($n = 129$) overall was achieved.

To address non-response bias, a third email was sent following the two initial e-mails to collect data to non-responders with a link to a different survey that only collected demographic data. According to Lindner, Murphy, and Briers (2001), a minimum of 20

responses from non-responders is needed to accurately determine non-response bias. This third email returned 22 responses and no statistically significant differences among responders and non-responders were found. In addition, statistical differences among early responders and late responders was assessed as well. Responses that occurred in the first six days were considered early respondents ($n = 108$), and responses that occurred the seventh day and after were considered late responders ($n = 21$). Statistical analysis showed no differences among early and late respondents.

The analysis of all data occurred using SPSS Version 27. To analyze research objectives one and two, frequencies, percentages, means, and standard deviations were utilized

Findings

Research Question One

Demographic information from this study for CTE administrators in Alabama is presented in Table 1, demographic data from CTE administrators in Georgia is presented in Table 2, and demographic information from all participants is presented in Table 3. Female CTE administrators comprised the largest gender group with 57.4% ($f = 74$) while 42.6% of CTE administrators were male ($f = 55$). A total of 82.9% of CTE administrators were white ($f = 107$), 16.3% were African American ($f = 21$), and 0.8% were American Indian/Alaska Native ($f = 1$). Approximately 1.6% of CTE administrator's highest degree earned was a bachelor's degree ($f = 2$), 19.4% had a master's degree ($f = 25$), 48.8% had a specialist degree ($f = 63$), and 30.2% had earned a doctoral degree ($f = 39$). A total of 50.4% of CTE administrators ($f = 65$) had no CTE background. Of those that did report having a background in CTE, 28.7% had a background in business/marketing education ($f = 37$), 12.4% had a background in agricultural education ($f = 16$), 2.3% had a background in family and consumer science ($f = 3$), 1.6% had a background in trade/technical education ($f = 2$), 1.6% had a background in engineering education ($f = 2$), and 3.1% had a background in other areas of CTE ($f = 4$). The years of experience as a classroom teacher differed greatly among CTE administrators with a mean of 13.05 years ($SD = 7.07$). In addition, 13.2% reported having 0-5 years of classroom experience ($f = 17$), 58.1% reported having 6-15 years of experience ($f = 75$), 21.7% reported 16-25 years of experience ($f = 28$), and 7.0% reported having 26+ years of experience as a classroom teacher ($f = 9$).

Total years of experience in education had a mean of 23.25 years ($SD = 6.69$). Of the participants that responded, 5.4% reported having 0-5 years of experience ($f = 7$), 38.0% reported having 6-15 years of experience ($f = 49$), 30.2% reported having 16-25 years of experience ($f = 39$), and 26.4% reported having 26+ years of total education experience ($f = 34$).

The school districts that employed CTE administrators were very diverse in size. Approximately 11.6% had 0-1000 students enrolled in P-12 ($f = 15$), 31.8% had 1,000-3,000

students enrolled in P-12 ($f = 41$), 23.9% had 3,000-5,000 students enrolled in P-12 ($f = 31$), 13.2% had 5,000-9,000 students enrolled in P-12 ($f = 17$), 11.6% had 9,000-15,000 students enrolled in P-12 ($f = 15$), and 7.8% has 15,001+ students enrolled in P-12 ($f = 10$).

Over 71.3% of CTE administrators reported that a majority of their duties were related to CTE ($f = 92$) while 28.7% reported that the majority of their duties did not relate to CTE ($f = 37$). The administrators reporting claimed that 79.1% of their district's offered agricultural education ($f = 102$) and 20.9% did not ($f = 27$). In addition, 14% reported that they were a CTE administrator over a charter school ($f = 18$) and 86% reported they were not a CTE administrator over a charter school ($f = 111$).

Table 1

Personal Demographics of CTE Administrator Participants in Alabama (n = 53)

		<i>f</i>	<i>%</i>
Gender	Female	23	43.4
	Male	30	56.6
Race	White	44	83.0
	African American	8	15.1
	American Indian or Alaska Native	1	1.9
Highest Degree Earned	Bachelors	0	0.0
	Masters	15	28.3
	Specialist	21	39.6
	Doctoral	17	32.1
Educational Background in CTE	Agricultural Education	11	20.7
	Business/Marketing Education	10	18.9
	Technical/Trade Education	1	1.9
	No Background in CTE	31	58.5
Years as a Classroom Teacher	0-5 Years	7	13.2
	6-10 Years	16	30.2
	11-15 Years	23	43.4
	16-25 Year	7	13.2
School System Type	City School System	25	47.2
	County School System	28	52.8
Years in Education Total	0-5 Years	7	13.2
	6-10 Years	16	30.2
	11-15 Years	23	43.4
	16-20 Years	4	7.5
	21-25 Years	3	5.7

Duty Allocation	Majority of Duties Related to CTE	36	67.9
	Majority of Duties Not Related to CTE	17	32.1
School System Size	0-1,000 Students P-12	5	9.4
	1,000-3,000 Students P-12	16	30.2
	3,000-5,000 Students P-12	16	30.2
	5,000-9,000- Students P-12	8	15.1
	9,000-15,000 Students P-12	6	11.3
	15,000-25,000 Students P-12	2	3.8
Agricultural Education	Offered	38	71.7
	Not Offered	15	28.3
Administrator Over a Charter School	Yes	1	1.9
	No	52	98.1

Table 2

Personal Demographics of CTE Administrator Participants in Georgia (n = 76)

		<i>f</i>	%
Gender	Female	51	67.1
	Male	25	32.9
Race	White	63	82.9
	African American	13	17.1
Highest Degree Earned	Bachelor's	2	2.6
	Master's	10	13.2
	Specialist	42	55.3
	Doctoral	22	28.9
Educational Background in CTE	Agricultural Education	5	6.6
	Business/Marketing Education	27	35.5
	Other Area of CTE	10	5.3
	No Background in CTE	34	44.7
Years as a Classroom Teacher	0-5 Years	10	13.1
	6-10 Years	13	17.1
	11-15 Years	23	30.3
	16-20 Years	17	22.4
	21-25 Years	4	5.3
	26-30 Years	6	7.9
	30+ Years	3	3.9
School System Type	City School System	13	17.1
	County School System	63	82.9
Years in Education Total	0-5 Years	0	0.0
	6-10 Years	3	3.9
	11-15 Years	7	9.2

	16-20 Years	13	17.1
	21-25 Years	19	25.0
	26-29 Years	22	29.0
	30+ Years	12	15.8
Duty Allocation	Majority of Duties Related to CTE	56	73.7
	Majority of Duties Not Related to CTE	20	26.3
School System Size	0-1000 Students P-12	10	13.2
	1,000-3,000 Students P-12	25	32.9
	3,000-5,000 Students P-12	15	19.7
	5,000-9,000- Students P-12	9	11.9
	9,000-15,000 Students P-12	9	11.9
	15,001+ Students P-12	8	10.4
Agricultural Education	Offered	64	84.2
	Not Offered	12	15.8
Administrator Over a Charter School	Yes	17	22.4
	No	59	77.6

Table 3

Personal Demographics of CTE Administrator Participants in Alabama and Georgia (n = 129)

		<i>f</i>	<i>%</i>
Gender	Female	74	57.4
	Male	55	42.6
Race	White	107	82.9
	African American	21	16.3
	American Indian or Alaska Native	1	0.8
	Other	0	0.0
Highest Degree Earned	Bachelors	2	1.6
	Masters	25	19.4
	Specialist	63	48.8
	Doctoral	39	30.2
Educational Background in CTE	Agricultural Education	16	12.4
	Business/Marketing Education	37	28.7
	Technical/Trade Education	2	1.6
	Family and Consumer Science	3	2.3
	Engineering	2	1.6
	Other Area of CTE	4	3.1
	No Background in CTE	65	50.3
Years as a Classroom Teacher	0-5 Years	17	13.2
	6-15 Years	75	58.1
	16-25 Years	28	21.7
	26+ Years	9	7.0
School System Type	City School System	38	29.5
	County School System	91	70.5

Years in Education Total	0-5 Years	7	5.4
	6-15 Years	49	38.0
	16-25 Years	39	30.2
	26+ Years	34	26.4
Duty Allocation	Majority of Duties Related to CTE	92	71.3
	Majority of Duties Not Related to CTE	37	28.7
School System Size	0-1000 Students P-12	15	11.6
	1,000-3,000 Students P-12	41	31.8
	3,000-5,000 Students P-12	31	23.9
	5,000-9,000- Students P-12	17	13.3
	9,000-15,000 Students P-12	15	11.6
Agricultural Education	15,001+ Students P-12	10	7.8
	Offered	102	79.1
	Not Offered	27	20.9
Administrator Over a Charter School	Yes	18	14.0
	No	111	86.0

Research Question Two

A total of 129 individuals participated in the study with 102 responses offering agricultural education and, therefore, providing data for employability skills. The respondents were categorized by CTE Administrators in Alabama ($f = 38$) and Georgia ($f = 64$). To assess the differences in employability skills, the categories of Applied Academic Skills, Critical Thinking Skills, Resource Management Skills, Information Use Skills, Communication Skills, Systems Thinking Skills, Technology Use Skills, Personal Qualities, Interpersonal Skills were used as the dependent variables (Table 4).

Table 4

Descriptive Statistics for Employability Skills by State of Employment (n = 102)

Skill Area	In which state are you a CTE Administrator?	M	SD	<i>f</i>
Applied Academic Skills	Alabama	4.51	.495	38
	Georgia	4.47	.566	64
	Total	4.48	.538	102
Critical Thinking Skills	Alabama	4.69	.425	38
	Georgia	4.72	.426	64
	Total	4.71	.424	102
Resource Management Skills	Alabama	4.39	.586	38
	Georgia	4.41	.583	64
	Total	4.40	.581	102
Information Use Skills	Alabama	4.56	.494	38
	Georgia	4.43	.556	64
	Total	4.48	.536	102
Communication Skills	Alabama	4.57	.442	38

	Georgia	4.57	.485	64
	Total	4.57	.467	102
Systems Thinking Skills	Alabama	4.12	.664	38
	Georgia	4.20	.697	64
	Total	4.17	.683	102
Technology Skills	Alabama	4.34	.582	38
	Georgia	4.50	.563	64
	Total	4.44	.573	102
Personal Qualities	Alabama	4.63	.422	38
	Georgia	4.60	.436	64
	Total	4.61	.429	102
Interpersonal Skills	Alabama	4.55	.491	38
	Georgia	4.50	.471	64
	Total	4.52	.477	102

To screen for multivariate outliers among variables, Mahalanobis distance scores were generated. In the current analyses, there were nine degrees of freedom, which equated to a critical Chi-square value of 27.88 ($\alpha = .001$). The test revealed one case with a distance score exceeding this critical value. The response was retained for the analysis.

According to Pituch and Stevens (2016), the threshold for tolerance levels when assessing multicollinearity is .10. A test linear regression was used to assess the condition of multicollinearity, and it was found that the condition was not violated (Applied Academic Skills, Tolerance = .54; Critical Thinking Skills, Tolerance = .28; Resource Management Skills, Tolerance = .44; Information Use Skills, Tolerance = .29; Communication Skills, Tolerance = .28; Systems Thinking Skills, Tolerance = .44; Technology Skills, Tolerance = .68; Personal Qualities, Tolerance = .24; Interpersonal Skills, Tolerance = .20). To assess multivariate normality, the Shapiro-Wilk's test was used which indicated that all dependent variables violate the multivariate normality assumption. According to Olson (1974), the MANOVA is robust against deviations from normality assuming limited multivariate outliers. In addition, the assumption of linearity was assessed using Q-Q plots and individual scatterplot matrices and the examination suggests that the condition of linearity is met.

The assumption of homogeneity of covariance matrices was assessed using box test: Box's $M = 51.19$, $F(45, 92) = 1.02$, $p = .44$. The nonsignificant result of Box's test suggests that the assumption is met.

Table 5

MANOVA Results for Employability Skills by State of Employment

Pillai's Trace	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
.104	1.181	9.000	92.000	.316	.104

Note: $\alpha = .05$

A multivariate analysis of variance (MANOVA) was performed to evaluate the effect of state of employment on how certain employability skills are valued (Table 5), and it was found that there is not a significant effect: Pillai's Trace = .104, $F(9, 92) = 1.18$, $p = .316$.

In addition, several univariate Analysis of Variance (ANOVA) tests were used to assess any statistical differences. The test indicated that there were no statistical differences among any of the dependent variables.

Conclusions and Recommendations

The first research question aimed to describe the characteristics of the CTE administrators in Alabama and Georgia. It was found that the average CTE administrator was a white female with a specialist or doctoral degree and no educational background in CTE. In addition, the average CTE administrator was employed in a county school system with less than 15,000 students that offered agricultural education. Furthermore, the average CTE administrator has 13.05 years of teaching experience and 23.25 years of total experience in education. On average, CTE encompassed the majority of their duties and they were not an administrator in a charter school.

The second research question aimed to assess consistency and congruency among CTE administrators in Alabama and Georgia. To determine these results, a MANOVA was used to ascertain any differences among Alabama and Georgia CTE administrators. The MANOVA results in an insignificant result suggesting the CTE administrators in Alabama and Georgia have consistent views on the importance of employability skills integration into agricultural education. Furthermore, Free (2017) found that agricultural teachers in Alabama ranked general ethics, reliability, and communication skills as the most valued skills. This is consistent with the findings of this study with Personal Qualities and Communication Skills being two of the highest ranked skills. This shows congruency and consistency between the value of skills between agricultural educators and CTE administrators.

Based on the results determined in the study, future research should be conducted on following areas:

- 1.) Research examining the perceptions of CTE administrators in other areas of the U.S. on the importance of employability skills.

- 2.) Research examining the perceptions of administrators in other areas besides CTE (superintendents, principals, etc.) on employability skills and STEM skills.
- 3.) Research on the long-term effects of students participating in a simulated workforce classroom and/or a work-based learning program.

The most effective methods of developing these employability skills are with Work Based Learning projects, Simulated Workforce Classroom, and leadership opportunities through Career and Technical Student Organizations (CTSOs) such as the National FFA Organization. Additionally, the demographic portion of the study found that the majority of CTE administrators in Alabama and Georgia do not have a background in CTE prior to becoming an administrator. This is concerning considering the importance of workforce development and career education to today's industry. When hiring CTE administrators in the future, school systems should consider candidates with CTE classroom experience and an educational background in CTE, due to its value and relevance to administrating CTE teachers.

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Factors Influencing the Teaching of Livestock Production within Arizona School-Based Agricultural Education

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The purpose of this study was to determine the factors that influence the teaching of livestock production content to high school students enrolled in secondary Agriscience programs in Arizona. The objectives of this study were to describe the Arizona livestock production technical content standards taught, describe the factors that influence the incorporation of livestock production content in curricula, and to determine the relationship between the two. Social cognitive theory (SCT) was utilized to determine the factors influencing teacher decision-making for teaching livestock production content. The Arizona technical content standards for livestock production were utilized to determine the content standards currently taught in Arizona SBAE. Quantitative analysis revealed a positive correlational relationship between the state standards used and both personal/cognitive factors and environmental factors from SCT. However, more than half of the Arizona standards identified as livestock production content were rarely utilized in classrooms. It is recommended that more opportunities be provided to Arizona teachers and their students to educate them about the Arizona livestock production industry. Additionally, state standards should be reevaluated to better fit educator needs while broadening their students' knowledge about livestock production.

Introduction

At the high school level, school-based agricultural education (SBAE) programs build the foundation for student understanding of the United States food and fiber system, including the scientific background behind growing plants, raising production animals, and how agricultural resources are utilized by producers and consumers (Frick et al., 1991). SBAE courses are designed to prepare students for furthering their passion for agriculture and to allow them to discover various career opportunities within the agriculture industry (Hughes & Barrick, 1993). More specifically, content within SBAE courses often informs students about careers in the animal sciences, including livestock production, animal husbandry, and other fields related to the caretaking of animals (Hughes & Barrick, 1993).

Agriculture accounts for 5.2% of the total United States economy, consisting of \$1.1 trillion each year (USDA, 2021). Modern livestock production within agriculture offers a variety of jobs beyond ranchers and farmers, including animal nutritionists, reproductive biologists, and agricultural lawyers (MSU, 2020). In addition to the scientific side of livestock production, there are also more labor-intensive positions available, including livestock ranch managers, dairy plant managers, and herdsman positions (MSU, 2020). Considering the diverse nature of livestock production, students need to understand livestock production at the state and national levels. Especially within Arizona's economy, agriculture constitutes \$23.3 billion a year, with \$1.6 billion generated from the state's beef and dairy industry alone (Gilmore, 2018). Educating students about all of these career opportunities not only opens the door for them to expand upon their interests and pursue future education, certification, and careers in these areas; it also allows them to understand how livestock production functions as an industry.

In addition to the career and college readiness goals of SBAE, these programs also serve to create agriculturally literate citizens (Doerfert, 2011). Over the last few decades, agricultural literacy definitions have morphed to adapt to modern agricultural education initiatives and industry needs. One current definition states that an agriculturally literate individual understands the economic, social, and environmental impact of the food and fiber system and looks beyond the pathos of an issue to use logical and information-based thought patterns to create modern solutions (Kovar & Ball, 2013).

Despite the various, yet congruent, definitions of agricultural literacy and the purposeful integration of agricultural literacy concepts into formal SBAE programs, many students nationwide are still unsure of the origin of their food and common household goods (Hess & Trexler, 2011). In the 1980s, a shift occurred in SBAE to increase focus on scientific concepts as the National Research Council noted agricultural education was becoming outdated and needed a more science-focused curriculum to better serve students (Thompson & Schumacher, 1997). As much as biological science integration is warranted in the SBAE classroom, the practicality and purpose of agriculture is still necessary for students to understand how commonly used goods make it to their communities, which in turn can lead to more insightful decisions on current agricultural issues (Kovar & Ball, 2013). Within animal systems specifically, the increase in biological sciences curriculum in SBAE can lead to graduates becoming less informed of the application of this sector, hence not understanding the “why” and “how” of livestock production (Doerfert, 2011).

In Arizona, SBAE programmatic decisions on curricular content are largely guided by the state agriculture technical content standards, which are interpreted and implemented by SBAE teachers (Arizona Department of Education, 2018). These state standards are heavily focused on the science of agriculture but do include components of livestock management and more applied production concepts in the animal sciences (Arizona Department of Education, 2018). In addition to state standards, an individual teacher’s self-efficacy for teaching particular content, administrator support, and community stance on agricultural production can influence what an agriculture teacher discusses in their classroom to meet the needs of their students (Henry et al., 2014). Considering the controversial nature of livestock production in the current social and political climate, one may be wary about teaching some aspects of livestock production in their classroom (Powell et al., 2008). Agriculture teachers may not wish to discuss livestock production to avoid community dissatisfaction or because of their reservations about current animal industry practices (Powell et al., 2008).

Researchers have investigated obstacles teachers face in similar fields, such as environmental education in elementary school classrooms (Schumacher & Fuhrman, 2012). Self-efficacy, community support, freedom of curriculum creation, administration support, and availability of resources were the main factors that influenced teachers’ decisions for incorporating environmental education concepts into their classrooms (Schumacher & Fuhrman, 2012). Henry et al. (2014) identified gaps when educating students about all aspects of the agriculture industry, including applying agricultural fields to the students’ communities and differences in how teachers approached SBAE content. Although this research indicates decision-making factors for various agricultural curricula, there has not been direct research on factors of decision making at the state level or research specifically focusing on livestock production concepts, further substantiating the need for this study.

Purpose of the Study and Research Objectives

The purpose of this study was to determine the factors that influence the teaching of production livestock agriculture content to high school students enrolled in secondary agriscience programs in Arizona. According to The American Association for Agricultural Education National Research Agenda 2016-2020, research priority five indicates a need to research the incorporation of livestock production to further educate individuals about agricultural practices (Roberts et al., 2016). This study aims to illuminate what livestock production content is being taught in SBAE programs across Arizona in conjunction with the factors influencing agricultural teachers' curricular decisions in livestock production content. The following objectives guided the study:

1. Describe the characteristics of the respondents: years spent teaching, type and geographic location of the program, subjects taught, education, and gender identity.
2. Describe the livestock production technical content standards utilized by Arizona SBAE teachers.
3. Describe the factors that influence livestock production content incorporation for Arizona SBAE teachers using SCT personal/cognitive and environmental factors.
4. Determine the relationship between the SCT personal/cognitive and environmental factors that influence the incorporation of livestock production content and technical content standards utilized for Arizona SBAE teachers.

Relevant Literature and Frameworks

In 2018, The Arizona Career and Technical Education Quality Commission, comprised of teachers, administrators, and agriculture industry leaders, revised the technical content standards to which all Arizona Agriscience programs must adhere (Arizona Department of Education, 2018). A standard is a specific topic identified as necessary for students to understand and successfully apply to specific techniques or processes the students must complete (Arizona Department of Education, 2018). However, these standards have some flexibility in their implementation for educators, including which courses they are addressed within, the degree to which they are addressed, and the relevant examples and skills taught in cooperation with each standard to 80% expectation (Arizona Department of Education, 2018). For teachers, these standards expose students to a wide spectrum of agricultural concepts and various careers and opportunities within agriculture. Additionally, educators may choose to align their curriculums with Career Development Events (CDE) through FFA participation and to supervised agricultural experiences (SAE) within the three-component model of agricultural education (Sands et al., 2019). Arizona Agriscience programs also follow the Arizona professional skills standards, focusing explicitly on FFA, SAE, and other professional skill attainments (Arizona Department of Education, 2018). For this study, the focus will be on the Arizona agriscience technical content standards, including specific standards related to the animal sciences and livestock production content.

Within the Arizona agriscience technical content standards, a variety of agricultural concepts are addressed, including the role of agriculture in society, the impact of technology and policy, scientific processes in agriculture, soil management, cellular biology, plant and animal

science, plant and animal management, integrated pest management, food safety, agricultural mechanics, tools and equipment, and agribusiness management, among others. In total, 16 primary standards make up the Arizona agriscience technical content standards. Within these primary standards, various sub-standards further identify knowledge and skills students should master related to the primary standard. For example, within standard 8.0, demonstrate concepts of plant management, there are multiple sub-standards, including 8.1 analyze the nutritional needs of plants and 8.5 implement a fertilization plan for specific plants or crops. In total, 122 unique sub-standards encompass the Arizona agriscience technical content standards. Within these sub-standards, some focus heavily on the scientific side of agriculture, while others focus on agriculture's production or management side. For this study, 21 sub-standards relate to the animal sciences, and 17 of the 21 sub-standards specifically relate to livestock production concepts. These standards were selected as they are directly related to livestock or animal production and do not include other components from various agricultural industries. Therefore, those 17 sub-standards were utilized to understand better the factors that influence Arizona agriculture teachers to teach livestock production content within their SBAE programs.

Livestock production-related standards and sub-standards explored for the purpose of this study included:

Standard 9.0- Analyze animal science principles

- 9.1- Define common terminology related to animal science and production practices (e.g., gender, age, dehorning, castration, identification, tail docking, etc.).
- 9.2- Classify animals according to taxonomic classification systems and use (e.g., agricultural, companion).
- 9.4- Explain basic anatomy and external parts of production animals.
- 9.5- Apply principles of comparative anatomy and physiology to use within animal systems (e.g., circulatory, endocrine, immune, integumentary, musculoskeletal, nervous, reproductive, respiratory, urinary).
- 9.6- Describe a livestock animal's digestive system (e.g., avian, modified digestion, ruminant, etc.).
- 9.7- Describe the basic principles of animal welfare (e.g., appropriate environment, facilities, food, healthcare, proper handling, water).

Standard 10.0- Demonstrate concepts of animal management

- 10.1- Recognize animal behaviors to facilitate safely working with animals.
- 10.2- Investigate the nature and properties of food, fiber, and by-products from animals.
- 10.5 - Analyze the nutritional roles and needs of animals.
- 10.6- Analyze feed rations to meet the nutritional needs of animals.
- 10.7- Develop a plan to treat animal ailments.
- 10.8- Differentiate among animal selection, reproduction, breeding, and genetics.
- 10.9- Demonstrate animal selection based on reproduction, breeding, and genetics.
- 10.10- Explore how animals are evaluated for breeding readiness and soundness.

- 10.11- Create a sustainable reproduction management plan.
- 10.12- Demonstrate proper methods to clean and disinfect animal equipment and facilities.
- 10.13- Demonstrate proper use of animal medications following established withdrawal protocols.

Social Cognitive Theory (SCT) posits that the individual makes decisions based on various internal and external factors. These factors are based on the individual's beliefs, behaviors, and environments, such as community, family attributions, and other similar areas (Bandura, 1989). Through the interactions between external (environmental) and internal (behavioral and personal/cognitive) factors, an individual will proceed with a choice they see as best fitting for them. There are shared relationships between environmental, cognitive, and behavioral factors, which stem from the individual's background, community, and how they ultimately react to a given situation (see Figure 1). For this study, SCT can be applied to the educator's confidence in their knowledge of livestock production, personal beliefs about animal systems, and the administration's support of applicable livestock production content.

In SCT, behavior affects an individual's decisions through the individual's pressures within their personal/cognitive and environmental factors (Bandura, 1989). Behavior encompasses how an individual reacts towards others and themselves when making decisions (Bandura, 1989). Behavior relates to personal and environmental factors by the individual's overall demeanor they portray because of the other factors (Bandura, 1989). As individuals utilize external factors, they will adjust their actions, changing how they behave (Bandura, 1989). An example of a behavioral factor is an educator's decision to eliminate teaching the beef industry sectors from their curriculum due to limited approval from their administration. Through the actions of both their external situation and their internal reactions, educators may be persuaded to modify their curriculum to fit their situation, ultimately changing their behavior (Bates & Bray-Clark, 2003).

Personal and cognitive factors are another major component of SCT as these factors relate to how an individual thinks, sees, and feels the world around them. These factors tie in an individual's beliefs, self-efficacy, personal experiences, and morals that stem from internal controls in the individual (Bandura, 1989). How these factors align themselves for the individual affects how they control their behavior and the controllable environmental factors around them (Bandura, 1989). Specifically, for this study, self-efficacy towards teaching livestock production in the classroom is how confident the instructor teaches concepts. Self-efficacy can stem from the individual's familiarity with the basic husbandry of livestock animals because of their background, prior knowledge from an institution, and/or work experience in the industry. Similar studies, such as Schumacher and Fuhrman's (2012) research in environmental education, showcased cognitive factors faced by some educators who were not comfortable teaching environmental education concepts because they did not have the background nor the confidence in their knowledge of the subject.

Environmental factors pertain to the external inputs an individual receives in their daily lives. Environmental factors include community support, family beliefs, rural versus urban territory, and work environments (Bandura, 1989). These factors highly influence personal/cognitive factors and behavioral factors by the way an individual views their environment and the different pressures they may receive from other individuals within that

environment (Bandura, 1989). The pressures educators receive from others can greatly affect the content they choose to utilize in their classrooms when they choose to teach those concepts and the depth at which these concepts are addressed, possibly modifying their curriculum in a way they may or may not personally feel comfortable disseminating (Bandura, 1991).

By examining the factors suggested through SCT, other studies have indicated how the type of support given greatly impacts educator decision-making. Korte and Simonsen (2018) identified how social support influences novice educators as they tend not to receive the same support they had during their student teaching internship. The study indicated a decline in the educators' confidence in their capabilities when the support was removed, as society expects them to perform similarly to a veteran educator (Korte & Simonsen, 2018). Other factors that influence teacher decision-making include the resources available and the location of the facilities. Having access to various resources such as land labs and industry tours increases the educator's efficacy in teaching animal production (Easterly & Simpson, 2020).

Lastly, teaching in different geographic locations can affect how educators create their curriculum and what content they teach more in-depth (Ennis & Chin, 1995). Being in a rural setting suggests that educators have more flexibility in their curriculum decisions versus their urban counterparts (Trentham & Schaer, 1985). Flexibility allows educators to incorporate a curriculum that piques their students' interest, which boosts community support of the educator's content (Preston, 2006).

Internal and external factors greatly impact how educators make curricular decisions. School location, resources available, administrative support, and self-efficacy of the educator can impact how the content is taught if it is taught at all, and to what depth (Ransford et al., 2009). Therefore, these factors were investigated to unpack further how livestock production is incorporated into Arizona SBAE classrooms.

Methods

The design of this quantitative study was descriptive correlational research. The two variables of the study were the inclusion of livestock production content in the SBAE classroom and the factors which influence Arizona SBAE teachers to incorporate livestock production content. The variables were operationalized by the Arizona agriscience technical content standards to explore which standards for livestock production content were utilized and to what depth and SCT to identify factors that influence teacher decisions to teach livestock production content. A questionnaire was utilized to survey participants, and questions were based on the technical standards issued by the Arizona Department of Education (2018). The factors were identified in SCT (Bandura, 1989) and in the existing agricultural education literature.

The target population for this study was all current Arizona SBAE teachers. A total of 111 teachers were registered in the Arizona Agricultural Education Directory for the 2021-2022 school year (Arizona Association FFA, 2021). As there are 111 SBAE teachers in Arizona, a census was utilized (Ary et al., 2010). The frame used for this study was convened through the Arizona Association FFA webpage (Arizona Association FFA, 2021). Considering the potential for error not being with a sampling method but rather frame error, the Arizona FFA Executive Secretary was consulted to confirm the accuracy of the frame. A total of 50 individuals participated in the questionnaire, and 45 respondents yielded usable data.

A questionnaire was used as the data collection instrument for this study in determining the relationship between the SCT personal/cognitive and environmental factors that influence SBAE educators to incorporate livestock production content and the livestock production technical content standards utilized. The first section of the questionnaire contained Likert-type statements that identified the technical standards in livestock production used by SBAE educators. For each statement, participants indicated the frequency in which they incorporated the content into the curriculum, if at all. An example statement was, "I teach the classification of production livestock (e.g., bovine, ovine, etc.)." The second section of the questionnaire contained Likert-type statements that identified the factors that influenced teachers' decision-making process to teach livestock production content. For each statement, participants indicated the degree of influence that factor had on their decision to teach production livestock concepts in their curriculum if any. An example statement was, "Professional development in livestock production." The third section of the questionnaire consisted of demographic questions. Participants were asked to identify the number of years they have been teaching agriculture, highest degree earned, if they have a major or minor in a content area other than agricultural education (e.g., animal science), what agriculture subjects they have taught, location of the program (e.g., rural or urban), type of program (e.g., multi or single teacher) and their gender identity. The face and content validity of the questionnaire was determined using a panel of experts ($n = 5$). The panel consisted of educators and researchers outside of the Arizona secondary education system. The panel was used to increase the accuracy of the data.

Data were collected in the fall of 2021 using a Qualtrics web-based questionnaire. This questionnaire was issued through an email/online format allowing for anonymity of the study subjects. A recruitment email was sent to all 111 SBAE educators in Arizona. After the questionnaire was emailed, four follow-up emails were sent to remain non-responders as an effort to maximize the response rate (Dillman et al., 2014). After the four points of contact, 50 Arizona SBAE teachers participated in the survey (45% response rate), with 45 respondents yielding usable data (41% response rate). It is important to note the results from this study cannot be generalized to the population of Arizona SBAE educators.

Each objective was analyzed utilizing SPSS software. The first three objectives were summarized using means and standard deviations. The 40 questions from the state standards were summated back into the 17 original standards to determine the means and standard deviations for each standard. Next the data from the 17 standards were summated together to identify the mean and the standard deviation for all standards. A similar process was utilized to analyze the personal/cognitive and environmental factors, as the statements pertaining to each factor were summated together to determine the overall mean and standard deviation for both personal/cognitive and environmental factors. The analysis of objective 4, a Pearson product-moment correlation, was used to determine the relationship between the average of the personal/cognitive and environmental factors that influence livestock production content incorporation and the overall standard average of the livestock production technical content standards utilized by Arizona SBAE teachers.

Findings

Objective 1 sought to describe the characteristics of the sample: years spent teaching, single versus multi-teacher program, degrees earned (including majors and minors not related to

agriculture), geographic program location (rural or urban), subjects taught, and gender identity. Out of the 50 respondents, 45 yielded usable data. Of those 45 participants, 20 identified as men (44%), 24 identified as women (53%), and one participant chose not to disclose their gender identity. Eighteen participants' highest degree earned was their bachelor's degree, 25 participants' highest degree earned was their master's degree, one participant had some college credits completed, and one participant earned their doctorate. Two participants received their bachelor's degree, five received their master's degrees in an area outside of agriculture, and two received minors in an area outside of agriculture. For the geographic location, 21 taught in a rural SBAE program (less than or equal to 49,999 population), and 24 taught in an urban program (greater than or equal to 50,000 population) (USDA, 2021). Single teacher programs were indicated by 22 participants, and 23 participants taught in a multi-teacher program. There was a wide range of total years spent teaching in the classroom ranging from 0- 42 years (0 = first year educator). Table 1 depicts the type of classes taught by respondents and how many teach the classes.

Table 1

Classes Taught and the Number of Respondents Teaching each Class (n = 45)

Classes Taught	Number of Respondents Teaching
Applied Biological Systems	36
Introduction to Agriculture/Agriscience	40
Agriculture Biology	15
Animal Science	35
Plant Science/Horticulture	31
Plants, Animals, and Leadership	18
Agricultural Mechanics/Engineering	22
Agricultural Chemistry	1
Agricultural Leadership	11
Agricultural Communications	4
Agricultural Business	23
Veterinary Science	8
Environmental Science	1
Physical Education	1
Meat Processing	1
Aquaculture	1

Objective 2 sought to describe the livestock production technical content standards utilized by Arizona SBAE teachers. For this objective, 17 Arizona state standards were used to determine the degree of frequency the participants taught each selected standard within their curriculum. On a scale of 1 to 5, with 1 being “never used” to 5 being “always used,” Table 2 displays the overall scores for the 45 participants ($M = 3.27$; $SD = 0.77$). In Table 3, each of the 17 standards were broken out individually. Standard 10.10 explore how animals are evaluated for breeding readiness and soundness, had the lowest average frequency ($M = 2.73$; $SD = 1.27$), and standard 9.1 define common terminology related to animal science and production practices (e.g., gender, age, dehorning, castration, identification, tail docking, etc.), had the highest average frequency ($M = 4.41$; $SD = 0.80$).

Table 2

Average Frequency of Teaching All Livestock Production Standards (n = 45)

	<i>M</i>	<i>SD</i>
All Livestock Production Standards	3.27	0.77

Scale: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always

Table 3

Individual Frequency of Teaching Livestock Production Standards (n = 45)

Arizona Standard Used	<i>M</i>	<i>SD</i>
Standard 9.0- Analyze animal science principles		
9.1- Common terminology	4.41	0.80
9.2-Animal taxonomic classification	4.36	0.98
9.4- Basic anatomy of external parts	4.32	0.86
9.5- Comparative anatomy and physiology	4.24	1.00
9.6- Digestive systems	4.40	0.96
9.7- Animal welfare	3.96	0.91
Standard 10.0- Demonstrate concepts of animal management		
10.1- Safely working with animals	3.92	1.03
10.2- Properties of food, fiber, and by-products	3.84	0.79
10.5- Analyze nutritional roles and needs	3.88	0.96
10.6- Analyze nutritional needs for rations	3.62	1.04
10.7- Plan to treat animal ailments	3.61	1.24
10.8- Differentiate animal selection	3.81	0.89
10.9- Animal selection for reproduction with their genetics	3.36	1.21
10.10- Evaluate animals for breeding soundness and readiness	2.73	1.27
10.11- Sustainable reproduction management program	3.11	1.24
10.12- Proper methods of disinfecting facilities and equipment	3.29	1.25
10.13- Proper use of livestock medications	3.60	1.26

Scale: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always

Objective 3 sought to describe the factors that influenced livestock production content incorporation for Arizona SBAE teachers. Table 4 displays the combined statements for personal/cognitive ($M = 3.45$; $SD = 0.95$) and environmental constructs ($M = 3.02$; $SD = 0.99$). Table 5 and Table 6 display each of the individual statements within the personal/cognitive and environmental constructs. Personal/cognitive factors that had moderate influence included content knowledge ($M = 3.73$; $SD = 1.10$) and ethical obligation ($M = 3.71$; $SD = 1.27$). Personal/cognitive factors that were somewhat influential were individuals having some colligate course work ($M = 2.93$; $SD = 1.34$) and if they had any professional development in livestock production ($M = 3.07$; $SD = 1.45$). Environmental factors that had moderate influence included facilities available ($M = 3.44$; $SD = 1.46$) and resources/equipment available ($M = 3.42$; $SD = 1.36$). Environmental factors that were least influential were peer teacher support ($M = 2.31$; $SD = 1.41$) and administration support ($M = 2.58$; $SD = 1.45$).

Table 4

Average Frequency for All Influential Factors (n = 45)

Factors Used	<i>M</i>	<i>SD</i>
Personal/Cognitive	3.45	0.94
Environmental	3.02	0.99

Scale: 1 = No Influence, 2 = Somewhat Influential, 3 = Moderately Influential, 4 = Very Influential, 5 = Extremely Influential

Table 5

Individual Frequency of Personal/Cognitive Factors (n = 45)

Sub- Factors	<i>M</i>	<i>SD</i>
Content Knowledge	3.73	1.10
Ethical Obligation	3.71	1.27
Confidence	3.67	1.13
Personal Beliefs	3.58	1.32
Background	3.56	1.13
Moral Obligation	3.53	1.36
Previous or Current Employment	3.29	1.60
Professional Development	3.07	1.45
Collegiate Coursework	2.93	1.34

Scale: 1 = No Influence, 2 = Somewhat Influential, 3 = Moderately Influential, 4 = Very Influential, 5 = Extremely Influential

Table 6

Individual Frequency of Environmental Factors (n = 45)

Sub- Factors	<i>M</i>	<i>SD</i>
Facilities Available	3.44	1.46
Resources/Equipment Available	3.42	1.36
Student Interest	3.42	1.25
Livestock Production Career Opportunities in Area	3.24	1.21
Time to Prepare Curricula	3.11	1.47
Funding Available	3.04	1.45
Community Support	3.04	1.40
Livestock Production Prevalence	3.04	1.38
Student Certifications	2.91	1.46
Curriculum Packages/ Lessons Available	2.87	1.31
Parent/Guardian Support	2.82	1.37
Administrative Support	2.58	1.45
Peer Teacher Support	2.31	1.41

Scale: 1 = No Influence, 2 = Somewhat Influential, 3 = Moderately Influential, 4 = Very Influential, 5 = Extremely Influential

Objective 4 sought to determine the relationship between the personal/cognitive and environmental factors that influenced the incorporation of livestock production content and technical content standards utilized for Arizona SBAE teachers. There was a positive, substantial correlational relationship between personal/cognitive factors and the overall standards used ($r = 0.57$); see Table 7. There was also a positive, moderate correlational relationship between the

environmental factors and the overall standards used ($r = 0.35$); see Table 7. Both correlations indicate a positive relationship between the factors indicated and the state standards used. Figure 2 shows a visual representation of the correlation between personal/cognitive factors and the overall standards used. Figure 3 shows the visual representation of environmental factors and the overall standards used. Figures 2 and 3 have been included to indicate outliers in the data due to low sample size, however, not all components of the variance are explained by the data collected.

Table 7

Correlation of Personal/Cognitive and Environmental Factors with Overall Standards

Variables	Personal/Cognitive Factors	Environmental Factors
Overall Standards	$r = 0.57$	$r = 0.35$

Scale: Perfect = 1.00, Very High = 0.70 - 0.99, Substantial = 0.50 - 0.69, Moderate = 0.30 - 0.49, Low = 0.10 - 0.29, Negligible = 0.10 - 0.09 (Davis, 1971)

Conclusions/Implications/ Recommendations

The findings in this study suggest that the personal/cognitive and environmental factors influence the livestock production content taught in Arizona SBAE programs. This study is limited to SBAE teachers in Arizona who participated in the study, with additional limitations being potential question misinterpretation and the use of select standards encompassing livestock production. As this is a sampling of the population, it should be noted that the results and conclusions should not be generalized to the entire population. The findings show that general information about livestock production, including terminology, anatomy and physiology, animal welfare, and safe handling techniques, were incorporated at a relatively high frequency. However, over half of the standards are only rarely used. Since each of the standards are required by the Arizona Department of Education (2018), it is alarming that over half of the standards are only being taught in SBAE programs at a low frequency. Basic livestock knowledge is taught with high frequency (9.0 standards); however, the production of livestock (10.0 standards) is not utilized as frequently. Without a sense of all components of livestock production, students may not be able to understand the complexity of agriculture, leaving gaps in knowledge (Hess & Trexler, 2011).

Using SCT, two primary constructs were explored, personal/cognitive and environmental (Bandura, 1989). The averages of the sub-factors used for personal/cognitive factors and environmental factors resulted in ($M = 3.02$), indicating that most of the sub-factors were moderately influential in teachers' decision making for incorporating livestock production content into their curricula. One of the most influential sub-factors within the personal/cognitive construct was content knowledge. Content knowledge is a critical component for teachers to possess when teaching (Ball et al., 2008). The more a teacher understands the content, the greater knowledge they have to discuss that information. Another influential sub-factor within the personal/cognitive construct was ethical obligation. An ethical obligation in livestock production indicates the sample generally values the proper management and ethical care of livestock (Bates & Bray-Clark, 2003). This finding demonstrates that while content knowledge is an important, influential factor, teachers appear to be gaining content knowledge from other areas outside of collegiate education to be sufficient for their background knowledge. One of the most influential sub-factors within the environmental construct was facilities being available to teach livestock production and resources and equipment available. This echoes previous research that access to

facilities, resources, and equipment increases an educator's efficacy for teaching content (Easterly & Simpson, 2020; Schumacher & Fuhrman, 2012). Conversely, administrative support and peer teacher support was least influential. This is contrary to previous research in SBAE indicating most teachers will look to others in their support system for advice or input about a decision (Korte & Simonsen, 2018).

There was a positive correlation for both personal/cognitive and environmental factors used with the standards identified, indicating they influence teachers' decision-making when incorporating livestock production into their curriculum. This information parallels the self-efficacy theory as individuals who have stronger backgrounds or knowledge of content rely on their instincts to incorporate various livestock production content (Bates & Bray-Clark, 2003). Seeing a positive correlation in these relationships shows that livestock production content is selected to be in educators curricula; however, there is a definite need to incorporate livestock production at a deeper level. By utilizing more of these concepts, students will have a greater opportunity to understand the livestock production industry and learn how it functions, yielding agricultural literacy and career decision-making outcomes within livestock production.

Considering that all of the standards for livestock production were not used often, there is a need to reevaluate the Arizona technical content standards. Further analysis should be conducted to understand the differences between rural and urban participants. Clarifying components of the Arizona state standards should be performed to better align with different state locations and determine if further standards should be designed to illustrate livestock production opaquely for areas that may not utilize this content as much as others. Additionally, it would be beneficial to create further educational opportunities for educators to experience more areas of Arizona livestock production. While most participants indicated a background in livestock production, many still focus on the general concepts of livestock, such as the terminology, anatomy, and physiology; however, the actual application of livestock production is not taught to the same depth. There is a need to broaden their knowledge of livestock production to enhance literacy by re-incorporating the applicable side of livestock production (Doerfert, 2011).

Since collegiate education was not listed as an extremely influential factor, professional development opportunities should be enhanced for Arizona agriculture teachers in the area of livestock production, with an emphasis on how to teach the content at the secondary level. Additionally, educators need the proper resources available to educate students about livestock, influencing their decision-making. Possible outside experiences for students who may not be immersed in livestock production could also be promoted to educators and opportunities to integrate within SAE and FFA to boost student interest.

Minimal efforts have been made to understand how livestock production fits into general agricultural education classes. Since most teachers taught classes with titles outside the realm of livestock production, there is a need to better integrate livestock production concepts into early agriculture courses like introduction to agriscience or applied biological systems. Collecting data from other states to understand the depth and frequency livestock production is taught is also another avenue for future research to see how Arizona compares to other states with prevalent livestock industries.

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What Technical Agriculture Skills Do Teachers Need to Teach Courses in the Animal Systems Pathway?

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As part of their design, an important facet of agricultural teacher education programs is ensuring pre-service teachers are ready to provide educational opportunities in various aspects of school-based agricultural education (SBAE), including teaching technical agriculture skills to students. As part of a larger study, we used a three-round Delphi technique to identify the technical agriculture skills SBAE teachers in Illinois and Iowa need to effectively teach courses in the Animal Systems pathway within the broader Agriculture, Food, and Natural Resources (AFNR) Career Cluster. Thirty-four experienced SBAE teachers contributed data for our study. Twenty-two teachers participated in all three rounds. We identified 35 technical agriculture skill items. To help ensure teachers are competent and prepared to teach courses in the Animal Systems pathway, we outline several approaches agricultural teacher educators should contemplate: (1) facilitating opportunities to foster technical agriculture skill development within agricultural teacher education programs, (2) collaborating with agricultural faculty who teach technical agriculture courses to pre-service teachers, and (3) using our list of 35 skills to facilitate future scholarly investigation on the topic. To overcome the limitation of generalizability and to delve deeper into teachers’ technical agriculture skill needs, we suggest that our study be replicated in other states.

Introduction

School-based agricultural education (SBAE) programs are located in public schools across the United States. These programs are designed to serve students of various backgrounds and are traditionally intended to reflect the needs of the surrounding community. As program leaders, SBAE teachers wear many hats and serve various differing yet often overlapping roles, including preparing students to engage in leadership skill development activities (Phipps et al., 2008), addressing local and regional needs related to workforce development (Wells & Hainline, 2021; Wells et al., 2021), and providing the agricultural industry with a capable, well-trained workforce (Stripling & Ricketts, 2016). Because of these important and consequential roles, it is imperative that well-prepared, effective SBAE teachers lead SBAE programs. Among other traits, effective SBAE teachers are knowledgeable about agricultural subject matter (Eck et al., 2019). Agricultural subject matter knowledge encompasses a broad range of categories, including agricultural mechanics, agribusiness, and animal science (Phipps et al., 2008), and has long been deemed as a trait of effective SBAE teachers (Eck et al., 2019; Roberts & Dyer, 2004).

Within the context of agricultural teacher education programs, technical agriculture courses, such as Introduction to Animal Science and Introduction to Plant Science, are used to

provide pre-service teachers with the technical agriculture background relevant to their forthcoming professional responsibilities (Whittington, 2005). Subsequently, just as the agricultural industry is in a constant state of fluctuation to better serve the needs and desires of the modern world (Doerfert, 2011), SBAE teachers' agricultural subject matter knowledge needs change as well. Thus, a challenge remains: establishing that the agricultural subject matter knowledge of SBAE teachers is up-to-date and reflective of the expertise needed to successfully lead SBAE programs.

In recent years, SBAE stakeholders have undertaken efforts nationally to help ensure SBAE coursework is flexible and remains congruent with the needs of the agricultural industry. In 2015, The National Council for Agricultural Education issued a revised list of Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards across eight career pathways: (1) Agribusiness Systems, (2) Animal Systems, (3) Biotechnology Systems, (4) Environmental Service Systems, (5) Food Products and Processing, (6) Natural Resource Systems, (7) Plant Systems, and (8) Power, Structural, and Technical Systems. The content standards were designed to both align with the needs of the agricultural industry and to promote the college and career success of students (The Council, 2015). Moreover, The Council's (2015) broader mission was to facilitate the informed progression of SBAE programs via these revised standards. In effect, these changes and their underlying motivations have implications for SBAE stakeholders, such as agricultural teacher education programs, especially when considering the preparation of effective teachers.

Considering SBAE teachers directly impact students and their respective programs, schools, and communities at-large through the workforce development training they provide, it is imperative that teachers are prepared to competently lead instruction in technical agriculture skills (Wells & Hainline, 2021; Wells et al., 2021). Regarding workforce development needs, Slusher et al. (2011) worked with industry representatives to identify the technical skills SBAE program graduates need for entry-level employment in the animal agriculture industry and found that graduates need a wide range of technical skills, such as transporting livestock and operating equipment safely, to successfully procure entry-level employment.

Similar to Slusher et al. (2011), Ramsey and Edwards (2011) explored agricultural industry stakeholders' expectations for students' technical skill acquisition through their Supervised Agricultural Experiences (SAEs), finding that the stakeholders in their study expected students to learn a wide range of technical skills, particularly those related to animal agriculture (e.g., animal nutrition, animal handling, etc.). In addition to industry stakeholders' expectations, Ramsey and Edwards (2012) noted that SBAE teachers expect students to acquire numerous entry-level technical skills through their SAEs. Considering these findings, it is logical to suggest teachers should be able to competently provide students with instruction in technical agriculture skills to help better-prepare them for career opportunities in the agricultural industry.

Recent literature (i.e., Hainline & Wells, 2019; Swafford & Hagler, 2018; Wells et al., 2021) has focused much attention on identifying the knowledge and skills SBAE teachers need to successfully teach agricultural mechanics. Meanwhile, there has been little recent literature on other areas of technical agriculture, such as plant science, soil science, and animal science. To help fill this gap, Albritton and Roberts (2020) recently explored the technical agriculture skill

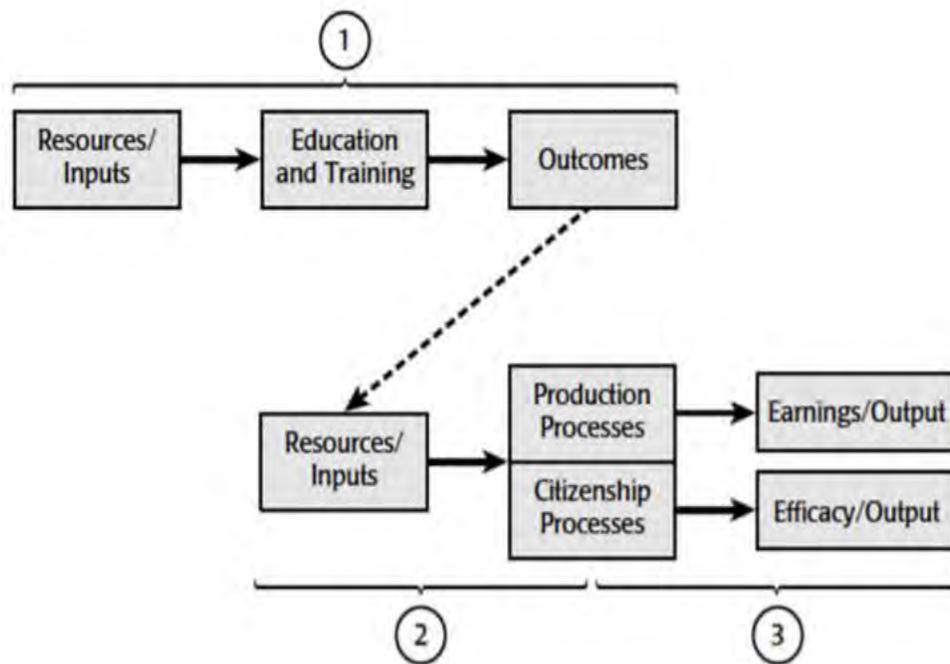
needs of beginning teachers. While their study addressed numerous agricultural subject matter areas, a primary limitation of their study arose simply due to its scope. What about the technical agriculture skills needed by teachers regardless of experience level? We sought to address this question specifically. Simultaneously, we also sought to build upon existing literature related to this topic (i.e., studies focused on agricultural mechanics knowledge and skills needed by teachers) and expand the literature related to the technical agriculture skill needs of SBAE teachers. Our study, which focused specifically on the Animal Systems pathway, was part of a larger effort to address such needs. Our overarching goal was to develop and provide a list of specific technical agriculture skills to better inform stakeholders involved in agricultural teacher education programs (e.g., agricultural teacher educators, agricultural faculty at-large, etc.).

Theoretical Framework

We used Swanson and Holton’s (2001) model of human capital theory (HCT) to underpin our study (see Figure 1).

Figure 1

A Model of Human Capital Theory



Human capital includes both the health and education of people and the stock of educated people. Human capital is measured through an assessment of the quality and quantity of formal education received by individuals (Lutz & KC, 2011). Sweetland (1996) noted that education is consistently identified as the principal human capital investment for empirical analysis. Further, education has served as the foundational human capital component of several prior studies in agricultural education (i.e., Easterly & Myers, 2017; Hendrix & Morrison, 2018; Robinson & Baker, 2013; Robinson & Garton, 2008; Wells & Hainline, 2021) that evaluated the skills, needs, and education required of individuals in the context of workforce development. In their model of

HCT, Swanson and Holton (2001) describe three key relationships that transpire throughout the human capital development process. Our study used the first two relationships of the model. The first relationship relates to the outcomes of resources, inputs, and education and training of individuals. These outcomes are subsequently applied as inputs as the individual proceeds to earn employment within an organization and applies the education and training to the work they perform. In turn, the productivity for the workplaces that individuals occupy is increased as they apply their educational outcomes as inputs to their employer (Swanson & Holton, 2001).

Baye and Prince (2014) further expressed the application of an individual's education outputs transitioning to become inputs to their employer by describing human capital as a specialized investment that firms are required to make in order to yield returns. Their definition indicates that employers are willing to invest in their employees by helping them acquire a set of specific knowledge or skills related to their role in the organization, which improves human capital as a resource. When examining the connection between relationships one and two in Swanson and Holton's (2001) model, knowledge and skills acquired as a result of an employee's education should directly articulate as inputs for an employer (production process), thus serving as a benefit. When employees are able to contribute relevant knowledge, education, and skills that can be used by their employers, employers may in turn be inclined to reduce their direct financial investment into human capital. This creates an economic benefit for both employees and employers.

An employee's ability to provide knowledge, skills, and education to their employer stems directly from the education they received in relationship one of the HCT model. In the context of agricultural teacher education, SBAE teachers who are competent in their agricultural subject matter knowledge will both: (1) have a positive impact on increasing the knowledge and skillsets of their students and (2) will contribute to creating a connection between relationships one and two as their employers (i.e., local school districts) invest in teachers' human capital development via further professional training throughout their careers.

Purpose

The purpose of our study was to describe the technical agriculture skills teachers in Illinois and Iowa need to effectively teach courses in the Animal Systems pathway within the broader AFNR Career Cluster. We used the perceptions of knowledgeable, experienced SBAE teachers to accomplish our purpose. Our study was part of a larger study focused on identifying the technical agriculture skills SBAE teachers in Illinois and Iowa need. Our study specifically addressed the American Association for Agricultural Education (AAAE) National Research Agenda (NRA) Research Priority 3: Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century (Stripling & Ricketts, 2016).

Methods

We conducted a three-round Delphi study to obtain a consensus among SBAE teachers in Illinois and Iowa regarding their perceptions of the most important technical agricultural skills teachers should have to effectively teach courses in the Animal Systems pathway. Delphi methods have been used in several recent Agricultural Education studies (i.e., Hainline et al.,

2019; Rinker et al., 2021; Wells et al., 2021). Further, Delphi methods are effective for building consensus among a panel by using a series of questionnaires (Linstone & Turoff, 1975).

Nomination Process

The purposeful, careful selection of qualified panelists has been described as the “keystone to a successful Delphi study” (Stitt-Gohdes & Crews, 2004, p. 60). Our study included Illinois and Iowa SBAE teachers nominated by state-level SBAE leaders (e.g., agricultural teacher educators, state staff, etc.) to provide input regarding the technical skills needed to teach courses in the Animal Systems pathway. We requested that these leaders identify individual SBAE teachers in their respective states who they believed to be effective teachers of courses in the Animal Systems pathway. When this initial nomination process concluded, 57 SBAE teachers were nominated for participation in our study. Using a snowball sampling technique, we asked these 57 initially-nominated teachers to in turn nominate other teachers who they believed were effective teachers of courses in the Animal Systems pathway. When the nomination process concluded, 111 SBAE teachers were nominated to serve as panelists in our study.

Instrumentation / Data Collection

We used three separate Qualtrics-based survey instrument to collect data during each round of our three-round Delphi study (i.e., a different instrument for each round of our study). For each round, we sent a survey instrument to the panelists via e-mail. To increase our response rate, we subsequently sent two reminder e-mails to non-respondents in seven-day increments. To reward their participation in our study, we sent a small refrigerator magnet with the *Teach Ag* logo printed on it to each panelist who responded to our first-round instrument. We sought to follow the recommendations of Dillman et al. (2014) to motivate panelists to respond to our second- and third-round instruments by providing them with a small token of appreciation for their assistance with our efforts.

Our first-round recruitment e-mail included a brief description of our study, information regarding the scope of the Delphi process, an Institutional Review Board (IRB) -approved informed consent form, and a link to access our first-round instrument. Our first-round instrument included four items. The first item was an open-response item that asked the panelists to detail the most important technical agriculture skills teachers need to teach concepts in the Animal Systems pathway. The second item was multiple-answer and asked the panelists to specify the previous experiences that served to influence their perceptions regarding the technical skills they deemed to be important. The multiple-answer item included 19 experiences (e.g., “Experiences teaching agricultural education coursework,” “Experiences working in the agricultural industry,” and “My experiences with FFA activities [e.g., CDE teams, etc.]”) for the panelists to select from along with an item that allowed teachers to specify other experiences we did not list. The third question asked about the panelists' number of years of teaching experience. The final item prompted the panelists to nominate other knowledgeable teachers who teach courses in the Animal Systems pathway.

We originally sent our first-round instrument to 57 SBAE teachers. The snowball sampling technique incorporated in the instrument generated the nomination of 54 additional

SBAE teachers to serve as panelists. Of the 111 teachers nominated to participate in the first round, 34 SBAE teachers responded in the first round, yielding a response rate of 30.6%. After round one concluded, we reviewed the open-ended responses provided by the panelists. We aggregated duplicate responses, which resulted in the identification of 99 unique skill items. We included these 99 skills on our second-round instrument, which we sent to the 34 panelists who participated in round one. We asked the panelists to review the 99 skill items and use a six-point rating scale (1 = *Strongly disagree*; 2 = *Disagree*; 3 = *Slightly disagree*; 4 = *Slightly agree*; 5 = *Agree*; 6 = *Strongly agree*) to indicate their level of agreement regarding the importance for SBAE teachers to have competency with each skill item. Based on recommendations set forth by Dillman et al. (2014), we grouped similar skill items together on our second-round instrument to enhance the readability and improve response efficiency. Specifically, we presented the skill items on our second-round instrument in the following nine categories: (1) General Animal Systems skills; (2) Business and Communications skills; (3) Animal Handling and Restraint skills; (4) Animal Anatomy, Physiology, and Biology skills; (5) Animal Reproduction and Breeding skills; (6) Animal Nutrition skills; (7) Animal Management skills; (8) Animal Health and Care skills; and (9) Animal Products, Processing, and Marketing skills.

We sent our second-round instrument to the 34 panelists who participated in the first round of our study. Twenty-three out of 34 panelists (response rate = 67.6%) participated in the second round of our study. We set the consensus criteria outlined in Table 1 *a priori*. We used these criteria as a metric to determine if each skill item had met consensus amongst the panel.

Table 1

Consensus Criteria Based on Percentage of Panelists who Indicated a 5 (Agree) or 6 (Strongly agree) on a Given Item

Criteria Decision	%
Met consensus	≥ 75
Included on the third-round instrument for reevaluation	51 to 74
Omitted from further consideration	< 51

Twenty-four of the 99 skill items met consensus in the second round. Fifty-one to 74% of the panelists rated 55 skill items as a 5 (*Agree*) or 6 (*Strongly agree*). These 55 skill items were subsequently included on our third-round instrument. Twenty items fell below the bottom threshold of our consensus criteria. These 20 items were thus excluded from further consideration. Our third-round instrument included 55 skill items. We sent our third-round instrument to the 23 panelists who had previously responded to both our first- and second-round instruments. Twenty-two panelists (response rate = 95.7%) responded to our third-round instrument. Congruent with the procedures we employed with our second-round instrument, we asked the panelists to designate their level of agreement with the importance of each skill item using the same six-point scale (1 = *Strongly disagree* to 6 = *Strongly agree*). As with the second round of our study, we used the same consensus criteria were used to evaluate the skill items (see Table 2). Of the 55 items presented on our third-round instrument, 11 items met consensus and we eliminated the remaining 44 skill items from further consideration. At the conclusion of our three-round Delphi study, 35 skill items met consensus among the panelists.

Validity and Reliability

Our implementation of a three-round Delphi process in which respondents identified and met consensus of agreement on the items over several rounds bolstered the concurrent validity of this research (Hasson & Keeney, 2011; Sharkey & Sharples, 2001). To assess content validity, we asked a panel of experts to review each of our three instruments. Our panel consisted of three agricultural teacher educators who were on the faculty at three different land-grant universities. We asked these three panel members to review our instruments and provide suggestions for improvement. Based on the feedback we received from the panel, we adjusted the wording of some items and reformatted the directions for enhanced readability.

Concerning reliability, Dalkey et al. (1972) indicated the number of panelists in a Delphi study serves as a metric to determine the reliability of the instrument. Specifically, Dalkey et al. (1972) noted a panel of 11 members would yield a reliability coefficient of 0.70 and a panel of 13 or more members would garner a reliability coefficient of 0.90. Based on Dalkey et al.'s (1972) recommendations for reliability, the number of panelists in all three rounds of our study (Round One, $n = 34$; Round Two, $n = 23$; Round Three, $n = 22$) exceed the posited threshold and we would thus expect to yield reliable findings. While we recognize that our study meets the reliability threshold posited by Dalkey et al. (1972), the reliability of Delphi studies has been disputed by many scholars (Hasson & Keeney, 2011; Williams & Webb, 1994; Woudenberg, 1991; Yousuf, 2007). Woudenberg (1991) pointed out the Delphi process yields judgments and not measurements—which have the propensity to be influenced by situation- and person-specific biases. In an attempt to mitigate situation-specific biases (i.e., factors), we standardized the recruitment procedures, instrument dissemination procedures, instrument designs, and the number of Delphi rounds. The inherent presence of person-specific biases associated with this study served as a key limitation related to the establishment of reliability.

Data Analysis

We used IBM® SPSS® Statistics Version 26 software to analyze the data we collected. We analyzed the open-ended items on the first-round instrument by organizing the responses into categories and removing duplicate responses. We calculated measures of central tendency and dispersion along with frequencies and percentages for the multiple answer and short-answer items in our first-round instrument. We calculated frequencies and percentages to determine if the scale items in the second and third rounds of our Delphi study had met our consensus criteria.

Results

Participants

One-hundred and eleven SBAE teachers were nominated to participate in our study; 34 agreed to do so as panelists. These 34 panelists had taught an average of 13.47 ($SD = 8.20$) years. We asked each panelist to identify any source of experience that they believed influenced their perceptions of the technical agriculture skills teachers need to teach courses in the Animal Systems pathway. The two experiences panelists most frequently indicated as an influence were:

“Experiences teaching agricultural education coursework” ($f = 27$; 79.4%) and “Experiences working in the agricultural industry” ($f = 26$; 76.5%; see Table 2).

Table 2

Experiences Influencing Panel Members’ Perceptions of the Animal Systems Skills Needed by SBAE Teachers (n = 34)

Experience	f (%)
Experiences teaching agricultural education coursework	27 (79.4)
Experiences working in the agricultural industry	26 (76.5)
My experiences with FFA activities (e.g., CDE teams, etc.)	17 (50.0)
Teacher education program coursework	12 (34.3)
My experiences with student Supervised Agricultural Experiences (SAE)	12 (34.3)
Early field experiences / observations before student teaching	10 (29.4)
Attendance at professional development workshop sessions	10 (29.4)
Meetings with industry representatives	10 (29.4)
High school coursework as a student	9 (26.5)
Meetings with my current / former students	8 (23.5)
Meetings with other agricultural education teachers	8 (23.5)
Compliance with mandated course standards	5 (14.7)
Meetings with my program advisory committee members	4 (11.8)
Meetings with community members	3 (8.8)
Compliance with workforce development data	2 (5.9)
Meetings with parents / guardians	2 (5.9)
Meetings with other (non-agricultural education) teachers	2 (5.9)
Meetings with my school administrators	2 (5.9)

Conversely, “Meetings with other (non-agricultural education) teachers” ($f = 2$; 5.9%) and “Meetings with my school administrators” ($f = 2$; 5.9%) were the two experiences the fewest numbers of panelists perceived to influence their perceptions of the technical agriculture skills teachers need to teach courses in the Animal Systems pathway.

Round One

In round one of our study, the panelists provided us with 293 skill items. We removed any duplicate responses we received, yielding 99 unique skill items for consideration by the panelists during round two. Prior to distributing our second-round instrument, we grouped these items into nine categories to improve the readability of our second-round instrument.

Round Two

We used our second-round instrument to send the 99 skill items back to the panelists for review. Upon completion of the second round, 24 of the 99 skill items met consensus. Fifty-one to 74% of the panelists rated 55 skill items as a 5 (*Agree*) or 6 (*Strongly agree*). We used our

third-round instrument to send these 55 skill items back to the panelists for review. Twenty items fell below the 51% threshold of the consensus criteria during the second round. We eliminated these 20 items from further consideration in round three.

Round Three

Our third-round instrument was comprised of 55 skill items. During the third round, the panelists reached consensus on 11 skill items. Forty-four skill items did not meet consensus and we thus removed them from our list. At the conclusion of our three-round Delphi study, 35 skill items met consensus among the panelists. We detailed the skill items that met consensus throughout rounds two and three in Table 3 below.

Table 3*Round Two and Three Findings: Animal Systems Skills Needed by SBAE Teachers*

Skill Item	<i>n</i>	Category	% Agreement
Identifying animal species ^a	23	GAS	100.0
Procedures for using a microscope ^b	22	APB	95.7
Identifying external animal anatomy ^a	23	APB	95.6
Interpreting animal feed labels ^b	22	ANS	95.4
Keeping accurate animal records ^a	23	BCS	91.3
Procedures for safe animal handling tool and equipment use (ex. using squeeze chutes properly, etc.) ^a	23	AHR	91.3
Identifying various animal body systems and their components ^a	23	APB	91.3
Selecting appropriate housing for animals ^b	22	AMS	91.3
Identifying veterinary tools ^{ac}	22	AHC	90.9
Evaluating live animals ^a	23	GAS	87.0
Interpreting animal behavior ^a	23	GAS	87.0
Advocating for animal agriculture ^a	23	BCS	87.0
Sexing animals ^a	23	ARB	87.0
Identifying animal breeds ^a	23	GAS	86.9
Identifying tools and equipment used with animal handling ^a	23	AHR	86.9
Identifying animal feedstuffs ^a	23	ANS	86.9
Professionally communicating about animal agriculture to the public ^a	23	BCS	85.7
Performing profit / loss calculations for an animal enterprise ^a	23	BCS	82.6
Procedures for restraining large animals (ex. cattle, etc.) ^a	23	AHR	82.6
Calculating animal genetic probability (ex. using Punnett Squares, etc.) ^a	23	ARB	82.6
Interpreting veterinary medical terminology ^b	22	AHC	82.6
Performing veterinary calculations (ex. conversions, etc.) ^b	22	AHC	82.6
Calculating animal medication dosages ^{ac}	22	AHC	81.9
Performing an animal health check / physical exam ^{ac}	22	AHC	81.8
Interpreting animal medication labels ^{ac}	22	AHC	81.8
Administering animal vaccinations (ex. subcutaneous, etc.) ^b	22	AHC	78.3
Identifying wholesale cuts of meat ^b	22	APPM	78.3
Using the Pearson Square to formulate feed rations ^b	23	ANS	78.3

Skill Item	<i>n</i>	Category	% Agreement
Professionally collaborating with colleagues and clients about animals ^b	22	BCS	78.3
Performing animal first aid ^b	22	AHC	78.3
Procedures for dissecting animals ^b	22	APB	78.2
Safely handling hazardous materials ^a	23	GAS	78.2
Procedures for restraining small animals (ex. dogs, etc.) ^a	23	AHR	78.2
Collecting animal vital signs (ex. body temperature, etc.) ^{ac}	22	AHC	77.3
Identifying retail cuts of meat ^{ac}	22	APMM	77.3

Note. ^aItem reached consensus in round two; ^bItem reached consensus in round three; ^cItem was not answered by all panel members. 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Slightly disagree*, 4 = *Slightly agree*, 5 = *Agree*, 6 = *Strongly agree*.

Key for Skill Categories. (1) General Animal Systems skills = GAS, (2) Business and Communications skills = BCS, (3) Animal Handling and Restraint skills = AHR, (4) Animal Anatomy, Physiology, and Biology skills = APB, (5) Animal Reproduction and Breeding skills = ARB, (6) Animal Nutrition skills = ANS, (7) Animal Management skills = AMS, (8) Animal Health and Care skills = AHC, and (9) Animal Products, Processing, and Marketing skills = APPM.

Conclusions, Discussion, and Recommendations

We identified 35 technical agriculture skills teachers in Illinois and Iowa need to effectively teach courses in the Animal Systems pathway found within the broader AFNR Career Cluster as indicated by The Council (2015). Regarding the technical agriculture skills needed by SBAE teachers, our findings add to the body of knowledge presented by other scholars' recent works (i.e., Albritton & Roberts, 2020; Swafford & Hagler, 2018; Wells et al., 2021). We believe our list of 35 technical agriculture skills has implications for the teacher competence development process in Illinois and Iowa and are valuable to SBAE stakeholders in these states. Thus, we offer several practical recommendations these stakeholders should consider: (1) use our list of technical agriculture skills to explore the development of professional development workshops targeted toward in-service teachers to facilitate continued professional growth and technical agriculture skill development, (2) review current agricultural teacher education programs in Illinois and Iowa to examine and identify opportunities for pre-service teachers to learn technical agriculture skills relevant to courses in the Animal Systems pathway, (3) engage with agricultural faculty who teach technical agriculture coursework relevant to the Animal Systems pathway within undergraduate degree programs, and (4) use our list of technical agriculture skills to further explore professional development needs through follow-up studies, similar to the approach used by Wells and Hainline (2021). These efforts could help to better ensure that SBAE teachers in Illinois and Iowa are more prepared to competently teach technical agriculture skills.

Carefully crafted strategies must be developed and implemented to help ensure teachers can competently teach technical agriculture skills to their own students. Agricultural teacher education programs can sometimes be difficult to alter due to an assortment of limiting factors. It is therefore necessary to consider practical, creative solutions to ensuring pre-service teachers can learn the requisite technical agricultural skills they need. Early field experiences could be used to help improve teacher competence (Wells et al., 2018) in conjunction with high-quality student teaching experiences. In addition, incorporating technical agriculture skill development-oriented activities into existing teaching methods courses could be suitable and cost-effective.

We collected data only from the current SBAE teachers in Illinois and Iowa. We recognize that our results are not generalizable beyond these states or these panelists. To help combat these limitations, we recommend that scholars replicate our study in other areas of the United States. Doing so would add to the literature describing SBAE teachers' technical agriculture skill needs relevant to teaching courses in the Animal Systems pathway. Moreover, as also expressed by Wells et al. (2021), replication of our study at regular intervals of time would help SBAE stakeholders monitor for alterations in teachers' agricultural subject matter knowledge needs, which are a trait of effective SBAE teachers (Eck et al., 2019; Roberts & Dyer, 2004). Undertaking a national-level replication of our study would be valuable as well and would serve a broader body of SBAE stakeholders. Consideration should be given to including animal agriculture industry stakeholders as panelists in future replications of our study. This approach would be similar to how Slusher et al. (2011) and Ramsey and Edwards (2011) conducted their studies and may yield deeper insights regarding the technical agriculture skills teachers need to prepare their students for both college and career opportunities. The agricultural industry needs well-prepared human capital to solve 21st-century challenges (Stripling &

Ricketts, 2016). We sought to help define how one area of human capital development should progress.

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What Technical Agriculture Skills Do Teachers Need to Teach Courses in the Plant Systems Pathway?

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Agricultural teacher education programs prepare competent teachers who are ready to teach public school students a broad spectrum of agricultural subject matter, such as technical agriculture skills. As part of a larger study, we used a three-round Delphi study to identify the technical agriculture skills teachers in Illinois and Iowa need to effectively teach courses in the Plant Systems pathway within the broader Agriculture, Food, and Natural Resources (AFNR) Career Cluster. Twenty-seven experienced SBAE teachers contributed data for our study. Eighteen teachers participated in all three rounds. We identified 82 technical agriculture skill items. To help ensure teachers are prepared to teach courses in the Plant Systems pathway, we suggest several approaches for consideration: (1) facilitating opportunities to implement technical agriculture skill development opportunities within agricultural teacher education programs, (2) engaging with agricultural faculty who teach technical agriculture courses to pre-service teachers, and (3) using our list of 82 skills as a springboard to further study the topic. While not generalizable beyond the SBAE teachers in Illinois and Iowa, we believe our findings are valuable to SBAE stakeholders. To enhance generalizability and provide a more thorough exploration of teachers’ technical agriculture skill needs, replication of our study should occur in other states.

Introduction

School-based agricultural education (SBAE) programs are found within schools of differing sizes, community types, and demographics. Philosophically, SBAE programs are intended to reflect the needs of their respective local communities and serve various functions, such as facilitating opportunities for student growth via leadership activities (Phipps et al., 2008), addressing workforce development needs (Wells & Hainline, 2021; Wells et al., 2021), and preparing students for future opportunities in the agricultural industry (Stripling & Ricketts, 2016). To maximize potential for positive student and community impacts, SBAE programs must be led by effective SBAE teachers. Effective SBAE teachers possess a range of characteristics, such as knowledge about teaching and learning processes and agricultural subject matter knowledge (Eck et al., 2019). Agricultural subject matter knowledge has consistently been identified as characteristic of effective SBAE teachers (Eck et al., 2019; Roberts & Dyer, 2004).

Agricultural subject matter is broad and encompasses a wide range of topic areas commonly taught in SBAE programs, including agribusiness, agricultural mechanics, environmental and natural resources, animal science, and plant science (Phipps et al., 2008). Within the context of agricultural teacher education programs, technical agriculture coursework

addressing the different segments of agriculture is typically a significant portion of an undergraduate degree program (Whittington, 2005). The agricultural industry perpetually adjusts to meet the needs and desires of modern society (Doerfert, 2011). Likewise, the agricultural subject matter knowledge needs of SBAE teachers change as well. Viewed holistically, the scope of agricultural subject matter knowledge needed by SBAE teachers alongside the progressive nature of the agricultural industry can present challenges for SBAE and its stakeholders, particularly from the perspective of ensuring teachers are competent and prepared to adequately address the purposes of SBAE programs and the needs of their students.

Teacher competence is vital to facilitating and supporting the intended outcomes of SBAE programs (Wells & Hainline, 2021). Ensuring SBAE teachers are both competent in their agricultural subject matter knowledge and prepared to lead instruction in technical agriculture skills has implications beyond impacts on students, the SBAE program, the school, and the community at-large. Teacher competence (or the lack thereof) can not only hinder the learning experience for students but can also create other issues, such as teacher liability concerns (Hainline et al., 2019). Liability concerns relevant to SBAE teachers consist of a spectrum of topics, including student supervision, student safety, and classroom management (Hainline et al., 2019), all of which can be present when providing technical agriculture skill instruction commonly found in SBAE curricula. Moreover, as much of SBAE instruction is laboratory-based (Phipps et al., 2008) and SBAE laboratories are frequently used to support the purposes of SBAE programs (Shoulders & Myers, 2012), SBAE teachers are tasked with creating and managing safe learning environments (Saucier et al., 2014). Doing so requires SBAE teachers to be competent in their technical agriculture knowledge and skills (Wells & Hainline, 2021).

In the context of preparing competent SBAE teachers, recent literature (i.e., Hainline & Wells, 2019; Swafford & Hagler, 2018; Wells & Hainline, 2021; Wells et al., 2021) has focused more extensively and deeply on agricultural mechanics versus other agricultural subject matter areas, such as agribusiness, animal science, and plant science. Albritton and Roberts (2020) explored the technical agriculture skill needs of beginning teachers and addressed a broad swath of agricultural subject matter areas. However, their study was intended primarily to serve the interests of preparing early-career teachers and thus serves as a limitation when considering the technical agriculture skills needed by teachers of all experience levels.

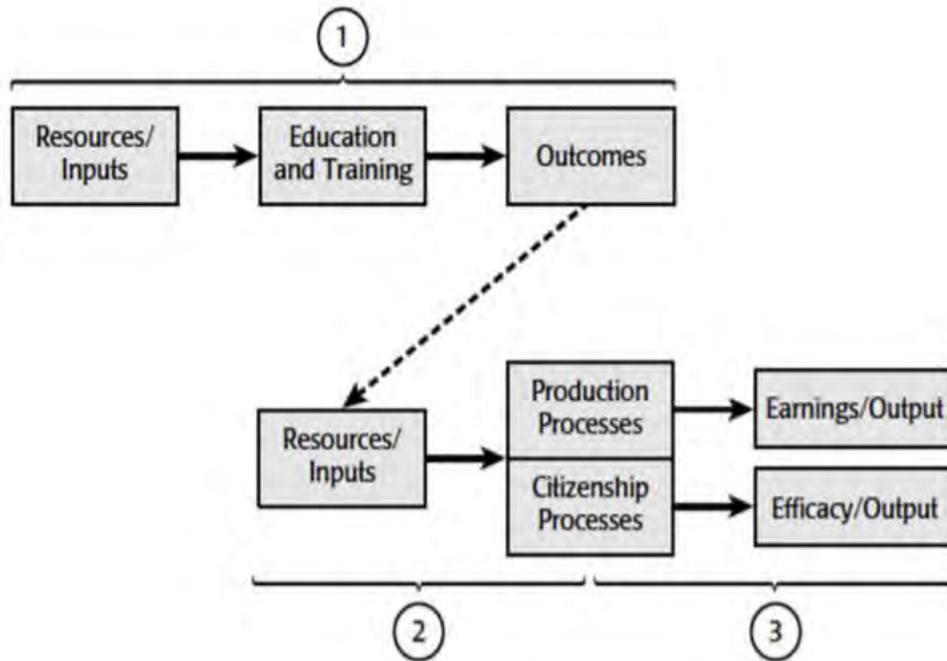
While other scholars such as Clemons et al. (2018), Figland et al. (2019), and Smalley et al. (2019) have recently explored SBAE teachers' professional development needs related to their teaching responsibilities (including agricultural subject matter), limited deeper knowledge about detailed agricultural subject matter items (i.e., specific, identifiable technical agriculture skills within broader agricultural subject matter areas) serves as a limitation to such efforts, thus creating a gap in the literature. As part of a larger effort to address teachers' technical agriculture skills needs, our study focused specifically on the Plant Systems pathway. Our intention was to help fill the existing gap in the literature by providing a list of specific technical agriculture skills that could be used to better inform SBAE stakeholders who have a role in developing competent, prepared teachers, such as agricultural teacher educators and other agricultural faculty at-large, regarding expectations for teacher competence in SBAE programs.

Theoretical Framework

We used human capital theory (HCT) as modeled by Swanson and Holton (2001) to underpin our study (see Figure 1).

Figure 1

A Model of Human Capital Theory



Human capital encompasses the health and education of people, the stock of educated people, and is measured by assessing the quantity and quality of formal education received by individuals (Lutz & KC, 2011). Education consistently emerges as the prime human capital investment for empirical analysis (Sweetland, 1996) and has served as the foundational human capital component of many studies which have evaluated the skills, needs, and education required of individuals as they relate to workforce preparedness (Easterly & Myers, 2017; Hendrix & Morrison, 2018; Robinson & Baker, 2013; Robinson & Garton, 2008; Wells & Hainline, 2021). In the HCT model, Swanson and Holton (2001) describe three key relationships that occur through the process of human capital development. Our study used the first two relationships of their model as a foundation. The first relationship within the HCT model relates to the outcomes of the resources, inputs, education, and training of individuals. These outcomes are then utilized as inputs as the individual progresses to employment and applies the education and training to their work. As noted by Swanson and Holton (2001), as individuals apply their educational outcomes as inputs in the workplace, productivity for the firm which they are employed will be bolstered.

Baye and Prince (2014) add to the conversation related to the application of an individual's education outputs transferring to become inputs to their area of employment by describing human capital as a specialized investment firms are required to make. This definition implies that firms or companies are willing to invest in their employees to help them attain

specific knowledge or skills related to their job, thus improving human capital as a resource. When looking at the connection between relationships one and two in the HCT model, knowledge and skills learned from an employee's education should directly transfer as inputs for a firm (production process) as a benefit. Employees are able to contribute relevant knowledge, education, and skills to the firm in which they are employed. In turn, firms can reduce the amount of direct investment they make into human capital through reliance on employees bringing prior knowledge, education, and skills with them to their current employer. This subsequently creates an economic benefit for both employee and employer through an exchange of benefits and cost savings.

An employee's ability to provide knowledge, skills, and education to their employment stems from the education received in relationship one of the HCT model (i.e., resources, inputs, education, and training of individuals). SBAE teachers who are competent and proficient in relevant agricultural subject matter will not only have a positive impact on increasing the knowledge and skillsets of their students but will contribute to crafting a connection between relationships one and two as employers (e.g., school districts) invest in their employees (e.g., teachers), as outlined by Swanson and Holton (2001).

Purpose

The purpose of our study was to describe the technical agriculture skills teachers in Illinois and Iowa need to effectively teach courses in the Plant Systems pathway within the broader AFNR Career Cluster. We used the perceptions of knowledgeable, experienced SBAE teachers to accomplish our purpose. It should be noted our study was part of a larger study focused on identifying the technical agriculture skills SBAE teachers in Illinois and Iowa need. Our study specifically addressed the American Association for Agricultural Education (AAAE) National Research Agenda (NRA) Research Priority 3: Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century (Stripling & Ricketts, 2016).

Methods

We conducted a three-round Delphi study to obtain a general consensus among Illinois and Iowa SBAE teachers regarding their perceptions of the most important technical agricultural skills teachers should have to effectively teach courses in the Plant Systems pathway. Delphi methods have been used in a myriad of recent Agricultural Education studies (Hainline et al., 2019; Rinker et al., 2021; Wells et al., 2021) and serve as an effective tool for building consensus among a panel by using a series of questionnaires (Linstone & Turoff, 1975).

Nomination Process

The careful selection of experts to serve on the panel has been described as the "keystone to a successful Delphi study" (Stitt-Gohdes & Crews, 2004, p. 60). The panelists we used to inform our Delphi study were nominated using a snowball sampling process. The initial nomination process was conducted by reaching out to agricultural teacher educators and state-level SBAE leaders in the two states included in our study. Specifically, we asked these individuals to identify SBAE teachers in their respective state who they perceived to be effective

teachers of courses in the Plant Systems pathway. At the conclusion of the initial nomination process, 58 SBAE teachers were nominated to participate in our study. Following the snowball sampling technique, we asked the SBAE teachers who were initially nominated to nominate other teachers who they perceived to be effective teachers of courses in the Plant Systems pathway. They nominated 27 additional SBAE teachers. At the conclusion of the nomination process, a total of 85 SBAE teachers were nominated to participate in our study as panelists.

Instrumentation / Data Collection

We conducted a three-round Delphi study and used a separate Qualtrics survey instrument to collect data during each round. For each round, we sent an initial survey instrument to the panelists via e-mail. We subsequently sent two reminder e-mails to non-respondents in seven-day increments to increase our response rate. As a reward for their participation in our study, we sent a small refrigerator magnet with the *Teach Ag* logo printed on it to each panelist who responded to our first-round instrument. As we sought to follow the concepts expressed by Dillman et al. (2014), our intention was to motivate panelists to continue responding to our second- and third-round instruments by providing them with a small token of appreciation for their assistance with our scholarly efforts.

Our first-round recruitment e-mail included a description of the study, information regarding the three rounds of the Delphi process, an Institutional Review Board (IRB) -approved informed consent form, and a link to access the first-round instrument. Our first-round instrument was comprised of four items. The first item was an open-ended item that asked the panelists to specify the most important technical agriculture skills teachers need to teach concepts in the Plant Systems pathway. The second item was a multiple-answer question that asked the panelists to specify which previous experiences served as an influence regarding the technical skills they deemed to be important in question one. The multiple-answer item included 19 experiences (e.g., teacher education program coursework or attendance at professional development workshop sessions) for the panelists to select from along with an item that allowed teachers to specify other experiences which were not listed. The third question inquired about the panelists' years of teaching experience. The final item prompted them to nominate other knowledgeable teachers who teach courses in the Plant Systems pathway.

After round one concluded, the panelists identified 129 unique Plant Systems skill items. Our second-round instrument included the 129 skill items compiled in the first round of our study. We asked the panelists to review the 129 skill items and indicate their level of agreement, on a six-point scale (1 = *Strongly disagree*; 2 = *Disagree*; 3 = *Slightly disagree*; 4 = *Slightly agree*; 5 = *Agree*; 6 = *Strongly agree*), regarding the importance for SBAE teachers to have competency with each skill item. We grouped the 129 technical skills and presented them within 10 different categories on the second-round instrument to enhance readability and response efficiency (Dillman et al., 2014). Our 10 skill categories included: (1) Plant Science skills, (2) Business and Communication skills, (3) Equipment, Tool, and Technology skills, (4) General Plant Production skills, (5) Floriculture skills, (6) Plant Propagation skills, (7) Greenhouse and Nursery Management skills, (8) Landscape and Forestry skills, (9) Plant Problem skills, and (10) Agronomy and Soil Science skills.

We sent our second-round instrument only to the 27 SBAE teachers who responded to the first round of our study. Twenty-four SBAE teachers (response rate = 88.9%) responded in the second round of our study. We set the consensus criteria outlined in Table 1 *a priori* and used these criteria as a metric to determine if each skill item had met consensus amongst the panel.

Table 1

Consensus Criteria Based on Percentage of Panelists who Indicated a 5 (Agree) or 6 (Strongly agree) on a Given Item

Criteria Decision	%
Met consensus	≥ 75
Included on the third-round instrument for reevaluation	51 to 74
Omitted from further consideration	< 51

Seventy-three of the 129 skill items met consensus in the second round. Fifty-one to 74% of the panelists rated 42 skill items as a 5 (*Agree*) or 6 (*Strongly agree*). These 42 skill items were included on the third-round instrument. Fourteen items fell below the bottom threshold of the consensus criteria and were thus excluded from further consideration.

Our third-round instrument was comprised of 42 skill items. We sent our third-round instrument to the panelists who had responded to both our first- and second-round instruments. Eighteen panelists responded on the third-round instrument, yielding a response rate of 75%. Similar to the second round, we asked the panelists to specify their level of agreement with the importance of the skill using same six-point scale (1 = *Strongly disagree* to 6 = *Strongly agree*). The panelists reached a consensus on nine skill items in the third round; we omitted the remaining 33 items from further consideration. At the end of our three-round Delphi study, 82 skill items were considered to have met consensus among the panelists.

Validity and Reliability

We used a panel of experts to review and assess the content validity of our instruments. Members of our panel were three agricultural teacher educators at three different land-grant universities across the United States. We asked each member from the panel of experts to review our instruments, determine the appropriateness of each item, and provide suggestions for the improvement of the instruments. We made augmentations to the instruments (i.e., wording of multiple-answer selections, wording of instrument directions) based on the feedback they each provided. Aside from the establishment of content validity, our implementation of three successive rounds in our Delphi study contributed to concurrent validity of our study as the panelists identified and agreed on the topics over several rounds (Hasson & Keeney, 2011; Sharkey & Sharples, 2001).

In regard to reliability, Dalkey et al. (1972) noted that a 0.70 reliability coefficient could be expected from a Delphi study with a panel of 11 or more members and a Delphi study with 13 or more members would yield a coefficient of 0.90. Based on Dalkey et al.'s (1972) reliability recommendations, the panel size for all three rounds in this study (Round 1, $n = 27$; Round 2, $n = 24$; Round 3, $n = 18$) would be expected to yield reliable findings. While our study meets the

threshold of reliability set forth by Dalkey et al. (1972), the establishment of reliability in Delphi studies has been widely disputed (Hasson & Keeney, 2011; Williams & Webb, 1994; Woudenberg, 1991; Yousuf, 2007). Specifically, Woudenberg (1991) contended the Delphi approach yields judgements, not measurements. Judgements are inherently influenced by person-specific and situation specific biases (i.e., factors). We standardized the recruitment procedure, background information, instrument administration techniques, design of the instruments, and the number of rounds to mitigate situation-specific biases. However, we recognize that person-specific biases were present in this study—serving as a key limitation associated with the establishment of reliability.

Data Analysis

We used IBM® SPSS® (Version 26) software to analyze the data we collected throughout our study. We analyzed the open-ended items on the first-round instrument by organizing the responses into categories and removing any duplicate responses. We calculated measures of central tendency and dispersion, along with frequencies and percentages for the multiple answer and short-answer items in our first-round instrument. We calculated frequencies and percentages to assess if the scale items in the second and third rounds of our Delphi study had met consensus.

Results

Participants

Of the 85 SBAE teacher nominated to participate in our study, 27 agreed to participate as panelists. These teachers had taught an average of 16.63 ($SD = 9.68$) years. We asked each panelist to identify any source of experience that they believed influenced their perceptions of the technical agriculture skills teachers need to teach courses in the Plant Systems pathway. The three influences they most frequently indicated were “Experiences teaching agricultural education coursework” ($f = 22$; 81.5%), “My experiences with FFA activities (e.g., CDE teams, etc.)” ($f = 18$; 66.7%), and “Attendance at professional development workshop sessions” ($f = 15$; 55.6%; see Table 2).

Table 2

Experiences Influencing Panel Members’ Perceptions of the Plant Systems Skills Needed by SBAE Teachers (n = 27)

Experience	f (%)
Experiences teaching agricultural education coursework	22 (81.5)
My experiences with FFA activities (e.g., CDE teams, etc.)	18 (66.7)
Attendance at professional development workshop sessions	15 (55.6)
Experiences working in the agricultural industry	14 (51.9)
High school coursework as a student	14 (51.9)
Experience	f (%)
Meetings with industry representatives	12 (44.4)
Early field experiences / observations before student teaching	10 (37.0)

My experiences with student Supervised Agricultural Experiences (SAE)	9 (33.3)
Compliance with mandated course standards	8 (29.6)
Meetings with other agricultural education teachers	8 (29.6)
Teacher education program coursework	7 (25.9)
Meetings with community members	7 (25.9)
Meetings with my current / former students	7 (25.9)
Meetings with my program advisory committee members	4 (14.8)
Meetings with parents / guardians	3 (11.1)
Meetings with my FFA Alumni and supporters	2 (7.4)
Compliance with workforce development data	1 (3.7)
Meetings with other (non-agricultural education) teachers	1 (3.7)
Meetings with my school administrators	1 (3.7)

Conversely, “Compliance with workforce development data” ($f = 1$; 3.7%), “Meetings with other (non-agricultural education) teachers” ($f = 1$; 3.7%), and “Meetings with my school administrators” ($f = 1$; 3.7%; see Table 1) were the experiences the fewest numbers of panelists perceived to influence their perceptions of the technical agriculture skills teachers need to teach courses in the Plant Systems pathway.

Round One

In round one of our study, the panelists provided us with 361 skill items. We disregarded any duplicate responses we received from the panelists, giving us 129 unique skill items for consideration by the panelists in round two. Prior to distributing our second-round instrument, we grouped these items into 10 categories, based upon the nature of the skill item, to improve the readability of our instrument.

Round Two

Using our second-round instrument, we sent the 129 skill items back to the panelists for review. Upon completion of the second round, 73 of the 129 skill items met consensus in round two. At the conclusion of round two, 51 to 74% of the panelists rated 42 skill items as a 5 (*Agree*) or 6 (*Strongly agree*). We subsequently presented these 42 skill items back to the panelists via our third-round instrument. Fourteen items fell below the 51% threshold of the consensus criteria and we thus eliminated them from further consideration prior to round three.

Round Three

Our third-round instrument included 42 skill items. The panelists reached consensus on nine skill items in the third round. Thirty-three items did not meet consensus and were thus removed from our list. At the conclusion of our three-round Delphi study, 82 skill items met consensus among the panelists. All items meeting consensus in rounds two and three are detailed in Table 3 below.

Table 3*Round Two and Three Findings: Plant Systems Skills Needed by SBAE Teachers*

Skill Item	<i>n</i>	Category	% Agreement
Recordkeeping ^a	24	BCC	95.9
Identifying plant anatomy ^a	24	PS	95.8
Broadcasting landscape inputs (ex. fertilizer, etc.) ^b	18	LF	94.5
Selecting crops ^b	18	GNM	94.4
Transplanting greenhouse crops ^b	18	GNM	94.4
Transplanting plants ^a	24	GPP	91.7
Identifying floral plants ^a	24	FL	91.7
Germinating seeds ^a	24	PP	91.7
Operating greenhouse climate systems ^a	24	GNM	91.7
Using the soil textural triangle ^a	24	ASS	91.7
Identifying plants ^a	24	PS	91.6
Maintaining plants during production (ex. proper watering, etc.) ^a	24	GPP	91.6
Ribbon-testing soil texture ^a	24	ASS	91.6
Conducting soil tests ^b	18	ASS	88.9
Demonstrating plant science principles in a lab setting (ex. photosynthesis, etc.) ^a	24	PS	87.5
Managing a plant production enterprise (ex. greenhouse, etc.) ^a	24	BCC	87.5
Marketing a commodity (ex. corn, etc.) ^a	24	BCC	87.5
Marketing a product (ex. corsages, etc.) ^a	24	BCC	87.5
Organizing plant sales ^a	24	BCC	87.5
Conducting sales (contractual, wholesale, or retail) ^a	24	BCC	87.5
Demonstrating equipment safety procedures ^a	24	ETT	87.5
Calculating fertilizer rates based on formulation available (NPK) ^a	24	GPP	87.5
Selecting plant and seed varieties ^a	24	GPP	87.5
Dividing plants ^a	24	PP	87.5
Purchasing items for greenhouses ^a	24	GNM	87.5
Applying landscape design principles ex. scale, etc.) ^a	24	LF	87.5
Identifying nutrient deficiency ^a	24	PPR	87.5
Skillfully using hand tools ^a	24	ETT	83.4
Tool maintenance ^a	24	ETT	83.4

Skill Item	<i>n</i>	Category	% Agreement
Harvesting crops ^a	24	GPP	83.4
Using rooting hormones ^a	24	PP	83.4
Collecting soil samples ^a	24	ASS	83.4
Determining soil organic matter content ^a	24	ASS	83.4
Determining soil nutrient use and loss ^a	24	ASS	83.4
Determining soil structure ^a	24	ASS	83.4
Classifying soils ^a	24	ASS	83.4
Using introductory-level precision agriculture technology (ex. GPS, etc.) ^{b, c}	18	ETT	83.4
Equipment maintenance ^{b, c}	18	ETT	83.4
Making bows ^{b, c}	18	FL	83.3
Making bouquets ^{b, c}	18	FL	83.3
Maintaining a safe plant laboratory ^a	24	PS	83.3
Conducting customer service procedures ^a	24	BCC	83.3
Calculating profit and loss statements ^a	24	BCC	83.3
Maintaining water supply and irrigation systems ^a	24	GNM	83.3
Creating landscape designs ^a	24	LF	83.3
Calculating area-based estimates for the landscape (ex. mulch, etc.) ^a	24	LF	83.3
Safely using pesticides ^a	24	PPR	83.3
Interpreting a soil test report ^a	24	ASS	83.3
Identifying plant development cycles ^a	24	PS	79.2
Calculating plant genetic probability (ex. Using Punnett Squares, etc.) ^a	24	PS	79.2
Identifying seeds ^a	24	PS	79.2
Using a microscope ^a	24	PS	79.2
Presenting a plant enterprise proposal, design, or plan ^a	24	BCC	79.2
Propagating using cuttings (ex. stem cutting, etc.) ^a	24	PP	79.2
Grafting / budding plants ^a	24	PP	79.2
Stratifying seeds (cold/warm) ^a	24	PP	79.2
Testing seed viability ^a	24	PP	79.2
Growing greenhouse vegetables ^a	24	GNM	79.2
Scheduling crops ^a	24	GNM	79.2
Installing plant materials in the landscape ^a	24	LF	79.2
Installing landscape materials (ex. landscape fabric, etc.) ^a	24	LF	79.2

Skill Item	<i>n</i>	Category	% Agreement
Interpreting a pesticide label ^a	24	PPR	79.2
Calculating pesticide application rates ^a	24	PPR	79.2
Using a soil probe ^a	24	ASS	79.2
Determining land use ^a	24	ASS	79.2
Determining land slope ^a	24	ASS	79.2
Identifying parts of a plant cell ^a	24	PS	79.1
Skillfully operating power tools ^a	24	ETT	79.1
Planting crops ^a	24	GPP	79.1
Layering plants ^a	24	PP	79.1
Identifying insects ^a	24	PPR	79.1
Identifying weeds ^a	24	PPR	79.1
Scouting for pests ^a	24	PPR	79.1
Determining soil permeability ^a	24	ASS	79.1
Interpreting data ^{b, c}	18	PS	77.4
Operating equipment (ex. a tractor, etc.) ^a	24	ETT	75.0
Managing postharvest storage of crops ^a	24	GPP	75.0
Producing floriculture crops ^a	24	GNM	75.0
Developing fertilization regimens (ex. fertilizer timing, etc.) ^a	24	GNM	75.0
Pruning plants ^a	24	LF	75.0
Identifying plant diseases ^a	24	PPR	75.0
Developing an integrated pest management plan ^a	24	PPR	75.0

Note. ^aItem reached consensus in round two; ^bItem reached consensus in round three; ^cItem was not answered by all panelists. 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Slightly disagree*, 4 = *Slightly agree*, 5 = *Agree*, 6 = *Strongly agree*.

Key for Skill Categories. (1) Plant Science skills = PS, (2) Business and Communication skills = BCS, (3) Equipment, Tool, and Technology skills = ETT, (4) General Plant Production skills = GPP, (5) Floriculture skills = FL, (6) Plant Propagation skills = PP, (7) Greenhouse and Nursery Management skills = GNM, (8) Landscape and Forestry skills = LF, (9) Plant Problem skills = PPS, and (10) Agronomy and Soil Science skills = ASS.

Conclusions, Discussion, and Recommendations

We identified 82 technical agriculture skills teachers in Illinois and Iowa need to effectively teach courses in the Plant Systems pathway within the broader AFNR Career Cluster. In the context of identifying technical agriculture skills needed by SBAE teachers to successfully provide instruction in agricultural subject matter, our findings add to the body of knowledge recently presented by other scholars (e.g., Albritton & Roberts, 2020; Hainline & Wells, 2019; Swafford & Hagler, 2018; Wells et al., 2021).

SBAE stakeholders in Illinois and Iowa should employ the list of 82 technical agriculture skills we identified to help inform the teacher competence development process for their teachers. This could be accomplished by using our defined list of technical agriculture skills as a springboard for discussions and opportunities regarding the preparation of SBAE teachers to engage in Plant Systems pathway-related subject matter. Consideration should be given to the following ideas: (1) the exploration and as-needed revision of current agricultural teacher education programs for pre-service teachers to better prepare them to teach technical agriculture skills relevant to courses in the Plant Systems pathway, (2) engagement and partnership with agricultural faculty (e.g., soil scientists, agronomists, plant scientists, etc.) who teach technical agriculture coursework relevant to the Plant Systems pathway within undergraduate degree programs, and (3) the use of our list of technical agriculture skills to further explore professional development needs through follow-up studies specifically designed to do so, similar to the approach used by Wells and Hainline (2021). These efforts could be impactful for ensuring SBAE teachers in Illinois and Iowa are better-able to serve their students through improved preparation to teach technical agriculture skills.

Because we only collected data from teachers in Illinois and Iowa, we do wish to caution that our results are not generalizable beyond these states. Because this is a limitation of our study, we recommend efforts be undertaken to replicate our inquiry in other areas of the United States to better inform the SBAE stakeholders' knowledge regarding the technical agriculture skills needed by teachers to teach courses in the Plant Systems pathway. Concurrent with Wells et al.'s (2021) recommendation, regular replication would help to expand the knowledge base regarding the topic and would help to monitor for changes in teachers' agricultural subject matter-related needs. It is worth noting that perhaps a national-level study examining our topic would be useful and practical as well. Doing so would serve a broader number of SBAE stakeholders.

As we acknowledge that realities about agricultural teacher education programs (e.g., degree program credit hour limitations, requisite state-level approvals of changes to degree programs, etc.) do exist, creativity is needed to ensure pre-service teachers are prepared to step into their own SBAE programs in the near future and teach the technical agriculture skills associated with courses in the Plant Systems pathway. The incorporation of technical agriculture skill development-oriented activities into existing teaching methods courses could be a suitable and cost-effective approach. Moreover, leveraging the practicality of existing early field experiences and student teaching experiences by purposefully placing pre-service teachers alongside in-service teachers who are competent in teaching technical agriculture skills associated with teaching courses in the Plant Systems pathway would be valuable as well.

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Interviewing Influencers: Instagram Influencers As A Crisis Communication Tool

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Social media played an essential role in crisis communication during the early days of the COVID-19 pandemic (Malecki et al., 2020). With supply chain disruptions and agricultural production implications, many consumers turned to social media to understand the implications COVID-19 had on the food supply. Studies suggest social media influencers build strong relationships with their stakeholders through opinion leadership, but this concept has not yet been studied in agriculture. The purpose of this study was to explore strategies, approaches, and motivations used by Instagram influencers in the dairy industry during COVID-19. This study utilized qualitative, semi-structured interviews with seven dairy influencers on Instagram. Results indicate most influencers had strategic approaches to their Instagram crisis communication efforts. Influencers were motivated by helping stakeholders and educating their community to post about the crisis within the industry. Based on these results, agricultural influencers are appropriate opinion leaders and should be used as industry partners before and during a crisis. Influencer relationships should also be included in crisis communication plans and crisis communication education.

Introduction

The World Health Organization (WHO) officially declared COVID-19 a pandemic in March 2020 (WHO, 2020). The infectious disease took the lives of millions and continues to have implications for industries around the world (CDC, 2021). It created supply chain disruptions that interfere with trade, production, processing, supply, and transportation (USDA, 2021). In agriculture, supply chain bottlenecks caused disruptions in production and sales for many producers (Deconinck et al., 2021). Because COVID-19 required restaurant and school closures, dairy farmers experienced a decreased demand for products, and many dairies had to dump milk (Hillyard et al., 2020). This left many consumers questioning why (Neves & Fischer, 2021). In presumed efforts to support the dairy industry, many dairy influencers on Instagram created industry-focused response content for consumers. This poses the question: How can agricultural industries use social media influencers as partners to communicate in a crisis?

A recent study on crisis communication during COVID-19 suggests social media play a vital role in shaping outrage and public perceptions of risk mitigation (Malecki et al., 2020). Additional studies support the use of social media influencers in crisis response (Singh et al., 2020). It is also known that social media influencers can help build relationships with stakeholders and develop positive perceptions for a brand (Singh et al., 2020). However, this practice is not well studied or documented in agricultural communications.

Van der Meer and Verhoeven (2013) noted a gap in literature and called for continued research on crisis framing by prominent actors. Additionally, Taylor (2020) said there is an urgent need for research on influencer marketing, particularly surrounding COVID-19 and the segmentation of macro versus micro-influencers. This study explored strategies and approaches used by Instagram influencers in the dairy industry during a crisis to address the aforementioned gaps in

the literature. This study sought to assess approaches, describe strategies, and understand the motivation behind Instagram influencer’s social media posts in support of the dairy industry during COVID-19. Results can help improve practice and management in crisis communication.

Purpose and Research Objectives

The purpose of this study was to explore and describe strategies, approaches, and motivations used by Instagram influencers in the dairy industry during COVID-19. This study was guided by the following research objectives:

RO1: Describe agricultural influencer strategies to communicate about COVID-19’s impact on the dairy industry.

RO2: Understand the motivation behind agricultural influencers’ social media posts about the dairy industry during COVID-19.

RO3: Determine if agricultural influencers are influenced by agricultural news stories.

Literature Review

The term influencer is defined in literature as an individual who exerts substantial influence over others within a network (Bakshy et al., 2011; Weiman, 1994). This definition references ‘the influentials’ in society prior to today’s popular social media influencers. However, with a lack of substantial academic research on the concept of influencers, popular press provides a more industry-focused definition: individuals who affect purchasing decisions of their niche following based on their expertise and relationship with their audience (Geysler, 2021). In areas such as advertising and marketing, it is crucial to follow popular press to understand what trends have created a need for academic research to contribute to practice and theory (Taylor, 2020). Influencers play various roles in the decision-making process, outlined in Figure 4.1 (Brown & Hayes, 2008). The extent of influence one may have is achieved through a two-way system of communication that works across a network of people (Brown & Hayes, 2008). In addition to other influencers, they need individuals to exert their influence (Brown & Hayes, 2008).

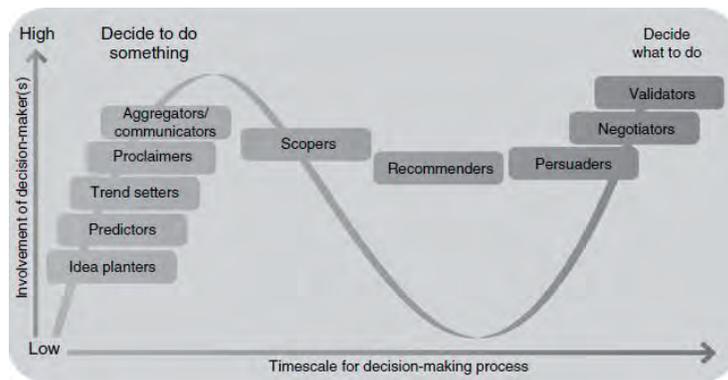


Figure 4.1
Influencer roles in the decision process (Brown & Hayes, 2008)

The power of influencers is evident on their audience’s decision-making (Brown & Hayes, 2008). For example, the 2014 “ice bucket challenge” began as a joke among friends, but after the

viral challenge reached former Boston College baseball captain and amyotrophic lateral sclerosis (ALS) patient Pete Frates, his large network took on the challenge, including a donation to ALS research (Wicks, 2014). This led to a spread to major celebrities and a monumental increase in donations reported by ALS charities (Wicks, 2014). Joaquin Phoenix, an actor known for his role in *The Joker*, is another example of the power of influencers. He used his influence and platform at the 2020 Academy Awards to call on his audience to be more considerate of animal rights, especially dairy cattle (Yasharoff, 2020). In favor of agriculture, Michelle Miller, also known as the Farm Babe, has more than 200,000 followers on social media (Miller, 2020). When Burger King aired its 2020 commercial focusing on sustainability, it deemed the beef industry a major contributor to global warming (Miller, 2020). Miller's role as an influencer and advocate for agriculture convinced Burger King executives to create a new commercial highlighting its partnership with the beef industry (Miller, 2020).

An influencer's ability to impact an individual's decision-making process and positively effect a brand's image makes them beneficial tools for crisis communication (Singh et al., 2020). Singh et al. (2020) conducted the first study on the interplay of crisis communication and the use of influencers. The study advises brands to promote values-driven motives when utilizing influencers during a crisis.

There are many examples of brands and organizations partnering with influencers. McDonalds utilized influencers as part of their crisis communication in response to backlash from the Masala Dolce Brioche breakfast in India, using popular food influencers as social advocates to improve consumer relations (Singh et al., 2020). In societal crisis, many influencers, on Instagram especially, find themselves in a position of power to be change makers (Ho & McCausland, 2020). This was heightened following the death of George Floyd, when many Instagram influencers joined the protest and social justice movements (Ho & McCausland, 2020). During the 2016 Zika virus, Puerto Rico Tourism Company enlisted Olympic Gold medalist Monica Puig to promote disease protection (Alton, 2021).

The potential reach of influencers is partially what drives influencer marketing and partnerships. Influencer marketing is described by Brown and Hayes (2008) as an innovative approach to marketing that breaks sales barriers and directly addresses decision-makers. Companies have continuously increased marketing budgets for influencer marketing, and the area is expected to reach \$15 billion in global expenditures by 2022 (Schomer, 2019).

The most successful use of influencer marketing is rooted in agriculture, specifically the dairy industry. The Milk Processors Board "Got Milk" campaign featured milk mustaches using celebrity endorsers (Ekaterina, 2004). Celebrities across industries including Beyonce, Kobe Bryant, and Betty White posed with milk mustaches endorsing milk consumption (Ekaterina, 2004). The campaign is still tokened as one of the most successful advertising campaigns worldwide (Manning, 2003).

Additional dairy influencer marketing campaigns have been used by companies like California Milk Advisory Board, Dairy Farmers of Wisconsin, and National Milk Producers Federation. California Milk Advisory Board is currently partnering with Mario Lopez to highlight the importance of family breakfast and consuming dairy products (Real California Milk, 2021).

Dairy Farmers of Wisconsin's Cheeselandia campaign was named the 2021 influencer campaign of the year by Adweek (Adweek, 2021). Dairy Management Inc. and Undeniably Dairy have partnered with YouTube gaming influencer Jimmy Donaldson, also known as Mr. Beast, to connect dairy and Gen Z audiences (Undeniably Dairy, 2020).

Agriculture has been present throughout the history of influencer marketing. Glamorized depictions of farm life have been portrayed through influencers like Martha Stewart, Pioneer Woman, and the Magnolia Network spearheaded by Chip and Joanna Gaines. However, research has determined consumers resonate more closely with social media influencers than celebrity influencers (Schouten et al., 2020; Djafarova & Rushworth, 2017). This may be due to their perception of social media influencers as more relatable (Lou & Yuan, 2019).

With 72% of Americans using social media, influencers have become one of the largest campaign types (Pew Research, 2021; Childers et al., 2019). Social media influencers are typically “ordinary” social media users – without prior celebrity status, who have built a large following through sharing their lives with their fans using content creation (Garcia, 2017). Their online presence is related to their interests and lifestyle (Tafesse & Wood, 2021). Followers perceive influencers as authentic with similar interests (Schouten et al., 2020; Chappie & Cownie, 2017).

Among social media platforms, Instagram is the most widely used by social media influencers because of its formation of online communities, visual appeal, and high engagement rates (Casalo et al., 2020; Locowise, 2017). Previous studies have found even higher Instagram engagement rates among influencers (Casalo et al., 2020; Influence.co, 2017). DeVierman et al. (2017) found the number of followers an Instagram influencer has affects follower perception of brands they collaborate with. It is used as a tool by many industries, most heavily by fashion brands and fashion influencers (Casalo et al., 2020).

Agriculture is keeping up with the trends of other industries through a rise in agriculture influencers on Instagram. AgDaily (Stauffer, 2018), Country Living (Country Living, 2020), and Buzzfeed (Gerstein, 2019) provide lists of top farm influencers to follow on the social media platform. Brands like Dairy Good have partnered with some of these influencers in an effort to participate in influencer marketing (Shaw, 2021). Dairy and sustainability Instagram influencer @newmexicomilkmaid broke barriers outside of agriculture with her work featured in Women's Health Magazine (MacAvoy, 2021). However, the use of influencer marketing in agriculture is minimal compared to other industries. A 2020 study on dairy influencers on Instagram concluded women play a large advocate role for the industry (Warnimont, 2019). Additionally, Neves (2021) recommended agricultural Instagram influencers play a supporting role in crisis communication to industry professionals. Social media influencers, especially on Instagram, are a marketing trend that is on the rise (Taylor, 2020). This study aims to provide insight into the practicality of using Instagram influencers in agriculture, particularly during a crisis.

Theoretical Framework

Opinion leadership has been used to guide studies across disciplines (Weimann, 1994). Similar to the definition of influencers, opinion leaders play a key role in the diffusion of information and decision-making processes (Chan & Misra, 1990).

In relation to mass media, opinion leaders have a strong connection to the consumption of formal media (Lazarsfeld et al., 1944). The Lazarsfeld et al. (1944) study marked the beginning of 73-year history studying opinion leadership. It described opinion leader communication as a two-step flow from mass media to opinion leaders to followers – those less active in the consumption of mass media (Lazarsfeld et al., 1944). Rogers (1962) went further to explain the first step from mass media to opinion leaders is a transfer of information and the second step from opinion leaders to followers is a spread of influence. Some of the first opinion leaders in agriculture revolve around the social diffusion of agricultural innovations (Rogers, 1995). Rural sociologists found early importance in utilizing informal channels, such as social networks of farmers, to promote and influence the adoption of new ideas and technologies in agriculture (Weimann, 1994).

With its long-standing history in agriculture, opinion leadership saw its first study in 1943 with a study on the diffusion of hybrid corn in Iowa (Ryan & Gross, 1943). Traditional opinion leaders were identified by their consumption and knowledge of news (Weeks et al., 2017). However, with the rise in social media, opinion leaders also engage in creating and sharing content and may be more influential due to individuals' increasing dependence on social media (Weeks et al., 2017). The interactivity of social media makes opinion leadership a relevant perspective (Schafer & Taddicken, 2015). Opinion leaders on social media combine interpersonal communication with the influence of mass media, influencing even larger networks (Weeks et al., 2017; Fogg, 2008). Social media opinion leaders are often identified by the quantity of their communication activity online, as well as their likelihood to consume, distribute, and produce content on social media to diffuse information (Weeks et al., 2017).

Opinion leadership is also often studied in regard to influencers (Casalo et al., 2020; DeVairman et al., 2017; Weeks et al., 2017; Weimann, 1994). The terms influencer and opinion leader are often used interchangeably (Weimann, 1994). DeVairman et al., (2017) determined an influencer's number of followers on social media influenced their popularity and overall opinion leadership. Casalo et al. (2020) states there is a need for a deeper understanding of opinion leadership on Instagram. Through the principles of opinion leadership, this study looked at the use of Instagram influencers as opinion leaders in crisis communication in the dairy industry.

Methodology

A phenomenological approach was used to guide the methodology of this study. These studies seek to describe commonalities of individuals who have experienced a concept or phenomenon (Creswell, 2013). They focus on drawing from the individual experience to understand and describe the universal essence (Creswell, 2013). This study utilized qualitative, semi-structured interviews with dairy influencers on Instagram. Qualitative studies are an interpretative approach that studies a problem in a natural setting to identify patterns or themes (Denzin & Lincoln, 2018; Creswell, 2013). The researcher serves as the key instrument in qualitative studies and allows for reflexivity (Creswell, 2013). The interviews followed a seven-step process and

utilized a semi-structured interview guide to facilitate interviews (Rubin & Rubin, 2012). Texas Tech University Institutional Review Board approved this study.

Participant Selection & Descriptions

Participants were selected based on their status as an Instagram influencer focused in the dairy industry. Both macro – 21,000 followers or more – and micro-influencers – less than 21,000 followers – were considered (Kay et al., 2020). Initial participants were selected from a Google search that resulted in three lists of dairy influencers on Instagram as used by Neves (2021). Snowball sampling was also used by asking each interviewee for additional participant recommendations to increase likelihood of ample responses. Each participant had experience with the phenomenon (Creswell, 2013). In phenomenological research, Creswell (2013) recommends five to 25 participants to be interviewed. The researcher established each participant needed to meet the following criteria 1) had been identified as an influencer by influencer lists or by other influencers 2) posted about the dairy industry on Instagram relating to COVID-19 in 2020.

Selected influencer Instagram accounts were manually reviewed for the established criteria. Participants were messaged on Instagram and sent an email if an email was listed on the account. Interested participants were assured confidentiality. If participants responded and agreed to participate, an interview was scheduled. Seven participants agreed to an interview for the study. All participants were Influencers on Instagram with a dairy background. Descriptions of the participants are minimal to provide additional anonymity due to the nature and publicity of the participants.

Anna: Grew up in the dairy industry and specialized in another field. Based in the South.

Olive: Works on a dairy. Based in the Midwest.

Bertha: Works on a dairy. Based on the West Coast.

Amy: Grew up in the dairy industry and specialized in another field. Based in the East.

Estelle: Works in the dairy and beef industries. Based in the Midwest.

Nellie: Works on a dairy and on public issues. Based on the West Coast.

Bessie: Works on a dairy. Based in the Southwest.

Data Collection & Analysis

Interviews were conducted over Zoom. Zoom has been rated as a superior interview platform compared to traditional mediums (Archibald et al., 2019). A Zoom link was sent to each participant from the researcher's account, and all interviews were recorded. Each interview began with an opening statement to ensure participant's confidentiality. Further questions addressed engagement strategies, posting motivations, crisis communication strategies, future communication strategies, hashtags, target audiences, consulting, follower sentiment, and news consumption.

Interviews lasted between 20 and 45 minutes; each was recorded, downloaded, and transcribed. Each transcribed interview was also exported and uploaded to MaxQDA for coding. During each interview, the researcher took notes with personal reflections to use during data analysis. Quotes were extracted from the data to provide context and evidence of resulting themes.

Pseudonyms were assigned to each participant to protect their identity. An inductive, bottom-up approach was used to analyze the narrative for emergent themes. Open and axial coding was used in MaxQDA (Glaser & Strauss, 1967). Data were coded through a first cycle of descriptive coding and a second cycle of focused coding (Saldana, 2016). Throughout the analysis, the researcher developed an audit trail to detail theme formation, definitions, and researcher notes.

Trustworthiness

If a qualitative study is to add to a body of knowledge, the process in which it was conducted must establish truth value, the basis for applying it, and allow for external judgments to be made about its neutrality and consistency (Erlandson et al., 1993). Lincoln and Guba (1985) referred to this as trustworthiness. Trustworthiness was partially ensured through initially coding during transcription and performing self-reflection (Ezzy, 2002). Credibility was established through member checks at the end of the interview process, peer debriefs, and triangulation between interview responses and their social media posts and behaviors (Erlandson et al., 1993). Thick descriptions were provided to allow judgments of transferability (Erlandson et al., 1993). The researcher created an audit trail throughout the research process to provide dependability and confirmability (Erlandson et al., 1993).

In this qualitative, phenomenological study the researcher served as the primary instrument and it is important to recognize researcher bias (Creswell, 2013). The lead researcher grew up in the dairy industry raising dairy cattle. The researcher is also an avid social media user with a profile on Instagram, and follows many influencers on Instagram.

Results

Research Objective One

Research Objective One was to describe agricultural influencer strategies to communicate about COVID-19's impact on the dairy industry. This research objective provides insight into influencers' risk and crisis communication strategies. After analyzing participant responses, two themes emerged: 1) Crisis response strategies 2) Future crisis response strategies.

Crisis Response Strategies

Amongst the seven influencers interviewed, most had a strategy for posting about a crisis, specifically COVID-19's impact on the dairy industry. Most influencers noted their main strategy was to be conscious of their tone and to stay positive.

BESSIE: I want a call to action. I want people talking. I want it shared, but obviously the messaging changes so [...] you want to be conscious of your tone and not be tone deaf, especially during COVID.

ANNA: I just felt like it was such a stressful situation for so many people that I chose not to include it [COVID-19] in all of my messages because I wanted my page to be a source of security and not a source of stress, and so I addressed it a little bit, and I did a few

posts specifically related to COVID-19, but majority was continuing to educate on how dairy fits into your diet and why. So, I tried to be really sensitive to the topic.

OLIVE: It's a balance between speaking conversationally but not speaking down to people because nobody wants to be talked down to. I don't enjoy it.

Additionally, one influencer mentioned their strategy was to have a fact-based approach to communication.

AMY: I really wanted to make sure I understood what was going on and hearing it from farmers and really knowing I wasn't spreading fears or strictly emotions. I was trying to have a morefactual based approach and understanding it from the actual farmers themselves who were going through it before I tried posting anything just to get people to feel bad and drink more milk.

Another said their approach was to provide consumers a behind the scenes look at what was happening on the farm.

ESTELLE: To help people have a behind the scenes look at what was happening on our farms and supply chain issues, it was just giving perspective from someone who's already boots on the ground with it.

One participant said they did not have much of a strategy. They post when inspired and are off the cuff. However, having no strategy is a strategy in itself.

BERTHA: I'm more of a "it comes to me in the moment" kind of person.

Future Crisis Response Strategies

All participants discussed how they would or would not adjust their crisis response strategies for a future crisis facing the industry. These changes include being more up front, not reacting until they know the whole story, posting more frequently, collaborating with other influencers, and would respond to fears more quickly.

ANNA: I think for a future crisis I would be more up front with it and prepare for the worst, which I did not do with COVID-19 and I think that's why I wasn't as strategic on my page.

BESSIE: I still think I would keep my message really positive. I would try to get out ahead of it more had I known that the milk thing was going to be going on, I probably would have reached out to media outlets like, hey if you're going to cover this story here's a dairy farmers perspective, but that's so hard in the moment.

AMY: I think potentially moving forward, there's continuously the opportunity to collaborate and work together with other influencers.

ESTELLE: In the future, I'd get information out there faster, and respond to those type of fears quicker.

Two participants said they would not change their crisis communication strategies.

OLIVE: When you react the day of and without knowing all the story then you almost have to backtrack a few days later. So I don't think the way I put the information out would change or even has changed, but I will say when something is so big and important that people are really paying attention to I will write out my points and I become more prepared. I don't want to be caught completely off guard.

NELLIE: I don't know, 'cause everything I'm trying to do is in real time, so if I feel like posting I'm going to. If I don't feel like I've got anything genuine or funny or anything real to say, I'm not going to post something just to post it.

Research Objective Two

Research Objective Two was to understand the motivation behind agricultural influencers' social media posts about the dairy industry during COVID-19. Two themes emerged: 1) helping stakeholders and 2) educating the community.

Helping Stakeholders

Five interview participants talked about their desire to help stakeholders as their posting motivation. This includes supporting farmer mental health, driving consumer interest during supply chain shortages, sharing the story of dairy farmers, and getting dairy products into the hands of those who need it.

OLIVE: Everyone started hearing that we were dumping milk and people just didn't understand, and I got super defensive, but at the same time, you wanted to fight back. I remember a specific couple of weeks that really motivated me to post, and it started before COVID.

ANNA: I really wanted to drive consumer interest in the dairy industry, especially with COVID-19. We know that people were financially impacted. That's going to impact their ability to buy food and buy enough food and when it comes down to an affordable, nutrient dense option that is dairy products.

BESSIE: It was such a sensitive time for people, nobody needed the blame game, so I just tried to be conscientious of that and had my posts address the hard situations, but keep a positive outlook on it.

AMY: I know my one Instagram post isn't going to change the world or anything but knowing that if I have the opportunity to help promote and bridge this gap to help support dairy farmers and my friends and family in any sort of way.

ESTELLE: We really wanted to get dairy into the hands of people that needed it and we were all at home and disconnected, so social media was the way that we could reconnect with people across the U.S. and globally.

Educating the Community

Four interview participants discussed educating the community as a driving force to communicate about crisis. This includes educating both producers and consumers.

NELLIE: The motivation there was to continue the education, but that went toward the kids' side of things. As far as adults, you don't have many three-year-olds or five-year-olds that are on Facebook or Tik Tok, so that part of things didn't really change. I want to make people laugh. I wanted to make sure that, at least on my page it was a relief. It wasn't nonpartisan nonagenda, these are my cows, these are my kids.

BERTHA: I had a post explaining why that happened and explained it from a dairy producer's perspective, saying no we have a lot of milk, the supply chain changed.

Research Objective Three

Research Objective Three was to determine if agricultural influencers were influenced by agricultural news stories. To do so, participants were first asked about their consumption habits of agricultural news. Six out of seven influencers stated they regularly consume agricultural news. The outlier in this study did note they subscribe to many news updates and emails and felt they should consume agricultural news more regularly, but they currently do not read them.

Inspired by News

Four out of seven participants stated they are often inspired by stories they see in agricultural news.

BESSIE: It gives me a lot of inspiration for posts, keeping my finger on the pulse of what's going on in the world and I will typically read my new favorite, Magnetic Ag.

AMY: Just being able to see where they're potentially getting their references from, where they're getting their information from, it gives me a little bit more to work with so I could go out and create these posts as well and know it's coming from a factual source.

BERTHA: A lot of times my passion for wanting to share things is that I was getting tired of animal activists getting light for things and knowing that it was false information and a lot of people just had no idea.

ANNA: I definitely would say that they've inspired some of my posts. They also keep me up to date on potential crisis, whether it be COVID-19 or an activist situation, or some other concern that's going on in the industry. They can inspire posts, but I also think they help prepare me for questions.

Two participants were unsure due to their involvement in policy, and one participant did not consume ag news to be influenced by.

NELLIE: A lot of times I'm in the room during that [making newsworthy decisions], so it's kind of difficult to say which came first.

ESTELLE: I don't think so, but that doesn't mean I wasn't subconsciously influenced.

Conclusions and Discussions

The purpose of this study was to explore and describe strategies, approaches, and motivations used by Instagram influencers in the dairy industry during the early months of the COVID-19 pandemic. With a rise in influencer marketing and little research conducted on the subject in agriculture, this study aimed to provide practical data about the use of social media influencers during an agricultural crisis (Schomer, 2019).

Important conclusions can get lost when embedded in the narrative (McCammon & Saldana, 2011). Because of this, Table 4.1 outlines the themes identified from each research objective (McCammon & Saldana, 2011).

The first research objective sought to describe agricultural influencer strategies to communicate COVID-19's impact on the dairy industry. Six out of seven influencers interviewed had a strategy when communicating about COVID-19 and the dairy industry. As opinion leaders, this

is a crucial part in their effectiveness of influencing others. The participant who did not have a strategy was a strategy within itself, which adds to their relatability. Additionally, all participants noted how they would adjust future crisis communication, one of which aimed to create additional partnerships. Influencer strategy and forward-thinking to future crisis communication make them good candidates for influencer marketing in crisis.

Table 4.1
Summary of Themes from Each Research Objective

Research Objective	Identified Themes
RO1 Describe agricultural influencer strategies to communicate about COVID-19's impact on the dairy industry.	1. Crisis communication strategies 2. Future crisis communication strategies
RO2 Understand the motivation behind agricultural influencers' social media posts about the dairy industry during COVID-19	1. Helping stakeholders 2. Educating the community
RO3 Determine if agricultural influencers are influenced by agricultural news stories.	1. Inspired by news

The second research objective aimed to understand the motivation behind agricultural influencers' social media posts about the dairy industry during COVID-19. All influencers were motivated to post by something other than themselves and their own personal gain. Some were motivated by helping stakeholders, and others were motivated by educating consumers and the farming community about the crisis. Results exhibit insight on crisis communication motivations by social media influencers within the industry. Furthermore, they relate to opinion leadership theory in their desire to exert influence over their followers. As advocates and opinion leaders, this further accentuates the idea of social media influencers as partners in crisis communication.

The third research objective determined if the social media influencers interviewed were influenced to post by agricultural news articles they had read. With four out of seven influencers stating they were inspired by agricultural news and two who were unsure, the data indicate a relationship between the two. The last participant was an outlier and did not consume any news to be influenced by, although they mentioned they would like to start. These results indicate that social media influencers within the dairy industry are informed about crises. This helps qualify them as opinion leaders. They also suggest there is room for partnership between agricultural news outlets, social media influencers within the industry, and dairy organizations.

An influencer's ability to impact an individual's decision-making process and positively influence a brand's image makes them beneficial tools for crisis communication (Singh et al., 2020). Their role as opinion leaders makes them key players in the diffusion of information (Chan & Misra, 1990). When social media influencers are used by brands to promote products, an organization can boost its image among influencer followers (Di Vierman et al, 2017). This can be useful for agriculture as an industry when facing a crisis.

Through the results of this study, it is evident influencers within the dairy industry have selfless motivations to post about industry crisis. It is also evident that they are opinion leaders by the number of followers and the manner in which they stay informed on issues. Influencers within agriculture wanted to protect their industry by educating both farmers and consumers about the truth behind the crisis of COVID-19 and its impact on the dairy industry. Influencers also did so strategically, with the intention of being mindful of the tone of their posts. They tried to stay positive, relatable, and present factual information.

This study provides industry professionals with important insight into the strategies and motivations behind social media influencers within the dairy industry. Results from this study are beneficial to both industry professionals and the field of academia. The use of influencers can be a beneficial addition to communication strategy and crisis communication plans in the agriculture industry. Influencer marketing is a growing practice, and these results provide practitioners with necessary information when deciding to include influencers in their crisis communication backed by opinion leadership theory.

Recommendations

This research is the first of its kind in the field of agriculture to our knowledge. It is evident additional research should be conducted on both the use of Instagram influencers and the use of influencers as a marketing tool in agriculture (Taylor, 2020). Future research should look at agricultural influencers in other segments of the agricultural industry, rather than specifically dairy. While results can be generalized to other industries in agriculture, a less specific replication of this study could benefit both academia and industry practice.

Additionally, future research should be conducted on other crises. This crisis was unique in that it was a worldwide pandemic. The industry could benefit from similar research conducted on additional crises specific to a sector of industry. This could provide saturation and additional generalizability for crisis communication and the use of influencers.

Within agriculture, influencers should be an addition to crisis communication plans and communication strategy. Relationships with influencers should be developed prior to a crisis. This allows for a more natural partnership between influencers and agricultural organizations.

In the field of agricultural communications, this study also makes contributions to the education of future agricultural communications students. When teaching students about crisis communications, it is important to consider the implications of partnering with agricultural journalists and social media influencers. Educators should place emphasis on including these partnerships in crisis communication plans.

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An Examination of Extension Video Producers' Training, Background, and Attitudes

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Initiating an exploration of the media logic employed by extension communication units, this study focused on the background, training, and attitudes of extension communicators using video. Within this context, the application of media logic provides a pathway for non-media actors, such as extension, to capitalize existing audience expectations and increase attention to their products along with audience acceptance of messages. Through a nationally distributed survey, this study collected descriptive data on the extension workforce and factors which influence their use of media logic and illuminate their values within it. Here, we have a view of a mature workforce which seems built with a preference for educations and video experience over agricultural experience. Additional study will be required to fill in other elements of the logic model.

Introduction and Literature Review

The cooperative extension movement was one of the earliest adopters of broadcast technologies, utilizing the tools of audio and video to share information with rural and agricultural audiences (Wik, 1988; Zweig, 2009). Yet, with programmatic goals of education rather than entertainment, it remains vital that extension agencies regularly evaluate their video products, production processes, and audiences for alignment with organizational goals (Scherer, 1988). For the extension video professional, a predictable conflict may occur between the understood logics of the video production industry and the programmatic needs of the academic system in which extension professionals are typically embedded. Universities, including those land-grant institutions which house extension agencies, have characteristic qualities of an academic focus, bureaucratic structure, and highly complex organizational structures (Delpont, 2020). The logic which evolves from these characteristics, and its interpretation by actors within each system, will influence the application of sub-logics such as those of communication and information technology (Hayes & Rajão, 2011). Extension agencies may directly employ creative professionals to complete communication tasks including video production. The creative output of such individuals within an organization has been linked to both individual creative self-efficacy and team knowledge (Richter et al., 2012). Ekvall (1997) further found that understanding of organizational goals, mission, and strategies is supportive of creative work. Taken together, these offer a view of organizational creativity that is influenced by a combination of individual, team, and organizational factors.

Examination of the agricultural communication field has shown a rapidly changing agricultural industry, changing stakeholder groups within that industry, an increasing demand for communication products within a shortened timeframe, and an increase in the importance of brand identity (Doerfert & Miller, 2006). These suggest a benefit to agricultural communication

professionals from multiple forms of knowledge including agricultural knowledge and communication industry knowledge. Indeed, Morgan and Rucker (2010) found that university agricultural communication faculty placed an emphasis on agricultural knowledge alongside communication knowledge importance within their programs. Additionally, we see continued desire from employers for communication hires to have formal training in communication practices and technical skill sets (Corder & Irlbeck, 2018; Ettredge & Bellah, 2008; Leal et al., 2020). Likewise, a review of agricultural communication curriculum shows an increasing interest in visual communication courses (Cannon et al., 2016).

Theoretical & Conceptual Framework

This study seeks to document the characteristics of extension video producers along with their perceptions of common video tasks in an effort to begin to understand the influence of organizational logics on their work. Guiding this effort is the theory of media logic as proposed by Altheide and Snow (1979). Altheide (2004) defines media logic as the decision processes and influences that shape media processes and products and feed a reciprocal relationship with audiences. The application of media logic within these organizations is important to understand as it may influence the translation of internally articulated organizational goals and messages to external audiences. Such audiences tend to interact with media messages in both social and technological contexts, experiencing media not as a multitude of individual content but as a unified media phenomenon (Doeveling & Knorr, 2018). As an example, public discourse will often discuss and evaluate the effects of “the news” rather than individually assessing the effects of channels, programs, or specific reporters. Altheide (2004) defined the elements of this logic as the assumptions, processes, formats, grammar, and rhythms of the medium which evolve and over time form the expectations of the audience in what becomes a reciprocal relationship. It is a thick network of decisions and influences that then help the audience identify and classify the products they encounter. As media coalesce around a set group of common practices within a format and genre (i.e. local television news, national gossip magazines, public radio news), these products become more rapidly identifiable to audiences, and these practices become seen as the standards by which products may be judged (Altheide, 2013). Klinger and Svensson (2018) assert, “How we relate to media is governed by the logics/combination of logics on media platforms in terms of rules and processes of media production, distribution, and usage, as well as our perception of such norms and processes.” This relationship may serve as a pathway for non-media organizations (such as cooperative extension) to generate both attention and message acceptance within an audience whether distributing information through the media or by replicating the methods and formats of the media (Altheide, 2004; Mazzoleni & Splendore, 2008).

This study is an early step in the investigation of media logic use within the extension video production efforts. Here, the authors focus on the production decisions made within extension by examination of the influences of background and training on those creating video for extension, and the perceptions of those creators toward different common production practices. This is an essential step in conceptualizing media logic application within extension communication units, allowing for deeper exploration of this theory and its potential impact on the industry.

Purpose and Research Objectives

This descriptive study focused on video production personnel within extension communication units across the United States. Guiding this research are the following research questions:

RQ1: What agricultural background do extension communicators in video production roles possess?

RQ2: What formal video production training do extension communicators in video production roles possess?

RQ3: How do extension communicators in video production roles assess common video production tasks in terms of organizational importance, team competency, and individual comfort?

Methodology

This study sought to describe the common characteristics and attitudes of extension video producers across the United States. Key variables include descriptive statistics of videographer demographics, agricultural background, formal training, and production process attitudes. This research plan was reviewed by the Human Research Protection Program at Texas Tech University and received approval from the Institutional Review Board. A questionnaire was constructed and distributed through Qualtrics following the principles laid out by Dillman et al. (2014) and reviewed by an expert panel. Members of that panel had all previously worked within extension communication units and utilized video within those careers. None held such positions at the time of this survey. The group represented a wide range of technical experience and a variety of industry segment experiences necessary to construct a comprehensive set of common industry tasks. This panel contributed feedback on questions of agricultural experience, educational background, work history, and the common production tasks. Faculty members at Texas Tech University also reviewed the instrument for design issues and analytical validity. They further assisted in refining question design and reviewed expected data types with plans for analysis.

Two graduate students within the Department of Agricultural Education and Communications at Texas Tech University were recruited for cognitive testing of the instrument. These individuals worked through the instrument in the presence of the lead researcher, speaking their thought process aloud (Dillman et al., 2014). Issues identified in this process included wording, order, navigation, and design. All identified problem areas were addressed before continuing forward. A larger set of graduate students in the Department of Agricultural Education and Communications at Texas Tech University then participated in a pilot test to identify distribution errors and provide sample data for an analysis mockup, verifying the build of the data set.

A study frame was constructed to include individual video producers across the 50 United States employed full-time in communication units by the state extension agencies associated with land-grant universities. Recognizing that many types of extension employees (including county agents, support staff, and state specialists) may create video products as part of their duties, this

study focused solely on those employed as professional communicators engaged in content-creation practices or media management within a formal communication or administrative unit, and thus most likely to be formally trained to adhere to media logic norms and to represent the top-line communication projects of their respective agencies. However, it is important to note that many in the frame wear multiple hats as professional communicators. Video production may be only one of their common tasks. This frame was compiled through the examination of extension websites, direct contact with departmental leadership via email and/or telephone, and through professional organization membership. In all, 144 individuals were identified for initial instrument distribution with the instrument encouraging participants to share the study with colleagues for additional snowball sampling.

Participants were sent a recruitment letter with a small recruitment incentive via traditional mail to their office address. As survey participants were all state employees and each state has unique policies regarding employee acceptance of gifts, the chosen incentive was a low-value, custom-printed lens cleaning cloth featuring a custom design and the words, “Lights, Camera, Educate!” Along with a written appeal that emphasized a shared bond with the researcher (Dillman et al., 2014) as a former extension video producer seeking to address questions important to the participants (Dillman et al., 2014), this incentive was intended to increase participation. Additionally, the inclusion of the projected length of response time in the invitation email, and the use of inclusive language throughout, was used to further increase response rates (Dillman et al., 2014). The letter was timed to arrive in offices three to five days prior to an invitation email. This reiterated the key points of the recruitment letter while providing a link to access a Qualtrics survey. This and reminder emails were automated through Qualtrics using individual links so that completed questionnaires would exclude participants from reminder emails. Reminders were sent at roughly one-week intervals over six weeks.

Seventy-nine individuals responded for a response rate of 54.9%. After eliminating six responses either through check questions or via survey abandonment, a final sample of 73 responses remained. However, several responses were included where demographic data alone was withheld by the respondents. Due to this, demographic data is limited to 70 respondents. While the constructed frame included individuals from 48 states, responses were received from only 35 states. No appropriate individuals were identified for inclusion in the frame in the final two states.

A gender breakdown of the sample reveals 55.7% of respondents self-reporting as Male ($n = 39$), 38.6% as Female ($n = 27$), and 5.7% choosing not to report ($n = 4$). Age distributions derived from U.S. Bureau of Labor Statistics standards are shown in Table 1. From youngest to oldest, 30.0% of the sample was in the 25-34 range ($n = 21$), 17.1% in the 35-44 range ($n = 12$), 12.9% in the 45-54 range ($n = 9$), 31.4% in the 55-64 range ($n = 22$), and 8.6% in the 65 and older range ($n = 6$). No respondents reported being under the age of 25.

Table 1

Demographics – Age ($n = 70$)

25-34	35-44	45-54	55-64	65 +
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<i>n</i>	21	12	9	22	6
%	30.0	17.1	12.9	31.4	8.6

Table 2 demonstrates the sample’s self-reported ethnicity with 1% of the sample reporting Spanish, Hispanic, or Latino ethnicity ($n = 1$), while 96% selected “None of these” ($n = 67$), and 3% preferring not to answer ($n = 2$).

Table 2
Demographics – Ethnicity (n = 70)

Ethnicity	Spanish, Hispanic, or Latino		None of these		Prefer not to Answer	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
	1	1.4	67	94.4	2	2.8

Table 3 shows the sample breakdown along racial identity where 92% of the sample identified as White ($n = 65$), 1% identified as Black or African American ($n = 1$), 1% identified as American Indian or Alaska Native ($n = 1$), and 6% identified as Other ($n = 4$). No respondents reported racial identification within the offered categories of Asian or Native Hawaiian/Pacific Islander.

Table 3
Demographics – Racial Identity (n = 70)

Racial Identity	White		Black or African American		American Indian or Alaska Native		Other	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
	65	91.5	1	1.4	1	1.4	4	5.6

Evaluation of the survey continued through collections and into data analysis. Initial responses were evaluated for irregularities with none found. Data was exported and analyzed in IBM’s SPSS. In the initial analysis of data collected, descriptive variables were assessed for content and face validity by the researchers with an eye toward irregularities and unexpected results. During the data analysis stage, questions related to agricultural experience, educational background, and work history were reported with frequencies, means, and standard deviations.

Three additional sections dealt with perceptions of 14 common video tasks within questions of individual comfort, team competence, and organizational importance. These three elements were selected to examine individual, team, and organizational factors which influence creative work within organizations (Göran Ekvall, 1997; Richter et al., 2012). The list of 14 tasks identified as common video production tasks was researcher-created and vetted by a panel of industry experts. These sections relied on a 5-point Likert-type scale (Gliem & Gliem, 2003) and were evaluated for reliability using Cronbach's α to examine internal consistency. Scales for task Comfort ($\alpha = .83$), Competency ($\alpha = .87$), and Importance ($\alpha = .88$) were found to be sufficiently reliable. Individual tasks for each of these questions and response percentages for each corresponding rank are reported. A table is then included to allow for consideration of task means and standard deviations across all three questions. The distributed instrument was designed to probe five areas of particular interest related to media logic: producer background and training, producer attitudes toward processes, technology used, products created, and project origination. Here, only the results of *background and training* and *producer attitudes toward processes* will be reported due to space limitations. Other areas have been previously reported.

Findings

The evaluation of findings is reported here through groupings based on research questions. Research Question 1 sought to explore the background and training of those employed as extension video professionals. Survey respondents indicated that 56% ($f = 41$) spent portions of their childhood living in suburban areas (2,500-50,000 residents). With overlap, 32% ($f = 32$) indicated spending some time in rural areas (<2,500 residents), and another 25% ($f = 18$) lived in urban areas. Considering their current location, 55% ($f = 39$) indicate they currently work in a state where they spent a significant portion of their childhood.

Regarding the agricultural experiences of these video producers prior to employment in their current positions, 47% ($f = 34$) stated no prior experience with agriculture, as shown in Table 4. The remaining 53% provided overlapping answers to include: visiting farms or ranches of family or friends ($f = 23$, 36%), being raised on a farm or ranch ($f = 13$, 18%), working in production agriculture ($f = 5$, 7%), working in an agricultural support business ($n = 4$, 5%), or other ($n = 4$, 5%) with categories provided by users of news gathering, governmental service, and explanations of combinations from previous options.

Table 4

Agricultural Experiences of Video Producers Prior to Current Employment (n = 73)

	<i>f</i>	%
No prior experience with agriculture	34	47
Visited farm(s)/ranch(es) of family/friends	23	36
Raised on a farm/ranch	13	18
Worked in production agriculture	5	7
Worked in an agricultural support business	4	5
Other	4	5

Research Question 2 sought to explore the formal video production training of these communicators. This sample indicated high levels of college education. No respondent suggested their highest level of educational attainment was less than a bachelor's degree, while 48% ($f = 34$) indicated a bachelor's degree and 51% ($f = 36$) selected an advanced degree as their highest level achieved. Looking deeper at educational experiences related to video or film production, 52% ($f = 38$) stated they participated in formal classes within a post-secondary environment. Table 5 illustrates the findings. With participants allowed to select for all conditions that applied, self-guided training ($f = 26, 36\%$), informal training / mentoring ($f = 19, 26\%$), and formal classes in a secondary setting ($f = 15, 21\%$) accounted for other video or film training prior to their current position. Meanwhile, 14% ($f = 10$) suggested no prior educational experiences related to video or film.

Table 5

Educational Experience with Video/Film Prior to Accepting Current Position (n = 73)

	<i>f</i>	%
Post-secondary – Formal Classes	38	52
Self-Guided Training	26	36
Informal Training / Mentoring	19	26
Secondary – Formal Classes	15	21
No prior educational experience	10	14
Other	3	4

Respondents were likewise asked about all previous work experience in video or film prior to accepting their current position as shown in Table 6. Previous full-time video/film employment was reported by 41% ($f = 30$). An additional 29% ($f = 21$) reported experiences as an Amateur/Hobbyist, while 25% previously held part-time video/film employment. Where 16% ($f = 12$) reported engaging in freelance video/film work, an equal percentage reported no prior video/film experience ($f = 12$, 16%). Respondents were able to indicate more than one answer.

Table 6

Work Experience with Video/Film Prior to Accepting Current Position (n = 73)

	<i>f</i>	%
Full-time Video/Film Employment	30	41
Amateur/Hobbyist	21	29
Part-time Video/Film Employment	18	25

Freelance Video/Film Employment	12	16
No prior video/film experience	12	16

Turning then to task evaluations, participants were asked to rate each of 14 common video tasks by importance to their organization, team competence in completing the task, and individual comfort with each task. Editing video ($M = 4.64$, $SD = 0.76$), recording video ($M = 4.62$, $SD = 0.74$), and recording audio ($M = 4.53$, $SD = 0.85$) were evaluated as the most important tasks to meet organizational goals. Producing transcripts ($M = 3.18$, $SD = 1.25$), storyboarding ($M = 2.77$, $SD = 1.30$), and logging video metadata/tagging ($M = 2.70$, $SD = 1.22$) were seen as the least important tasks for organizational goals. Task means and standard deviations for all attitudes are reported in Table 7.

Table 7

Comparison of Mean Task Evaluations

	Organizational Importance		Team Competence		Personal Comfort	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Editing Video	4.64	0.76	4.60	0.78	4.43	0.99
Recording Video	4.62	0.74	4.66	0.66	4.45	0.99
Recording Audio	4.53	0.85	4.52	0.80	4.20	1.07
Uploading Video to Social Media	4.50	1.01	4.57	0.72	4.43	0.90
Managing Client Relationships	4.48	0.81	4.49	0.77	4.29	1.03
Exporting Video	4.41	0.91	4.66	0.73	4.45	1.01
Project Planning	4.38	0.87	4.60	0.55	4.62	0.69
Producing Closed Captions	4.06	1.11	4.15	1.06	3.78	1.20
Managing Social Media Comments	3.79	1.28	4.03	1.03	3.54	1.28
Script Writing	3.70	1.24	4.37	0.83	4.10	1.05
Creating Motion Graphics	3.24	1.20	3.63	1.27	2.86	1.34
Transcribing Video	3.18	1.25	4.10	0.87	3.88	1.13

Storyboarding	2.77	1.30	3.94	0.92	4.07	0.91
Logging Video Metadata / Tagging	2.70	1.22	3.75	1.20	3.42	1.23

Evaluations of team competence for the same list of common video tasks reveals recording video ($M = 4.66$, $SD = 0.66$), exporting video ($M = 4.66$, $SD = 0.73$), and editing video ($M = 4.60$, $SD = 0.78$) as the highest rated competencies. Storyboarding ($M = 3.94$, $SD = 0.92$), logging video metadata/tagging ($M = 3.75$, $SD = 1.20$), and creating motion graphics ($M = 3.63$, $SD = 1.27$) were the lowest rated competencies. Task means and standard deviations for all attitudes are reported in Table 7.

The final task perception measured was for individual comfort in performing tasks by participants. Project planning ($M = 4.62$, $SD = 0.69$), recording video ($M = 4.45$, $SD = 0.99$), and exporting video ($M = 4.45$, $SD = 1.01$) were the highest rated tasks for individual comfort. Meanwhile, managing social media comments ($M = 3.54$, $SD = 1.28$), logging video metadata/tagging ($M = 3.42$, $SD = 1.23$), and creating motion graphics ($M = 2.86$, $SD = 1.34$) were the lowest rated tasks for individual comfort in task performance. Task means and standard deviations for all attitudes are reported in Table 7.

Limitations

This study only intends to capture a view of this particular industry segment at this specific point in time. No assumptions are made that data related to this segment of video production will be representative of other governmental or organizational video production units, let alone the broader industry. With only 73 respondents, it is difficult to generalize the data from this study to a broader population. It is important to recognize that the data reported here is descriptive in nature and no statistical analysis was conducted which intended to generalize more broadly than this captured sample.

Conclusions

This study sought to examine the role and procedures of video professionals within extension communication units in the United States. Producer background and training was examined along with producer attitudes toward common tasks. These elements combine to provide an initial sketch of influence of media logic within extension communication units. The sample for this study represented 35 states. The participants were overwhelmingly white (91%) and non-Hispanic (94%). However, gender presented more diversity. While a majority (55.7%) reported as male, a large portion (38.6%) reported as female. This may also be seen as an aging population as more than 50% of the survey sample was age 45 or older, typically a career mid-point, and 40% were age 55 or older.

In examining the background and training of the respondents, we see that nearly half of our respondents had no experience with agriculture prior to their current position. Where Doerfert and Miller (2006) pointed to benefits of agricultural knowledge to agricultural communicators,

and Morgan and Rucker (2010) found agricultural communication faculty emphasizing this knowledge, this finding leads to deeper questions of final importance for this agricultural knowledge versus communication knowledge in the hiring process at least within this highly technical field. Meanwhile 86% of respondents reported some form of video/film training prior to accepting their current position. 73% of respondents reported formal training (either secondary or post-secondary) with film or video. This focus on education supports assertions of a deference for formal training and an influence of this preference on the applied logic (Deport, 2020; Hayes & Rajão, 2011). This would seem to support the conclusions that extension hiring managers defer to technical video knowledge above agricultural expertise and that agricultural communication graduates need a firm base in technical skill to be competitive in the job market (Corder & Irlbeck, 2018; Ettredge & Bellah, 2008; Leal et al., 2020).

When examining the individual comfort, team competency, and organizational importance of video-related tasks, a clearer understanding of the role these teams and producers play emerges. Organizational importance evaluations were strongest in the more traditional broadcast skills of shooting and editing video, project planning, and client relationships, yet all skills were rated above the mid-point for their scales.

While team competencies were generally rated highly for all skills, a clear drop off occurred in individual comfort, especially along the lines of newer work activities such as managing social media comments, creating captions, and creating motion graphics. This drop off may be a product of the age of our sample with the expectation that formal training for much of this sample would have occurred decades ago.

Implications

While this study assumes no set retirement age, these numbers suggest a fair number of position vacancies in the coming years. More than half of the individuals surveyed are above the age of 45 and should therefore be considered in the back half of their career. Further, 40% of participants are 55 years old or older. With this data, we may predict a number of openings within the field in the next 10-15 years as these individuals approach retirement. As these positions come open, agricultural communicators will need to have clearly demonstrated video training to be competitive candidates. More than half of this sample had no agricultural experience prior to employment in their current position. While agricultural experience is likely an advantage for candidates of equal technical qualification, it seems that knowledge of agriculture remains less important overall than technical knowledge of video production.

In considering the video techniques examined, a disparity emerged between the organizational importance of creating motion graphics and the personal comfort in doing so. This is a gap that agricultural communication programs may be able to fill through curriculum additions or through partnering with other departments within university systems. Recent evaluations of agricultural communication courses (Cannon et al., 2016) showed no focused classes identified with motion graphics, yet these skills may be taught within video production or graphic design courses.

Recommendations

Recommendations for Research

Future research may continue to explore the role of media logic in extension programming in multiple ways. To directly follow on this study, effort should be made to explore the influence of training, background, and time of service within an extension communication unit within individual cases. Additional consideration of attitudes as related to education level would be warranted but would require a larger sample for proper statistical analysis. Considering this, the sample for such study should be expanded beyond the borders of extension education to include agricultural communicators in other sectors such as commodity groups, breed associations, and farm service organizations.

To explore more fully the indicated reciprocal relationship between audience and media, examination should be made of extension audience media habits and common outlets for these audiences. Again, descriptive studies of audience habits are a likely first step with deeper case-based analysis to follow.

With expected changes to this industry segment due to retirements, this study could be considered a benchmark and repeated at an appropriate time. Such effort could track changes in industry, while informing the training efforts of agricultural communication educational programs.

Recommendations for Practice

Where media logic suggests that audiences hold expectations of media, and that these may change by audience segment, extension communication units should apply effort into understanding the media habits of their audiences and regularly update this understanding. From there, effort and intention should be used in hiring to be reflective of audience expectations. Such effort could be reflective of demographics, education, and experience with agriculture. While it may be difficult to hire enough individuals to accurately reflect the diversity of extension audiences, efforts can be made to expose existing staff to cultural and industry experiences which allow them to better relate to, and thus better serve, identified audiences.

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Influence of Attitudes and Topic Importance on Selective Exposure to Agricultural Messages: A Logistic Regression Analysis

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Social media platforms have changed how people communicate. With the addition of programable algorithms and Web 3.0, users can form their own information bubble to confirm prior beliefs or attitudes, known as confirmation bias. This study sought to explore the effects of attitude and importance on selective exposure, an indicator of confirmation bias. While previous studies regarding the effects of selective exposure have been mainly within the realm of political and health sciences, this study explored this concept relevant to agricultural science information. Using a message treatment embedded in a questionnaire, this quasi-experimental study measured participants' attitude, topic importance, and selective exposure. The results of the logistic regression analysis indicated a significant influence of attitude and topic importance on selective exposure for the two experimental message topics, although this varied by message topic. The results encourage subsequent research to continue exploring the complex process of confirmation bias and selective exposure to online content. Additional insight in this area will help agricultural communicators develop more effective message strategies.

Introduction/Literature Review

From politics to personal connection to mental health, social media can impact all aspects of life (Allen, 2019; Brown, 2018). Social media are important tools for reaching a large audience and connecting people through online interactions (Zhao et al., 2020). In 2005, only 5% of United States adults used social media, but by 2019, that number has increased to 70% (Allen, 2019). Not only has the number of platforms a person uses increased, but also the time spent on each platform has “skyrocketed” (Allen, 2019, para. 1).

Just under half of U.S. adults (43%) receive their news from online sources, with 18% being strictly social media sources (Mitchell et al., 2020). During the COVID-19 pandemic, the reliance on social media only increased, specifically when looking into how people accessed news about current events (Hess et al., 2020; Mitchell et al., 2020). With the need for instant information regarding the pandemic, many health care professionals and politicians turned to social media networks to provide rapid communication (Venegas-Vera et al., 2020). Communication over social media is instantaneous and has a dynamic element, allowing users to interact with content and each other (González-Padilla & Tortolero-Blanco, 2020; Venegas-Vera et al., 2020).

The introduction of Web 3.0, which expanded from Web 2.0 by creating a new level of connection across platforms, and social media platforms shifting to new content and engagement-based algorithms (versus timeline-type algorithms) has changed how people find

and interact with online content. They are now presented with new content similar to past content based on their engagement: sharing, liking, and commenting (Digital Marketing Company, 2019a). Ultimately, this creates a feed that perfectly fits each user's personal interests, placing users into their own bubble. Social media feeds show users information that will continue to be "liked," and engaged with, eliminating an unbiased or well-rounded feed (Digital Marketing Company, 2019a); further dividing the bubbles people create (Baker, 2020; González-Padilla & Tortolero-Blanco, 2020; Pariser, 2011). These personalized "filter bubbles" cause social media to become divided, only displaying one side of information (Noor, 2020; Pariser, 2011). As social media become one of the primary ways consumers are receiving news about current events (including the agricultural industry), there is a danger that filter bubbles could lead to consumers not receiving all the facts and evidence to make an informed decision and fall victim to confirmation bias through selective exposure (Mitchell et al., 2020; Noor, 2020; Pariser, 2011).

Confirmation bias is defined as seeking for information that emphasizes or confirms pre-existing beliefs (American Psychology Association, n.d.; Klein, 2019; Klayman, 1995; Nickerson, 1998). Confirmation bias is a constant process to limit cognitive dissonance that shapes the way people think and their attitudes toward different topics (Noor, 2020). Confirmation bias is not only displayed when people seek out specific information, but also when recalling or re-interpreting information (Oswald & Grosjean, 2004). When using social media, people tend to find news outlets or follow accounts that match their beliefs, interests, and values (Pariser, 2011).

When confirmation bias is present, it is often expressed through selective exposure, which is defined as a deliberate behavior one commits to attain control over events in life to limit cognitive discomfort (Zillmann & Bryant, 1985). Selective exposure is a behavioral cognitive process individuals do, most likely subconsciously, to focus on information that helps affirm attitudes rather than causing discomfort through information that disagrees (Knobloch-Westerwick & Kleinman, 2012). When referring to attitudes, selective exposure is described as the action of choosing attitude-consistent information rather than attitude-discrepant information (Knobloch-Westerwick et al., 2015b).

Confirmation bias and selective exposure are interconnected and often studied together (Knobloch-Westerwick and Kleinman, 2012; Westerwick et al., 2020; Williams et al. 2016). In fact, some researchers will substitute one for the other (Klayman, 1995). Knobloch-Westerwick and Kleinman (2012) connected selective exposure to confirmation bias by using the time individuals expose themselves to different content as evidence for confirmation bias. Williams et al. (2016) theoretically connected selective exposure and confirmation bias into a positive feedback cycle when researching employee's attitude development. They found that employees with a positive attitude toward the company will seek out the positive aspects or virtues, which then confirms their positive attitude (bias) of the company, causing them to find more evidence to support their positive attitude (selective exposure) (Williams et al., 2016). Knobloch-Westerwick et al. (2015a) found a significant effect of importance on selective exposure. Importance has been a key variable in selective exposure research since Festinger (1957) because researchers theorized that higher personal importance will increase confirmation bias (Knobloch-Westerwick et al., 2015a). Knobloch-Westerwick et al. (2015a)

found that individuals presented a strong bias toward attitude-consistent messages, especially when the topic was of high importance.

Recent studies, specifically within political science, have demonstrated how social media platform algorithms cause users to be selectively exposed to content that matches their attitudes and beliefs (Knobloch-Westerwick & Kleinman, 2012; Knobloch-Westerwick et al., 2015a; Knobloch-Westerwick et al., 2015b; Ling, 2020; Westerwick et al., 2020; Zhao et al., 2020). Other researchers have used selective exposure as a tool to uncover an individual's confirmation bias (Fischer et al., 2020; Knobloch-Westerwick et al., 2015a; Westerwick et al., 2020.) Understanding the impact of confirmation bias on audience members' selective exposure and attention to social media messages will help communicators develop more effective message strategies.

Theoretical Framework

To guide this study, the theory of cognitive dissonance and the approach-avoidance model worked together to understand how attitude and confirmation bias impact the view of agricultural messages on social media. Festinger (1957) defined dissonance as the inconsistency of a person's thoughts. When a person's attitude and actions conflict with one another, an uneasiness or dissonance is created, leading to a change in attitude or action. Through different situations, a person hopes to achieve and experience consonance, or constancy in cognition (Festinger, 1957). Being exposed to dissonance "motivates [a] person to reduce the dissonance and leads to avoidance of information likely to increase the dissonance" (Harmon-Jones & Mills, 2019, p. 3). Studies that connect the theory of cognitive dissonance and selective exposure, including the current study, assume that any message that is not viewed is due to a participant avoiding attitude-discrepant information (Klayman, 1995; Knobloch-Westerwick & Kleinman, 2012; Sude et al., 2019).

The approach-avoidance model (Lowin, 1967) expands on the theory of cognitive dissonance to describe the two choices an individual has during a situation of dissonance. According to the model, people will approach messages with a high topic importance and avoid messages with low topic importance (Bruning & Campion, 2018). This description of how people interact with information is directly tied to the behavior of selective exposure. Within political communication, Westerwick et al. (2020) used this model to explore how source credibility impacted selective exposure. Based on the results, the researchers concluded that source credibility did not influence people to approach or avoid certain messages, nor did it impact the attitudes of participants. However, attitude and importance placed on the topic by the individual held a greater influence on selective exposure (Westerwick et al., 2020). Overall, the results of the study further supported the concept of the approach-avoidance model. Participants still sought out the information that agreed with existing attitudes, rather than information that contradicted them.

Purpose and Research Question

The purpose of this study was to determine the effect of attitudes and topic importance on an individual's selective exposure when seeking agricultural information on social media. The

following research question guided this study: What influence do attitudes and topic importance have on participants' selective exposure to agricultural messages?

Methodology

This quantitative study employed a quasi-experimental design. This study is presented like an experimental design; however, the researcher has no control over exposure to the stimuli (Campbell & Stanley, 1959), as the design of the study allowed participants to self-select stimuli. Four messages were created using a 2 (topic: climate change vs. antibiotics in livestock) x 2 (attitude: pro-agriculture/support vs. anti-agriculture/oppose) design. This study was modeled after procedures from Sude et al. (2019). The study was completed within a laboratory setting. While conducting the study within a laboratory setting creates an artificial environment, which decreases the ecological validity, the lab setting allowed the researcher to minimize distractions and provide a consistent environment for participants to complete the study (Wimmer & Dominick, 2014).

The questionnaire used for this study was created in Qualtrics and contained 45 questions, including the message stimuli. Participants controlled what messages they viewed so it was possible that not all 45 questions were viewed by all participants. Four different questionnaires were created to develop a randomized order of stimuli. The independent variables were attitude and topic importance. The dependent variable of selective exposure was measured by whether a specific stimulus was selected. A pilot test was conducted with agricultural education and communications graduate students to assess the flow of questions, establish the reliability of items, and message test the stimuli. Based on feedback from the pilot test, a few revisions were made to improve the flow of the questionnaire. Face validity was established using a panel of experts in agricultural communications and survey development.

Population and Sample

The target population for this study was college students. The accessible population was undergraduate students at Texas Tech University who are predominantly classified as Generation Z (ages 18-24). The Pew Research Center (2020) has referred to Gen Z as the "digital native" generation. Gen Z has grown up having access to all technology such as smartphones. For college students, social media platforms are not only tools used for connecting with family and friends, but also serve as the main place to find news (Pew Research Center, 2021).

Participants were recruited through an online university system, which allows researchers to recruit undergraduate students from a variety of departments and assign participation credit within the system. Students signed up voluntarily to participate in an in-person laboratory experiment. The data were collected over the course of three weeks in 21 different group sessions. Each session had a maximum of 24 students allowed in the lab at a time. Data were collected from 117 participants. Eight participants were eliminated from the final data collection due to incomplete information that inhibited data analysis. The final sample size was 109 participants.

Variables

Attitude. Participants were asked to indicate personal attitude of each topic on a 5-point semantic differential scale with five bipolar adjective pairs: *acceptable/unacceptable*, *helpful/harmful*, *right/wrong*, *good/bad*, *positive/negative*. These bipolar items were adapted from Fischer et al. (2020). Participants were asked to indicate their response to a phrase about each topic. The phrase for antibiotics was: “I believe of antibiotic use in livestock production is _____.” The phrase for climate change was: “I believe agricultural industry’s impact on climate change is _____.” An overall attitude score was computed for each participant by calculating the mean of the individual responses for the bipolar adjective pairs. Following the pilot test, reliability was calculated for these attitude scales. The antibiotic scale had a Cronbach’s alpha reliability of .97; the climate change scale had a Cronbach’s alpha reliability of .91.

Topic Importance. Participants were asked to indicate importance of each topic on a 5-point semantic differential scale with five bipolar adjective pairs: *not very important/very important*, *of no concern/of concern*, *doesn’t matter to me/matter to me*, *irrelevant/relevant*, *worthless/valuable*. The bipolar items were adapted from Fischer et al. (2020). The phrase for antibiotics was “I find the topic of antibiotic use in livestock production to be _____.” The phrase for climate change was: “I find the topic of agricultural industry’s impact on climate change to be _____.” An overall topic importance score was computed for each topic by calculating the average of the five bipolar adjective pairs. Using the pilot test data, the reliability of these scales was calculated. The antibiotic use in livestock scale had a Cronbach’s alpha reliability of .97 and climate change had a Cronbach’s alpha reliability of .95.

Selective Exposure. The dependent variable of selective exposure was measured by recording if the participant selected (or not) each stimulus.

Message Stimuli

The message stimuli included two parts: a Twitter feed with links to blog posts and the actual blog posts for participants to view. Both treatment and message variance were considered in this study. Treatment variance is created by providing two levels of treatment and message variance is created when there are multiple messages per treatment (Thorson et al., 2012). In this study, the treatment was the attitude of the message (pro-agriculture vs. anti-agriculture) and there were two topics per treatment (antibiotics and climate change). The two topics of antibiotic use in livestock and climate change were chosen due to interest of researchers and opinion polarity seen within news coverage nationally (Steede et al., 2019; Taddicken & Wolff, 2020).

Blog posts were taken from already published material (beefwhatsfordinner.com, 2021; Carrington, 2018; Groosman, 2021; Kleven, 2020) found through a Google search of key words/phrases. Original material was adjusted slightly to add or remove words to reach a similar word count and to add section headings, so the formatting appeared similar. No

pictures were included in any of the blogs. Targeted word count was set at 800 words, with a 10% range (\pm 80-word, 720-880).

Once the blog posts were written, a tweet for each blog post was created using a tweet generation website (tweetgen.com). All tweets came from a fake gender-neutral account (Jordan Smith, @jordansmith), had the same number of retweets (2.4K), quote tweets (511) and likes (18.7K), and were posted on the same day and time (3:26 PM on August 4, 2021) to avoid any unintentional bias due to source or external factors. A gender-neutral account was chosen to eliminate any bias on account of gender. Flanagin and Metzger (2003) suggested that gender can be an influential factor on audience perception and attention to information. Controlling the source of the account and characteristics of the tweet controlled the selection to be based on the text presented. Tweets were kept under the Twitter character count of 280 and all included the phrase "Click to learn more:" with a bit.ly link. Presentation order of the Twitter feed containing all four messages was randomized to guard against order effects (Ary et al., 2010). A total of four different versions of the Twitter feed were randomized across sessions.

Data Analysis

The data were collected in Qualtrics then analyzed in IBM SPSS version 27. Data were first exported from Qualtrics into an Excel document to be organized and remove participants with missing data. Descriptive and inferential statistics outlined by Field (2012) were used to answer the research question. Prior to calculating statistics, the researcher explored the data to ensure the assumption of statistical procedures had been met for parametric analysis. Binomial or binary logistic regressions are used to determine the probability (or to predict the odds of occurrence) of the dependent variable (i.e., selective exposure to each blog message) based on the independent variables, also known as predictors (i.e., attitude and topic importance). A binomial logistic regression was used because the dependent variable was dichotomous. Selective exposure was determined by if participants viewed or did not view each blog.

Results

Four binomial logistic regressions, one per blog type (topic x message frame), were performed to ascertain the effects of attitude and topic importance on the likelihood that participants would selectively expose themselves to agricultural messages. Three different models, within each binomial logistic regression, were ran to determine the effects of the independent variables (attitude and topic importance) on selective exposure (viewed vs. not viewed message). Each model considered a different predictor of selective exposure: Model 1 used attitude as the main predictor, Model 2 added topic importance, and Model 3 added the interaction of attitude x topic importance. Omnibus Test of Model Coefficients uses chi-square statistics to compare the three models to determine which model computed the best fit to use for further statistical analysis (Field, 2012). First, the overall fit of the model is considered. If the overall model is significant ($p < .05$), then the chi-square of the block is considered; however, if the chi-square model value is not significant, the model cannot be used for further analysis. The block value explains the change from previous models, and

determines which model is the best fit or predictor of the dependent variable (Field, 2012). The model with the best fit was determined per blog type. The results of the binomial logistical regressions are presented below, separated by blog type.

Antibiotic Use in Livestock Pro-Agriculture. The Omnibus Test of Model Coefficients of Model 1 (Table 1) was statistically significant, $\chi^2(1) = 20.04$, $p < .01$, determining that this model was the best fit for the antibiotic use in livestock pro-agriculture blog message. In Models 2 and 3, the model chi-squared values were found to be statistically significant; however, the block values were not. This indicated there was no improvement from Model 1, where attitude was the main predictor. Using Model 1, further analysis was conducted.

Table 1

Omnibus Test of Model Coefficients for Antibiotic Pro-Ag Blog Message

		χ^2	<i>df</i>	<i>p</i>
Model 1 ^a	Model	20.04	1	< .01*
	Block	20.04	1	< .01*
Model 2	Model	20.14	2	< .01*
	Block	.09	1	.76
Model 3	Model	20.53	3	< .01*
	Block	.40	1	.53

Note. ^a Model 1 used for further analysis. * $p < .05$

When conducting further analysis, the model explained 22.6% (Nagelkerke R²) of the variance in selective exposure and correctly classified 71.6% of cases. Attitude as a predictor was found to be statistically significant, seen in Table 2. Participants who indicated to have a more positive attitude toward antibiotic use in livestock were 2.44 times more likely to view the pro-agriculture blog message.

Table 2

Logistic Regression Predicting Likelihood of Selective Exposure Based on Attitude

	<i>B</i>	SE	Wald	<i>df</i>	<i>p</i>	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Attitude	.89	.23	15.61	1	< .01*	2.44	1.57	3.79
Constant	-2.80	.81	11.96	1	< .01*	.06		

Note. * $p < .05$

Antibiotic Use in Livestock Anti-Agriculture. When analyzing the Omnibus Test of Model Coefficients for the antibiotic use in livestock blog message, all three models were not statistically significant. This indicated there was no model that best fit the data. Table 3 displays the Omnibus Test of Model Coefficients for all three models. Because no model was found to be statistically significant, there was no further analysis completed regarding the antibiotic use in livestock anti-agriculture blog message.

Table 3

Omnibus Test of Model Coefficients for Antibiotic Anti-Ag Blog Message

		χ^2	<i>df</i>	<i>p</i>
Model 1	Model	.48	1	.49
	Block	.48	1	.49
Model 2	Model	.60	2	.75
	Block	.11	1	.74
Model 3	Model	5.10	3	.17
	Block	4.51	1	.03*

Note. No models were used for further analysis. * $p < .05$

Agriculture's Impact on Climate Change Pro-Agriculture. The Omnibus Test of Model Coefficients of Model 2 was statistically significant, $\chi^2(2) = 19.14$, $p < .01$, determining this model was the best fit for the climate change pro-agriculture blog, seen in Table 4. Model 1 was overall not statistically significant, and Model 3 was statistically significant overall (the model's chi-squared value) but displayed no improvement from Model 2 (chi-squared block value). This indicated that Model 2 was the best fit for the data. Using Model 2, further analysis was conducted.

Table 4*Omnibus Test of Model Coefficients for Climate Change Pro-Ag Blog Message*

		χ^2	<i>df</i>	<i>p</i>
Model 1	Model	.21	1	.65
	Block	.21	1	.65
Model 2 ^a	Model	19.14	2	< .01*
	Block	18.94	1	< .01*
Model 3	Model	19.15	3	< .01*
	Block	.01	1	.91

Note. ^a Model 2 used for further analysis. **p* < .05

When conducting further analysis, the model explained 21.3% (Nagelkerke R²) of the variance in selective exposure and correctly classified 67.0% of cases. With the addition of topic importance as a predictor, results were found to be statistically significant (Table 5). Participants who indicated they viewed climate change as a highly important topic were 3.05 times as likely to selectively expose themselves to the pro-agriculture blog message. However, attitude as a predictor was not found to be statistically significant.

Table 5*Logistic Regression Predicting Likelihood of Selective Exposure Based on Attitude and Importance*

	<i>B</i>	SE	Wald	<i>df</i>	<i>p</i>	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Attitude	-.09	.21	.19	1	.67	.91	.61	1.38
Importance	1.12	.29	15.26	1	<.01*	3.05	1.74	5.34
Constant	-4.45	1.16	15.02	1	<.01*	.01		

Note. **p* < .05

Agriculture's Impact on Climate Change Anti-Agriculture. In the final blog message, the Omnibus Test of Model Coefficients of Model 2 was statistically significant, $\chi^2(2) = 8.81$, *p* = .01, determining that this model was the best fit for the climate change anti-agriculture blog message (Table 6). Model 1 was statistically significant for both chi-square values, yet when looking at Model 2, the block value was statistically significant, indicating there was

improvement when adding importance as a predictor. Model 3 was not statistically significant. Using Model 2, further analysis was conducted.

Table 6

Omnibus Test of Model Coefficients for Climate Change Anti-Ag Blog Message

		χ^2	<i>df</i>	<i>p</i>
Model 1	Model	4.65	1	.03*
	Block	4.65	1	.03*
Model 2 ^a	Model	8.81	2	.01*
	Block	4.16	1	.04*
Model 3	Model	10.02	3	.02*
	Block	1.22	1	.27

Note. ^a Model 2 used for further analysis. **p* < .05

In further analysis, the model explained 10.4% (Nagelkerke R²) of the variance in selective exposure and correctly classified 64.2% of cases. Both attitude and topic importance as predictors were found to be statistically significant (Table 7). Participants were .65 times as likely to view the anti-agriculture blog message based on attitude and 1.63 times to view the blog message based on their level of importance.

Table 7

Logistic Regression Predicting Likelihood of Selective Exposure based on Attitude and Importance

	<i>B</i>	SE	Wald	<i>df</i>	<i>p</i>	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Attitude	-.43	.21	4.34	1	.04*	.65	.43	.97
Importance	.49	.25	3.91	1	.05*	1.63	1.00	2.63
Constant	-.72	1.16	.39	1	.54	.49		

Note. **p* < .05

Conclusions & Recommendations

The internet and related technologies have provided people with access to a large amount of information at the touch of a button (Graber, 1997; Zhao et al., 2020). The original hope was to eliminate bias; however, social media platforms have helped create an environment where

people can place themselves in “filter bubbles,” through spending time connecting with like-minded people (Graber, 1997; Pariser, 2011). Particularly within agriculture, consumers’ perceptions about agricultural topics can be influenced by the types of media consumed (Fischer et al., 2020; Heiman & Zilberman, 2011). For these reasons, the current study sought to explore how attitude and topic importance influence selective exposure to agricultural messages presented through social media.

Four binomial logistic regressions were conducted, one for each blog message, to predict the selective exposure of participants based on the independent variables of attitude and topic importance. To evaluate the effect the independent variables might have on predicting if an individual would view a blog message, selective exposure for each message was measured as a dichotomous variable – viewed or not viewed.

For the topic of antibiotic use in livestock, statistical tests indicated that attitude was a predictor for viewing (or not) the pro-agriculture blog. There was no effect for importance or the interaction of attitude x importance on either the pro-agriculture or anti-agriculture antibiotic use in livestock blog messages. Attitude was not a statistically significant predictor for the anti-agriculture blog message. These results agree with previous research that found attitude could impact someone’s selective exposure through the selection of attitude-consistent information (Westerwick et al, 2020), which demonstrates confirmation bias.

For the topic of agriculture’s role in climate change, attitude was found to be a predictor for the anti-agriculture blog message but was not statistically significant for the pro-agriculture blog message. This contradicts the results from the blog messages about antibiotic use in livestock. Participants indicated an overall neutral attitude for climate change and a more positive attitude for antibiotic use in livestock. As past literature has stated, participants tend to seek out information that is attitude-consistent over attitude-discrepant (Knoblock-Westerwick et al., 2015a; Knoblock-Westerwick et al., 2015b; Westerwick et al., 2020); however, that does not prevent participants from looking at attitude-discrepant information, especially when a strong attitude is not present. The current data highlight the need to recognize attitude has a crucial influence on selective exposure.

The logistic regression models also identified topic importance as a predictor for both types of climate change messages (pro- and anti-agriculture); however, topic importance was not a predictor for either message about antibiotic use in livestock. Neither climate change message was affected by the interaction of attitude x importance. When solely focused on the topic of climate change, the results confirm previous literature that importance can have an impact on selective exposure (Knoblock-Westerwick et al., 2015a; Mills et al., 1957). Other studies have supported this idea, finding that individuals presented a strong bias toward messages when the topic was of high importance (Knobloch-Westerwick & Kleinman, 2012; Westerwick et al., 2020).

The results of the logistic regression models were not consistent between the two message topics. The topic of antibiotic use in livestock was found to be predicted by attitude but not importance; whereas, climate change was predicted more by importance but not attitude. One potential explanation for the inconsistency of these results between topics may be related to

the personal relevancy and complexity of the topics. Antibiotic use in livestock and agriculture's impact on climate change may not have been interesting enough to the study's participants. Additionally, the message stimuli were scientific in nature instead of more inflammatory or biased, which may have impacted the perceived topic importance. As the tweets were created directly from information from the blogs, they may have not appealed each to encourage the participants to click on them to access the blog message. Antibiotic use in livestock and agriculture's role in climate change were likely not as relatable to the participants as other topics might have been. Using these topics with a different population such as primary grocery purchasers may have found the anticipated influence of topic importance on selective exposure.

A suggestion to further expand the current research is to pair quantitative and qualitative data. Lowin's (1967) approach-avoidance model suggested that people will approach strong consistent message and weak discrepant messages and avoid strong discrepant message and weak consistent messages. The addition of focus groups and interviews will allow researchers to gather insights regarding why some messages were more likely to be selected.

Another recommendation for future research is to use eye tracking to collect data continuously throughout the procedure. A limitation of the current study was that there were no data collected on the time participants spent looking at the Twitter feed before selecting the blog message. Using eye tracking technology would allow researchers to measure the time spent attending to all the content.

When providing social media content, agricultural professionals need to consider the relevance of the message. If organizations want people to view their content, they need to make sure the messages are relevant to the audience members. A limitation of the study was that both messages were focused on displaying the two sides of agriculture in a scientific way and the underlying values of the target audience were not addressed. When people are scrolling through content, emotions will influence the links someone might click on to explore more. Fischer et al. (2020) found that using value-based frames in content can increase the attention consumers place on the message.

This study highlights the importance of learning to conduct audience analyses. Agricultural communication education should place emphasis on educating students to identify their audience followed by strategic creation of content. Learning how to make agricultural topics relevant to the audience will improve strategic communication efforts.

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