Research Conference Proceedings

North Central Region
American Association for
Agricultural Education

Research Conference and Session Coordination
South Dakota State University

Conference Host
The Ohio State University
Columbus, OH

September 29-October 2, 2021

Review Process for the North Central Research Conference

South Dakota State University faculty, as the 2021 NC-AAAE Conference Research Host, and members of the North Central AAAE Research Committee offer sincere gratitude to the twelve colleagues whoserved as members of the panel that evaluated this year's research submissions. A total of 46 research abstracts were submitted. Based on quality rankings and time allotted in the conference schedule, 33 abstracts were selected for presentation at the 2021 North Central Conference.

Research Manuscript Reviewers for 2021 AAAE North Central Region Research Conference

Aaron J Giorgi; West Virgina University

Adam Cletzer; University of Missouri

Adam Marx; North Dakota State University

Annie Specht; The Ohio State University

Becky Haddad; University of Minnesota

Gaea Hock; Kansas State University

Hui-Hui Wang; Purdue University

Mary Rodriguez; The Ohio State University

Rama Radhakrishna; Penn State University

Scott Smalley; Iowa State University

Todd Higgins; Oklahoma State University

Yu-Lun Wu; The Ohio State University

Distinguished Manuscripts
Thursday, September 30, 8:00 AM

Professional Commitment Among Illinois School-based Agricultural Education Teachers
Dr. Jay K. Solomonson, Illinois State University
Dr. Steven M. Still, Southern Illinois University
Dr. Lucas D. Maxwell, Illinois State University
Dr. Michael J. Barrowclough, Illinois State University

Competing Positions: Contextualizing Mobility Through Discourse Analysis
Becky Haddad, University of Minnesota-Twin Cities
D. Brett Milliken, Oregon State University
Josh Stewart, Oregon State University

West Virginia Agricultural Educators' Usage of Internet-Based Instructional Technology
Travis Veach, West Virginia University
Dr. Rachel Hendrix, West Virginia University

Comparing the Content and Pedagogical Knowledge of Alternatively and Traditional Certified Agricultural Educators
Kristi M. Tonnessen, Rugby High School
Adam A. Marx, North Dakota State University

Research Session 1
Friday, October 1, 10:15 AM

Teacher Supply

Examining How Alternatively Certified Teachers Participate in Agricultural Education Communities of Practice
Kellie Claflin, The Ohio State University
Josh Stewart, Oregon State University
Haley Q. Traini, Oregon State University

Balancing Demand: Reevaluating SBAE Teacher Supply and Demand in Minnesota
Lavyne L. Rada, University of Minnesota-Twin Cities
Dr. Becky Haddad, University of Minnesota-Twin Cities

Measuring Mobility: A Quantitative Description of Mobility in Minnesota
Becky Haddad, University of Minnesota-Twin Cities
Lavyne L. Rada, University of Minnesota-Twin Cities

Working with Partners

Understanding the Role of Education in Water Governance: A Qualitative Study in Sub-Saharan Africa
Rafael Quijada Landavere, The Ohio State University
Dr. Mary Rodriguez, The Ohio State University
Dr. Amanda Robinson, The Ohio State University
Vinicius De Melo Justo, The Ohio State University
Dr. Rebecca Gianotti, The Ohio State University

Barriers to Collaborations with Indigenous Communities: Experiences of Extension Educators
Dr. Katherine Hartmann, Iowa State University

Exploration of Reporting Fatal Fires in West Virginia
Mark R. Lambert, West Virginia University
Dr. Aaron J. Giorgi, West Virginia University

Assessing Pennsylvania Farmers' Quality of Life and Leadership Competencies for Developing an Extension Program
Dr. Suzanna Windon, The Pennsylvania State University
Daniel Robotham, The Pennsylvania State University

Laboratory Prep

Determining the Antecedents of Preparation of SBAE Teachers Who Effectively Facilitate Learning in SBAE Laboratories
Kevin W. Sanders, Iowa State University
Scott W. Smalley, Iowa State University
Mark S. Hainline, Texas A&M University-Kingsville

Training Needs of Iowa Pre-service Teachers Related to Teaching Technical Agriculture and Classroom Management
Scott W. Smalley, Iowa State University
Mark S. Hainline, Texas A&M University-Kingsville

How Does Preservice Teacher Preparation for Agricultural Mechanics Project Construction Impact Physiological Stress?
Jeffrey J. Reed, University of Missouri
John D. Tummons, University of Missouri
Erica B. Thieman, Illinois State Board of Education
Leon G. Schumacher, University of Missouri

Courses Offered to Preservice SBAE Teachers in AG. ED. Laboratories
Kevin W. Sanders, Iowa State University
Mark S. Hainline, Texas A&M University-Kingsville
Scott W. Smalley, Iowa State University

Engaging Youth

The Study Abroad Experiences of Secondary Agriculture, Food and Natural Resources Students
Samantha J. Ludlam, Coopersville High School
Dr. R. Bud McKendree, Michigan State University
Dr. Aaron J. McKim, Michigan State University

Engaging Youth in Food Systems Issues: An Ohio Case Study
Kameron Rinehart, The Ohio State University
Dr. Jera Niewoehner-Green, The Ohio State University
Dr. Amanda Bowling, The Ohio State University

Recruitment Strategies Used by Agriculture, Food, and Natural Resources Educators in Michigan
Kylie M. Nowakowski; Michigan State University
Aaron J. McKim, Michigan State University

Afternoon Session
Friday, October 1, 3:15 PM

Developing an Inclusive Classroom

School Based Agricultural Education Teachers' Perceptions of Supporting Student Relatedness
Katrina A. Swinehart Held, M.S., The Ohio State University
Dr. Amanda M. Bowling, The Ohio State University

Gender and Hometown as Predictors for School-Based Agricultural Education Teacher Ingroup Prejudices
Colby Gregg, The Ohio State University
Dr. Amanda Bowling, The Ohio State University

Impact of Shifting Agrarian Ideologies on School-Based Agricultural Education
Michael J. Martin, Iowa State University

Session 2
Saturday, October 2, 9:00 AM

Media Literacy

An Exploration of College of Agriculture Students' Media Literacy
Dr. Taylor K. Ruth, University of Nebraska-Lincoln
Dr. Cara R. Lawson, Oregon State University

An Exploration of Student Trust in the News Media
Dr. Cara R. Lawson, Oregon State University
Dr. Taylor K. Ruth, University of Nebraska-Lincoln

Teacher Identity Development

Guiding Preservice Teacher Identity Development through Check-in Meetings
Patrick Hales, South Dakota State University
Laura Hasselquist, South Dakota State University
Tony Durr, South Dakota State University
Nicole A. Graves, South Dakota State University

Assessing Essential Pre-Service Agricultural Education Dispositions
Rivers Bachman, North Dakota State University
Dr. Brooke Thiel, North Dakota State University

Exploring Identity Development Among Preservice Agriscience Teachers During an Early Field Experience: A Phenomenological Study
Abbey VanTyne, The Ohio State University
Dr. Caryn Filson, The Ohio State University
Dr. Tracy Kitchel, The Ohio State University

Professional Development

Expanding Curriculum Development in Higher Education for a Budding Industry: An Analysis of a Cannabis Curriculum Professional Development Event
Blake C. Colclasure, Doane University
Andrea Holmes, Doane University
Rob Mejia, Stockton University
Koral Fritz, Stockton University
Ekaterina Sedia, Stockton University
Mariah Duffey, Stockton University

Utilizing Lesson Study for Agriculture Instructor Professional Development and Social Support
Dr. Amy M. Leman, University of Illinois at Urbana-Champaign
Eliza Petry, University of Illinois at Urbana-Champaign
Joseph Birrittier, University of Illinois at Urbana-Champaign

School-Based Agricultural Education Teachers' Self-Efficacy Related to Educational Technology Professional Development
Macey Kleinjan, Flasher High School, North Dakota
Adam A. Marx, North Dakota State University

Needs and Experiences of School Based Ag Ed Programs

Determining the Professional Development Needs of Iowa School-based Agricultural Education Teachers Related to Program Design, Leadership, and SAE Development
Mark S. Hainline, Texas A&M University-Kingsville
Scott W. Smalley, Iowa State University

Availability and Use of Agricultural Laboratories in Indiana SBAE Programs
Dr. Sarah E. LaRose, Purdue University
Miranda McGuire, Purdue University
Melissia A. Grant, Purdue University

SAE Experiences of Novice Agriculture Teachers: A Longitudinal Qualitative Collective Case Study
Dr. Brandie Disberger, Kansas State University
Dr. Shannon Washburn, The Ohio State University
Dr. Gaea Hock, Kansas State University
Dr. Jon Ulmer, Kansas State University

Professional Commitment Among Illinois School-based Agricultural Education Teachers

Jay K. Solomonson, Illinois State University
Steven M. Still, Southern Illinois University
Lucas D. Maxwell, Illinois State University
Michael Barrowclough, Illinois State University

Introduction

The shortage of qualified secondary school-based agricultural education (SBAE) teachers is well documented and has been a chronic issue for decades (Camp et al., 2002; Foster et al., 2020; Kantrovich, 2010). This is due to the lack of qualified SBAE teachers produced by teacher preparation programs as well as high attrition rates amongst those once in the profession (Foster et al., 2020). Numerous studies have sought to identify factors influencing SBAE teacher attrition. Top teacher attrition factors include family or personal reasons (Solomonson et al., 2018), perceptions of low administrative support (Kelsey, 2006; Sutcher et al., 2016), heavy workload and responsibilities outside the normal workday (Lemons et al., 2015; Solomonson et al., 2018), and stress and burnout (Kitchel et al., 2012; Maslach et al., 2001, Myers et al., 2005). Fewer studies have sought to explain why SBAE teachers stay in the profession. Positive administrative support (Clark et al., 2014; Rice et al., 2001) and teacher preparedness have been shown to be strongly correlated to a teacher's decision to stay in the classroom (Darling-Hammond et al., 2002; Tippens et al., 2013), as are high levels of self-efficacy (Blackburn et al., 2017) and professional commitment to the career field (Crutchfield et al., 2013; Day, 2008; Sorensen & McKim, 2014).

Blau et al. (1993) defines professional or occupational commitment as an individual's attitude toward their chosen occupation. Strong professional commitment has been found to be a positive predictor of teacher retention (Chapman, 1983; Singh & Billingsley, 1996; Crutchfield et al., 2013). Our study expands upon previous SBAE teacher professional commitment research conducted by Crutchfield et al. (2013) and Sorensen and McKim (2014). Both studies investigated the relationship among career retention factors, including professional commitment. Crutchfield et al. 's (2013) research revealed SBAE teachers were moderately to strongly committed to the profession and that occupational commitment can be partially attributed to levels of work engagement and work-life balance. Sorensen and McKim (2013) examined professional commitment, among other career retention factors, and its relationship to specific demographic characteristics. They found small to negligible effects on professional commitment as they related to sex, marital status, parental status, and career stage, but recommended further research exploring relationships among other demographic characteristics (Sorensen & McKim, 2013). This recommendation provides the foundation for our study. The need for our research was directed by the American Association for Agricultural Education's (AAAE) National Research Agenda, Research Priority 3: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Roberts et al., 2016).

Conceptual Framework

This study was conceptualized around the body of work related to attributional theory. "Attribution theorists investigate the perception of causality, or the judgment of why a particular

incident occurred" (Weiner, 1972, p. 203). This framework is useful in understanding observed and intentional behaviors of participants. In this situation, it helps to become aware of reasons behind the behavioral result of one choosing to remain in the teaching profession.

Weiner (1972) suggests people are affected by environmental factors (external factors), such as their home and work environment, as well as personal factors (internal factors), such as lived experiences and previously learned knowledge. These two factors influence the attributions people make which influences their future behavior. Attributions are classified along three causal dimensions: locus of control, stability, and controllability (Weiner, 1974). Locus refers to the location, external or internal, of the perceived cause of failure or success. Stability relates to whether the cause of failure or success is stable over time and in different settings. Controllability deals with whether the cause of success or failure is under the control of the individual (Weiner, 2010). Using attribution theory, we attempted to examine through our discussion the relationship between professional commitment and personal and professional characteristics of SBAE teachers.

Purpose and Objectives

The purpose of our study was to examine professional commitment and its relationship to chosen demographic characteristics of Illinois school-based agricultural education teachers. The specific objectives of this study were to:

1. Describe the personal and professional demographic characteristics of Illinois school-based agricultural education teachers.

2. Determine Illinois school-based agricultural education teachers' perceived levels of professional commitment and if differences exist between selected demographic characteristics.

Methods

Our research team used a census study design to survey current Illinois school-based agricultural education (SBAE) teachers. The instrument consisted of two sections to examine the career retention factors under investigation: (1) factors related to professional commitment and (2) teacher personal and professional characteristics. Questions to determine levels of professional commitment were measured by using questions from Blau et al.'s (1993) Work Commitment Index ($\alpha = .91$). This section of the instrument had participants evaluate 11 career-related statements using a 6-point Likert-type scale, ranging from *strongly agree* to *strongly disagree.*

After receiving Institutional Review Board (IRB) approval, our electronic questionnaire was sent out to all 432 full-time SBAE teachers in Illinois via the Qualtrics platform in June of 2020. Email addresses for the teachers were obtained from the Illinois agricultural education online directory. Following recommendations from Dillman et al. (2014), five points of contact were scheduled with our intended population over a period of four weeks. This resulted in a 47.0% response rate ($n = 203$) from our population of possible participants. Non-response error was calculated by comparing mean scores of those individuals responding in the first week and

the last week of data collection, which yielded no significant differences between groups ($p < .05$). Comparing early and late respondents has been deemed an acceptable method of determining non-response error in agricultural education research according to Lindner et al. (2001).

Data were analyzed using the Statistical Package for the Social Sciences (SPSS©) program version 24.0. To address our first research objective, frequencies and percentages were calculated to determine the personal and professional characteristics of the chosen population. To answer our second research objective, means and standard deviations were used to determine perceived levels of professional commitment of our respondents overall and within their respective demographic groups. Further, to determine if significant differences existed between groups, unpaired samples t-test were used when comparing the means of two groups while the one-way analysis of variance (ANOVA) were used when comparing groups of three.

Findings

Objective 1

To address objective one, descriptive statistics (frequencies and percentages) were used to describe the personal and professional characteristics of school-based agricultural education (SBAE) teachers in Illinois. Demographic characteristics were used to determine groups to address objective two. All personal and professional characteristics can be found in Table 1.

Table 1

Selected Personal and Professional Demographic Data of Responding Illinois SBAE Teachers (n = 203)

Variable	*f*	%
Sex		
Male	80	39.4%
Female	122	60.1%
Relationship Status		
Married	147	72.4%
Not Married	55	27.1%
Parental Status		
Yes	132	65.3%
No	70	34.5%
Type of Licensure		
Fully-State Certified: Professional Educators License	170	83.7%

Alternatively- Certified: Educator License with Stipulations	32	15.8%
Highest Education Attained		
Bachelor's Degree	130	64.0%
Master's Degree	72	35.5%
Length of Teaching Contract		
Less than 12 months	93	45.8%
12 months	109	53.7%
Number of Ag Teachers in Department		
One	134	66.0%
Two or More	68	33.5%
Years of Experience (Professional Life Cycle)		
Novice (5 or less years)	71	35.0%
Mid-Career (6-15 years)	63	31.0%
Late-Career (16+ years)	68	34.5%

Note. One individual did not disclose demographic information.

Objective 2

The intent of research objective two was to determine Illinois agriculture teachers' perceived levels of professional commitment and their relationship to selected demographic characteristics. When examining levels of professional commitment, the overall perceived level for the respondents were high (M = 4.77, SD = 1.39).

When examining specific demographic groups, several variables were found to be significant. It was discovered that professional commitment was significantly higher for both SBAE teachers fully-state certified and those with an advanced degree. Further, findings indicate late-career teachers possess significantly higher levels of professional commitment than those in the mid-career professional life stage. All statistics related to professional commitment and associated demographic groups can be found in Table 2.

Table 2

Perceived Levels of Professional Commitment and Differences in Associated Demographics of Responding Illinois SBAE Teachers (n = 203)

Variable	*M*	*SD*	*t-test*	*p*	Cohen's *d*
Sex					
Male	4.86	.77			
Female	4.72	.78	1.27	.21	.18
Relationship Status					
Married	4.75	.83			
Not Married	4.82	.61	.54	.59	.09
Parental Status					
Yes	4.78	.78			
No	4.76	.77	.13	.90	.02
Type of Licensure					
Fully-State Certified	4.84	.76			
Alternatively- Certified	4.40	.76	3.00	.00*	.56
Highest Education Attained					
Bachelor's Degree	4.68	.76			
Master's Degree	4.93	.78	-2.23	.03*	-.32
Length of Teaching Contract					
Less than 12 months	4.81	.73			
12 months	4.73	.82	-.73	.47	-.10

Number of Ag Teachers in Department					
One	4.72	.79			
Two or More	4.89	.73	-1.49	.14	-.22
Professional Life Cycle [a]					
Novice (5 or less years)	4.70	.77			
Mid-Career (6-15 years)	4.64	.76			
Late-Career (16+ years)	4.96	.76	3.35	.04*	.18

Note. The professional commitment scale was based on a 6-point Likert-type scale ranging from 1 = "Strongly Disagree" to 6 = "Strongly Agree".
[a] ANOVA was conducted for the variable "Professional Life Cycle". The test statistic shown is the F statistic.
*p = < .05 level, 2-tailed

Conclusions, Implications, & Recommendations

The purpose of our study was to examine the relationship between selected demographic characteristics of Illinois school-based agricultural education (SBAE) teachers and their professional commitment. While yielding valuable descriptive data, it should be noted that these results are not generalizable beyond the target population which is a limitation of this study.

Our first objective was to describe the personal and professional demographic characteristics of Illinois SBAE teachers. Of the 203 respondents, 60.1% identified as female. Examining this characteristic was essential with the growing number of female SBAE teachers in the state (Illinois Annual Ag Ed Report, 2020). Although previous research has indicated sex having only negligible effects on professional commitment (Sorensen & McKim, 2013), as the demographics of Illinois SBAE teachers change, it is recommended that current professional development activities and efforts to increase career retention factors be evaluated to ensure they are meeting the needs of the population. Similarly, the other findings related to our first objective were consistent with data provided in the Illinois Ag Ed Report (2020).

We used objective two to determine Illinois SBAE teachers' perceived levels of professional commitment and if differences exist between the selected demographic characteristics we gathered in objective one. Of the eight personal and professional characteristics examined, significant differences were found in three areas. We conclude that respondents who were fully-state certified have a significantly higher level of professional commitment when compared to their counterparts who were alternatively certified. The type of certification held had a medium effect size on teachers' level of professional commitment. Previous research by Solomonson et al. (2021) indicated that several factors related to why

SBAE teachers remain in the profession can be directly influenced by preservice teacher education programs. Weiner (1972) suggested these personal or internal factors related to lived experiences and previously learned knowledge influence future beliefs and behaviors. It is recommended that efforts be directed at supporting those teachers who are alternatively certified with targeted professional development aimed at providing them with the tools and resources to increase their self-efficacy and thereby, levels of professional commitment.

The remaining two significant personal and professional characteristics were the highest level of education attained and where the teacher was in their professional life cycle (novice, mid-career, late-career). Earning a master's degree and identifying as late-career were both found to have slight, but significant impacts on professional commitment. It is recommended that efforts be made to increase access to graduate coursework and assist teachers in earning a master's degree. Additionally, since novice and mid-career teachers indicated lower levels of professional commitment, it is recommended that an early career mentoring program be developed. This is in line with previous research suggesting the value of such programs (Ingersoll, 2003; Krasnoff, 2014).

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Competing Positions: Contextualizing Mobility Through Discourse Analysis

Becky Haddad, University of Minnesota-Twin Cities
D. Brett Milliken and Josh Stewart, Oregon State University

Introduction & Theoretical Framework

No one works in a vacuum, and substantial research in agricultural education discusses the necessity of working relationships between school-based agricultural education (SBAE) programs and their broader community (Eck et al., 2021; Langley et al., 2014; Moser & McKim, 2020). Arguably, community engagement has significant impacts on SBAE teachers' perceived opportunities to remain at their schools or in the profession at large. Notably, mobile teachers express community support as one of the greatest factors contributing to feeling supported in their teaching practice (Haddad et al., 2019).

Given this understanding and the expectation for embeddedness of SBAE programs in their communities, we approached SBAE teacher mobility using a positioning theory approach to discourse (Davies, 2000). Positioning theory approaches discourse to recognize the multiple ways an episode may be perceived (Davies, 2000). For example, a teacher may position themselves as supported if they have the resources to do their job, but a community influencer may see their positioning of being supportive rejected if their attempts beyond resource deployment are not engaged. Drawing on earlier work identifying the positions engaged in migratory contexts, we turned to how engaged positions may contribute to an SBAE teachers' acceptance or rejection in a community. By understanding how taken up positions were perceived by SBAE teachers and their community influencers, we are better able, as pre-service educators and SBAE researchers, to pre-empt conflicts in community engagement as new teachers and migrators alike step into new programs.

The current SBAE research adopts a stance toward mobility as a *source of new hires* in the NAAE Supply and Demand Studies (Foster et al., 2015; Foster et al., 2016; Smith et al., 2017; Smith et al., 2018). In aligning with this approach, we offer a discipline-oriented and community-situated perspective to issues of teacher mobility. This identifies the multiple ways individuals interact with and around their work. Without discounting the impacts of teacher mobility on schools, a gap in the literature exists in seeking out migrating teachers to determine how they may be unique in their professional choices and needs relative to their exiting, or even first-year-teacher, counterparts.

Purpose & Research Question

The broad purpose of this line of inquiry is to understand how engaged positions invoke challenge or support, particularly in helping us understand how to retain mobile teachers. Specific to this study, our purpose was to understand how individuals in communities interacted with each other's positions to better understand where support and challenge were perceived. The question guiding this study was: How do SBAE migrators and community influencers align (take up, reject, or reify) themselves with assigned positionalities? This question addresses AAAE Research Priority 3, Question 2: "What methods, models, and practices are effective in

recruiting agricultural leadership, education, and communication practitioners and supporting their success at all stages of their careers?" (Roberts et al., 2016).

Methods

This study utilized discourse collected through a series of interviews based in dialogue with several actors across a migratory context. We operationalized *interviews based in dialogue* through a semi-structured protocol, allowing significant time for participants to unpack the meaning making of their experiences as they continued to share (Davies & Harré, 1990). Our actors (participants), at the time of the study, included two former agriculture teachers (Aaron and Stephanie), the current agriculture teacher (Jessie, discussed by others, but later withdrew from study participation), the current assistant principal (Aaron), two former industrial technology teachers (Ben and Caleb), and the current FFA Alumni president (John). In addition, we engaged the state supervisor (Mark) for additional context of the state community, however, given his distanced engagement with the site, we did not consider him a participant. Collecting interviews based in dialogue involved an initial discussion with these actors regarding their experience with the various episodes of mobility (e.g., hiring and onboarding processes and their work) (Patel-Stevens, 2004). A follow up interview allowed the participants to interpret and make meaning of their reflective experience back to the researcher.

Regarding our own positionality, and in line with engaging a community-based approach, one of the research team was a former SBAE teacher in this context. Therefore, participant-researcher relationships were already present allowing for genuine conversations with migrators and key influencers, and accurate tracking of teachers in this context (Patel Stevens, 2004). Embeddedness of the team member in the research site was central to this study, while recognizing their interpretations of the context, informed by their experience (Harré & van Langenhove, 1999). Proceeding in this way called for a particular "forthrightness about intents" (Patel Stevens, 2004, p. 184), which accounted for institutional positions, reflexivity, and answerability.

The subsequent discourse analysis followed Ash's (2003) coding scheme, identifying speech episodes, associated positions, order of positioning, and aligned *metacomments*. After confirming the identified positions with participants, we used open coding to reduce to themes for two sub-groups: migrators (Aaron and Stephanie) and influencers (Aaron, Ben, Caleb, and John). We were interested in how the two groups' desired positions took up, rejected, or reified the desired positions from the other group. To evaluate the use of positionalities, we mapped codes, definitions, and aligning positions of each group against the other. This regrouping condensed to three themes relative to the interactions positioning SBAE migrators and their community counterparts: *Conflicting Requirements*, *I Can and I Will*, and *All My Love and Support*.

Findings

Within the *Conflicting Requirements* theme, interactions of attempt and intention sought to yield better programmatic results for all involved. Unfortunately, lack of clarity in expectation challenged the uptake and reification of positions allowing forward mobility through *vision*, *growth*, and *needed change*. As alumni president John put it:

> Unfortunately, I like [the ag program] to be something like you were building there. We talked about it as a group. We never wanted to have said, "…This is how [the former teacher] did it." It wasn't a great topic…They say, quite often, the worst place to be is following a successful person…But in your case, there was a high expectation, so we were very aware of that.

Those involved can put themselves in a position of *doing the right things*, but unless the right things are taken up and reified by those with whom they closely interact, an irreconcilable challenge to positionality occurs. While not a surprising finding, it bears writing out empirically: Without all involved agreeing on the *right things*, it is difficult to find a way forward allowing SBAE teachers to position themselves as *meeting expectations*.

The interesting finding within the *I Can and I Will* theme is the *not*. There was a discrepancy in SBAE migrators and community influencers positioning themselves. While both relied on similar positions, *resilient survivor*, *autonomous individual*, and *imposter* were taken up, reified, and rejected in ways that incited conflict among the participants in this study. Former SBAE teacher Stephanie gave this example of her frustration:

> I was hired with this promise of, "Do what you want. It will be your program and you can turn it into whatever you want it to be." That was pretty appealing to me. The reality was half the time I was teaching Junior High, which was not my fave, and the other part of the time was the high school stuff…I added some of my own stuff but was tied down schedule-wise by the Junior High electives and that wasn't something I was really into.

Both community influencers and SBAE migrators were *resilient survivors*, but only community influencers saw their counterparts this way. Similarly, SBAE migrators perceived themselves as *autonomous individuals*, a position reified by their community counterparts. However, SBAE migrators did not extend this same position to their community influencers. Both SBAE migrators and community influencers positioned the SBAE migrator as an *imposter*.

In these tellings, uptake, reification, and rejection turned to ideas of reciprocal investment, as exemplified in theme three: *All My Love & Support*. In essence, did community influencers position SBAE teachers as *equally invested* rather than merely *invested*? Among a multi-voiced concern for outward shows of investment from the SBAE teacher, Ben, former industrial technology teacher added:

> In a town the size of Oakville, people really appreciate the teachers that live in town and go to their churches, are there for other activities. They see him go downtown to the parade, and all that stuff…When you have a smaller town, that's one of the things that has changed a lot…It's just different…but we've noticed people really appreciate if you're living in the town you work at.

The importance of this finding is the nuanced investment beyond ties to place. *Investment* was the culmination of, and was predicated on, *connection* and *support*, but went beyond the provision of these positions to an expected uptake of connectedness and being supported. Anything less than uptake and reification was a slight to the investment of community

influencers; a slight that would inevitably cause support and connectedness to crumble as available positions within the SBAE teacher's repertoire.

Taken together, the themes *Conflicting Requirements*, *I Can and I Will*, and *All My Love and Support* compiled an interesting landscape for SBAE migrators and their community influencers to navigate. First, the expectations from community influencers on SBAE migrators were numerous and varied. Taking up positions relative to these expectations was imperative for SBAE teachers. However, this could be a competing requirement with their own efforts at independent positionality. Second, survivorship and autonomy were at odds with each other. SBAE teachers and community influencers each took up these positions but did not always extend the courtesies of these positions to others. Whether for lack of opportunity in the interview or truly not viewing their counterparts this way, SBAE migrators did not position the community members with whom they interacted as surviving or having autonomy. Finally, positions of *support* and *connectedness* tied closely with *investment*. Community influencers reified SBAE migrators' attempts at investment where support and connectedness were reciprocated. SBAE migrators took up support, but also recognized rejection in their investment efforts if they did not align with the community influencers' positions of being supportive and connected.

Conclusions & Implications

These themes culminated in an interactional *work cycle* of a person who will one day take the place of another. The predominant discourse reified here tells SBAE teachers they owe it to themselves to put in the extra work now to be compensated for it later. Aaron and Stephanie corroborated this discourse. Teachers across SBAE engage in this cyclic mentality to find little reward at the end (Traini et al., 2019). Therefore, it is essential SBAE teachers consider the *work cycle* in terms of what they leave for the next person. Can someone replace you? What will the community expect of the next SBAE teacher based on the job you are doing?

Recommendations from Community Influencers for Migrators

Community influencers shared several key recommendations for the migrators in this study. Ben and Caleb both strongly encouraged migrators to challenge themselves and be selective and evaluative in considering future positions. For both the new teacher and the migrator, however, the key consideration seemed to be geography, as identified by several of the participants and corroborated by the state supervisor, "Especially with first year teachers, everybody wants to go home." Community influencers recognized the difficult role a SBAE teacher occupies. They also offered substantial help and support to aid in managing the workload, and in fact, influencers saw their positions rejected if the assistance was not accepted.

Caleb gave an example of his former principal knowing how the auto tech teacher engaged local businesses to determine his curriculum. He noted how, first, it identified the teacher as engaged in what the community needed. Second, it recognized the responsibility of the teacher to remind necessary stakeholders of their efforts. And finally, it provided an example of reducing a teacher's workload while capitalizing on community interests. This example identified a teacher sharing the workload of developing relevant curriculum with an industry

partner who already had the pre-requisite expertise, reducing the workload on the teacher, and establishing a community influencer in the process.

The assumption underlying these implications, based on the data presented here, is community members seek engagement. Despite being busy survivors themselves, they are eager to be involved. Teachers identified asking community members to be guest speakers, field trip hosts, and CDE coaches, but the data here suggested their ask was too small. Community influencers were willing and able to provide much greater leverage to a total SBAE program including financial stability, institutional knowledge, content expertise, facilitation of community connectedness, support for challenging students, and input and visioning for forward progress of the program. If this appears overzealous, we ask SBAE teacher readers to keep in mind a community's investment in the success of local agriculture.

Community influencers expressed engaging with the local SBAE program as carrying out a mission for local agricultural success. This requires a reification from SBAE teachers of serving a community well acquainted with hard work. While community influencers did not expect anything to be difficult for the sake of difficulty, they expected others to rise to the challenge for which they were hired. SBAE teachers' willingness and ability to return others' investment was essential to establishing a position of support.

Recommendations from Migrators for Community Influencers

Teachers expressed several desires in connection from their administrators, validating connection already occurring and seeking additional points of support, including regular check ins, support for continued development of pedagogical content knowledge, mentoring relationships, supplies to do the job, schedule accommodations, follow through on classroom management issues, classroom autonomy, and time to connect with fellow staff members. Aaron emphasized these as important to his role as administrator, particularly in his context as a former agriculture teacher. The reminder for administrators is to maintain accountability in mistakes. Allow them, but enforce clear, reasonable, and consistent expectations at all levels.

Resource availability did not seem to be the issue for these teachers. Provided enough chairs, teachers suggested they had the material resources they needed to perform the tasks of their job. The biggest resource they were lacking, however, was time. Stephanie identified time to collaborate and plan as two foremost factors inhibiting program growth. Stephanie expressed the challenge of implementing resources when she was too overworked and stressed to sort through them. Aaron and Stephanie both expressed the overwhelming nature of sorting through available resources to find what would work for their program. The limit, rather than resources themselves, was cost, time to implement, or time to secure funding to cover the cost, particularly for resources to expand program offerings.

Teachers expressed concern over knowing how and who to ask for help. Employing opportunities to grow preservice teachers' comfort in asking for assistance could be an essential skill as early-career teachers seek program fit. Apart from seeking human resources, deploying human capital and delegating were vital tasks for teachers' success. However, these teachers had limited capacity to organize resource deployment, despite available assistance. Integrating opportunities for communication and public relations plans, or community engagement plans, in

pre-service programs provides a starting point for early-career teachers to capitalize on and secure resources in their communities. Engaging a culture of questions continues work already in progress to build a culture of learning in pre-service and early-career teachers. This further acknowledges teaching as a learning profession and confirms the advice from community influencers regarding the practice and support needed to become an effective educator.

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West Virginia Agricultural Educators' Usage of Internet-Based Instructional Technology

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Introduction

Technology is increasingly vital to American education. Approximately 95% of American educators use technology in the classroom, which has major impacts on teaching and learning (Vega & Robb, 2019; Purcell et al., 2013). This trend includes the field of agricultural education, where studies show teachers have long been using technology not only for basic instructional purposes, but for teaching more complex career and behavioral skills students will need as adults (Coley et al., 2015; Williams et al., 2014).

The most widely used educational technologies are those accessible through the internet (Vega & Robb, 2019). Examples of internet-based technologies include search engines, online videos, instructional games, apps, social media, and virtual field trips, among others (Vega & Robb, 2019). While these technologies offer great educational potential to educators and students, not all are created equal. Out of the myriad technologies that exist, it can be difficult to identify and integrate technologies that are truly effective at educating and engaging students.

Vega and Robb (2019) report 36% of all technology products purchased by schools go unused due to lack of relevancy, engagement, or effectiveness at teaching content, and that the tools teachers use most frequently are not always the ones most suited for successful learning. These inconsistencies waste time, money, and effort, and lead to misunderstandings about which technologies work in the classroom, and which do not. If teacher educators are to guide teachers, schools, and districts in integrating useful technology into learning processes, it is essential to identify technologies that meet educator needs and merit sustained use. This can be done by examining the qualities of each technology, the frequency of use for each, and the purposes to which they are used in the agricultural education classroom.

Theoretical Framework

This study is based on Rogers's (2003) Diffusion of Innovations theory. Rogers's (2003) theory concerns itself with "the process in which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). The innovation-diffusion process begins when individuals are introduced to an idea and begin gathering evidence and forming attitudes about potential utility. Individuals may reject the innovation outright, or adopt

it on a trial basis for evaluation. Adopters then use the results of the evaluation period – as well as outside reinforcement – to confirm their adoption or rejection of the innovation.

Even when an innovation is adopted, it is still possible that use may be discontinued or significantly altered. Discontinuance can be the result of an individual receiving conflicting messages about the innovation, rejecting the innovation due to inferiority or an inability to meet needs, misusing the innovation, or general dissatisfaction with innovation performance (Rogers, 2003). In these cases, innovations die out as they pass through a social system. In other cases, an unsuitable innovation with some positive attributes can be reinvented to make it more suitable for use in specific communities (Rogers, 2003). Successful reinvention increases the speed with which an innovation is adopted, and the likelihood that the innovation will become institutionalized (Rogers, 2003). The innovations most likely to be reinvented are those that offer individuals more freedom of and possibilities for use (Sahin, 2006; Rogers, 2003). Sahin (2006) notes that computers are particularly ripe for reinvention, as they allow "many possible opportunities and applications" (p. 4).

Purpose and Objectives

The purpose of this study was to explore West Virginia agricultural educators' frequency of use of internet-based technology in their classrooms and identify connections between use patterns and technology characteristics.

Specific objectives for this study included:

1. Identify how many agricultural educators in [state] utilize internet-based technology in the classroom.
2. Identify the most commonly used internet-based technologies.
3. Identify the frequency with which agricultural educators used specific internet-based technologies in their classrooms.
4. Compare the attributes of different technologies with their patterns of use in the classroom.

Methods/Procedures

This descriptive study explored the frequency of technology usage in West Virginia agricultural educators' classrooms. It was part of a larger overall study to identify the role of technology in West Virginia agricultural education programs. The population of this study was all agricultural educators employed in West Virginia during the 2019-2020 school year (N = 103). Participants were contacted by email and asked to complete an online survey instrument.

The instrument was composed of three sections. The first section asked respondents if they used internet-based technology in their classrooms, and if they had access to required resources to make such use possible. The second section used a Likert-type scale to address the frequency of use for various internet-based technologies. The third section collected information about respondent demographics.

The types of internet-based technology included in the study were derived from the work of Vega and Robb (2019), which included search engines, learning management systems such as Google Classroom and Blackboard, virtual field trips, video sharing platforms, and supplemental websites, apps, and games. The researchers added The Agricultural Experience Tracker (AET), iCEV, and video conferencing platforms like Zoom and Google Meets to the study. The AET and iCEV were chosen because they provide agricultural education-specific resources and were thus not included in Vega and Robb's (2019) general education study. The AET helps students maintain detailed Supervised Agricultural Experience (SAE) records and apply for awards and degrees, and allows teachers to monitor SAE growth and maintain FFA chapter rosters and records. iCEV provides educators with resources such as lesson plans, videos, quizzes, tests, activities, and more. Both technologies require paid accounts. Video conferencing platforms were added due to their importance during the 2020-2021 school year, which required great technological changes due to the COVID-19 pandemic.

To ensure validity, the survey was first examined by a panel of agricultural education teacher educators, and then pilot tested on teachers from Mississippi. A few minor changes were made to the survey instrument based on the panel's recommendations and results of the pilot test. Data were analyzed for frequencies, means, and standard deviations using IBM® SPSS® 27.0 for Windows.

Findings/Results

Thirty-two educators completed the survey, for a response rate of 31.06% (n = 32). Eighteen respondents identified themselves as male (56.30%), 13 as female (41.60%), and two did not provide their gender (3.10%). The average length of participants teaching careers was 14.63 years (SD = 10.20). Of the 32 respondents, 31 (96.88%) reported having access to reliable internet and to the resources needed to utilize internet-based technology in their classrooms. All 32 respondents (100%) stated that their students had access to such resources, either through personal or school-owned devices. This access made it possible for each of the 32 respondents (100%) to utilize at least one form of internet-based technology in their agricultural education classrooms.

Results showed that most technologies were widely used by agricultural educators, with search engines and learning management systems having 100% adoption. Video conferencing systems, virtual field trips, the Agricultural Experience Tracker, video sharing platforms, and supplemental materials were also popular. iCEV showed the least amount of use. Detailed results are available in Table 1.

This study explored how frequently respondents used each piece of internet-based technology in their everyday classroom instruction. Participants indicated if they "always," "often," "occasionally," or "rarely" used the technology. Results show that learning management systems and the Agricultural Experience Tracker were frequently used, while virtual field trips, supplemental materials, and iCEV were less so. Table 2 displays the results for frequency of use

regarding each piece of technology. Table 2 is arranged in order from most used technology to least used.

Table 1

Use of internet-based technology

Technology	*f*	%
Search Engines	32	100.00
Learning Management Systems	32	100.00
Video Conferencing Systems	31	96.88
Virtual Field Trips	29	90.63
The Agricultural Experience Tracker	29	90.63
Video Sharing Platforms	28	87.50
Websites/Apps/Games	28	87.50
iCEV	22	68.75

Table 2

Frequency of use of internet-based technology

	Always		Often		Occasionally		Rarely	
Technology	*f*	%	*f*	%	*f*	%	*f*	%
Search Engines	10	31.25	18	56.25	3	9.38	1	3.13
Learning Management Systems	17	53.13	11	34.38	3	9.38	1	3.13
Video Conferencing Systems	7	22.58	14	45.16	9	29.03	1	3.23
Virtual Field Trips	0	0.00	1	3.45	15	51.72	13	44.83

Agricultural Experience Tracker	14	48.28	11	37.93	3	10.34	1	3.45
Video Sharing Platforms	1	3.5	14	50.00	6	21.43	7	25.00
Websites/Apps/Games	1	3.57	4	14.29	10	35.71	13	46.42
iCEV	4	18.18	7	31.82	4	18.18	7	31.82

Conclusions, Recommendations, and Discussion

Results of this study indicate that internet-based technology has an important place in the agricultural education classroom. All 32 respondents reported using some form of internet-based technology, which agrees with estimates that upwards of 95% of teachers nationwide utilize technology in some form (Vega & Robb, 2019; Purcell et al., 2013). Even though some schools may not have the resources to provide technology, the use of students' personal devices for educational activities is seen as an acceptable substitute.

Most of the internet-based technologies included in the study showed sustained and wide adoption. These technologies are essential to online learning, open to reinvention, and in possession of key attributes that Rogers (2003) linked with successful adoption. Technologies like search engines or video sharing platforms are easy to learn and implement in a variety of situations, and they offer adopters opportunities to access and share information in new and effective ways. They also are supported and widely used by the general educational community (Vega & Robb, 2019), which indicates that adopters are getting favorable messages from others in their social systems and thus more likely to continue use.

Less frequently used technologies included virtual field trips and supplemental websites, apps, and games. These technologies offer unique learning opportunities, but are pre-developed and therefore offer less teacher control and potential for reinvention. Virtual field trips are not interactive on their own, which contrasts with the goals of agricultural education and likely makes them inferior to other learning opportunities. Both virtual field trips and supplemental technology are also difficult to view on small screens, which affects use in schools that cannot provide universal computer access. Results indicate that teachers see these two technologies as niche products utilized in specific situations but not as part of everyday class activities. Future studies should seek to understand which specific virtual field trips and supplemental technologies are most widely used in agricultural education, and why agricultural educators prefer those tools.

The Agricultural Experience Tracker and iCEV were the two least frequently used technologies, but they showed contrasting patterns of use. It is likely that they were least used because they require paid subscriptions, which may be a substantial entry barrier for some programs. Those who did use the AET overwhelmingly implemented it on a frequent basis. The AET is primarily intended for students to keep records of their FFA and SAE activities, although teachers can also use it to perform a variety of program management-related needs (AET, 2021). In addition, the AET is constantly being updated by its creator in response to teacher requests, making it more likely that buy-in occurs (Sahin, 2006; Rogers, 2003). Finally, the AET is

advertised through teacher networks and by the National FFA Organization itself, which provides teachers with positive reinforcement regarding its adoption (Flatt, 2020). It is recommended that future studies examine how teachers are integrating the AET into their classrooms on a daily basis and determine which aspects of the website – for both students and teachers – are most frequently used.

iCEV provides teachers with standard-based, pre-made lesson plans, videos, activities, and self-grading assessments (iCEV, 2021). Results showed that most teachers either used iCEV either "often" or "rarely," indicating an interesting dichotomy. iCEV potentially makes lesson planning and instruction much faster and easier for teachers by offering pre-made material, but this material is creator-controlled and may not meet some teachers' needs or standards. While teachers can edit plans, this may expend limited time and make iCEV not worth the cost. The researchers recommend further exploring which agricultural educators use iCEV, the role that iCEV material plays in their classrooms, the suitability of lessons for meeting curricular needs, and why some teachers who pay for iCEV licenses use the material only "rarely."

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Comparing the Content and Pedagogical Knowledge of Alternatively and Traditional Certified Agricultural Educators

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Introduction and Literature Review

The field of school-based agricultural education is not immune to the nationwide teacher shortage (Sutcher et al., 2016; Boone & Boone, 2007; Bowling & Ball, 2018; Smith et al., 2018; Solomonson et al., 2019). Although much of the teacher shortage is a result of teacher retirements (Sutcher et al., 2016), many current agricultural teachers are deciding to leave School-Based Agricultural Education (SBAE) altogether (Smalley, Hainline, & Sands, 2019). The reasons for departure vary extensively. School districts are facing an up-hill battle in filling these positions with qualified personnel. To help curb this evolving reality, many state teacher licensure administrations and teacher preparation programs have investigated and developed alterative pathways to state teacher certification (Bowling & Ball, 2018). In 2016, AAAE began evaluating Alternative Certification (AC) professionals as one part of their supply and demand work. In recent years, on average, 18.83% of new hires in agricultural education nationwide were individuals who gained access to the classroom through an alternative route (Smith et al., 2017; Smith et al., 2018; Smith et al., 2019; Foster et al., 2020).

Alternative certification is simply defined as, "anything but a four-year undergraduate program housed in a school of education." (Walsh & Jacobs, 2007, p. 13). AC has actually been an option for SBAE teacher licensure since the 1980s in a few states, but it has not been actively sought in most states until more recently. According to Bowling and Ball (2018), there are over 130 varieties of alternative certification pathways across the nation, all of which are different in terms of longevity, entrance requirements, etc. Regardless of the specifications or requirements of the differing pathways, the goal of AC remains constant: to help relieve the ongoing teacher shortage. As more people enter secondary classrooms through alternative means and without a standard format for teacher preparation, are they different than their peers? Do AC teachers differ in their perceptions of their abilities in the classroom? While some empirical foundation

does exist, it is not extensive and the primary conclusions center on lack of pedagogical preparation differences in AC programs.

Theoretical Framework

Perhaps the most influential piece of an educator's longevity in the profession is their development of Pedagogical Content Knowledge (PCK) (A. Rice, personal communication, May 27, 2020). The organized concept of PCK comes from the research conducted by Shulman (1986), but more recently, Rice has studied PCK in the context of agricultural education. PCK, as defined by Rice & Kitchel (2015b), is where content knowledge expertise is put into practice by the educator. The foundation of PCK includes knowledge of content, students, students' understanding, teaching methods, assessment, and curriculum (Rice & Kitchel, 2015b). PCK is the teacher's ability to take content and turn it into educational practice. PCK development in educators begins early in teacher preparation courses and truly comes to fruition about five to seven years into one's career (Rice & Kitchel, 2016). In-practice reflection, professional development workshops, and teaching experience are all key pieces to understanding and applying PCK in the classroom. The primary tenets of PCK development among teachers whether traditionally prepared or alternatively certified provided the foundational lens for this study.

The development of PCK begins in teacher preparation programs and is then fine-tuned throughout the in-service careers of agricultural educators including the careers of traditionally certified educators. If alternative certification professionals are here to stay, and if it is truly going to be a viable solution, we must discover the PCK needs of alternatively certified teachers. The longevity of their career and student success may depend upon their development and execution of PCK.

Purpose

The purpose of this study was to describe in-service SBAE teachers' perceived Pedagogical Content Knowledge and self-reported sources of content knowledge.

Research Objectives

1. Describe Pedagogical Content Knowledge (PCK) of traditionally certified agricultural education teachers.
2. Describe Pedagogical Content Knowledge of alternatively certified agricultural education teachers.
3. Describe the differences in PCK between licensure types.
4. Describe teachers' perceived sources of knowledge in relation to teacher licensure routes.

Methods

A Qualtrics survey was distributed via email to approximately 7,097 (*N*) prospective respondents from 12 states representing each of the six NAAE regions. Instrument design consisted of four primary sections: demographics, PCK related to a self-identified unit the respondent knows and teaches well, PCK related to a self-identified unit the respondent struggles

with teaching and knows the content the least, and sources of agricultural knowledge. Independent variables included education, years of experience teaching SBAE, college major, gender, state, and licensure type. The dependent variables were the six PCK constructs and sources of agricultural knowledge.

Respondents were asked to rate their competency level in an agricultural unit they know well and teach well using a sliding scale (1-100). With that particular unit in mind, participants used a five-point Likert-type scale identifying to what extent they agreed with 18 statements aligned with the six PCK constructs as defined by Hill et al., (2008). Example questions within each construct are provided in Table 1.

Table 1

Selected Teacher Questionnaire Items

Knowledge Construct	Example Questions
Horizon Content Knowledge (HCK)	I can easily explain the definitions of commonly used terms in the unit.
	I can explain how this unit links to other units within agriculture.
Common Content Knowledge (CCK)	When given information, I can easily discern accurate from inaccurate information.
	I am able to easily explain the process behind various concepts.
Specialized Content Knowledge (SCK)	When presented with a problem, I can find multiple ways to get an answer.
	I can easily explain why a student answer is incorrect.
Knowledge of Content and Teaching (KCT)	I can easily utilize questioning techniques to enhance student learning.

	I can easily identify the advantages and disadvantages of various instructional strategies.
Knowledge of Content and Students (KCS)	I can easily predict what concepts will be most challenging for my students.
	I know where my students should be developmentally.
Knowledge of Content and Curriculum (KCC)	I am able to easily locate outside resources to aid in my teaching.
	I am able to fluidly sequence my material.

Common Content Knowledge (CCK) refers to the teacher's ability to identify when a student gives an incorrect answer (Rice & Kitchel, 2015b). Specialized Content Knowledge (SCK) is the teacher's ability to take an incorrect answer and explain why the answer was incorrect (Rice & Kitchel, 2015b). Horizon Content Knowledge (HCK) is the ability to link the subject matter to other units within and beyond agriculture (Rice & Kitchel, 2015b). Knowledge of Content and Students (KCS) is the teacher's ability to predict challenging concepts and knowing where students are at developmentally (Rice & Kitchel, 2015b). Knowledge of Content and Teaching (KCT) refers to the teacher's ability to utilize questioning techniques to help understand content and concepts (Rice & Kitchel, 2015b). Lastly, Knowledge of Content and Curriculum (KCC) is referring to overall curriculum design and sequencing/scaffolding lessons within a unit (Rice & Kitchel, 2015b). The PCK related questions and sources of agriculture knowledge were adapted from Missouri Agriculture Teacher Knowledge Questionnaire, which was found to have at least 0.70 reliability for all constructs except Horizon Content Knowledge. Horizon Content Knowledge had 0.60 reliability (Rice & Kitchel, 2015b). Rice retained this construct "due to the exploratory nature" of the study (Rice & Kitchel, 2015b, p. 160). The sources of knowledge are listed in Table 4. Statistical analysis for objectives one and two included means and standard deviation. For objective three, statistical analysis included t-test and Cronbach's alpha, and for objective four, it included means, standard deviation, and t-test.

Demographics

Data collection took place from January 24th to February 20, 2021. The survey yielded 551 respondents for an eight percent response rate. Of the total, 57.7% were female and 41.7% male. A majority of respondents had been teaching four or less years at 34.1%, followed by five to nine years at 24.9%, 25 years or more at 11.6%, 10-14 years at 10.7%, 15-19 years at 9.6%,

and 20-24 years at 9.1%. Traditional licensure was obtained by 420 teachers (76.2%), and 131 teachers (23.8%) were alternatively certified.

Findings

Objectives 1 and 2

Both licensure routes had the highest average construct score in Horizon Content Knowledge (HCK) followed by Common Content Knowledge (CCK) as shown in Table 2.

Table 2

Perceived PCK of Traditionally Certified (n=413) and Alternatively Certified (n=130) Agricultural Educators by Construct

Knowledge Construct	TC Mean	TC SD	AC Mean	AC SD
Horizon Content Knowledge (HCK)	4.61	0.42	4.60	0.43
Common Content Knowledge (CCK)	4.54	0.46	4.51	0.46
Specialized Content Knowledge (SCK)	4.45	0.51	4.42	0.49
Knowledge of Content and Teaching (KCT)	4.32	0.55	4.21	0.58
Knowledge of Content and Students (KCS)	4.17	0.56	4.07	0.59
Knowledge of Content and Curriculum (KCC)	4.13	0.66	4.03	0.67

Note. Scale: 1 = to no extent, 2 = to little extent, 3 = to some extent, 4 = to fair extent, and 5 = to great extent

Objective 3

For five of the six constructs, CCK, SCK, HCK, KCS, and KCC, there were no statistically significant differences in PCK between AC and TC teachers. The KCT construct was statistically different and significant at $p = 0.05$, although still a small effect size. For constructs KCS, KCT, and KCC a slightly larger, small effect (Cohen's d=0.15, 0.17, and 0.13, respectively) was calculated for the constructs more directly focused on the implementation of teaching skills. This is shown in Table 3.

Table 3

Comparison by Licensure Type of Perceived PCK by Construct (traditional certification n=404; alternative certification n=129)

Knowledge Construct	F	*t*[a]	Sig. (2-tailed)[c]	df	MD[b]	Cohen's *d*
Knowledge of Content and Students (KCS)						
Equal variances assumed	0.04	1.70	0.09	531	0.10	0.15
Equal variances not assumed		1.64	0.10	204.47		
Knowledge of Content and Teaching (KCT)						
Equal variances assumed	0.41	1.94	0.05	531	0.11	0.17
Equal variances not assumed		1.88	0.06	205.13		
Knowledge of Content and Curriculum (KCC)						
Equal variances assumed	0.11	1.48	0.14	531	0.10	0.13
Equal variances not assumed		1.47	0.14	212.75		

Note. a. 95% Confidence Interval b. Mean Difference c. *p* value

Objective 4

There was a significant difference at a 95% confidence interval in the teacher preparation program (p=0.00) and teaching experience (p=0.00) as shown in Table 4. There was no difference (<0.05) in the remaining five sources of knowledge.

Table 4

Sources of Knowledge and Their Effect on Ability to Teach (traditionally certified n=366 and alternatively certified n=94)

Source of Content Knowledge	TC Mean	TC SD	AC Mean	AC SD
Teaching experience	5.34	0.73	4.97	0.91
Previous agriculture related jobs or internships	5.14	0.89	5.27	0.86
Experts in the field consulted either formally or informally	5.10	0.85	5.15	0.85
Teacher preparation program	4.76	0.92	4.28	1.2
High school agriculture program	4.74	1.1	4.71	1.2
Professional development workshops	4.71	0.91	4.67	1.18
Internet, textbooks, or other media	4.67	0.87	4.80	0.94

Note. Scale: 0 = not applicable, 1 = very ineffective, 2 = ineffective, 3 = somewhat ineffective, 4 = somewhat effective, 5 = effective, 6 = very effective

Conclusions and Recommendations

For the present sample, few differences exist between AC and TC teachers regarding PCK, which counters some preconceived assumptions. These findings are not generalizable beyond those respondents, but do help paint a picture of, at least, how AC and TC teachers nationwide perceive their pedagogical standing. Traditionally certified agricultural educators had the highest average construct score in Horizon Content Knowledge (HCK). This construct directly relates to a teacher's ability to link the subject matter with other units within agriculture as well as beyond agriculture (Rice & Kitchel, 2015b). These agricultural education teachers have specific training through university teacher preparation programs on instructional methods that help them make real-world connections with agriculture content and applications of agriculture knowledge across other disciplines within education as a whole. Alternatively certified agricultural education teachers also saw the highest construct score in Horizon Content Knowledge (HCK) followed by CCK. This is possible because these teachers have different experiences outside of education. This has the potential to give them the unique ability to use personal real-world examples and experiences to make those same connections for students in the HCK construct.

In all six PCK constructs, traditionally certified teachers were numerically higher. This initially tells us that TC teachers perceive their PCK to be higher than AC teachers, but the lone significant difference was observed in Knowledge of Content and Teaching (KCT) construct. According to Rice and Kitchel (2015b), an example of KCT in practice would be applying various questioning techniques to help students grasp challenging or complex topics of instruction. From this, it can be interpreted that alternatively certified teachers may experience more difficulty in implementing various questioning strategies to help students understand complex agricultural concepts. Teacher preparation programs provide teachers with specialized methods and instructional strategies courses exclusive, for the most part, to agricultural education that help prepare and begin fostering PCK in pre-service educators. Typically, alternatively certified teachers are not getting that same deliberate experience; however, according to the research data in this study, the knowledge contributing to PCK development is coming from other sources. That said, they cannot acknowledge PCK development if they do not know what it is to begin with. It can be concluded that their experiences outside of the classroom are equally as valuable based on the finding in sources of agriculture knowledge and the effectiveness on ability to teach. It is recommended that alternatively certified teachers still participate in the education-specific instructional courses, even if it is during their first few years of teaching. Since educators need to constantly reflect on their practices and instruction, those courses can be valuable at any stage. Afterall, PCK development takes years and is never perfected (Rice & Kitchel, 2016).

This study does raise some questions in regard to years of teaching experience and PCK development. PCK for in-service SBAE teachers is not considered fully developed until achieving five to seven years of teaching experience (Rice & Kitchel, 2016). A majority of respondents in this study had been teaching less than four years (34.1%). Meaning that 34.1% of the respondents are considered to still be working on their foundational PCK development. It is recommended that future studies focus on years of teaching experience based on licensure route and their PCK development. It is possible that greater differences between licensure type could

be evident at different stages of early career educators. School administrators and state agricultural education staff could potentially better target challenging areas of PCK if those educators are broken apart by experience level. The findings of this study indicate that AC agricultural educators primarily need assistance in the construct area of Knowledge of Content and Teaching. The next step in research and practice would be to develop specific professional development workshops to meet those needs of developing better inquiry into content knowledge in addition to broad strategies on question development.

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Examining How Alternatively Certified Teachers Participate in Agricultural Education Communities of Practice

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Introduction

Alternative certification of agriculture teachers continues to rise as school districts and policymakers seek to ensure enough teachers are in classrooms (Feistritzer & Haar, 2008; Foster et al., 2020). According to the 2019 National Agricultural Education Supply and Demand Study (Foster et al., 2020), 63 full- and part-time positions were unfilled at the beginning of the 2019-2020 school year, with approximately 16.5% percent of new agriculture teachers in the United States alternatively certified. Alternatively certified agriculture teachers are individuals who were certified to teach agriculture outside of a traditional agricultural education teacher preparation program and/or hold an alternative license in agricultural education (Claflin et al., 2020). Prior research on alternatively certified agriculture teachers centers primarily on teacher self-efficacy and professional development needs in comparison to traditionally certified teachers, with findings indicating alternatively certified agriculture teachers are sometimes less

self-efficacious and differ in professional development needs (Duncan & Ricketts, 2008; Roberts & Dyer, 2004; Robinson & Edwards, 2012; Rocca & Washburn, 2006; Stair et al., 2019).

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 findings of SBAE being a "welcoming, but exclusive community" (Claflin et al., 2019, p. 60), this study sought to understand how alternatively certified agriculture teachers learn from and participate in the unique SBAE agriculture teacher community of practice.

Theoretical Framework

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). 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. In a COP, newcomers learn how to participate as they observe others and are mentored by experienced members. Wenger (1998) explained new members need to be seen as legitimate by current members and are supported as they first participate, which often occurs on the periphery of the community. As we continue to participate in a COP, we become more familiar with the language, terms, and stories concerning community membership.

Purpose and Research Question

This study was part of a larger research project that explored the experiences of alternatively certified agriculture teachers 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), with hermeneutic phenomenology specifically allowing researchers to acknowledge their own experiences and knowledge (Lopez & Willis, 2004) as they study the perspective of those who experience the phenomenon (Cohen et al., 2000).

This study aimed to include participants from across the United States, who were secondary agriculture teachers, held an alternative license in agriculture, and/or did not complete a traditional route to agriculture teaching (i.e., a teacher education program in agricultural education). The participants for this study were recommended by state staff and teacher educators in SBAE. Thirteen individuals from eight states agreed to participate in the study.

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 provide descriptions of the agriculture teacher community, describe their experiences interacting with the agriculture teacher community, and if they considered themselves members of the community. Semi-structured interviews lasting between 45 and 90 minutes were conducted over Zoom in the winter of 2020.

Interviews were transcribed verbatim and field notes were collected to serve as an additional data source. Throughout the analysis, 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). To maintain trustworthiness in the study, we adopted the framework advanced by Merriam and Tisdale (2016) 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 and see themselves as members of the community.

We're All in This Together

As the participants discussed their participation in the agriculture teacher community of practice, they overwhelmingly shared the support which fellow agriculture teachers provided. Specifically, they talked about how they interacted with agriculture teachers, the willingness to help one another, and the unique familial feeling of the group. As participants came together with other agriculture teachers at FFA events and agriculture teacher meetings throughout the year, they built connections and learned from others. For example, Evan highlighted how the conversations between agriculture teachers at events provided value because they allowed the teachers to share suggestions and help each other out. Likewise, Mindy talked about the fall

agricultural education professional development event she attends, 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.” There was an implicit expectation that agriculture teachers should be offering assistance to each other and sharing resources. The more experienced agriculture teachers shared that they valued serving as mentors and giving back to the profession while the early-career teachers noted how other agriculture teachers supported them by sharing curriculum, teaching strategies, fundraisers, and advising FFA chapters. Beyond sharing advice and resources, participants likened connecting with fellow agriculture teachers to being with their own families and mentioned checking in on each other’s families during interactions before asking about school. For example, when Angela suffered a loss in her family, neighboring agriculture teachers dropped off food and sent notes.

Belonging

The participants in this study agreed they belonged to the agriculture teacher COP, with the sense of belonging being more similar to a continuum than a dichotomy. Many participants noted how they did not identify as community members early in their careers, either due to a lack of experience or knowledge of the community. As participants explained their membership in the community, they talked of paying their dues (both literally and figuratively), their ability to contribute to the group, and being recognized for their contributions and achievements by others. 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 giving presentations or serving as a resource to other agriculture teachers provided them a sense of legitimacy in the

community. For Pamela, simply being included as a member of the group 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.

Conclusion

This study sought to understand how alternatively certified agriculture teachers learn from and participate in an agriculture teacher community of practice by answering the following research question: *how do alternatively certified agriculture teachers participate in the agriculture teacher COP?* The participants participated in the COP at FFA events, meetings, and professional development sessions by connecting with other teachers through sharing ideas and resources or offering support. As a result, all the participants felt like they belonged to the agriculture teacher COP. However, the sense of belonging differed among participants depending on their ability to participate, share resources, or be seen as a legitimate group member. These findings provide insight into how alternatively certified agriculture teachers are learning about being an agriculture teacher and about SBAE through the lens of social learning and COP. As the teachers participate in the community, they are learning the group's practices and making meaning of what it means to be an agriculture teacher and are identified by others as legitimate members of the community.

This study showcases how alternatively certified agriculture teachers participate within the agriculture teacher community of practice and provides insight into how participants who entered teaching from various backgrounds interact and view the agriculture teacher community. Additionally, the study sheds light on the implicit, hidden practices of the agriculture teacher community which offer additional implications and recommendations to SBAE leaders and complement other studies which have utilized COP as a framework (Roberts & Stair, 2020; Traini et al., 2019). These findings are crucial as we continue to seek ways to support alternatively certified agriculture teachers. We must recognize both the importance of social learning and the unique practices of agriculture teachers. Newcomers to a community of practice often lack competence as they learn how to engage with others, talk to, or recognize shared references (Wenger, 1998). How are we sharing these often-unspoken expectations, so alternatively certified teachers feel capable and welcome with other agriculture teachers? Wenger noted if someone is not seen as a legitimate participant, their access to the community will be limited.

Additionally, Wenger (1998) shared that we often learn in communities of practice from those with more experience. It is through these individuals we gain access to the community and an understanding of the practices. However, it can be challenging to make those connections if individuals are unaware the community exists. The knowledge about where and how participants participated within the agriculture teacher COP and how they learned should be considered as state leaders in SBAE discuss formal programming, mentoring, and support for alternatively certified agriculture teachers.

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Balancing Demand: Reevaluating SBAE Teacher Supply and Demand in Minnesota

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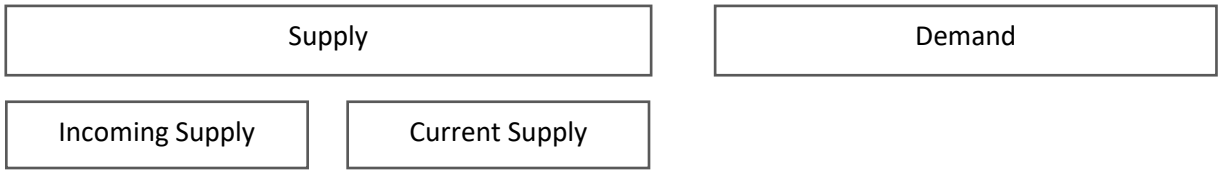
Introduction & Theoretical Framework

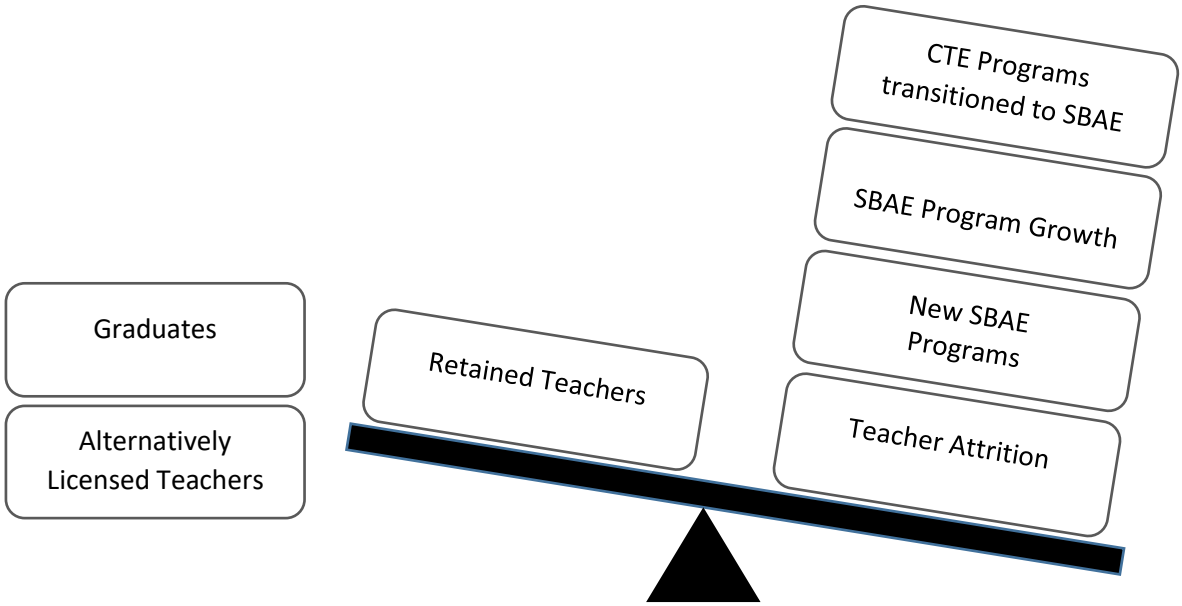
While a longstanding issue in school-based agricultural education (SBAE), the demand for SBAE teachers has reached an all-time national high with 13,827 SBAE teachers in the United States (Eck & Edwards, 2019; Smith et al., 2019) and 291 SBAE teachers in Minnesota (Sheehan, 2020). The United States Department of Education (2021) lists Minnesota as having a SBAE teacher shortage since 2018.

The economic law of supply and demand explains the interaction between the supply of and demand for a resource at a given price (Gale, 1955). We applied this law as the conceptual framework for our study, supported through supply equilibrium (Murnane & Steele, 2007), teacher labor supply and demand (Ingersoll & May, 2011), and supply and demand imbalance (Sutcher et al., 2016). In our case, SBAE teacher labor is the product supply and demand under examination. We conceptualized *supply equilibrium* (Murnane & Steele, 2007) as an ideal state noting, however, an *imbalance* as illustrated in Figure 1 (Sutcher et al., 2016).

Figure 1.

Conceptual model for supply and demand of Minnesota SBAE teachers





In our state, several unique considerations comprise a demand and supply imbalance (Sutcher et al., 2016). In terms of demand, our state has seen significant program growth, especially over the last 15 years (Sheehan, 2020). Since 2005, 27 school districts added new SBAE programs and an additional 75 SBAE teaching positions needed to be filled state-wide (Sheehan, 2020). The considerable growth has been influenced by a few factors bearing implications for understanding these data. Career and Technical Education (CTE) positions in Minnesota often accept applicants with any CTE license, so many SBAE teachers are hired to teach in broader CTE areas. Additionally, Minnesota SBAE teachers can offer credit equivalencies for art, economics, mathematics, elective science, chemistry, and physics (Minnesota Credit Equivalencies, 2019).These demands alone would cause an imbalance in SBAE teacher demand, but bear further implications for SBAE teacher supply as well.

On the supply side, SBAE teacher numbers remained consistent from 1990 to 2005, and Minnesota had a low of 216 teachers in 2010 (Sheehan, 2020). SBAE teaching positions in Minnesota rarely go unfilled, as the Minnesota licensure board provides a variety of opportunities for licensure. For context, 60 SBAE positions were filled – 17 of which were new teaching positions – in 2020-2021; only two were left unfilled (Sheehan, 2021). To fully balance the demand, up to 25 alternatively licensed SBAE teachers taught in Minnesota during the 2020-2021 school year (Sheehan, 2021). Arguably, there are more considerations in play to conceptualize SBAE supply and demand than the final numbers of filled positions are able to capture.

By net positions, Minnesota has achieved a supply and demand equilibrium. Given the contextual factors for our state, however, we find ourselves asking: Is there still a supply and demand issue for SBAE in Minnesota? Without a more nuanced review of our supply and demand, we will miss opportunities to address supply and demand imbalances to achieve equilibrium.

Purpose & Research Question

The purpose of our study was to better understand the supply and demand imbalance in Minnesota. Examining the historical retention for SBAE teachers in Minnesota will illuminate contributors to supply and demand imbalances in SBAE. Ultimately, this enhanced understanding will better allow us to support SBAE teachers across the supply chain. The problem remains that positions filled do not adequately describe the supply and demand equilibrium in Minnesota. Our goal is to clarify the equilibrium status in Minnesota with a more detailed understanding of the historical retention patterns influencing the supply and demand of SBAE teachers.

We used the following research questions to fulfill this purpose:

1. What is the 22-year retention rate for Minnesota?
2. At how many years of experience do Minnesota teachers historically leave SBAE teaching?

Our study aligns with AAAE Research Agenda Item 3, Priority Question 2 (Stripling & Ricketts, 2016): 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?

Methods

To begin the descriptive examination of SBAE teacher supply and demand in Minnesota, the most logical starting point was reviewing the retention data for the last 22 years (1998-2020). Annual state teacher directories were compiled and sorted by school district. This yielded a population of 394 (*N*) SBAE teachers. These data were then sorted by teacher, noting the school and year the teacher began teaching. We cross-checked data against induction program rosters and the Minnesota educator license database to identify teachers still teaching in the spring of 2020. Thirteen teachers were excluded from the final sample (n = 381) based on incomplete data that we were unable to ascertain through email follow up with specific teachers.

We coded teachers by *left SBAE* and *still teaching* to identify *percent remaining* and *percent left* for each year accounted for in the data frame. We identified the attrition and retention frequencies by years of teaching experience of teachers who remained teaching or left SBAE, allowing us to identify the percentage of teachers leaving annually. Notably, teachers in our study ranged from 1-22 years of teaching experience, with only those who began in 1998 completing the full range of experience available. As such, the average years of teaching experience for the sample (n = 381) was seven years in 1.5 schools.

To answer research question one, we used the compiled data to identify the total teachers still in the Minnesota SBAE teaching force relative to the number at the start. This percentage derived the retention rate. Subsequently, we identified annual retention and attrition of the total teachers based on the year of experience they left the secondary teaching force. This

identification allowed us to answer research question two based on the number of teachers who left the secondary SBAE classroom.

We are limited in our ability to make comparative claims based on the available data. Prior to 1998, minimal data exist to allow claims based on our state's retentive capacity. Furthermore, given the available data is largely binary, we have minimal opportunity to make comparative claims among the data. Finally, this sample (n = 381) is not assumed to be representative of the general SBAE teaching population. While these results inform the work of our induction and state-wide retention programs, similar studies must be conducted in individual states to continue the work of understanding long-term retention.

Findings

Research Question 1: What is the 22-year retention rate for Minnesota?

Of the 381 teachers beginning their careers in Minnesota between 1998 and 2020, 208 were still teaching in SBAE classrooms (54.5%) in 2020. Most of this attrition from SBAE occurred during or after the first year of teaching (n = 47, 12%). Less than 5% (n = 13) left after the fifth year of teaching. No individual year was particularly detrimental to teacher retention in our state.

Research Question 2: At how many years of experience do Minnesota teachers tend to leave SBAE teaching?

In line with previous studies (Haddad et al., 2020), the most significant attrition was evident in SBAE teachers with five or fewer years of experience (Table 1).

Table 1.

Reduction in Minnesota SBAE Teaching Force by Years Experience (Years 1-5, 1998-2020)

	Year 1	Year 2	Year 3	Year 4	Year 5
Total at Start	381	334	303	276	264
Attrition	47 (12%)	31 (9%)	27 (9%)	12 (4%)	13 (5%)
Retention	334 (88%)	303 (91%)	276 (91%)	264 (96%)	251 (95%)

While our data provided some insight into routes at exit (industry, higher education, administration), we were not focused on reasons for leaving teaching as outcomes of this study. In particular, 12% (n = 47) of teachers left after one year in the SBAE classroom, 9% (n = 31) left after two years, 9% (n = 27) at three, 4% (n = 12) at four, and 5% (n = 13) at five.

Beyond year five, and by the National Center for Education Statistics (NCES) breakdown, teacher attrition for Minnesota reflects declining attrition (Table 2).

Table 2.

Reduction in Minnesota SBAE Teaching Force by Years Experience (NCES Groupings, 1998-2020)

	Year 1-3	Year 4-9	Year 10-19	Year 20+
Total at Start	381	276	230	208
Attrition	105 (28%)	46 (17%)	22 (10%)	0 (0%)
Retention	276 (72%)	230 (83%)	208 (90%)	208 (100%)

In our state, we lost 28% (*n* = 105) of SBAE teachers between years 1-3 and 17% (*n* = 46) between years 4-9. Notably, over half of the teachers in our dataset have fewer than ten years of experience; it stands to reason, given more teachers with less experience, we would see greater attrition in lower experience categories. Regardless, losing 40% of teachers with fewer than ten years of experience is unsustainable. In addition, losing nearly one-third of teachers in years one through three warrants additional attention regarding the support of teachers beyond year one.

Conclusions & Implications

While retaining only half (*n* = 208, 55%) of SBAE teachers in the classroom over 22 years may seem paltry, remember, half the dataset presented at under ten years of experience. Notably, though, 88% (*n* = 334) of SBAE teachers were retained after their first year in the classroom across the 22 year dataset. This is higher than the percentage of new teachers not returning after their first year (12% compared to 7%), noted by Franklin and Molina (2012). However, this is lower than the national estimates of attrition (between 19-30%) in the first five years of teaching (Darling-Hammond & Sykes, 2003; Gray et al., 2015). Our average annual percent attrition for SBAE teachers (2.4% compared to 4.5%) is also lower than the national SBAE attrition (Foster et al., 2020). Furthermore, we lost 26% of individuals between their first through third years in the profession. This begs the question: Is there a SBAE teacher shortage in Minnesota?

As the conceptual model demonstrates, multiple factors influence the supply and demand of SBAE teachers in Minnesota. These data provide a historical accounting for teacher attrition; however, they do not permit evaluation of teacher effectiveness, analysis or comparison of the retention of alternatively licensed teachers, nor do they address the retention rate of Minnesota's entire agricultural education profession. Our study brings to light additional needs regarding the data collection and coordinated research efforts in our state's teacher retention programs. Analysis of the composition of the retained teachers may help identify support needs throughout a SBAE teacher's career. More robust measures must be employed relative to the factors influencing the supply and demand of teachers including needs assessment of retained teachers and an evaluation of other factors influencing teacher retention.

Perhaps one of the most important contextual factors backgrounding this study is recognizing in the 22 years evaluated, few vacancies remained open each year in Minnesota (Sheehan, 2020). Our AAAE research agenda, supply and demand studies, and efforts of the

NAAE TeachAg Campaign note shortcomings across the nation in available SBAE candidates to fill the demand. Certainly, retaining the teachers who enter the profession is essential, but must be supplanted with focus on the anticipated supply of graduates and alternatively licensed teachers. Understanding the attrition patterns of SBAE teachers provides information to assist in predicting anticipated demand while also informing when additional support may be needed to prevent attrition. If more teachers can be retained and new teachers supported, the supply and demand equilibrium can be attained. With greater numbers of teachers comes reduced impact of a few making career decisions that take them outside SBAE. Continued attention to both sides of the SBAE teacher shortage equation is urgently warranted and necessary. Taking a holistic, ecological approach, even more so.

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Measuring Mobility: A Quantitative Description of Mobility in Minnesota

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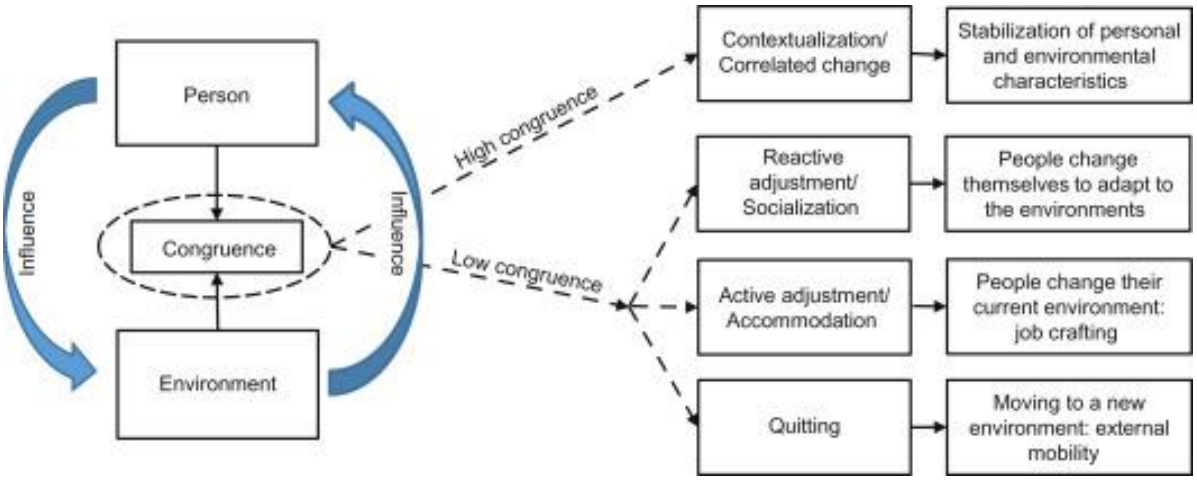
Introduction & Theoretical Framework

Considerations around teacher attrition, supply and demand, and retention are incomplete without including teacher mobility. With 30% of school-based agricultural education (SBAE) program openings filled by mobile teachers annually (Foster et al., 2020; Foster et al., 2016; Foster et al., 2015; Smith et al., 2019; Smith et al., 2018; Smith et al., 2017) and 60% of first-time movers making subsequent program moves (Haddad et al., 2021), additional work is needed to better understand mobility on the state level. Furthermore, the recent teacher mobility literature notes heightened challenges for retaining early-career teachers at both the school and professional level (Perrone et al., 2019).

Vagi and Pivovarova (2016) acknowledge the similar effects teacher mobility and attrition have on schools while also noting the differences driving choice and intention. In other words, for mobile teachers, it may not be a mismatch of profession, but a mismatch of location (Vagi & Pivovarova, 2016). While identifying several factors and potential theories to be applied in the teacher mobility framework, they argue no one theory encompasses the breadth of factors influencing a teacher's decision to change schools. They suggest, instead, person-environment theory provides the best lens for examining teacher mobility (Vagi & Pivovarova, 2016). Notably, its close counterpart, the person-environment accommodation model includes several factors of *congruence* aligning with time between program moves (Figure 1., Holland, 1997, p. 68).

Figure 1.
Theory of Vocational Choice, Person-Environment Accommodation Model (Holland, 1997)



The problem as it currently stands finds SBAE ill-equipped, at the professional level, to support mobile teachers. However, provisions of support cannot be well supplied if mobile teachers remain unidentified. Given the only study within the Journal of Agricultural Education (JAE) quantifying mobile teachers focuses on a single state (Haddad et al., 2020), it is time to add ours to the available research.

Purpose & Research Question

The purpose of our study was to quantitatively describe teacher mobility in Minnesota over the last 25 years (1995-2020). We guided our research using the following questions:

1. What is the 25-year SBAE mobility rate for Minnesota?
2. At how many years do SBAE teachers in Minnesota tend to change schools?

Our study aligns with AAAE Research Agenda Item 3, Priority Question 2 (Stripling & Ricketts, 2016): What methods, models, and practices are effective in recruiting agricultural education practitioners and supporting their success at all stages of their career?

Methods

To describe SBAE teacher mobility in our state, we utilized teacher retention data compiled from state teacher directories over the last 25 years (1995-2020). The initial data set (*N* = 425) showed teachers by name, year they began teaching, license, and school district, sorted by the years a given teacher was in said district. Four teachers presented with incomplete data, yielding a final sample of 421 teachers (*n*). After this compilation, we reorganized the data by name, code number, first year teaching, number of schools, and years in program. Based on these two datasets, we were able to identify teachers by name, code, current retention status (teaching as of 2020), number of schools in which they taught, years in program, and total years of experience at each program move.

To answer research question one, we calculated the mean, median, and mode years teaching for the sample of teachers (*n* = 421). Teachers ranged from 0.5-26 years of experience and one to four program moves. These teachers, collectively, held 638 positions (noting that many teachers taught in multiple schools). Of these teachers, 245 (58%) are still teaching, and 176 (42%) are no longer in the SBAE classroom. Across the sample, teachers had a mean 6.5 years teaching experience (median = 4, mode = 1) in a mean of 1.5 schools. The sample description is outlined in Table 1.

Table 1.

Sample description for Minnesota SBAE Teachers (1995-2020)

	Frequency	%
Mobile Teachers	153	36%
Retained Teachers (regardless of # of schools)	245	58%
Reduction in Force (attrition)	176	42%
Total Teachers	421	

To answer research question two, we identified the number of moves each teacher made by years of experience at each move and number of years they taught in a given program. We identified mobile teachers as those who taught in two or more schools during their tenure in

SBAE (n_1 = 153, 36%). Bear in mind, teachers who moved at least once were denoted as *mobile teachers.* Subsequent moves are not additive in identifying the mobile subset of teachers. 107 (70% of mobile teachers) teachers moved only once. On average, teachers who moved made their first move within three years of beginning teaching, and subsequent moves at years 7, 9, and 12.5. In addition, mobile teachers moved to another school, on average, within 3.5 years of starting in a new program.

Regarding this dataset, we have a limited ability to make comparative claims. Limited data exist prior to 1995 to assemble a valid and reliable historical picture of teacher mobility for our state. The data available are largely descriptive; at this point, we do not have the data to corroborate themes suggested in the literature regarding factors of mobility. Finally, this sample (n = 421) is not assumed to be representative of the general SBAE teaching population, nor the teaching population in our state.

Findings

Research Question 1: What is the 25-year SBAE mobility rate for Minnesota?

Simply put, 153 (36%) of the 421 teachers in this sample changed schools at least once in the 25-year sample window. This historic mobility rate corroborates the California study of SBAE teacher mobility (Haddad et al., 2021) and mirrors national data for teacher mobility for the last several years (Foster et al., 2020; Foster et al., 2016; Foster et al., 2015; Smith et al., 2019; Smith et al., 2018; Smith et al., 2017).

Table 2.
Mobility frequencies by move for Minnesota SBAE teachers (1995-2020)

	Move 1	Move 2	Move 3	Move 4
Mobility Frequency[1]	153	46	16	6
% Total (n = 421)	36%	11%	4%	1%
% Mobile (n_1 = 153)		30%	10%	4%
Attrition Frequency[2]	38	7	1	0
% Mobile Attrition (n_1 = 153)	25%	5%	<1%	0

Note: [1] Mobility frequency (n_1), denotes all teachers who taught in more than one school

[2] Attrition frequency denotes the attrition frequency among mobile teachers

In the total sample (n = 421), 153 (36%) teachers moved at least once, 46 (11%) moved twice, 16 (4%) moved three times, and six (1%) moved four times. No teacher made more than four program moves in the 25-year sample frame. Within the mobile group of teachers (n = 153) there were 68 subsequent moves across 46 teachers (44% subsequent mobility rate). This is a much lower subsequent turnover rate than noted in previous studies (60%, Haddad et al., 2021). Notably, all but one of the teachers who moved three and four times was still teaching as of

2020. Even then, this one teacher was still involved in the larger profession at the time of the study (post-secondary education). Among teachers making first and second program moves, 38 (25% of those who had already moved once) left teaching after their second school, and 7 (5% of those who moved twice) left teaching after their third school.

Research Question 2: At how many years do SBAE teachers in Minnesota tend to change schools?

Our sample of 421 teachers held 638 positions. 62 teachers (40% of mobile teachers) made their first career move after their first year of teaching. On average, teachers made their first program change at three years of teaching experience, with subsequent moves at years 7, 9, and 12.5. However, teachers made their first program move anywhere between their first and 16th year teaching, second move between 2-19 years, third move between 3-14 years, and fourth move between 7-17 years. Table 3 shows moves by years of experience by the National Center of Education Statistics (NCES) breakdown for years of experience.

Table 3.

Mobility of Minnesota SBAE teachers (NCES Groupings for years of experience, 1995-2020)

	Move 1	Move 2	Move 3	Move 4
Year 1-3	108 (71%)	15 (10%)	1 (<1%)	0
Year 4-9	35 (23%)	17 (10%)	8 (5%)	1 (<1%)
Year 10-19	10 (7%)	14 (9%)	7 (5%)	5 (3%)

Note: Given the relative experience of the sample, few teachers had more than 20 years of experience and none have experienced program moves beyond 19 years. Percentages are listed as % of mobile teachers (n_1 = 153).

In addition, teachers moved within 3.5 years, on average, in a new program. These numbers mirrored total years' experience closely, particularly among 1-3- and 4-9-year teachers. Table 4 outlines programmatic moves by years in program.

Table 4.

Mobility of Minnesota SBAE teachers (time in program, 1995-2020)

	Move 1	Move 2	Move 3	Move 4
1-3 years in program	110 (72%)	28 (18%)	7 (5%)	3 (2%)
4-9 years in program	33 (22%)	14 (9%)	9 (6%)	3 (2%)
10-19 years in program	10 (7%)	4 (3%)	0	0

Remember, 153 (n_1) of the total 421 (n) teachers in our dataset were considered mobile. Of these mobile teachers, 72% made their first move between their first- and third year in a

program (corroborating Haddad et al., 2021). This finding bears implications for our professional induction of early-career teachers, especially in light of the anecdotal narrative around mobility being a career restart.

Conclusions & Implications

These findings add to a growing base of research surrounding the support of mobile SBAE teachers. While we only provided a quantitative description of mobility in our state, it clarifies the picture regarding *churn*, mobility rates, and the teaching experience of mobile teachers. These findings bear implications for our pre-service preparation, induction level support, and mid-career advice and support relative to the suggested reduction of frequency in mobility with additional teaching experience. Certainly, SBAE teachers move, but individual teachers do not appear to be stuck in cycles of mobility.

A previous study showed 30% of SBAE teachers leave teaching altogether after a program move (Haddad et al., 2021). Our sample mirrored this frequency (41, 27%). We also saw mobility rates continued to decline as teaching experience accrued. While this means several were retained to the profession through mobility, ideas of *congruence* (Holland, 1997) bear implications relative to this study for pre-service preparation, induction level support, and mid-career advice and support. In prior studies, mobile teachers have urged their peers considering a move to evaluate the desired change and if a geographical shift would affect that change (Haddad et al., 2019). For pre-service programs, raising awareness for the influence of a person on their environment and environment on a person could prove essential.

These habits of self-evaluation subsequently follow into induction where *high congruence factors* (Holland, 1997) such as contextualization and stabilization aid a person in seeing greater influence over their environment or vice versa. As such, understanding induction as a process extending beyond the first year in the classroom prompts support programs to incorporate mobility as an essential component of the career. Providing mentoring support to evaluate career decisions may become an essential goal of induction programs should retention continue to be a central focus.

Finally, we acknowledge the teaching career as cyclic (Fessler & Christiansen, 1994). We saw our mobile teachers moving at mirroring years of experience and time in program. This begs us to revisit the anecdotal *restart* of a move in future research. This may shift our view of what it means to support mid-career teachers, particularly as they experience *reinductions* through program moves. Since we did not examine perceptions of congruence specifically, additional research is necessary to examine congruence as teachers progress through a career. We can certainly point back to Vagi and Pivovarova's (2016) reminder that the driving mechanisms and subsequent supports look different for mobility compared to attrition. However, we cannot assume a career point at which stabilization has been reached, requiring no further support.

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Understanding the Role of Education in Water Governance: A Qualitative Study in Sub-Saharan Africa.

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Introduction

In any area of human development, education is a primary domain goal (Kilpatrick, Field, & Falk, 2003). In the development agenda pursued by the Sustainable Development Goals (SDGs), education is a transversal component within the 17 statements that seek to promote social, economic, and environmental well-being, emphasizing actions in developing regions. The sixth SDG, "Drinking water and sanitation," requires greater literacy among all stakeholders on this environmental and development issue (Moreno-Guerrero et al., 2020).

Globally, water availability for human consumption reduces faster than the results generation rate from efforts to conserve and protect water resources (Kusangay et al., 2014). In Sub-Saharan Africa, people have historically faced several challenges in accessing clean water sources. This region of the African continent continues to suffer the consequences of an abrupt and violent colonization process. On the other hand, it has the most significant geographical disparity in access to water resources among countries in the same region worldwide (UN Refugee Agency, 2019).

Faced with the need to guarantee clean water to a growing population, public and private organizations promote actions that ensure a more equitable and effective distribution. To achieve this goal, water resources have been managed under various governance models. However, some governance models have failed due to a lack of acceptance and adoption among community members. Community resistance is a common phenomenon in community development initiatives (Duncombe, 2007). According to Saepudin and Mulyono (2019), the lack of educational activities proposed by the implementers of a development project for the users/beneficiaries is one of the main reasons for the project's failure.

Conceptual Framework

According to the Organization for Economic Co-operation and Development (OECD) (2015, p. 1), “governance is the range of political, institutional, and administrative rules, practices, and processes (formal and informal) through which decisions are made and implemented." In any governance scheme, the interests of all stakeholders are taken into consideration; and it is the decision-makers who are responsible for the management that satisfies those interests (Mexican National Commission of Water [CONAGUA], 2016). Therefore, water governance requires the

participation from different points of action of all those interested in a water distribution system. In general, among stakeholders, users or community members are the least informed about the relevant aspects of the management of the system, which makes it difficult for them to participate in the governance process (OECD, 2015).

As in most community development initiatives, Saepudin and Mulyono (2019) propose that users participate in non-formal and informal educational activities that allow them to learn about managing the water distribution system. According to Latchem (2014), although most of an individual's knowledge occurs in informal settings. Non-formal education also contributes in a dominant way to what the individual learns. UNESCO (1997, p.1) defines non-formal education as "organized and sustained educational activities that do not correspond exactly to the definition of formal education [and] may have different durations and may or may not confer certification." Non-formal education is a reinforcement of formal education systems that are insufficient to meet the educational needs of today's society (Latchem, 2014).

In the context of community development, non-formal and informal education has proven to be an effective vehicle for disseminating information among stakeholders on any initiative with impacts on people's livelihoods (Saepudin & Mulyono, 2019). Most stakeholders in a community development project will be able to fulfill their obligations and reap the benefits provided they are adequately informed about the scope and characteristics of the project. In addition, the knowledge of the community members is a critical factor for the success or failure of the project evaluated in the adoption, benefit, and impact of the project on the community livelihoods.

Purpose and Research Questions

This qualitative study aimed to explore the role of non-formal and informal education efforts within the governance of water distribution systems in three countries in Sub-Saharan Africa. The following research questions were used to guide the study.

1. What educational efforts have been used in water governance in sub-Saharan Africa?

2. How do stakeholders in a water distribution system benefit from the educational activities included in the governance model?

Methodology

In partnership with the governments of Tanzania, Kenya, and Uganda, we selected five sites among the rural areas of these countries. For this qualitative study, the data came from fifty face-to-face interviews and fourteen focus group discussions (FGD) conducted with stakeholders from the five research sites. Representatives from central and local governments, industry, national and international non-profit organizations, academia, and civil society organizations participated in the SIs. Members of the water committees, community leaders, and users of the distribution systems participated in the FGDs. The interviews were conducted by a team member in English and lasted an average of one hour. A group of local facilitators developed the

Kiswahili focus group discussions to facilitate understanding and dialogue for participants. The research team trained the focus group facilitators and supported the observation protocols and field notes during the information-gathering activities. The research team implemented triangulation of data and peer debriefing to ensure credibility and dependability (Sinkovics, Penz, & Ghauri, 2008; Johnson, Adkins, & Chauvin, 2020; Lemon, & Hayes, 2020). As recommended by Creswell (2013), field notes, interviews, focus group discussions, and literature were used to triangulate the data. Peer debriefing included coding the interviews and FGDs by two research team members until achieving a level of agreement on the interpretation of the findings (Harris, Pryor & Adams, 1997).

Results

Education formats

Community Meetings

Community meetings are the most popular educational format among the water distribution systems participating in the study. In this educational format, those responsible for the system share information with stakeholders on management and decision-making within the governance scheme. For those interested, these meetings are opportunities to learn about the system and identify if its representatives are working to improve water distribution in the community. Finally, community meetings allow learning through the interaction of different actors in the system. A participant mentioned, "We have the meetings with members of village committees, giving them information, educating them about the e-water system, and they seemed to be happy. Everyone was like, want to have an e-water system be installed [in their] area so that they can use it."

Participatory Planning

Participatory planning includes informed decision-making among representatives of the stakeholders of a water distribution system. Beyond the benefits of planning and advocating for certain groups, participatory planning has an implicit objective of disseminating information in an informal format in which the representatives of each group inform those they represent in the participatory process.

Training and Capacity Building

Although this format is focused on a small group of people who somehow participate in the management and performance of the system; It is a non-formal education format that benefits water distribution regardless of who is the operator of the system. Usually, water distribution systems face a lack of trained personnel, limiting the system's performance and directly impacting the system's users. Therefore, the training and capacity-building programs aim to reduce the dependence of water distribution systems on external suppliers while guaranteeing the most effective water distribution.

Publication of Performance Information

Publication of performance information refers to providing publicly available information about the performance of service providers. The content of performance information can refer to the quantity and quality-of-service provision, resource and financial management, and other dimensions of the system's performance. The provision of such information can also take multiple formats within a single distribution system. Still, the core commonality is that stakeholders such as the public, users, and/or oversight bodies have access to clear and accurate information about the performance of service providers.

Information Dashboards

While dashboards promise stakeholders access to pertinent and timely information, many of these platforms' complexity and proprietary nature may limit their use. In terms of complexity, utilizing the information presented within a dashboard requires understanding how to interpret graphs and summary statistics. There also must be demand for the info. For example, a director of an electronic prepaid tap firm told us that, in their experience, “there is often reluctance by those with oversight responsibilities to use the dashboard." He attributed this lack of use to a "cultural" lack of interest. Still, lack of use typically reflects that the information provided is not clear enough or irrelevant to the decisions of the potential user.

Benefits of Educational Efforts

The second research question seeks to understand how the actors of a water distribution system benefit from the educational activities promoted by those responsible for the system's governance. Although many water distribution systems included in this study do not have records of the activities implemented to inform stakeholders, they recognize the benefits of educating the system's stakeholders. One of the participants mentioned: "People were educated. The community was involved at each stage. Clearly, they understand that this project is for the community. We established a COWSO committee, it's established under the law, and are the ones with authority to manage this project."

One of the benefits of investing in stakeholder education is adopting strategies that benefit the water distribution system. For example, payment for services has proven beneficial in expanding, maintaining, and repairing water distribution systems. However, users are unaware of these benefits and cling to the idea of water as a freely accessible good. Those systems in which users have been trained on payment for services have shown higher levels of adoption of this payment scheme. One participant commented, "I think education is going to be the key here. You know, because you are shifting mindsets, and the best way to do that is just to educate people because, in some of these areas, when they see water, they think it is going to be free." Participants mention contingent funds, electronic meters, and microfinance as other governance tools that require the education of community members to be adopted.

Water distribution systems whose users receive management information within the governance scheme make better use of the system. The system's use and management regulations are disseminated through different educational activities, allowing users to know the limits of use of the water distributed in the system. One of the participants mentioned: "People need awareness on how to use water. For example, they have to be told how costly it is to repair the pump, so for it to be repaired, you have to contribute so that it can last longer. After receiving that education, they will sit down and think that is better to contribute than stay for a long time without water."

Educating on the governance of the water distribution system potentially benefits users' participation in various activities, including water boards or committees in each community. In addition, users make important decisions such as the selection of community representatives through popular election processes. One of the participants commented.

Finally, stakeholders educated about system management develop a sense of ownership of the system. The feeling of ownership is beneficial for the conservation and maintenance of the community water system.

Discussion, Conclusions, and Recommendations

This qualitative study sought to explore the benefits of non-formal and informal education in the governance of water distribution systems in Uganda, Kenya, and Tanzania. These three countries of Sub-Saharan Africa experience a constant decrease in the quality and quantity of water resources, so they demand models and governance tools that ensure a sustainable distribution and use of water resources. In these models, stakeholder education is one of the essential axes to ensure the inclusion and equity of the benefits and obligations of all stakeholders.

According to Asunción and Segovia (2006, p. 6),

> "A non-formal educational process that pursues good management of the water resource seeks to achieve a gradual migration of the actions and practices conventionally defined as incorrect, towards a point where the activities that are carried out are informed and with a more significant assessment of the impact they cause."

This study shows the benefits of education in the management, participation, decision-making, and performance of a water distribution system under a governance scheme.

According to OECD (2015), those water distribution systems in which stakeholders are adequately informed have better performance levels in accountability and service provision. However, in developing countries, those responsible for these projects must consider the sociodemographic characteristics of the populations when making decisions about formats and strategies to disseminate information from the system. According to the results of this study, users who receive information about the water system develop higher levels of ownership and better behavior in the use of water resources.

Future research should explore the groups' preferences regarding the educational formats to receive information about the water distribution system. Finally, the results of this study could be

used by those responsible for the governance of community service delivery systems to plan, implement and evaluate their education and outreach efforts among system actors. Lastly, for international development projects, interventions, and initiatives, the education of their interest groups must be a requirement demanded by financial institutions to guarantee the equitable and inclusive participation of those interested in the service distribution system.

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Barriers to Collaborations with Indigenous Communities: Experiences of Extension Educators

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Abstract

The mission of Land Grant Institutions (LGIs) and Cooperative Extension has always included the concepts of educational access, to "teach agriculture, military tactics, and the mechanic arts as well as classical studies so members of the working classes could obtain a liberal, practical education" (APLU, 2018). Indeed, there is an Extension office in or near all of the 3,000 counties in the US (Hiller, 2005) and serving nearly 100% of US counties (Brewer et al., 2016). However, Extension has not served all communities equitably, in both their access to agricultural resources (Brewer et al., 2016; NCAI, 2010) and in the kinds of programs that they provide (Emm & Breazeale, 2008).

An important example of these inequities can be seen in Indigenous communities, where Extension offices can only be found in less than 10% of communities. Extension in Indigenous communities is underfunded and unable to provide equitable support (Brewer et al., 2016; NCAI, 2010). Despite these challenges, there are 1862 Extension educators that collaborate with Indigenous communities. These educators have valuable experience and insight that is critical to capture if Extension is going to encourage and support others in this work. In addressing these systemic issues in Extension and with the intention of encouraging these collaborations in mind, I ask the following research question: What are the barriers that Extension Educators face in creating and sustaining successful collaborations with Indigenous communities?

Purpose and Objectives

The purpose of this work was to better understand the professional and socio-cultural context that Extension educators are working in Indigenous communities face, the barriers that they encounter in their work, and, in their opinion, the support structures that would help them to overcome those barriers. If Extension is going to fulfill its Land Grant Mission, understanding these collaborations and the needs of the educators that facilitate them is crucial, especially because these educators represent a minority of Extension professionals. With a greater understanding of their lived experiences, Extension can learn to support them and other educators as they serve Indigenous and other marginalized communities.

Theoretical Framework

This project was committed to practicing decolonizing methodology. Decolonizing research deconstructs Western research traditions by pushing researchers to evaluate ways of knowing, their legitimacy, and how our complex identities impact knowledge creation (Battiste, 2008). This implies problematizing the relationship between knowledge and power in postcolonial contexts (Jankie, 2004). Decolonizing research includes participant collaboration at all phases (Battiste, 2008; Mutua & Swadener, 2004) and must embrace the collaborative nature of Indigenous knowledge creation systems, and the connectedness between people, communities, and the natural world (Battiste & Youngblood, 2009; Cajete & Pueblo, 2010; Falcón, 2016;

Latulippe, 2015). To strive for decoloniality in research, researchers need to work toward undoing existing practices and paradigms, while creating and rebuilding with these guiding principles.

Given the context and goals of this research, I applied a decolonizing methodology to my research design. The outcomes of this research are intended to benefit and promote the voices and self-determination of research participants by being participatory and committed to Indigenous community interests (Denzin et al., 2008). While the methods of research are a survey and interviews, both of which are prevalent in colonized, Western research, the methodology strived to be decolonizing, with an emphasis on counternarratives, the co-construction of knowledge with participants through their lived experiences (Fierros & Delgado Bernal, 2016), and the liberatory effects for Indigenous peoples. Decolonizing methodology and research on Indigenous topics has not been common in the *Journal of Agricultural Education* (Vicenti-Henio & Torres, 1998), though other critical methodologies which share similar epistemological tenets have been published more recently (Barajas et al., 2020; Cline, Rosson, & Weeks, 2020; Murray, Trexler, & Cannon, 2020).

Methodology

To answer the research question, I employed a transformative convergent mixed methods design. Because of the large size of the Western Region of Extension and the unique cultures, goals, and constraints found within it, combining quantitative and qualitative methods provided a more complete answer to the research question (Creswell & Plano Clark, 2018). This design also allows for triangulation and complementarity, making corroboration, enhancement, and a deeper illustration of findings possible (Onwuegbuzie & Leech, 2006). Transformative design is a distinct form of mixed methods design that highlights the importance of value-based, action-oriented research, that directly engages members of diverse groups with a focus on social justice (Mertens, 2010; Mertens, 2011). This often includes theoretical perspectives that can then be laid over the design elements of the study (Creswell, 2009; Creswell & Plano Clark, 2018). In this study, I used decolonizing methodology as the theoretical frameworks overlaid on the mixed methods design. Transformative design is collaborative and participatory, allowing for an overlap with decolonizing methodologies (Creswell & Plano Clark, 2018).

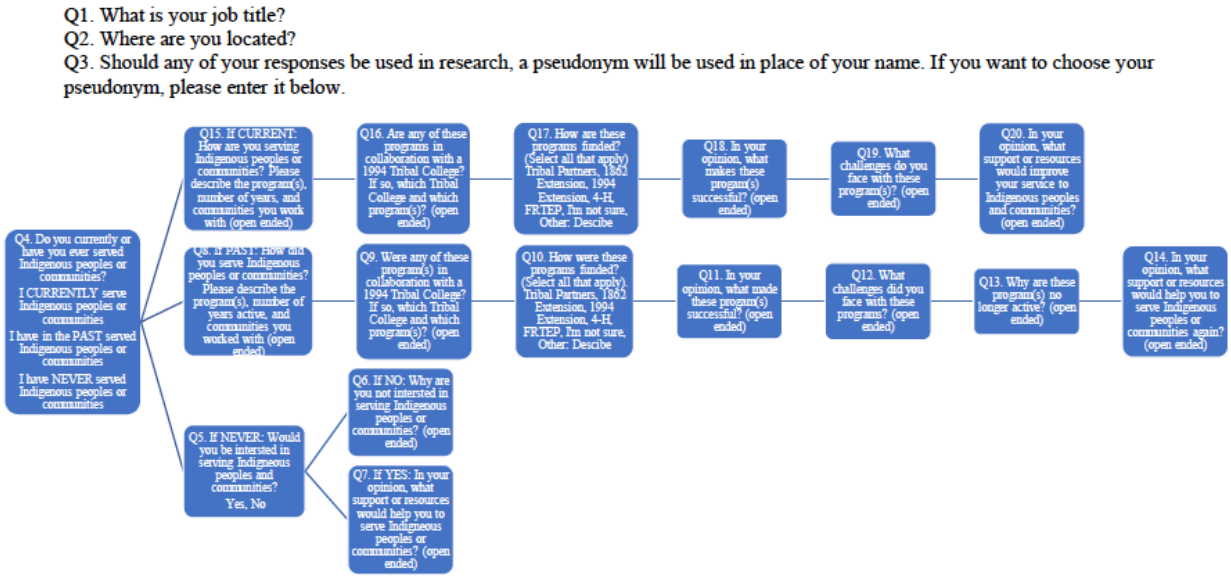
The survey and interview questions were similar, with the survey essentially being a way to disseminate the interview questions to a much larger audience, albeit without the benefit of an interviewer. The quantitative addition to the survey included the ability to use location information to map current and past collaborations across the region using Geographic Information Systems (GIS) mapping. Although this is a critical component to gaining a larger understanding of the collaborations in the region and giving context to the qualitative responses, the findings in this paper relied solely on the qualitative questions from the survey and interviews.

I co-constructed 20 survey questions with the stakeholders of this work, but because of the branching structure of the survey, the most questions that a respondent might answer was 11 questions. The interview protocol was semi-structured, allowing the direction of the interview

to evolve as the participants' experiences and perspectives directed them, with an emphasis on the mutual co-construction of ideas and researcher reflexivity (Fierros & Delgado Bernal, 2016). With permission from participants, the interviews were audio recorded and transcribed for analysis. Figure 1 shows the survey questions in detail; these were the same as the interview questions. The data presented here relied on Q12/Q19 and Q14/Q20 from Figure 1 regarding barriers and needed support structures.

Figure 1

Survey structure and questions



The Western region of Extension encompasses 13 states (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming), American Samoa, Gaum, Micronesia, and the Northern Mariana Islands. After creating the survey, I contacted State Directors and asked them to distribute the survey to all Extension personnel in their state. Each Director was asked to remind Extension personnel about the survey two weeks after it was first sent. For the interviews, sampling was a mixture of convenience and purposive (Bazeley, 2020). Again, Directors were asked for recommendations and participants often had recommendations of other educators to speak with during their interviews. Participants' specific locations, universities, reservations, and job titles have been removed from their quotes to protect their identities, and pseudonyms have been used. Participants held different kinds of professional positions, had varying levels of administrative power, and were both Indigenous and non-Indigenous.

To analyze the interviews and qualitative components of the survey, I used thematic analysis (Bazeley, 2020; Braun & Clarke, 2006). I selected compelling examples and related the analysis back to the theoretical perspectives in order to form conclusions (Bazeley, 2020; Braun & Clarke, 2006). During all stages of this process, I included participants (Brayboy & Deyhle, 2000; Hallett et al., 2016; MacDonald, 2012) by giving them opportunities to provide feedback depending on their level of interest and time.

Findings

There were 307 responses to the survey, the distribution of which can be seen in Table 1, including the responses to Question 4, which further breaks the participants up into significant subgroups that will be discussed more below.

Table 1
Survey Responses by State

State/ US Territory	Number of Responses	Response Rate	Response to Q4		
			Current	Past	Never
Alaska	0	NA			
American Samoa	0	NA			
Arizona	13	2.56%	8	2	3
California	78	3.13%	22	18	358
Colorado	19	3.41%	4	7	8
Guam	1	1.29%	1	0	0
Hawaii	16	14.81%	13	2	1
Idaho	50	35.71%	19	8	23
Micronesia	1	3.03%	1	0	0
Montana	9	2.21%	7	1	1
Nevada	32	12.75%	9	9	14
New Mexico	10	30.30%	8	2	0
Northern Mariana Islands	0	NA			
Oregon	29	4.04%	18	5	6
Utah	42	28.00%	18	3	21
Washington	0	NA			
Wyoming	7	6.42%	3	0	4
Western Region	307	5.50%	131	57	119

Note. Question 4: "Do you currently or have you ever served Indigenous peoples or communities?" Respondents could choose one of three answers: "I CURRENTLY serve Indigenous peoples or communities," "I have in the PAST served Indigenous peoples or communities," or "I have NEVER served Indigenous peoples or communities."

The sample of respondents from the survey is considered unrepresentative because everyone that received the survey self-selected to be in the study (Gliner et al., 2017). Further, an overall response rate of 5.50% is low, although the available literature on web-based surveys show that response rates vary greatly (Sax et al., 2003). The response rate might be attributed to many factors, including the culture and climate of each state's Extension system, educators' workloads, and the very real influence that the COVID-19 pandemic had on people's willingness and ability to participate. The widely variable response rates between states might also speak to all these possibilities. I also interviewed 20 Extension educators from 10 states and one US territory, as displayed in Figure 2. From State Directors, I received 43 suggestions for educators to contact, resulting in a response rate of 46.5%. Further, it should be noted that participants were not

required to answer every question and not all answers to questions were substantive (for example, “I’m not sure,” “I don’t know,” etc.). Please note that the numbers of responses in each theme described below are from subsets of subsets of responses depending on the question asked.

Figure 2
Number of Interviews by State

Participants were asked what barriers were common in their work and the major themes in barriers that participants experienced were funding, research logistics, rural issues, Extension educators being spread too thin, distrust of the government and universities, and racism in communities.

Funding was a major theme in regard to barriers, with 12 interview participants and 32 survey respondents discussing it in reference to common barriers in their work, including 4 respondents with past collaborations that said the program ended due to lack of funding. Additionally, 57 survey respondents included funding as a form of support that they need from Extension in order to be successful. The particular issues surrounding funding were unique to each participant’s context, however, and the need was from both the universities’ and Indigenous communities’ sides. Common issues were a lack of funding, difficulties in obtaining funding, and how to explain working in an Indigenous community to granting agencies, particularly given the unique issues found in Indigenous communities.

Many of the communities that participants work in are rural and remote, which itself presents challenges. Seven interview participants and 12 survey respondents described issues common to all rural communities that make them harder to serve. These included long travel times and lack of transportation, utilities, technology, the internet, and even food. These basic services tend to be more expensive or hard to find and Extension employees are often working in these remote places alone.

Navigating all of the challenges of working with marginalized communities, including Indigenous communities, becomes more difficult when Extension educators are spread too thin in their time and professional responsibilities. Working with Indigenous communities takes more time to build relationships, more skill to develop culturally relevant programming, and more attention to negotiate funding barriers. When serving Indigenous communities is often left to the discretion of the Extension employee, making Indigenous communities a priority is difficult when an employee's time is spread too thin.

Many of the participants discussed how they were often challenged with distrust that tribal members have for both the government and universities. Six interview participants and 17 survey respondents identified distrust as a major barrier. Sometimes, this was because of a general distrust for outsiders and from the historical trauma that tribes have experienced and sometimes it was a distrust born out of specific examples of broken trust from the past. Three of the interview participants and 2 of the survey respondents described how racism from within Extension and in communities towards Indigenous peoples was a barrier to their success in programming and as educators. Educators had developed various ways to cope with this, including having specific classes on reservations so that community members would feel welcome.

A unique aspect to the survey that was not present in the interviews was the opportunity to hear from Extension educators that have never worked with Indigenous communities. Of the total 307, 105 respondents to the survey answered that they had never worked with Indigenous peoples or communities, but that they would be interested in doing so. When they were asked about what support or resources would be helpful for them to serve Indigenous communities, they had many great suggestions and brought up significant barriers. These included the need for more academic understanding, help with relationship building and Insider collaborations, funding, and greater systemic support. A respondent from Nevada summarized the needs well: "Expertise, relationships, funds, FTEs, supportive administrators."

Discussion and Implications

Given the socio-cultural history of the Land Grant System, a "cultural shift," as Margaret put it, is necessary for LGIs to fulfill their mission of educational access and equity. LGIs have not lived up to this mission by not serving people equitably (Sorber & Geiger, 2014), including Indigenous communities (Brewer, et. al., 2016; Hiller, 2005). From this work, educators and administrators can learn about common barriers to successful collaborations, hopefully informing them about what to expect in forming new collaborations, how to maintain collaborations once established, and how to support educators doing this work.

From the findings, some suggestions emerged, including the need to prioritize these programs through funding. Also, it is important to facilitate learning opportunities for educators in areas such as creating culturally relevant programming, US and tribal history, and cultural competency. With a third of the survey respondents not working in Indigenous communities, learning opportunities should be targeted to those that are interested to assist them in forming collaborations. Lastly, administrators will need to understand that this work is difficult and that educators might need additional or different support structures than in traditional Extension programs. Importantly, this work takes time and consistency, is often performed in rural settings, and doesn't have to be attempted alone. Utilizing experts from within the community, the university, other Extension educators, and our sister Land Grant Institutions- both 1994 Tribal Colleges and 1890 Land Grant Institutions- is useful to create supportive professional networks for educators and to lessen the need for educators to create these programs on their own. Despite these barriers, it is critical work for community development and integral to the Land Grant Mission.

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Exploration of Reporting Fatal Fires in West Virginia

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Introduction

Historically, the state of West Virginia has maintained a top 5 ranking in the number of fire fatalities per capita in the United States. On average, a West Virginia resident is three times more likely to die in a fire than residents of other states (USFA, 2021). The 65 and older population in the United States has the highest relative risk of fire related injury and fatality, at 2.6 times that of any other age group (USFA, 2021).

Research-based literature on fatal fires in the United States is sparse, with the most contemporary being published in the late 1990's or early 2000's. A study out of North Carolina focused on comparing characteristics of those that live and die in the same residential fire event (Marshall et al., 1998). It was concluded that smoke detectors were effective at mitigating fire related injuries, and that the effect was equitable for both high- and low-vulnerability groups (Marshall et al., 1998). Additional findings from other studies can be used to support the notion that smoke detectors decrease injury and death in a fire (Istre et al., 2001; Runyan et al., 1992). Using data from the New Jersey Office of the Medical Examiner, Barillo and Goode (1996) found that smoking materials were the most common cause of ignition, followed by homicide/arson, cooking or kitchen fires and heating systems. This finding was supported by Runyan et al. (1992) who found that smoking materials increased the odds of death in a fire by over seven-fold. Fires that result in injury or death have been linked to causes such as space heaters, age of domicile, lesser median-income, and arson (Istre et al., 2001; Marshall et al., 1998; Runyan et al., 1992).

Descriptively, West Virginia is a small rural state with a declining population that stands at about 1.7 million people and a median household income of $44,000 (USCB, 2020). The state population's median age is 42, with 20.5% of the population being over the age of 65. In West Virginia, 73% of residents own their home, with 11.6% of grandparents in the state caring for grandchildren fulltime (AARP, 2021). High School diploma or equivalency rate is 92% and a consistent ranking in the bottom 5 states in healthcare (Kerr, 2021). West Virginia State statute requires smoke detectors in privately owned family dwellings and required smoke and carbon monoxide detectors in a rental property, hotels and other overnight accommodations (Smoke Detector Act, 2021).

Need for Study

Firefighting services in West Virginia are predominately run on a volunteer basis. To support the state's needs the West Virginia University Fire Service Extension (WVU-FSE) evolved from teaching mine fire safety classes in 1913 under the umbrella of Mining Extension to becoming a unit of Extension in 1931 under the Mine and Engineering Extension. The FSE was given and permanent research and training facility in Morgantown in 1950, the facility was the first of statewide fire training facility in the United States. The FSE has served as the lead fire training agency in West Virginia for 91 years. Since the 1950s, the FSE has expanded services past basic firefighting and into teaching classes in advanced firefighting, hazardous materials, aircraft firefighter rescue and fire investigation and arson detection. Additionally, theoretically sound program evaluation has become the next step in developing quality fire extension services.

Purpose and Research Questions

The purpose of the study was to explore the data reporting systems used by the West Virginia Fire Marshal. Guiding this inquiry were two research questions:

1. Are there meaningful relationships between fatal structural fires in [State] and presence of fire detection devices?
2. Is there an association between multiple fatalities and presence of working smoke detector?

This research was a collaborative effort by West Virginia Extension Services and the West Virginia State Fire Marshal. Data was provided by the West Virginia State Fire Marshal and their Fire Investigations division.

Methods

The target population for this study were structural fires in West Virginia. The sample population were structural fires that resulted in a casualty reported in the NIFRS and BATS systems from 2013-2018. Variables of interest for exploration are *casualties* and *fire detection devices*. *Casualties* are defined as any level of injury and are an exclusive binary code in the NIFRS system as either injuries or deaths. *Fire detection devices* are coded in three levels: no device, detectors, and automatic extinguisher systems (AES). The basic unit of analysis is incidences of *structural fire*, vehicle and other types of fires are recorded withing the data sets, but excluded for this analysis. Data from the BATS system recorded only deaths, and the quantity of deaths per fire incident.

Data Sources

Our sources of data for analysis were the United States Fire Administration National Fire Incident Reporting System (NFIRS) and the United States Bureau of Alcohol, Tobacco, Firearms and Explosives Bomb Arson Tracking System (BATS). The NIFRS data set was used to answer research question one and BATS was used to answer research question two. Both datasets are secondary data collected from fire and police agencies.

NFIRS is a voluntary reporting standard that fire departments use to uniformly report on the full range of their activities, from fire to emergency medical services to severe weather and natural disasters (USFA, n.d.). NFIRS is the world's largest, national, annual database of fire incident information. 28.4 million incidents were reported by participating fire departments, including 1.2 million fires in 2018. Fire departments can use NFIRS to track and manage apparatus, personnel and casualty information, document the full range of department activity, and justify budgets with summary and statistical data. Fire departments in all 50 states and Washington, DC report information to the NFIRS database.

BATS is a secure, web-based, computer case management system that is provided to state and local agencies for documenting explosives, fire and arson investigations (ATF, n.d.). The BATS program is separate from the NFIRS database. Whereas the primary mission of NFIRS is to collect fire incident information, BATS is dedicated to documenting the “follow-up” investigation (i.e., case management). According to the U.S. Fire Administration (n.d.), NFIRS is considered a supplementary system to arson information management systems such as BATS.

Data Analysis

Basic descriptive statistics were run for fire data from years 2013-2018. IBM SPSS© version 27 was used to complete statistical analysis. Chi-squared analysis was used to evaluate statistical differences between types of casualties based on type of detector present (2 x3 contingency table). Pearson correlation was computed to describe level of association between type of detector present and quantity of fatalities.

Data Limitations

Both NIFRS and BATS are user-input data sets. Access is also restricted to licensed individuals. Therefore, the analysis was limited because researchers did not have direct access to data. Researchers were given overall quantities and frequencies not individual case data. This limits the ability to conduct higher level inferential statistics.

Additionally, the NIFRS data violates the chi-square assumption of expected frequencies (Fields, 2017) for the category of *Deaths* by A*utomatic Extinguisher System* (n = 2). Researchers assert

that the statistical limitation should be noted, but the practical discussion of minimizing deaths during a fire incident is relevant and pragmatic.

Results and Conclusions

Research Question 1

Overall, from 2013-18 there were 21,767 total fire incidents in West Virginia reported in NIFRS. A majority (80.1%) of the fire incidents did not have a reported fire detection device, with 17.6% reporting only a detector and 1.8% reporting an AES. There were 761 total cases of injuries resulting from those fires, and 270 total deaths reported. Fires with no reported fire detection device also had the substantive majorities for injuries (70.2%) and deaths (82.2%). Table 1 represents the total frequencies of fire incidences and casualties by type of fire detection device.

Table 1.
Frequencies of Fire Incidences and Casualties by type of Fire Detection Device

	Type of Fire Detection Device		
	None Reported	Detector Only	AES
Total Fire Incidents	17,583	3,822	362
Injuries Reported	534	215	12
Deaths Reported	222	46	2

A chi-square test of independence was performed to examine the relationship between casualty sustained and the type of fire detection device present. There was a significant association between the casualty sustained during a fire and the type of fire detection system reported χ^2 (2, n = 1031) = 14.88, $p < .001$. *Deaths* and *Injuries* in the presence of an *AES* was significantly lower than any other category. Deaths were also found to be significantly lower that injuries in the data regardless of type of detection devices. The data shows that the best odds of reducing casualties during a fire are with smoke detectors and an automatic extinguishment system present in the structure. It was concluded that fire detection devices reduced the potential for casualty during a structural fire.

Research Question 2

Overall, during the 2013-2018 timeframe 228 total fire incidences that resulted in a death were reported in West Virginia in BATS. From the 228 total fires reported that resulted in a death during the timeframe, 34 cases resulted in multiple deaths. Those cases of multiples deaths accounted for 29.2% (n = 80) of the total deaths (n = 274). BATS reported the presence of smoke detectors in fire cases as four categories: *Unknown* (67%), *None* (9%), *Not Working* (9.5%), and *Yes* (14.5%).

Fire cases resulting in multiple deaths had an insignificant, small negative correlation with the *Presence of a Working Smoke Detector*, r (227) = -.05, R^2 = .003, p = .468, and BaCI [-.166, .091] (Cohens, 1988). Due to the insignificant correlation, no further analyses were run. It was concluded that during the 2013-2018 timeframe, and unknown association exists between multiple deaths and presence of working smoke detectors.

Discussion and Recommendations

The findings from this study support previous findings that fire detection devices reduce casualties during fire incidents (Istre et al., 2001; Marshall et al., 1998; Runyan et al., 1992). The insignificant relationship between multiple deaths and smoke detectors in this study is incongruent with the previous literature. The high frequency of reported *unknown* for working smoke detectors is likely to have influenced this finding. Further research should be conducted to uncover the reasons for reporting gaps.

The data available limited research to what analyses could be conducted. The format and variables in provided data sets were limitations of the study. The BATS system can add questions for investigators that could increase opportunities for exploring influential factors related of fatal fires in West Virginia and how to further prevent them. For example, listing the age and sex of any survivors of a fatal fire could have allowed further comparisons and a more robust analysis. Noting drugs or alcohol use by the deceased and the survivors of an incident could pinpoint risk factors (Barillo & Goode, 1996; Runyun et al., 1992). Researchers recommend that more concise guidance is provided to NIFRS and BATS users to promote a more succinct and accurate reporting of fire related data. Researchers also recommend that West Virginia Extension undertake programming targeting rural, older, and *highly-vulnerable* groups and the impacts of working smoke detectors on fire related casualties.

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Assessing Pennsylvania Farmers' Quality of Life and Leadership Competencies for Developing an Extension Program

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Introduction

Despite an idyllic lifestyle associated with farming, the landscape of farming is changing, with the number of farms in Pennsylvania consistently declining since 2007 (United States Department of Agriculture National Agricultural Statistics Service Information [USDA NASS], 2017). Part of this decline can be attributed to the increased stress, expectations, and responsibilities associated with farming due to evolving technology and increased competition (Parry et al., 2005). Modern farmers must possess competencies to lead not only themselves but also others. Farmers today must have the ability to manage large groups of employees, navigate complex production and distribution markets, and deal with constant pressure to innovate and adapt to new technology (Ulvenblad & Björklund, 2018). Leadership competency has been shown to effectively reduce and manage work stress (Thompson & Gomez, 2014), which negatively impacts an individual's quality of life (Greenhaus et al., 2003). However, limited research directly discusses the relationships between farmers' quality of life and farmers' self-leadership and ability to lead others' competencies. Hence, this exploratory study investigates Pennsylvania farmers' perceptions of their quality of life and analyzes its relationships with farmers' self-leadership and ability to lead others' competencies.

Theoretical/Conceptual Framework

This study utilized the American quality of life framework, which focuses on an individual's subjective quality of life/well-being (Campbell et al. 1976). Based on the subjective well-being approach, which refers to an individual's perceptions of their life and work (Coughenour & Swanson, 1988), we characterized the quality of life as an individual's judgment of their standing in life based on their culture, values, expectations, aspirations, and concerns (Rejeski & Mihalko, 2001; Whoqol Group, 1995). Applied in the farming context, research shows that satisfaction with farm work influences satisfaction with farm life (Coughenour & Swanson, 1988). However, measuring and interpreting farmers quality of life can be difficult due to the variety of working conditions and life experiences (Windon et al., 2016).

This study also utilized the leader and leadership development framework developed by Day (2000) that distinguishes leader development and leadership development as relating to intrapersonal and interpersonal leadership competencies. We applied Harder and Narine's (2019) definition of competencies as a set of "knowledge, skills, and abilities associated with professions" (p. 224). Specifically, Day (2000) described leader development as developing intrapersonal or self-leadership skills that are characterized through competencies such as self-awareness (self-confidence, emotional awareness, accurate self-image), self-regulation (personal responsibility, trustworthiness, self-control), and self-motivation (initiative, commitment,

optimism). Day (2000) characterized leadership development as developing interpersonal skills through key competencies related to social awareness, including empathy and service orientation, and social skills, including bond building and conflict management. The importance of intrapersonal and interpersonal leadership competencies is well established, with Van Velsor et al. (2010) highlighting the need for both to be present in effective leaders. In the farming context, farmers' intra- and ability leadership competencies are essential in effective farm business management (Ulvenblad & Björklund, 2018).

While there is limited research on the relationship between farmer leadership competencies and quality of life, specific self-leadership competencies, including self-efficacy, optimism, and self-esteem, are shown to enhance individuals' health-related quality of life (Huang et al., 2017). The ability to lead others' competencies, including being inspirational, considerate, and having strong values, is associated with higher work-life balance among individuals within an organization (Corrigan et al., 2000; Suratno et al., 2018). The relationship between self-leadership and the ability to lead others' competencies with key correlates of quality of life (health- and work-related) suggests a possible relationship between leadership competencies and overall quality of life.

Based on the outlined theoretical and conceptual framework, we developed our conceptual model, which focused on examining the relationship between farmers' self-leadership competencies, ability to lead others' competencies, and farmers' perceived quality of life. In this study, farmers' self-leadership is an individual's intrapersonal leadership competencies development. Farmers' ability to lead others is an individual's interpersonal competencies development. Finally, farmers' perceived quality of life is the farmer's conscious cognitive judgment of satisfaction with farm work, family life, and overall health.

Purpose and Research Objectives

The purpose of this study was to explore the relationship between farmers' quality of life, farmers' self-leadership, and the ability to lead others' competencies. Two research objectives guided this study: 1. Describe farmers' self-leadership and ability to lead others' competencies and farmers' quality of life. 2. Explain the relationship between farmers' quality of life and farmers' self-leadership and ability to lead others' competencies.

Methods

This research utilized the open web page questionnaire method to collect data from Pennsylvania farmers. We utilized convenience, self-selecting, and chain-referral sampling approaches. Respondents were recruited through various organizational web platforms. The final data set included responses from 59 farmers. We developed the self-leadership and the ability to lead others' competencies scales using existing literature related to intrapersonal and interpersonal leadership competencies (Benge et al., 2011; Bruce & Anderson, 2012; Conklin et al., 2002; Cooper & Graham, 2001; Day, 2000; Day & Dragoni, 2015; Goleman, 2004; Haynes, 2000; Stedman & Rudd, 2006). These two scales were measured using a five-point Likert scale ranging from 1 (strongly disagree) - 5 (strongly agree). We used the *Farmers' Quality of Life* scale (Author et al., 2016) to measure farmers' perceptions about their quality of life. The scale was measured using a five-point Likert scale ranging from 1 (very dissatisfied) - 5 (very

satisfied).We used SPSS® version 25 to conduct data analysis for our study. Independent variables and the dependent variables were treated as interval data. A descriptive statistic was utilized to describe the first research objective. A multiple linear regression analysis was conducted to answer the second research objective - determine the relationship between overall farmers' quality of life (dependent variable) and independent variables, such as farmers' self-leadership and ability to lead others' competencies. We used Davis (1971) conventions to describe the magnitude of the relationships between independent and dependent variables.

Findings/Results

The first research objective was to describe farmers' perceptions of their self-leadership competencies, ability to lead others' competencies, and farmers' quality of life. Surveyed farmers indicated greater needs in several self-leadership competencies: farm work-life balance, handling stress, quickly making decisions, and prioritizing tasks during the busy season. Among the ability to lead others' competencies, farmers indicated greater needs in effectively engaging in difficult conversations with farm employees, managing people at the farm, delegating tasks, and effective oral communication skills. Finally, regarding perceived quality of life, farmers reported that while generally satisfied with their work and overall health, they were less satisfied with their hours of sleep, managing farm work and family life, and work hours during their busy season.

The second research objective was to explain the relationship between farmers' perceptions of their quality of life and self-leadership competencies and their ability to lead others' competencies. Application of the Pearson correlation coefficient showed a significant positive association between self-leadership competencies and ability to lead others' competencies ($r = .55$, $p = .001$), farmers' self-leadership competencies and quality of life ($r = .63$, $p = .001$), and ability to lead others' competencies and quality of life ($r = .24$, $p = .013$). The results also indicated that a significant proportion of the total variance in overall farmers' quality of life was predicted by farmers' self-leadership and ability to lead others' competencies $F(2, 54) = 20.60$, $p < .001$. Multiple R^2 indicated that approximately 43% of the variation in overall farmers' quality of life could be explained by farmers' self-leadership and ability to lead others' competencies.

Discussion and Conclusions

This study makes a unique contribution to the research in the field of individual's quality of life in relationship with intrapersonal and interpersonal leadership competencies. The results of this study indicated that farmers generally have a high perception of their leadership competencies. Previous studies showed that certain self-leadership competencies moderate the effects of work stressors. Those with high self-leadership competency were more effective in managing their stress (Thompson & Gomez, 2014) with work stress a key factor influencing an individual's quality of life. The study results also indicated a greater need among farmers for improved work-life balance, which is consistent with previous studies that reported an individual's ability to balance work and personal family life is a significant factor related to their perceived quality of life (Greenhaus et al. 2003). Another reported area of need among farmers was the ability to have difficult conversations with farm employees. This supports previous research that emphasizes the leaders' challenge in having difficult or awkward conversations with their employees (Angelo, 2019; Bradley & Campbell, 2016). The study results suggest that

greater leadership skills, self-leadership, and the ability to lead others, correspond to greater perceived quality of life. These results are consistent with previous studies (Herrera et al., 2018; Kong et al., 2019) that reported the farmers' organizational management, interpersonal competencies, self-leadership competencies relate to farmers' quality of life.

It is important to note that based on the nature of the study, it is difficult to assess the applicability of the results outside of farmers in Pennsylvania or the specific programmatic needs of different state Extension services. However, study results suggest targeted leadership programming is necessary to address identified areas of need among farmers. The general leadership education currently provided by the Pennsylvania Extension service is insufficient to address the observed farmer leadership needs in the study. Consideration should be given to developing specific farmer leadership development programs in the following two areas, work stress and conflict resolution/management, both of which would help address key leadership competencies and quality of life.

Future studies may want to include a qualitative component to examine the perceived quality of life among farmers. Further research should explore the relationship between farmers' self-leadership and the ability to lead others' competencies and quality of life based on farmers' demographics. It would also be beneficial to conduct a longitudinal study to understand better the long-term effects of perceived leadership competency on farmers' quality of life.

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Determining the Antecedents of Preparation of SBAE Teachers Who Effectively Facilitate Learning in SBAE Laboratories

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Introduction / Literature Review

School-based agricultural education (SBAE) teachers teach content areas such as biology, animal science, agronomy, agribusiness, economics, horticulture, leadership, biofuels, alternative energies, and mathematics (Albritton & Roberts, 2020; Hainline & Wells, 2019; McCubbins et al., 2016). They also teach technical skills and how to safely and properly use equipment associated with those skills (e.g., electrical, welding, woodworking, greenhouse watering & heating systems, aquaculture systems, and agricultural mechanics). All of these skills are demonstrated, practiced, and are mastered in agricultural education laboratories (Burris et al., 2005; Hainline & Wells, 2019; McCubbins et al., 2016; Shoulders & Myers, 2012; Young et al., 2009). To properly prepare effective and competent teachers, Darling-hammond & Bransford, (2005) insisted pre-service teachers need training and knowledge of teaching, learners, and subject matter.

Laboratory instruction is one part of the three-component model that has been a fundamental tenet of the SBAE curriculum and is used to bridge conceptual knowledge to a kinesthetic learning application. Laboratories can come in many forms, but most common are: greenhouse, mechanics, carpentry, and a welding laboratory, which are found in nearly 76% of all SBAE programs in America; and have historically functioned as an engaging and useful form of instruction within SBAE programs (Hainline & Wells, 2019; McKim & Saucier, 2011; Shoulders, 2013).

Perhaps adequate training of pre-service SBAE teachers, particularly in the most common laboratories identified by Shoulders and Myers (2012) which are a greenhouse, mechanics lab, carpentry lab, and a welding laboratory would help mitigate the growing SBAE teacher attrition rate and ensure that proper laboratory teaching techniques and management is implemented. It has been postulated more laboratory exposure would bolster pre-service teachers' confidence and comfortability thus ensuring safely training and preparing students in laboratories which allow them to be more employable and workforce ready (Albritton & Roberts, 2020; Burris et al., 2005; Chumbley et. al., 2019; Phipps et. al., 2008).

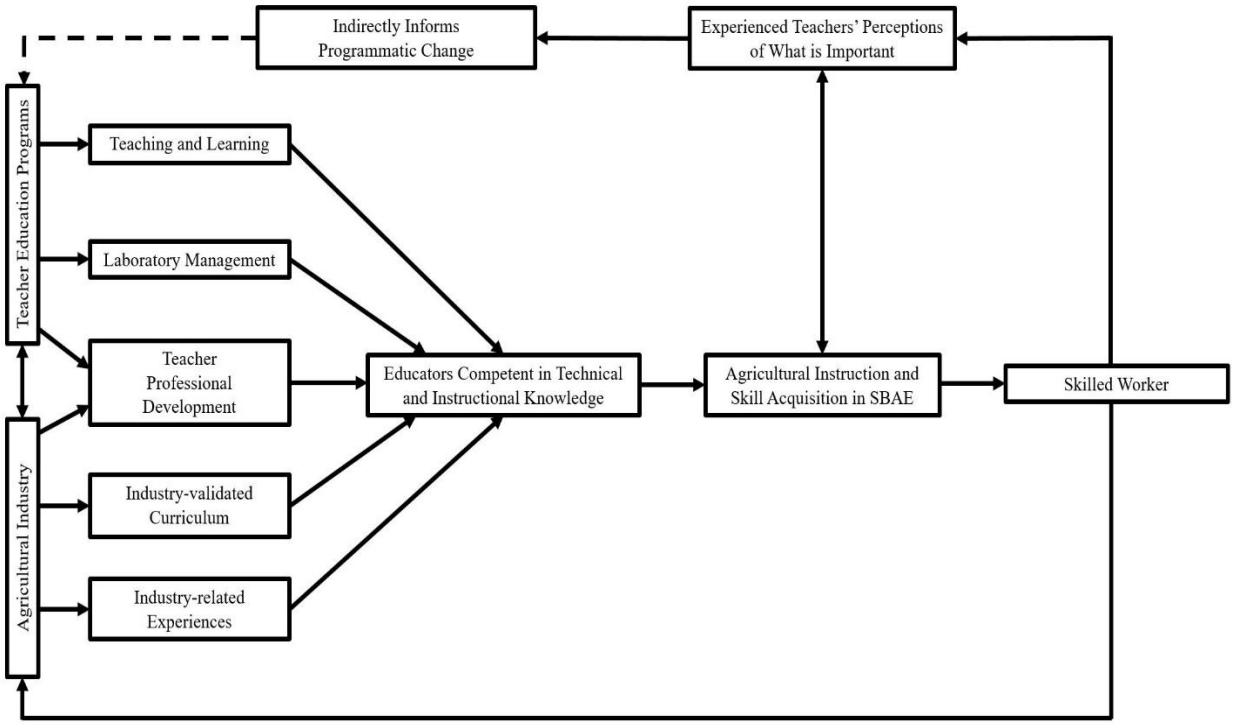
Many researchers (DeLay & Washburn, 2013; Douglas & Tim R, 2009; Hattie, 2003; Rayfield & Wilson, 2009) inform us that there are several teacher attributes and program

characteristics that are not only present, but is an indicator of a high-quality, effective, and sustainable agricultural education program. One congruent quality from several studies show us teachers need to be proficient in technical skills, teaching, managing and facilitating learning activities in SBAE laboratories (Burris et al., 2005; Darling-hammond & Bransford, 2005; Hainline & Wells, 2019; McCubbins et al., 2016; Shoulders et al., 2013; Young et al., 2009). Agricultural educators and all teachers within Career and Technical Education (CTE) are responsible for making a collaborative effort in working with industry to enhance the curriculum to provide the correct training for students to meet the needs of an ever-changing workforce.

This study was guided by Wells et. al. (2021) Agricultural Teacher Education and Agricultural Industry Partnership Model. Since this study sought to discover the antecedents that prepared SBAE teachers, the Educators Competent in Technical and Instructional Knowledge portion of the model was a point of focus (see Figure 1).

Figure 1

The Agricultural Teacher Education and Agricultural Industry Partnership Model



Purpose and Objectives

The purpose of this study was to determine what prepared current SBAE teacher experts to teach, manage and facilitate learning activities in SBAE laboratories. The following research objectives guided this study

1. Describe the demographics of the SBAE teachers in this study.

2. How do experienced SBAE teachers describe the experiences which best prepared them to serve as an effective facilitator of learning in laboratory-based SBAE settings?

Methods

This study was conducted using a qualitative explanatory case study design. Semi-structured interviews were conducted, in-person, and via telephone and electronic correspondence, to explore the research questions. A total of 27 SBAE teachers participated in the interview processes for this study. An interview protocol was developed to guide the interview process. The protocol contained several prompting questions that inquired about the teachers' experiences, prior training, and perceptions for further training of SBAE laboratory-based instruction (see Table 1).

Table 1
Interview Protocol Questions

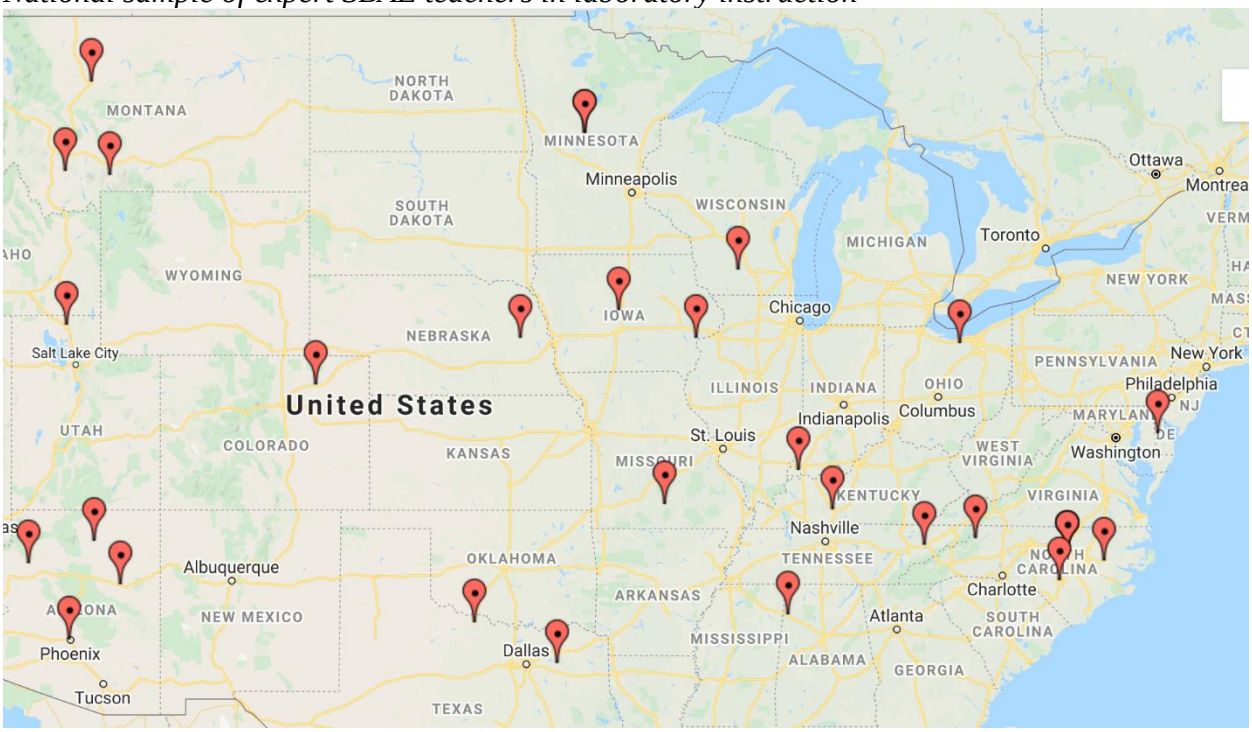
Interview Items
How many years have you been teaching Agriscience?
How did you become certified to teach Agriscience (traditional 4-year teacher prep program, masters teacher certification program, etc.)?
Briefly describe the laboratories (greenhouse, mechanics, woodworking, welding, etc.) that you teach in.
Describe what best prepared you to teach in these laboratories (i.e. college courses, technical jobs, personal experience, etc.)
Describe the laboratory training you received in your teacher preparation program?
What laboratory areas if any, do you wish you had received more training?

After receiving IRB approval, a nomination process was used to identify the participants for this study. We asked teacher educators from agricultural education certifying institutions across the nation to nominate SBAE teachers who they perceived to be extremely proficient in laboratory-based instruction in SBAE laboratories. Since there was not a sampling frame for this population, the interview process took place for all the names that were nominated. Once the list of teachers was finalized, we obtained their contact information through public domain.

A recruitment email was sent to teachers which provided general information about the study (e.g., notifying them of the nomination, purpose of the study, participation instructions, etc.). The email also included information about participation incentive, a random drawing for a 10, $20 gift cards. As teachers responded we correlated an interview place and time, teachers who did not respond were sent a follow up email reminder. The nominated teachers had an average of 13.4 years of teaching experience (SD = 8.5) in SBAE laboratories. The teachers represented in this study were from 17 states spanning as far North as Minnesota, as far South as Texas, as far East as North Carolina, and as far West as Arizona (see Figure 2).

Figure 2

National sample of expert SBAE teachers in laboratory instruction



The researchers followed an interview protocol for data collection which contained several prompting questions. Data collected during each interview transpired on the date and time set by the participant. Data collection began by using the zigzag method (Creswell, 2013), as researchers went from the place of interviewing (e.g., school or coffee shop) then back to the office to analyze data, then back to the participant's location to collect more data, then back to the office.

Once all the interviews had taken place, audio files were transcribed verbatim and shared with participants for member check. Each participant was given a pseudonym and each respondent's responses were grouped in an Excel sheet and color-coded for the analysis process.

Data analysis began when the research team independently listened to the interview recordings and took observational notes to highlight important statements made by the interviewees (Maxwell, 2013). While listening to the recordings, memos, codes, and possible themes were noted and put into a Microsoft Excel data spreadsheet created by the researchers. Creswell and Poth (2018) recommended individual data analysis process by each researcher to enhance the credibility of the study through triangulation.

Korstjens and Moser (2018) described data triangulation as using multiple data sources in time (e.g., gathering data in different times of the day), space (e.g., collecting data on the same phenomenon in multiples sites) and person (e.g., gathering data from different types or level of people). Korstjens and Moser (2018) described investigator triangulation as using two or more

researchers to make coding, analysis, and interpretation decisions; and they described method triangulation as using multiple methods of data collection.

The spreadsheet served as a research data log, which was reviewed by the research team establishing reliability and trustworthiness (Creswell, 2013). Each researcher then compared and compiled field notes, transcriptions, observational notes, thus creating data triangulation (Creswell, 2013). Analysis of the codes took place using an open-coding technique. Next codes were grouped using axial coding, which was informed by the study's purpose (Yin, 2018). Codes were refined and revised as analysis continued.

To establish trustworthiness Merriam and Tisdell (2016) and Creswell and Poth (2018) suggested that researchers with prior experience, assumptions, or viewpoints in regard to the research topic, should utilize a form of bracketing to identify any potential bias from the researchers. Although pre-conceived bias may not be able to be completely removed, even if bracketed before conducting the study, it is important for researchers to identify these assumptions and to follow common qualitative practice.

The research team had a designated debriefer (Creswell, 2013) which would ask hard questions about methods, findings, and reasoning for each part of the study. The designated debreifer also challenged the research team to use the reflexivity process (Korstjens & Moser, 2018) by examining our own conceptual lens, explicit and implicit assumptions, preconceptions, and how these affect research decisions in all phases of the study.

Results

The emerging themes of this study are: (1) teachers accredit their ability to teach, manage, and facilitate laboratory activities from an informal experience, (2) teachers accredit their ability to teach, manage, and facilitate laboratory activities from a formal experience, (3) a majority of the teachers felt the laboratory training they received was insufficient to prepare them for teaching, managing and facilitating learning activities in laboratories, and (4) there is a significant need for more lab-based training for pre-service SBAE teachers.

Theme One: Teachers accredited their ability to teach from an informal experience.

While interviewing Todd, he described his ability to teach in SBAE laboratories as,

"I believe that my experience outside of my formal education preparation classes at the university was really my biggest tool in helping me know what to do in laboratories. Whether it was jobs that I had prior to teaching, or an experience I had with family or friends."

While interviewing with Jonathan, he said,

"Honestly the majority of my knowledge needed to teach in these laboratories came from personal experience and trial and error. College prep programs help prepare you to find information but real experience gives you the knowledge to actually teach a skill."

Mark described what best prepared him to teach in SBAE laboratories as

"I had some preparation from one class at [UNIVERSITY] but most of my success is attributed to trial and error and mentoring from other ag science teachers, and my experience on the farm and in other jobs during the time I was in college."

Theme Two: Teachers accredited their ability to teach from a formal experience

Robby said "I learned quite a bit from the college courses that I took at [UNIVERSITY]. I took multiple Agricultural Mechanics courses in Electricity, Concrete, Construction Framing, and Welding." While interviewing Mark he said "my teacher preparation program did a significant job in preparing me for teaching in laboratory settings." While discovering this theme we also noticed several teachers credited their time as secondary student is what best prepared them to teach in laboratories. When asked what prepared Cedric to teach in SBAE laboratories he stated "I would say that my time as a high school Ag student and watching my high school Ag teachers in laboratory environments helped equip me with the skills to teach in these types of laboratories." While interviewing Amber, she said "My best preparation came from my high school ag teacher and the work I did in the shop and greenhouse as a high school student" Dylan described what best prepared him to teach in SBAE laboratories as "Truthfully, my high school Ag class experience, and my student teaching."

Theme Three – Many teachers felt underprepared to teach in laboratory settings.

Many teachers indicated their laboratory training was insufficient. Ita, described her laboratory training as

"It was very little. I had one course on how to set up a lab. Everything I learned about working in a laboratory came from my student teaching. I think there should be more training in multiple labs areas because you rarely know where you're going to teach while you are still in college."

When interviewing Skyler and asked him to describe his undergraduate training he described it as

"I learned how to build a 10'x12' shed, shoot framing nails at the high-rise dorms, and set off the brake on the SawStop. I think that there is a lot more lab management at [UNIVERSITY] now, but when I was there it was pretty slim."

Sarah described her undergraduate training for laboratory settings as "None - except for my student teaching experience which was plant and environmental science so I helped in the greenhouse."

When asked to describe her undergraduate laboratory training, Sarah said described her experiences as

"I received no laboratory training. For my first teaching position, I was responsible for several mechanics classes, and I had no clue what I was doing and had received no formal training, but I was certified by [STATE] to teach in these areas. I had woodshop back in

middle/high school but that was all. I had never welded a day in my life. I had no college classes or personal experience in the area. I relied heavily on my coworker and husband to help me get through the first few years, if it weren't for them, I would not have made it."

Several more interviews took place and many teachers described feeling underprepared to teach, manage, and facilitate learning activities in SBAE laboratories.

Theme four – There is a significant need for more lab-based training for pre-service SBAE teachers.

While interviewing Joy she described her need for more training as

> "It was quite overwhelming to start teaching in a program where it was expected that you could provide quality laboratory instruction…I was responsible for several lab-based courses without knowing how to do it. I didn't not have any undergraduate training in these areas yet, I was certified to teach in them."

Todd described his laboratory training needs as "Welding, Greenhouse, Animal Science, Biology... you name it, I could have used more of it." Sarah she stated,

> "All areas! Especially shop / Ag mechanics. I think there should have been a course that covered all the areas and potential lab settings you may encounter and then another one you could select after on a specific area you needed the most help with."

Greenhouses, welding, and mechanics laboratory training were the areas teachers indicated the highest need in further training. Very few respondents indicated their ability to teach in SBAE laboratories was due to their undergraduate training, and in fact, the respondents who did, also indicated an informal experience as also being what best prepared them to for laboratory instruction.

Conclusions, Limitations, Implications, & Recommendations

This study revealed an in-depth analysis of what experiences prepared SBAE teachers to effectively facilitate laboratory instruction in SBAE programs. Many researchers (Easterly & Myers, 2017; Phipps et al., 2008) have identified SBAE programs are designed to be led by qualified, effective SBAE teachers. Effective SBAE teachers are necessary components of quality SBAE programs (Easterly & Myers, 2017) who display a variety of characteristics (Eck et al., 2019; Roberts & Dyer, 2004), including dedication, pedagogical knowledge, and knowledge about agriculture (Eck et al., 2019; Roberts & Dyer, 2004; Whittington, 2005).

This study contributes to the discipline by providing specific laboratory training needed nationally by SBAE teachers. Universities, stakeholders, and state-level agricultural education / FFA staff members can use these findings by comparing the laboratory training being offered at their respective institutions to the training outlined in this study and then provide supplemental laboratory training to their pre-service SBAE teachers.

Further analysis should be conducted to determine if the geographical location is an indicator for what type of laboratories are most commonly found in SBAE programs. Institutions serving the region or state then could use the findings as a guide to formulate their laboratory training for their pre-service SBAE students.

According to Klein and Moore, (2016) formal training occurs in a structured and organized environment like an educational institution and leads to degrees and certifications. We recommend universities offer more laboratory training for their pre-service SBAE students. Per Klein and Moore, (2016) informal learning occurs when a learner learns something during everyday life activities (i.e. job, personal experiences, mentorship, etc.).We recommend agricultural education programs and SBAE teacher educators encourage pre-service teachers to immerse themselves in any informal or formal technical activity (i.e., help a someone with a home renovation project, be employed in agricultural technical fields such as welding, woodworking, farm help etc.) to bolster their competencies in SBAE laboratories.

This study is congruent with other studies (Burris et al., 2005; Hainline & Wells, 2019; Wells et al., 2021, Phipps et al., 2008; Talbert et al., 2014) showing several deficiencies in laboratory training, and the immediate need for an increase in laboratory training. There is a plethora of benefits for adequately and accurately trained SBAE teachers (Burris et al., 2005; Hainline & Wells, 2019; McKim & Saucier, 2013). Agricultural teacher educators must ensure laboratory training is continued and increased for the development of effective SBAE teachers. According to Hainline and Wells (2019); Whittington (2005); and Wells et. al. (2021) agricultural teacher education programs should provide opportunities for pre-service SBAE teachers to develop agricultural subject matter knowledge and skill development through laboratory-based training.

Reflecting on Wells et. al. (2021) Agricultural Teacher Education and Agricultural Industry Partnership Model which guided this study, in particular, the Educators Competent in Technical Knowledge portion of the model, the agricultural industry cannot function without highly competent SBAE teachers. This study can improve how pre-service SBAE teachers are trained by agricultural teacher preparation institutions using this data to further prepare their pre-service SBAE teachers by offering specific laboratory-based courses, and encouraging their students to engage in formal and non-formal experiences which would bolster their technical competencies.

SBAE stakeholders (e.g., agricultural teacher educators, state-level agricultural education / FFA staff members, etc.) could use the findings to bring awareness to the deficiencies discovered from this national sample of SBAE teachers, and possibly could be used to leverage financial support at a state level for funding professional development for [STATES] in-service SBAE teachers.

This study's limitations are found in generalizing the data to all SBAE teachers. While some teachers may describe their preparation to teach, manage, and facilitate learning activities in SBAE laboratories to something other than what was discovered in this study.

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Training Needs of Iowa State University Pre-service Teachers Related to Teaching Technical Agriculture and Classroom Management

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Introduction / Conceptual Framework

Agricultural education teacher preparation programs constantly attempt to keep pace with 21st Century agriculture and provide relevant pedagogical and content training for pre-service teachers. Previous literature has highlighted that working with students with special needs, developing curriculum, and teaching in agricultural mechanics laboratories, are areas which preservice and induction phase teachers need more training (Burris et al., 2005; Cannon et al., 2012; Dormody et al., 2006; Joerger, 2002; Saucier et al., 2014; Sorensen et al., 2014; Touchstone, 2015). Identifying the priorities of the teacher educator program is crucial in addressing the professional development needs of preservice teachers (Myers, et al., 2005).

Instructors at the post-secondary level should be cognizant of the autonomy and self-directedness of adult learners and strive to provide relevant coursework aligning with the needs and desires of learners (Cercone, 2008 Fidishun, 2000; Lieb, 1991). The concept of self-directed learning serves as a central tenet of Andragogy, an educational concept advanced by Knowles (1980). Knowles indicated that as students mature, their self-concept transitions from being dependent to being self-directed. These considerations will foster the self-directed nature of the agricultural education pre-service teachers—thus enhancing the likelihood of providing relevant training for the pre-service teachers (Waters & Haskell, 1989).

Purpose and Objectives

This study sought to determine the training needs of Iowa State University agricultural education pre-service teachers based on the General Program Standards for Agricultural Education put forth by the Iowa Governor's Council on Agricultural Education. This study aligns with the Fifth Priority Area of the AAAE NRA (Thoron et al., 2016). The following two objectives served to guide this study:

1. Determine the teacher preparation training needs of Agricultural Education Pre-service Teachers related to teaching and classroom management.

2. Determine the teacher preparation training needs of Agricultural Education Pre-service Teachers related to technical agriculture.

Methods

A census was attempted on all agricultural education pre-service teachers (*N* = 97) at Iowa State University. A total of 69 pre-service teachers provided responses (response rate = 71.1%). In regard to the academic classification breakdown of the respondents, there were nine (13.05%) freshmen, eight (11.59%) sophomores, 26 (37.68%) juniors, 21 (30.43%) seniors, and five (7.25%) graduate students. The average respondent was female (*n* = 50, 70.4%), had an average age of 20.70 (*SD* = 2.77), and had four years of involvement in SBAE as a secondary student (*n* = 54, 78.3%).

A modified Borich Needs Assessment Model was used in this study to assess the training needs of pre-service teachers. The General Program Standards for Agricultural Education were cross-walked with agricultural education needs constructs from previous studies (Garton & Chung, 1997; Joerger, 2002), to develop the instrument used in this study. The survey instrument contained 29 needs assessment items and eight multiple choice / short-answer demographics items. The needs assessment items pertaining to *teaching and classroom management* (*n* = 20) and *technical agriculture* (*n* = 9) were coupled with a pair of Likert-type scales. The two scales assessed the teachers perceived importance associated with each topic (1 = *Not Important* to 5 = *Very Important*) and their perceived level of knowledge of the topic (1 = *I have no knowledge on this issue* to 5 = *Very Knowledgeable*).

The instrument was distributed using the Qualtrics Survey Platform. Three reminder emails were sent to the non-respondents, in five-day increments (Yun & Trumbo, 2000). SPSS©, Version 25, was used to analyze descriptive statistics (i.e., percentages and frequencies). The first and second objectives were analyzed by calculating the mean weighted discrepancy score (MWDS) for each item, using McKim & Saucier's (2011) Excel-Based Mean Weighted Discrepancy Score Calculator. Cronbach's alpha coefficients for knowledge ($\alpha = .97$) and importance ($\alpha = .97$) scales were calculated and both scales met the tolerable threshold level for reliability establishment (Ary et al., 2010).

Findings

The first objective sought to determine the pre-service teachers' *teaching and classroom management* training needs. The *teaching and classroom management* topics which pre-service teachers reported the largest perceived levels of training needs were: proper implementation of IEPs for students with disabilities (MWDS = 9.01) and developing articulation agreements with local community colleges (MWDS = 8.40). Conversely, the topics with the lowest indicated levels of training needs were providing guidance to students interested in post-secondary education (MWDS = 5.08), and using technology in teaching (MWDS = 3.45; see Table 1).

Table 1
Pre-service Teachers' Perceived Training Needs Related to Teaching and Classroom Management (n = 69)

	MWDS					
Item	Fr	So	Jr	Sr	Gr	Total
Proper implementation of IEPs for students with disabilities.	11.36	5.33	9.04	8.76	11.04	9.01
Developing articulation agreements with local community colleges.	11.36	4.24	9.48	7.59	7.60	8.40
Teaching in an agricultural mechanics laboratory.	12.35	2.65	9.59	7.11	8.28	8.28
Developing a variety of agricultural curriculum.	10.86	3.80	8.72	6.54	10.00	7.89
Teaching in land laboratory.	13.16	2.65	7.08	7.67	8.80	7.67
Teaching in horticulture/greenhouse facility.	8.89	2.65	8.10	6.60	5.04	6.88
Motivating students to learn.	11.95	1.22	6.31	6.86	8.64	6.80
Organizing and supervising teaching laboratory.	10.37	2.20	7.42	5.33	10.12	6.77
Developing performance-based assessment instruments.	10.79	2.76	6.69	6.10	7.68	6.70
Determining the content that should be taught in specific courses.	10.62	3.67	6.75	6.89	3.20	6.66
Teaching students decision-making skills.	9.78	1.84	7.05	5.45	9.20	6.52
Providing career exploration activities in the agricultural education.	11.41	2.37	7.80	4.99	3.68	6.48
Teaching students problem-solving skills.	8.49	3.06	6.68	5.39	11.00	6.45
Managing student behavior problems.	7.09	3.80	6.62	7.03	3.20	6.21
Conducting parent/teacher conferences.	7.04	1.65	6.33	5.45	10.40	5.95
Locating and selecting student references and materials	9.62	2.20	6.28	4.84	7.13	5.85
Assessing and evaluating student performance.	10.12	1.71	6.69	4.75	2.52	5.69
Proper supervision of students to ensure safety	7.96	1.22	4.31	6.19	10.00	5.42
Providing guidance to students interested in post-secondary education.	9.02	1.71	4.84	5.04	4.80	5.08
Using technology in teaching.	9.11	1.71	1.71	3.37	5.52	3.45

Parallel to the overall highest-rated area of need, sophomores (MWDS = 5.33), seniors (MWDS = 8.76), and graduate students (MWDS = 11.04) indicated their largest area of training needs was related to the implementation of IEPs for students with special needs. On the other hand, teaching in an agricultural mechanics laboratory was the highest reported need for freshmen (MWDS = 12.35) and juniors (MWDS = 9.59).

The second objective for this study was to determine the pre-service teachers' training needs regarding *technical agriculture* topics. Overall, the highest rated area of need for the pre-service teachers was "teaching knowledge and skills in biotechnology" (MWDS = 9.03), and the lowest rated need area was "teaching knowledge and skills in the animal sciences" (MWDS = 3.54). When breaking down the needs by academic classification, teaching biotechnology was the highest indicated area of need for sophomores (MWDS = 8.77) and juniors (MWDS = 9.68). Freshmen (MWDS = 13.00) and seniors (MWDS = 8.05) reported their highest training need was associated with teaching agricultural mechanics (see Table 2).

Table 2
Pre-service Teachers' Perceived Training Needs Related to Technical Agriculture (n = 69)

	MWDS					
Item	F	So	J	Sr	Gr	Total
Teaching knowledge and skills in biotechnology.	12.04	8.77	9.68	7.74	5.76	9.03
Teaching knowledge and skills in agricultural mechanics.	13.00	3.31	9.10	8.05	4.00	8.23
Integrating current advances in agriculture technology into the curriculum.	11.64	7.41	6.69	4.90	9.20	7.07
Teaching knowledge and skills in agribusiness.	7.22	4.90	6.68	5.88	8.80	6.52
Teaching knowledge and skills in agronomy.	9.63	4.29	6.11	5.06	3.04	5.83
Teaching knowledge and skills in natural resources.	9.15	4.90	5.52	4.57	3.20	5.47
Teaching knowledge and skills in horticulture.	9.62	4.73	6.19	4.32	0.72	5.43
Teaching about public issues regarding agriculture.	6.22	6.73	5.49	3.68	5.76	5.18
Teaching knowledge and skills in the animal sciences.	6.74	1.14	4.35	2.07	3.52	3.54

The freshmen students' lowest training need was "teaching about public issues regarding agriculture" (MWDS = 6.22) while graduate students reported teaching horticulture (MWDS = 0.72) was their lowest need area associated with *technical agriculture*. Sophomores (MWDS = 1.14), juniors (MWDS = 4.35), and seniors (MWDS = 2.07) reported their lowest area of needs were associated with teaching animal science.

Conclusions / Recommendations

The two highest perceived areas of technical agriculture needs were teaching knowledge and skills in biotechnology and agricultural mechanics. The pre-service teachers' high indication of importance on these two items imply their understanding of importance of these topics in the School Based Agricultural Education (SBAE) program. Moreover, the pre-service teachers'

expressed needs coincided with Roberts et al. (2007) statement that pre-service teachers believe a successful SBAE teacher should be well versed in agricultural content knowledge.

Houck and Kitchel (2010) recommended evaluating pre-service teachers' base content knowledge to determine their specific curricular needs. Therefore, teacher educators should crosswalk the course curriculum requirements with the reported content area needs of the pre-service teachers. The reported training needs in the agricultural content areas mimicked the level of focus of the content areas in the curriculum requirements. It is implied the lack of focus on certain content areas (e.g., agricultural mechanics) in the degree program directly or indirectly influenced the pre-service teachers' perceived competence with the underrepresented content. This sentiment has been echoed by a myriad of researchers who indicated a decline in technical agricultural content courses at the post-secondary level (Burris et al. 2005; Edwards & Thompson, 2010).

Aside from the technical agriculture content needs, the pre-service teachers expressed some level of need with every *teaching and classroom management* item. Furthermore, the levels of needs reported for the *teaching and classroom management* items varied between students of different grade classifications, but the ranking of the items was somewhat consistent among classifications. Understandably, the students' experiences in content and pedagogical courses varied based on their classification. At the time of this study, just over half (n = 11, 52.4%) of the seniors and one (20.0%) graduate student were engaged in their student teaching experience. Although these students had more experience in the teacher preparation program, the overall training needs of seniors (MWDS range: 3.37 – 8.76) and graduate (MWDS range: 2.52 – 11.04) students were relatively high and consistent with the MWDS of the underclassmen.

The pre-service teachers reported the highest levels of perceived training needs on items related to working with special needs students, working with community colleges to develop articulation agreements, teaching in the agricultural mechanics laboratory, and developing curriculum. The reported training needs of the pre-service teachers agree with previous research regarding the needs of pre-service and induction-phase in-service teachers (Burris et al., 2005; Cannon et al., 2012; Dormody et al., 2006; Joerger, 2002; Saucier et al., 2014; Sorensen et al., 2014; Touchstone, 2015). The aforementioned topics represent the highest self-perceived training needs of the pre-service teachers; Therefore, teacher educators should strive to provide further training for the pre-service teachers on the educational topics they deem important.

To understand the extent of their training in technical agriculture content areas, educators must examine the full breadth of content courses the pre-service teachers are electing to take. The teacher educators should conduct degree audits on all teacher certification students and determine if the course selections match the areas of needs. Moreover, the teacher educators should consider developing a list of preferred or recommended electives to assist the pre-service teachers in selecting appropriate courses to hone their knowledge and skills in areas or reported deficiencies.

Aside from coursework, teacher educators should provide other forms of training outside of the classroom setting. This could be achieved by providing professional development (PD) events, which focus on the largest areas of need. Regardless of the source of teacher training (i.e., coursework, PD events, or field-based experiences), it is important educators, PD entities, and cooperating teachers serve as a catalyst to ignite the pre-service teachers' interest on important agricultural content and pedagogical topics, thus providing a foundation for lifelong learning. Moreover, this line of inquiry should be continued to see how students' progress in these areas, and to serve as a metric for making necessary changes to the curriculum.

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How Does Preservice Teacher Preparation for Agricultural Mechanics Project Construction Impact Physiological Stress?

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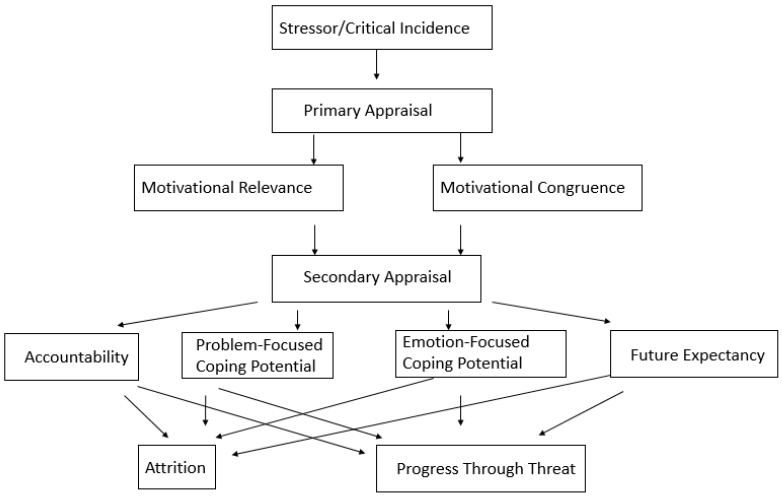
Introduction

Many preservice agriculture teachers feel underprepared and report unique concerns related to teaching agricultural mechanics content (Tummons, Langley, Reed & Paul, 2016). The limited time for agricultural mechanics skill development and methods in teacher preparation programs leaves many preservice teachers feeling ill prepared to serve in the role of instructor (Burris, Robinson, & Terry, 2005). A tremendous amount of content knowledge is required to teach agricultural mechanics; Pate, Warnick, & Meyers (2012) found experienced teachers listed forty-nine skills required to teach welding. Foster (1986) revealed high levels of anxiety for agricultural mechanics educators experience prior to and during the student teaching process. Tummons, Langley, Reed & Paul (2016) noted female agricultural mechanics teachers experienced stress while teaching how to use tools which could kill or harm them or students.

With minimal preparation, teacher stress becomes a relevant and valid concern. Teachers vary in their stress responses, and teacher's response to stress is critical for retention (Thieman, Henry, & Kitchel, 2012). Admiraal, Wubbels, & Korthagen (2000) worked with preservice educators and found teachers who employ ineffective ways of coping with stressful encounters reported feelings of distress and diminished learning opportunities for students.

Theoretical framework

Researchers used Lazarus's Theory of Psychological Stress (1991). Stress is an interface within an individual, the environment which they are currently experiencing, and the demand on an individual's own resources given the current environment.



Purpose/Objectives

The purpose of this study was to identify how differences in teacher preparation impact the physiological stress of teachers and teaching quality within the agricultural mechanics project construction. To address this, several research questions were developed.

1. What is the measured physiological stress level (heart rate high, heart rate low, stress response and steps) of treatment preservice teachers versus non-treatment preservice teachers?
2. What is the perceived comfort level of treatment preservice teachers vs non-treatment preservice teachers?
3. What is the perceived teacher effectiveness level (delivery, assessment and learning environment) of treatment preservice teachers vs non-treatment preservice teachers, from student perspective?
4. To what extent does treatment, days, and interaction of treatment times days explain variation in physiological stress, perceived comfort and teacher effectiveness?

Methodology

This study utilized quasi-experimental design research methods, utilizing nonequivalent control group design (Campbell & Stanley, 1966), with one predictor (independent) variable: teacher preparation, and three outcome (dependent) variables for this study: (1) physiological stress of preservice teachers and (2) teacher comfort level, and (3) teacher perceived effectiveness. Participants were senior-level college students enrolled in an agricultural mechanics teaching methods course designed to teach students project construction and laboratory management. Each student within the course serves as "teacher for a day". During this time, the "teacher" is responsible for all course content, just as they were the assigned teacher for the course. For this project, teachers in the treatment group received additional training on to build and teach project construction to their students before serving as teacher for a day (when they taught project construction to their peers). The control preservice teachers received no prior instruction for building the projects with their students.

This study utilized four instruments to gather information from the preservice agricultural educators- ambulatory heart rate monitors to measure heart rate, respiration, and stress response, pre-class questionnaires, post-teaching reflection questionnaires, and project grading rubrics. During the study, participants in the role of teacher wore heart monitors daily within the course. Teachers also completed a questionnaire to record their perceived comfort and provided background information for monitor data accuracy.

At the conclusion of each lab, participants within the role of student completed an instrument to measure the perceived effectiveness of their teacher (Peterson, Wahlquist, & Bone, 2000). Participant characteristics were controlled for by utilizing purposive random assignment to groups and assignment to treatment, providing detailed instruction prior to project construction to 8 of the groups. Plans, materials, and tool availability were the same for all groups. Groups were separated into two different labs to avoid cross contamination during the project construction process. This isolation allowed for groups to work on their own without interference or influence from other groups.

Results

Table 1

Teacher Heart Rate Data

	Control (*n=6*)		Treatment (*n=4*)	
	M	*SD*	*M*	*SD*
Day 1				
Heart Rate Level low[a]	79.00	9.48	79.75	13.72
Heart Rate Level average[a]	96.17	9.62	99.25	11.59
Heart Rate High[a]	122.17	9.06	127.25	7.54
Day 2				
Heart Rate Level low[a]	74.83	5.30	79.00	12.16
Heart Rate Level average[a]	95.17	5.45	94.33	10.07
Heart Rate High[a]	125.00	8.55	120.00	4.36

Note.. [a]Heart rate reported in beats per minute.

Table 2

Teacher Stress Response

	Control (*n=6*)		Treatment (*n=4*)	
	M	*SD*	*M*	*SD*
Day 1				
Stress Response[a]	79.83	5.38	67.75	8.18
Steps[b]	440.67	171.15	424.50	59.17
Day 2				
Stress Response	64.50	20.67	61.67	14.57
Steps	431.17	158.65	368.33	313.79

Note. [a]Anchors for stress response was scaled 0-100 as measured by the device. [b] Anchors for steps were steps taken during teaching.

Table 3

Teacher Effectiveness as perceived by students

	Control (*n=8*)		Treatment (*n=7*)	
	M	*SD*	*M*	*SD*
Day 1				
Teaching Delivery[a]	4.03	1.06	4.58	0.15
Learning Environment[a]	4.28	0.62	4.71	0.22
Assessment[a]	4.01	0.99	4.75	0.20
Perceived Comfort[b]	2.87	1.12	3.28	1.60
Day 2				
Teaching Delivery[a]	3.96	0.93	4.48	0.15
Learning Environment[a]	4.19	1.04	4.49	0.47
Assessment[a]	3.86	1.17	4.50	0.44
Perceived Comfort[b]	3.00	1.41	3.85	1.34

Note. [a]Anchors for psychosocial constructs was 1 = *Strongly Disagree*, 2= *Disagree*, 3 = *Neutral*, 4=*Agree*, and 5 = *Strongly Agree*. [b] Anchors for perceived comfort were 0= *very low*, 2-3 = *Moderate*, 5=*Very high*

For teaching delivery, the overall model explained a significant portion of variance $F(16,13)= 5.06$, $p < 0.05$.

Table 4

Analysis of Variance Summary Table for Teaching Delivery

Source	df	Type III SS	MS	*F*	*p*	partial η^2
Treatment	1	2.10	2.10	2.12	0.17	0.140
Day	1	0.06	0.06	0.30	0.59	0.023
Treatment*Day	1	0.01	0.01	0.01	0.95	0.00
Case	13	12.88	0.99			

Note: *= $p<0.05$

For learning environment, the overall model explained a significant portion of variance $F(16,13)= 6.89$, $p < 0.05$.

Table 5

Analysis of Variance Summary Table for Learning Environment

Source	df	Type III SS	MS	*F*	*p*	Partial η^2
Treatment	1	0.98	0.98	1.20	0.29	.085
Day	1	0.16	0.16	1.51	0.24	.104
Treatment*Day	1	0.03	0.03	0.31	0.58	.024
Case	13	10.63	0.82			

Note: *= $p<0.05$

For Assessment, the overall model explained a significant portion of variance $F(16,13)= 3.16$, $p < 0.05$.

Table 6

Analysis of Variance Summary Table for Assessment

Source	df	Type III SS	MS	*F*	*p*	Partial η^2
Treatment	1	3.60	3.60	3.47	0.08	0.211
Day	1	0.29	0.29	0.86	0.37	0.062
Treatment*Day	1	0.02	0.02	0.05	0.83	0.004
Case	13	13.48	1.04			

Note: *= $p<0.05$

For perceived comfort, the overall model explained a significant portion of variance $F(16,13)= 9.28$, $p < 0.05$.

Table 7

Analysis of Variance Summary Table for Perceived Comfort

Source	df	Type III SS	MS	*F*	*p*	Partial η^2
Treatment	1	3.00	3.00	0.87	0.37	0.063
Day	1	0.91	0.91	2.74	0.12	0.174
Treatment*Day	1	0.37	0.37	1.13	0.31	0.080

Case	13	44.87	3.45

Note: *= p<0.05

For heart rate low, the overall model explained a significant portion of variance $F(12,6)= 8.14$, $p < 0.05$.

Table 8

Analysis of Variance Summary Table for Heart Rate Low

Source	df	Type III SS	MS	*F*	*p*	Partial η^2
Treatment	1	11.21	11.21	0.07	0.79	0.11
.Day	1	0.27	0.27	0.02	0.90	0.003
Treatment*Day	1	3.27	3.27	0.22	0.66	0.036
Case	9	1362.85	1362.85			

Note: *= p<0.05

For heart rate average, the overall model explained a significant portion of variance $F(12,6)= 4.89$, $p < 0.05$.

Table 9

Analysis of Variance Summary Table for Heart Rate Average

Source	df	Type III SS	MS	*F*	*p*	Partial η^2
Treatment	1	0.24	0.24	0.00	0.97	0.002
Day	1	3.75	3.75	0.19	0.68	0.031
Treatment*Day	1	33.75	33.75	1.75	0.23	0.225
Case	9	1011.08	122.34			

Note: *= p<0.05

For heart rate high, researchers failed to reject the null hypothesis, as the overall model did not account for a significant portion of variance $F(12,6)= 0.64$, $p > 0.05$.

Table 10

Analysis of Variance Summary Table for Heart Rate High

Source	df	Type III SS	MS	*F*	*p*	Partial η^2
Treatment	1	18.36	18.36	0.33	0.58	0.036
Day	1	38.4	38.4	0.48	0.52	0.074

Treatment*Day	1	126.15	126.15	1.75	0.26	0.207
Case	9	502.98	55.89			

Note: *= p<0.05

For stress response, researchers failed to reject the null hypothesis, as the overall model did not account for a significant portion of variance $F(12,6)= 0.81$, $p > 0.05$.

Table 11

Analysis of Variance Summary Table for Stress Response

Source	df	Type III SS	MS	*F*	*p*	Partial η^2
Treatment	1	132.17	132.17	0.84	0.38	0.081
Day	1	288.20	288.20	1.16	0.32	0.162
Treatment*Day	1	44.20	44.20	0.18	0.69	0.029
Case	9	1416.02	157.33			

Note: *= p<0.05

For steps, researchers failed to reject the null hypothesis, as the overall model did not account for a significant portion of variance $F(12,6)= 1.12$, $p > 0.05$.

Table 12

Analysis of Variance Summary Table for Steps

Source	df	Type III SS	MS	*F*	*p*	Partial η^2
Treatment	1	4661.76	4661.76	0.13	0.73	0.030
Day	1	258.34	258.34	0.01	0.92	0.002
Treatment*Day	1	2673.34	2673.34	0.11	0.76	0.017
Case	9	328182.23	36464.69			

Note: *= p<0.05

Conclusions/Implications/Recommendations

Teaching agricultural mechanics is stressful for preservice teachers. Although researchers failed to reject the null for stress response, all teachers experienced stress above the average of a normal working level (Firstbeat, 2017). Participants were stressed with little to no recovery time within the 150 minute teaching window. (Firstbeat, 2017). Stress response for day one treatment, day one control, day two treatment, and day two control were all above the *more than usual* stress response of 60 (Firstbeat, 2014).

The treatment accounted for *large* differences in teaching delivery and assessment; *medium* differences in learning environment, perceived comfort, heart rate low (control was lower), and stress response; and a *small* effect size in heart rate high (treatment higher day one, control higher day two), and steps. Researchers concluded the treatment of modeling project construction for peer teachers resulted in improved instruction from the perspective of the students in the areas of teaching delivery and assessment.

On average, participants were not comfortable leading their classmates in project construction; participants' overall perceived comfort levels were *disagree* to *neutral*. In a specific instance, one treatment participant rated their comfort as a zero, even after building the project with a University instructor. All teachers, both treatment and control, lacked confidence in carrying out their assigned teacher roles.

Days accounted for a *large* effect size for perceived comfort, stress response, a medium effect size for learning environment, assessment, heart rate high, and a *small* effect size for teaching delivery and heart rate average. Both treatment and control teachers felt much more comfortable and showed less stress response on day two. Researchers noted the variance within project construction days and how novice teachers changed with experience through the process. Teacher educators should increase modeling to reduce stress within the agricultural mechanics laboratory. Data revealed University instructors or agricultural mechanics instructors in general should lead more in project construction through modeling. Those teachers who do not receive this additional training are likely to meet the attrition stage of the Lazarus (1991) model, exiting agricultural education. As students are exposed to stressor events which are novel, they seemed gain confidence once the novelty dissipates. The students embraced the stress of day one and should be shown how to use problem focused strategies to succeed.

The agricultural mechanics preparation curriculum should include early skill instruction to allow the primary and secondary appraisal, followed by the perception of individual coping ability (Lazarus, 1991). This will allow the two-part appraisal phase to begin before they are asked to teach agricultural mechanics content.

Educators should identify and recruit those students who possess problem focused coping skills while in a stressed environment. These are the students who succeeded within this study, this would also align with the Lazarus (1991) model some individuals cope while focusing on the problem and some do not.

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Courses Offered to Pre-service SBAE Teachers in AG. ED. Laboratories

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Introduction and Literature Review

Research has indicated that laboratory-based instruction in school-based agricultural education (SBAE) programs is commonplace (Shoulders & Meyers, 2012), a myriad of literature has noted SBAE teachers are not adequately prepared to teach, manage, and facilitate learning activities in SBAE laboratories upon completing their teacher education programs (Burris et al., 2005; Hainline & Wells, 2019; Shoulders, 2012).

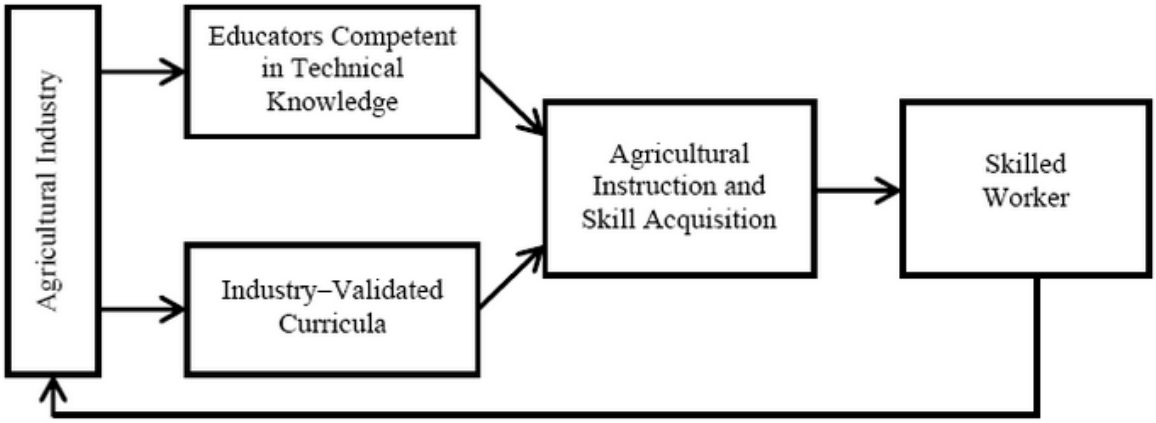
The use of SBAE laboratories is a way for experiential learning to take place, (Shoulders, 2013) teach problem-solving skills, decision-making skills, and teamwork; which is considered a fundamental principle within SBAE (Franklin, 2008; Phipps et al., 2008; Shoulders & Myers, 2012; Talbert et al., 2014). Agricultural mechanics has been a mainstay in the curriculum for agricultural education and is considered to be a foundational component comprising of topics ranging from electricity, welding / metalworking, building construction systems, biofuels, alternative energies, and mechanical systems (Burris et al., 2005; Hainline & Wells, 2019; McCubbins et al., 2016; Young et al., 2009). Shoulders and Meyers, (2012) findings indicate the most common laboratories found in SBAE programs in America are greenhouses, mechanics laboratories, carpentry shops, and welding laboratories.

Previous literature has provided an overview of the skills needed by SBAE teachers to effectively teach in SBAE laboratories (Burris et al., 2005; Hainline & Wells, 2019; Saucier et al., 2012). Congruent to Agricultural Education scholars' indication of important skills, many scholars have also found that pre-service and in-service SBAE teachers do not have the necessary skills to teach agricultural mechanics and other laboratory-based courses with fidelity (Burris et al., 2005; Hainline & Wells, 2019; Albritton & Roberts, 2020).

While previous literature has recommended institutions bolster their agricultural mechanics instruction to SBAE pre-service teachers to remedy this issue, a decline in agricultural mechanics coursework requirements has been observed over the past few decades across many institutions (Burris et al., 2005; Hainline & Wells, 2019). This study sought to identify what laboratory courses are being offered to prepare pre-service teachers to teach, manage, and facilitate learning activities in SBAE laboratories, which was guided by Roberts and Ball's (2009), content-based model for teaching agriculture. Specifically, this study focused on the

precursors of competent SBAE teachers, which has direct and indirect impacts on the learning of students in SBAE programs (see Figure 1).

Figure 1
Content-based Model for Teaching Agriculture (Roberts & Ball, 2009)



Purpose and Objectives

The purpose of this study was to identify the courses and training offered to pre-service SBAE teachers in laboratory settings across the nation. This study aligned with Research Priority Three of the AAAE NRA (Stripling & Ricketts, 2020). The following two objectives guided this qualitative study.

1. Identify what laboratory-based courses are offered at post-secondary agricultural education programs to pre-service teachers.
2. Determine teacher educators' perceptions regarding possible needs or changes in regard to preparing pre-service teachers associated with laboratory competencies.

Methods

We used a quantitative research approach to explore the objectives of this study. The survey instrument was comprised of 25 items. Four items were associated with identifying institutional characteristics and the remaining 21 items were included to better understand the availability of courses, coursework requirements, and perceptions of needed of expansion of each area. The 21 items were separated into four independent sections, focusing on four separate contexts of Agricultural Education (i.e., agricultural mechanics, plant science, animal science, and food science). For each item, the teacher educators were prompted to specify if: (1) the course was currently available at their institution, (2) does the course have a pedagogical focus, (3) is the course required for pre-service teachers, and (4) they felt instruction on this topic needed expansion.

Prior to data collection, the instrument was pilot tested on a group of professors who were not in the target population. The instrument was sent to a panel of experts (i.e., three Agricultural

Education faculty members) to review for face and content validity. Minor adjustments were made after the pilot test and instrument review to enhance the readability of the items. The instrument was distributed via Qualtrics. We sent out an initial email and two reminder emails.

The data collected in this study were analyzed using IBM SPSS, Version 25. Descriptive statistics were calculated to analyze research objectives one and two. Specifically, we calculated the frequency and percentage of each item on the instrument. Specifically, we sought to identify: institutional classification (i.e., 1862 Land-grant institution, 1890 (HBCU) Land-grant institution, Regional (Public) institution, Private institution), types of degrees offered (i.e., Bachelors / Masters), total number of credit hours in their bachelor' degree programs, and average number of students enrolled in the program.

There was no need to inquiry about the institutions Ph.D. program as we were only focusing on degrees which had a teaching certification option. The intended target population for this study was faculty members at Agricultural Education teacher certifying institutions. Contact information for each teacher educator was collected from the NAAE website with 33 different institutions teacher educators responding to this instrument (see Table 1).

Table 1

Demographics of Teacher Education Programs

Characteristic	*f*	%
University Classification		
Land-grant institution	15	45.5
Regional (Public) institution	12	36.3
Private institution	4	12.1
1890 (HBCU) institution	2	6.1
Types of Degrees Offered		
Masters	21	63.6
Bachelors	32	97.0

Results

Concerning the teacher educators' responses on General Mechanics, a majority (*f* = 28; 84.8%) of the respondents indicated having a stand-alone course in Agricultural Mechanics while four respondents (12.1%) indicated Agricultural Mechanics was embedded into another course, and one (3.0%) reported the course was not available. Slightly over half (*f* = 18; 56.3%) of the respondents reported having a stand-alone course in Welding, while 12 respondents (37.5%) indicated Welding was embedded into another course, and two (6.3%) reported the course was not available.

Thirty-one institutions (96.9%) required Agricultural Mechanics course and 26 (83.9%) required pre-service teachers to take a welding course. Of the 33 institutions represented in this study, 16 indicated their Agricultural Mechanics course and nine specified their Carpentry course had a pedagogical focus.

Among the Plant Science courses, Greenhouse Management (64.5%) and Turf Grass Management (51.6%) were most commonly taught as a stand-alone course. The most commonly required courses for pre-service teachers were Greenhouse Management (46.7%), Hydroponics (26.9%), and Orchard/Grove Management (21.4%). Of the Plant Science courses on the instrument, Greenhouse Management was the course which was most frequently taught with a pedagogical focus (*f* = 6, 19.4%).

In regard to Animal Science course availability, Livestock Management (*f* = 25, 78.1%), Equine Science (*f* = 24, 75%), Wildlife Management (*f* = 18, 56.3%), and Veterinarian Science (*f* = 17, 53.1%) were the most common stand-alone courses. Aside from Livestock Management (*f* = 20 64.5%), very few other Animal Science courses were required for pre-service teachers. When asked about the inclusion of pedagogical aspects, very few respondents indicated there was emphasis in these courses.

Regarding Food Science courses, a majority of respondents indicated the Meat Science (*f* = 23, 71.9%) and general Food Science (*f* = 18, 56.3%) were offered as stand-alone courses at their institutions. Roughly a quarter of the institutions required pre-service teachers to take these food science courses, and only one respondent on each of these courses indicated they had a pedagogical focus.

Next, the teacher educators were asked to share their perceptions on the need to expand instruction related to these topics. We had 21 laboratory-based courses which teacher educators' used the Expansion scale to determine their perceived need for expanding each course.

The course with the highest need for expansion was Metal / Welding Fabrication. This course had a had a split mode of five, *Very Significant Need* (*VSN*) and three, *Moderate Need* (*MN*). Teacher educators' (*f* = 7; 23.3%) indicated a *Very Significant Need* (*VSN*) for course expansion, and teacher educators' (*f* = 7; 23.3%) indicated a *Moderate Need* (*MN*) for course expansion.

The course teacher educators' indicated a *Limited Need* (*LN*) for course expansion was Forestry. Seven teacher educators' (30.4%) indicated a *Limited Need* (*LN*) for course expansion in Forestry (see Table 2).

Table 2

Teacher Educator's Perceptions on Expanding Instruction in Lab-Based Content Areas.

		f (%)					
Content Area	***n***	**1 NN**	**2 LN**	**3 MN**	**4 SN**	**5 VSN**	**Mode**
Welding / Metal Fabrication	30	6 (20.0)	6 (20.0)	7 (23.3)	4 (13.3)	7 (23.3)	**5/3**
Agricultural Mechanics	31	2 (6.5)	6 (19.4)	13 (41.9)	4 (12.9)	6 (19.4)	**3**
Poultry Science	28	6 (21.4)	6 (21.4)	12 (42.9)	2 (7.1)	2 (7.1)	**3**
Carpentry	30	5 (16.7)	7 (23.3)	12 (40.0)	2 (6.7)	4 (13.3)	**3**
Hydroponics	24	3 (12.5)	6 (25.0)	11 (45.8)	3 (12.5)	1 (4.2)	**3**
Food Science	29	4 (13.8)	5 (17.2)	11 (37.9)	7 (24.1)	2 (6.9)	**3**
Landscape Design	25	4 (16.0)	8 (32.0)	10 (40.0)	3 (12.0)	0	**3**
Wildlife Management	28	4 (14.3)	6 (21.4)	10 (35.7)	5 (17.9)	3 (10.7)	**3**
Equine Science	28	4 (14.3)	10 (35.7)	10 (35.7)	3 (10.7)	1 (3.6)	**3/2**
Greenhouse Management	27	4 (14.8)	4 (14.8)	9 (33.3)	3 (11.1)	7 (25.9)	**3**
Small Companion Animal Management	28	5 (17.9)	6 (21.4)	9 (32.1)	7 (25.0)	1 (3.6)	**3**
Biotechnology	24	1 (4.2)	5 (20.8)	8 (33.3)	7 (29.2)	3 (12.5)	**3**
Meat Science	30	6 (20.0)	7 (23.3)	8 (26.7)	7 (23.3)	2 (6.7)	**3**
Nursery / Orchard / Grove Management	25	3 (12.0)	11 (44.0)	7 (28.0)	3 (12.0)	1 (4.0)	**2**
Viticulture	25	7 (28.0)	11 (44.0)	4 (16.0)	2 (8.0)	1 (4.0)	**2**
Turf Grass Management	27	6 (22.2)	10 (37.0)	5 (18.5)	5 (18.5)	1 (3.7)	**2**
Apiculture (Beekeeping)	27	7 (25.9)	9 (33.3)	7 (25.9)	2 (7.4)	2 (7.4)	**2**
Veterinary Science	28	4 (14.3)	9 (32.1)	9 (32.1)	2 (7.1)	4 (14.3)	**2/3**
Livestock Management	29	5 (17.2)	9 (31.0)	8 (27.6)	3 (10.3)	4 (13.8)	**2**
Aquaculture / Aquatic Sciences	27	6 (22.2)	8 (29.6)	8 (29.6)	4 (14.8)	1 (3.7)	**2/3**
Forestry	23	4 (17.4)	7 (30.4)	6 (26.1)	5 (21.7)	1 (4.3)	**2**

Note. Expansion scale: 1 = *No Need* (*NN*), 2 = *Limited Need* (*LN*), 3 = *Moderate Need* (*MN*), 4 = *Significant Need (SN)*, 5 = *Very Significant Need* (*VSN*).

Conclusions, Limitations, Implications, & Recommendations

This study produced a comprehensive list of laboratory-based courses that are offered to prepare pre-service SBAE teachers to teach, manage and facilitate learning activities in agricultural education laboratories. We found the majority (*f* = 32, 84.8%,) of the agricultural teacher education programs offered an Agricultural Mechanics course, and slightly over half (*f* = 32, 56.3%) offered a Welding / Metal Fabrication course. By majority, both of these courses were required for SBAE teacher certification students. However, nearly half (*f* = 32, 41.9%) of the teacher educators felt there is a *moderate need* (*MN*) to expand instruction pertaining Agricultural Mechanics, while nearly a quarter (*f* = 32, 23.3%) of teacher educators felt there was a *very significant need* (*VSN*) to expand instruction in Welding / Metal Fabrication.

Although the majority of agricultural education programs have a stand-alone course in Agricultural Mechanics, this study's results are congruent with other studies which shows a significant need for expanding Agricultural Mechanics and other laboratory instruction for pre-service teachers (Burris et al., 2005; Hainline & Wells, 2019; Wells et al., 2021).

Several researchers' (Albritton & Roberts, 2020; Burris et al., 2005; Hainline & Wells, 2019; McCubbins et al., 2016; Young et al., 2009) literature shows an increased exposure in laboratory settings to students will help close the gap found in pre-service SBAE teachers' laboratory competencies. Several studies (Burris et al., 2010; Ingersoll et al., 2014; Paypay et. al. 2017) indicated teachers leave the profession due to lack of training, resources, administrative support, and professional Development (PD).

Per Phipps et al., (2008), Hainline and Wells (2019), and Roberts & Dyer, (2004), SBAE teachers who can effectively use SBAE laboratories have the opportunity to provide students with a plethora of skills, which they can develop, hone, and apply, all which help prepare students to be career ready. Burris et al., (2005), Hainline and Wells, (2019), and Tummons et al., (2017), reported that SBAE teacher educators, expert SBAE teachers, and industry representatives alike, agreed that there is a paramount need for extensive training for pre-service teachers in technical laboratories.

As the agriculture industry continues to evolve becoming more technologically advanced and highly productive, the ever-growing gap of people who lived and worked on a farm, and in which by doing so; obtained a fundamental level of agricultural mechanical skills (i.e. general knowledge of electrical systems, mechanical functions, building construction, animal care, etc.) is widening (Moore, 1994 Moore, 1987; Myers & McKnight, 2017). Thus meaning, individuals who desire to become a school-based agricultural educator, may not be getting the experiences which instill a certain level of mechanical skill, as many of the previous agricultural educators did. Perhaps this generation of aspiring agricultural educators are needing more and more agricultural mechanics type skills due to the continual societal shift moving away from an agrarian based economy to an urban-based economy.

Further research should explore if agricultural education teacher graduates, who have had more laboratory training show a higher level of preparedness for teaching, managing, and facilitating learning activities in agricultural education laboratories. Certainly there are many

researchers (Albritton & Roberts, 2020; Burris et al., 2005; Hainline & Wells, 2019; Wells et al., 2013) who have postulated that more laboratory training would better prepare pre-service teachers to be able to teach, manage, and facilitate learning activities in agricultural education laboratories. Pre-service SBAE should be prepared to teach in a variety of laboratories, and as the agricultural industry advances new and relevant skills pertaining to agricultural laboratories should be implemented into teacher training.

Reflecting on Roberts and Ball (2009) content-based model which guided this study, in particular, the Educators Competent in Technical Knowledge portion, the agricultural industry cannot function without well trained SBAE teachers. This study can improve how pre-service SBAE teachers are trained, by using the comprehensive list of laboratory-based courses which teacher educator programs could use as a guide to reframe their curriculum to help close the gap in laboratory deficiencies found in SBAE pre-service teachers. These course offerings or lack thereof, could be compared to the deficiencies found within pre-service SBAE teachers, thus each agricultural teacher prep program would know which courses they should offer to bolster pre-service teachers' competencies.

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The Study Abroad Experiences of Secondary Agriculture, Food and Natural Resources Students

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Introduction

Study abroad experiences are defined as "any number of arrangements by which students complete part of their degree program through educational activities outside the United States" (Purdue University, 2021, lines 2-3). During the 2018-19 academic year, 347,099 U.S. post-secondary students studied abroad, representing almost 250,000 more students than in 1994 (Martel et al., 2020). Although study abroad experiences and their benefits have been researched at the post-secondary level, there is a dearth of scholarship at the secondary school level. Within the context of Agriculture, Food and Natural Resources (AFNR) Education, there are even fewer studies examining this topic. The lack of study abroad programs available to secondary school students, especially programs focused on AFNR systems, is likely the cause. In 2020, however, one of the largest study abroad companies for secondary education (i.e., Education First Tours), started a campaign catering specifically to AFNR programs and their students (Fitzgerald, 2020). With new opportunities, it is critical to learn more about study abroad experiences and how they benefit secondary school students. In this research, we explore the study abroad experiences of secondary school AFNR students in Michigan.

Literature Review and Theoretical Framework

Existing scholarship on study abroad programs has focused almost exclusively on post-secondary or teacher education programs. These studies have explored myriad outcomes, including *cross cultural awareness* (Lokkesmore et al., 2016), *cultural competency* (Bunch et al., 2018), *global competencies* (Sankey et al., 2014), and *global citizenship* (Berg & Schwander, 2019). Additionally, case studies on the topic illuminate the lived experiences of students during study abroad experiences. For example, students from Louisiana State University shared how they felt "privileged" during their experience in Nicaragua and learned many things about the local culture and agricultural systems (O'Malley et al., 2019, p. 199). Additional research illuminates employers view study abroad experiences favorably when considering a resume; however, noted employers want students to have gained awareness or competencies transferable to their career (Harder et al., 2015). Other studies have examined the effect of study abroad on academic performance, with Xu et al. (2013) reporting positive correlations between study abroad and academic performance indicators (i.e., GPA, graduation rate, and graduation timeline). Existing scholarship illuminates the impact of study abroad experiences on post-secondary students; however, it is unclear if those positive impacts translate to experiences at secondary school level.

To investigate this important topic, we operationalized Astin's (1991) input-environment-output (I-E-O) model as the theoretical framework. The I-E-O posits individuals start an educational experience with certain qualities that influence their engagement (i.e., inputs). Through the environment of their experience, individuals develop measurable outputs (e.g., knowledge, skills, attitudes). Students engaged in secondary school AFNR education study abroad experiences were viewed as the inputs and their study abroad experience was conceptualized as the environment. For this study, the outputs of interest were career determination, self-awareness, empathy, cultural awareness, and global competence.

Purpose and Objectives

The purpose of this research was to explore the study abroad experiences of secondary school AFNR students as they relate to career determination, self-awareness, empathy, cultural awareness, and global competence. This purpose was achieved via three distinct objectives: (a) describe the international travel experiences of former participants in a secondary school AFNR study abroad experience as well as a comparison group; (b) evaluate the outcomes (i.e., career determination, empathy, cultural awareness, and global competence) of former secondary school AFNR study abroad participants as well as a comparison group; and (c) describe the relationship between international travel experiences and educational outcomes.

Methods

Population, Sample, and Data Collection

There were two distinct samples from which data were collected for this research. The first sample was titled the "AFNR Traveler Group." Educators at three Michigan secondary school AFNR programs in which students have engaged in international study abroad experiences provided a list of 37 past participants. In addition, a student comparison group consisting of 33 undergraduate students at Michigan State University enrolled in AFNR Education without secondary school AFNR study abroad experiences was identified. To collect data, a Qualtrics survey was sent to the 67 potential respondents, starting in February of 2021. Over the course of five weeks, six emails encouraged individuals to participate in this survey. In total, 32 complete responses were received, for a 47.76% response rate; 16 respondents were in the AFNR traveler group (i.e., 42.34% group response rate) and 16 were in the student comparison group (48.48% group response rate).

Instrumentation

The survey included five outcome constructs (see Table 1). Items within the constructs were measured on a five-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). In addition, the survey included measures of international travel experiences and demographic information.

Table 1

Description of Constructs

Construct	Items	Example Item	Original Construct Source	Post-hoc Reliability
Global Competence	11	I am knowledgeable of current world events	Foster et al. (2014) Table 3	0.91
Cultural Awareness	11	I like learning about different cultures.	Foster et al. (2014) Table 7	0.89
Empathy	16	When someone else is feeling excited, I tend to get excited too.	Spreng et al. (2009)	0.92
Career Determination	6	I have so many interests that it is hard to choose just one occupation.	Crites and Savickas (1996) Career Confidence	0.86

Face and content validity were evaluated by a panel of three professionals in agricultural education with expertise in social science research methods. To measure the reliability of the constructs, a *post-hoc* Chronbach's Alpha was calculated for each construct (see Table 1).

Data Analysis

Data were retrieved from Qualtrics and analyzed using SPSS. For our first objective, the mean number of countries visited by each group of students was calculated. For the second objective, we calculated the average scores for each construct separately for the two groups. Our third objective was to describe the relationship between international travel experiences and outcomes; therefore, we calculated a Pearson correlation between the variables across both groups.

Description of Respondents

All respondents had taken at least one secondary AFNR course; 43.90% of respondents had completed at least four years of AFNR coursework. All the respondents graduated high school between 2012 and 2020 and 62.50% maintained a GPA over 3.50. The respondents ranged in ages from 18 to 26. Six of the respondents identified as male, 24 identified as female, and two respondents did not report their sex.

Findings

To address the first objective, we identified the number of countries each group had traveled to outside the United States (see Table 2). Although the means between the two groups were similar, the student comparison group (*M* = 3.50; *SD* = 3.33) had a slightly higher average.

Table 2

Average Number of Countries Visited by Group

Group	*M*	*SD*
Student Comparison	3.50	3.33
AFNR Travelers	3.38	1.59
Total	3.44	2.56

For the second objective, we identified an average score for each outcome construct for the two groups (see Table 3). The average scores for global competence (*M* = 3.96; *SD* = 0.39) and cultural awareness (*M* = 4.52; *SD* = 0.45) were slightly higher for those students who studied abroad. Alternatively, the scores for empathy (*M* = 4.14; *SD* = 0.39) and career determination (*M* = 2.99; *SD* = 0.81) were higher in the student comparison group.

Table 3

Average Construct Scores by Group

	Global Competence		Cultural Awareness		Empathy		Career Determination	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Student Comparison	3.30	0.71	4.11	0.44	4.14	0.39	2.99	0.81
AFNR Travelers	3.96	0.39	4.52	0.45	4.11	0.58	2.71	1.06
Total	3.63	0.65	4.39	0.50	4.13	0.48	2.86	0.93

To accomplish objective three, a correlation between the number of countries visited and each outcome construct was calculated (see Table 4). No statistically significant correlations were identified; however, the highest correlation was identified between cultural awareness and the number of countries visited (*r* = .152; *p*-value = .40).

Table 4
Correlation between Number of Countries Visited and Constructs

Construct	Pearson Correlation	*p*-value
Global Competence	-.030	.87
Cultural Awareness	.153	.40
Empathy	.069	.72
Career Determination	-.011	.95

Discussion, Recommendations, and Conclusions

The emergence of new study abroad opportunities for secondary school students in AFNR underscores the need for, and timeliness, of this scholarship. Results from this research illuminate several trends worthy of further consideration. First, the group of AFNR travelers had traveled to fewer countries than the student comparison group. This result was not expected; however, we believe this was skewed by two individuals in the student comparison group who reported travelling to 11 countries.

When considering the utility of secondary AFNR study abroad experiences, the most promising findings were AFNR travelers reporting higher levels of global competency and cultural awareness. Results indicating higher cultural awareness, when compared to global competency, is consistent with prior literature (Sankey, 2014). In total, these data suggest structured academic experiences offered for secondary AFNR students can result in increased educational outcomes like global competency and cultural awareness. In contrast, the student comparison group scored higher in empathy and career determination. Importantly, students in the comparison group were enrolled in AFNR Education, and planned to become teachers, thus, it is not surprising they reported a higher career determination score. Teachers also tend to be more empathetic in nature. In conclusion, findings provide promising evidence of the value of study abroad experiences while reinforcing strengths of our comparison group, which was comprised of preservice teachers.

Examining the correlations identified in objective three, cultural awareness and number of countries visited yielded the strongest relationship. On the other hand, global competence and number of countries visited resulted in one of the weaker relationships. Neither correlation was statistically significant; therefore, potential conclusions are limited. One hypothesis, however, emerges; specifically, increasing cultural awareness and competence may no longer depend on a “boots on the ground” experience. Rather, those who are the most in touch with the rest of the world may stay informed through other outlets (e.g., regular media consumption, virtual

interactions with people of other nationalities, etc.). We encourage further research to explore this hypothesis.

While the results of this research provide support for Astin's I-E-O model, there is still a lot of ambiguity regarding the environment of each study abroad experience. Research exploring the length and types of study abroad experiences in relation to educational outcomes alongside a deeper dive into the other international travel experiences students have experienced will add to this line of inquiry. Qualitative research should be leveraged to seize these opportunities for scholarship.

As additional recommendations, we encourage both students and teachers in secondary AFNR programs explore opportunities for international study abroad focused on AFNR; especially when programmatic objectives include student development of global competence and cultural awareness. We also recommend scholars in AFNR Education continue to explore the topic of study abroad within secondary school settings. Since this is a growing industry, it is important to be in tune to the learning these experiences cultivate.

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Engaging Youth in Food Systems Issues: An Ohio Case Study

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Introduction

Food is a necessity for all living beings, but accessing sufficient, healthy food is a growing global issue. Food systems are considered a social-ecological system that are comprised of activities such as food production, processing and packaging, distribution and retail, and consumption (Berkes et al, 2003; Ericksen, 2008). Issues relating to this system include the governance and economics of food production, food waste, sustainability, and the impact of food on health (University of Oxford, n.d.). Everyone is an actor in the food system, whether they are a producer or consumer, including youth. Engaging youth to become problem-solving producers, entrepreneurs, change agents and leaders is considered critical for bringing forth transformative changes to food systems (Kwan, 2014; USAID, 2018; Yeboah, 2018). However, students in the U.S. receive less than eight hours of nutrition education per year (CDC, 2014) and food education is lacking (Smelkova, 2015).

Yet, change has occurred with increases in gardening and cooking in schools and programming through community organizations that promote healthy living and food literacy (Smelkova, 2015; Renwick & Powell, 2019). But food insecurity can play a role in what choices youth have in their households as healthy food may be more expensive and less unavailable in areas with low resource households (Darmon & Drenowski, 2015; Larson et al., 2009; Walker et al., 2012). Because food system issues are complex, different types of programming have been developed to address them including Supplemental Nutrition Assistance Program (SNAP), youth summer lunch programs, food pantries, community gardens, farm to school programs, and mobile food markets (Wardlaw & Baker, 2012; Martinez et al., 2010; Seligman & Berkowitz, 2019)

Community-based programs, 4-H, FFA, and Farm Bureau organizations can offer programming to educate and engage youth on food system issues but there is a dearth of literature on how such programs are doing so. Ohio ranked 47th out of 50 states in 2021 for health value, indicating that residents are less healthy and spend more on healthcare than in most other states (HPIO, 2021). Further, Ohio ranked above the U.S. national average in food insecurity in 2015-2017 (United States Department of Agriculture, 2018). Thus, we sought to explore how out-of-school time programs in Ohio are including food system topics in their curricula and if they are empowering youth to be engaged in addressing food system challenges.

Conceptual Framework

Two theoretical models undergirded the conceptual framework for this study: positive youth development (PYD) and youth empowerment.

PYD is an intentional, prosocial approach that focuses on young people's strengths and promotes positive outcomes through building positive relationships, providing opportunities to engage with their peers, families, organizations, and communities, and supporting psychological, emotional physical, and emotional development (Hamilton et al., 2004). This approach emerged in the 1990s as a response to the deficit-based programs that viewed youth as problems rather

than as resources to be developed (Lerner et al., 2005). PYD programs should provide a space that supports their growth in ways such as fostering positive social norms, support for efficacy, opportunities for skill building and the integration of family school and community efforts. (National Research Council, 2002; Roth & Brooks-Gunn, 2003).

Youth empowerment can be understood as a value orientation for programming, as well as a conceptual framework (Rappaport, 1987). Psychological empowerment has been conceptualized as intrapersonal, interactional, and behavioral. That is, how people think of themselves as capable of influencing, how they understand what resources are needed to achieve one's goals, and what behaviors they should engage in order to influence outcomes (Zimmerman, 1995). For youth, empowerment theory views them as assets and resources for their community rather than community problems (Holden et al., 2005) and developing youth interventions and programs from this perspective aids in teaching skills that prevent negative outcomes (Kim et al., 1998). Empowerment is best operationalized within a context in order to understand the process by which youth become active participants around an issue. Previous research has indicated that including empowering processes have enhanced leadership and efficacy, self-esteem, and community and school engagement (Zimmerman et al., 2018).

Purpose and Questions

We aimed to learn how Ohio PYD programs engage in activities around food security, healthy living, and gardening/urban farming. The following research questions guided our inquiry: (1) How do youth participants' demographics situate them within food system? (2) What are the challenges for engaging youth participants in food system issues? (3) What role do adult practitioners see youth playing in addressing food system issues?

Methods

For this qualitative study we used a collective case design (Stake, 1994) that employed purposive sampling with the bounded system of out-of-school time programs within Ohio. We approached the research through a constructivist lens, assuming that people construct their own understanding of reality (Lincoln and Guba, 1985). As former PYD program participants, and the two lead researchers former PYD practitioners, we bracketed our experiences to allow for data emergence. We initially sent a questionnaire to youth programs in the central, northeast, southeast, and southwest regions of Ohio requesting information on the inclusion of food security, healthy living, and/or gardening/urban farming in their curricula. From this sample, we identified three programs which fell within each of the following categories: (1) general PYD program, (2) food security, and (3) healthy living and/or gardening/urban farming for a total sample of nine programs.

Data were collected through interviews and field notes. We interviewed program leaders for each program. The interviews were semi-structured, conducted by one researcher, audio and video recorded, transcribed verbatim, and considered the primary data source. The researcher who conducted the interviews also documented interview field notes which served as an ancillary data source.

Data were analyzed using a three-stage coding process. To begin, one researcher coded all interviews separately. The research team then worked together to categorize the codes by organization and triangulated the field notes with emerging categories. Finally, the categories were triangulated across organizations and grouped into themes which captured the phenomenon

of engaging youth in food systems issues. Trustworthiness was upheld through data triangulation, thick, rich descriptions, audit trail, peer reviews, negative case analysis, and researcher positionality (Lincoln & Guba, 1985).

Findings

From the data five themes emerged which situate the youth participants within, describe challenges when engaging youth in, and explain the role PYD practitioners see youth playing in food system issues.

Serving Youth in Communities of Need

Although many of the organizations serve youth from various socio-economic backgrounds, many participants come from low-income areas. For example, one organization serves as a satellite for a major urban school district and stated that "One hundred percent of students within that school district are economically disadvantaged" and thus worked to build a community and a safe place for these youth to come to be themselves, grow, and learn. Many program leaders shared that it is critical they provide support systems for the youth they serve, because some may not have stable support systems at home. Further, whether programs were rural or urban, some participants lived in food deserts, of which leaders were highly aware. As one program leader commented, "We are in a food desert because by definition there are not fresh fruits and vegetables accessible. We teach kids about that we are a food desert in the rural environment that we live."

Meeting Basic Needs First

In order to engage youth in addressing food security and healthy living, they must have access to healthier food options; however, findings indicated this is often not always the case for program participants. In many instances, youth do not have access to healthy and fresh foods. A majority of youth participants who come from an urban setting are most likely to get a snack or meal at a corner store rather than a nutritious meal due to lack of transportation, food desserts, or the cost of healthier food options. One program leader said, "If you need to feed your kids and ramen noodles, you get what 10 packs for $2, they'll probably eat noodles and hot dogs versus a salad or fresh green beans." Several program leaders shared that they strive to provide healthy snack options when youth are participating in their programs, and they work to educate them on the benefits of eating healthy. Introducing youth to different ways of accessing and preparing food and also discussing how they are affected by food insecurity, however, has proven to be challenging.

Addressing Lack of Social Capital for Youth and Families

Several program leaders also discussed the challenge of assisting youth who are a part of a system with various influences. Instead of just focusing on youth behaviors and resources, many programs also include families in educational activities and connect them to resources. Through collaboration with other local community organizations focusing on public health, nutrition, and farming, youth organizations have been able to connect families in need to resources. Some organizations addressed community needs as part of their curriculum by either broaching the topic themselves or asking youth for input on topics. Understanding that a stand-alone program may not be able to meet all the needs of youth participants and their families, collaboration and networking was vital for many interviewees. One program leader spoke about the various programming opportunities they host to involve family members. Hosting movie

nights, cooking lessons, and pumpkin carving in the fall are just a few of the opportunities they have to bring the entire family out for a night of fun and interaction. The interviewee said that through these programs, "we can begin to build a bond with our families, so that we can share more resources and more information."

Upholding PYD Principles and Practices

Program leaders spoke of youth as assets and how they were valuable members of their community. As one program leader said "I truly believe these kids are born with everything they need from the get-go. I think it's just a matter of finding, you know, giving them the tools to lead and giving them the opportunities to lead and problem solve." Some of the approaches used to support youth participant development included age specific programming, maintaining appropriate youth to adult ratio, creating a safe place for youth to feel engaged and welcomed, building trust between youth participants and adult leaders, and assisting youth to develop positive and meaningful relationships with adult leaders and other youth in the program.

Youth as Actors in Food System Issues

Program leaders believed the youth to be capable of engaging in food system issues within their communities. Youth were encouraged to understand food system issues and see themselves as actors in addressing them. Examples given were asset mapping of communities, education on the political process, and how food and food production is connected to the ecosystem. However, it was also discussed that some youth may be unaware of how they can be influential, thus programs support critical thinking, autonomy, and encouragement to be agents of change. A program leader stated, "We all view them as leaders… [we] kind of constantly encourage an environment of, like, we believe in you, whatever it is that you know, you think and you feel and want to do, you have our full support." Specific approaches to teaching such as project-based learning were also cited to empower youth to make a difference.

Discussion and Recommendations

Through this collective case it emerged that while many youth participants face food insecurity and challenges exist when engaging youth in these issues, leaders viewed youth as assets who could become actors in food system issues (Holden et al., 2005; Lerner et al., 2005). Additionally, the program leaders recognized their part in meeting the basic needs of youth participants while acknowledging the voice and ability of the youth they serve. Finally, program leaders acknowledged that programming must educate youth on the food system, while developing their skills to become actors in food system issues (Kim et al., 1998).

From this study it is recommended that programs utilize research supported PYD principles and practices when developing programing to empower youth to address food system issues. Practitioners should also reflect on how their youth participants are influenced by food system issues and how this may impact their desire to act. Additionally, practitioners should create programming which includes families and addresses social capital issues. Increasing connections to resources as well as strengthening relationships among community members can increase the number of ties that may lead to additional opportunities and support. Future research should continue to investigate how PYD programming is engaging and empowering youth to act

on food system issues by measuring youths' perceived level of ability to address these issues. Instead of being viewed as simply a program participant, youth can be looked upon as problem solvers, volunteers, and change makers.

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Recruitment Strategies Used by Agriculture, Food, and Natural Resources Educators in Michigan

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Introduction

Engagement in school-based agricultural education (SBAE) provides learners with opportunities to develop a blend of skills and knowledge in leadership and agricultural systems. While not inclusive of all the benefits of SBAE engagement, research highlights students engaging in SBAE earn more money in their careers and are more likely to graduate high school than their non-SBAE peers (McKim et al., 2018). Findings from the same longitudinal dataset, however, suggest the percentage of Black and Hispanic students participating in SBAE falls below their representation in schools offering SBAE (Velez et al., 2018). The underrepresentation of Black and Hispanic students implies research into recruitment is critical to identifying opportunities to make strategies more inclusive. In addition to informing recruitment of underrepresented groups, research on recruitment strategies supports educators seeking to fill their program rosters with interested and engaged students. In an effort to support inclusive and successful recruitment across SBAE programs, we explored SBAE teacher utilization and perceived effectiveness of various recruitment strategies in Michigan.

Review of Literature and Theoretical Framework

In SBAE, there exists a dearth of research about recruitment. The lack of scholarship limits the ability of educators to "stabilize the variation in student enrollment" (Myers et al., 2003, p. 94). To offer a path forward, Myers et al. (2003) ranked recruitment strategies used in SBAE from most effective to least: (a) middle school feeder program, (b) agriculture teacher and student contact, (c) FFA chapter events, (d) publications, (e) curriculum, (f) social support, and (g) recruitment events. Additional research supports the efficacy of identified recruitment strategies. Facilitating communication has consistently been identified as an effective approach (Hoover & Scanlon, 1991). Furthermore, facilitating a program in alignment with the three-component model has been found to be essential (Rubenstein & Thoron, 2014).

To inform our research into the recruitment strategies used by SBAE teachers, we utilized the Recruitment Theory (Winston, 2001). Recruitment Theory is "associated with the identification of individuals who are likely to be successful and to contribute as leaders in organizations and professions" (Winston, 2011, p. 20). The Recruitment Theory offers useful insight to our research by identifying factors that motivate individuals to engage in a particular system, like an SBAE program (see Table 1).

Table 1

Factors Influencing Recruitment and their Operationalization

Recruitment Factors	Description	Operationalization
Social Encouragement	Family members, peers, teachers, and role models encouraging the individual.	Program spotlight through presentations; informal recruitment; and administration education.
Relevant Experiences	Past experiences which imbue confidence in a positive experience.	Program spotlight through immersion.
Expected Benefits	Valuing perceived outcomes like salary, benefits, and the ability to make a contribution.	Programmatic features and programmatic culture.
Personal Characteristics	Individual's personal interests as well as demographic characteristics.	Given the ubiquitous nature, personal characteristics were viewed as impacting each categorization.

Purpose and Research Objectives

The purpose of our research was to explore the reported use and perceived effectiveness of recruitment strategies among teachers in Michigan. To achieve our purpose, the following research objectives were developed: (a) identify SBAE teacher use of recruitment strategies and (b) identify the perceived effectiveness of recruitment strategies.

Methods

The current analysis was completed using a mixed method approach with an exploratory design (Creswell, 2017). In this approach the first method (i.e., qualitative focus group) led to the development of our second method (i.e., survey).

Data Collection

All SBAE teachers in Michigan during the 2020-2021 school year served as the population (N = 138). For the first method, a convenience sample of five SBAE teachers was selected to ensure the voices included in the focus group represented teachers at different stages in their careers as well as teachers working in different types of programs. During the 45-minute focus group, participants discussed recruitment strategies they found successful within their programs as well as recruitment strategies they were aware other SBAE teachers in Michigan utilized successfully.

The goal of the focus group, conducted in November 2020, was to create a comprehensive list of recruitment strategies used in SBAE.

For the second method, a census of SBAE teachers in Michigan was attempted. Data were collected via an online Qualtrics survey. Potential respondents were contacted up to five times via email between December 2020 and January 2021. In total, 71 responses were received, a 51.45% response rate. Reported use and perceived effectiveness items were compared between on-time respondents and late respondents. The lack of statistical differences between the two groups when using the Bonferroni correction (Armstrong, 2014) indicates an absence of non-response bias (Lindner et al., 2001; Miller & Smith, 1983).

Instrumentation

Focus group data informed the development of the survey utilized in the second phase of this exploratory design. The focus group discussion yielded a list of 40 recruitment strategies. For each recruitment strategy, respondents in the second phase rated their use on a five-point scale from 1 (*Never*) to 5 (*Every Time*). In addition, respondents indicated perceived effectiveness for each item on a five-point scale from 1 (*Extremely Ineffective*) to 5 (*Extremely Effective*) with an "Unable to Rate" option also available. The research team concatenated the 40 recruitment strategies into six categories, introduced in the "Operationalization" column of Table 1. A panel of experts, including four faculty in SBAE and one undergraduate researcher, reviewed the instrument for face and content validity. Feedback from the panel indicated the survey was a clear and comprehensive tool for achieving the established research objectives.

Data Analysis

For research objectives one and two, an average reported use and perceived effectiveness was calculated. While the recruitment strategies were placed in categories by the research team in an effort to organize responses in alignment with our theoretical framework, the categories are not conceptualized as constructs; therefore, results are reported for individual items and not for thematic collections of recruitment strategies.

Description of Respondents

Respondents included 58.06% who taught within a comprehensive public high school and 49.94% who taught within a vocational/career center. A total of 59.38% of respondents completed a traditional agriculture teacher education program. The average years of SBAE teaching experience was 12.72 years; the average years of teaching experience at their most recent school was 9.77 years.

Findings

To increase readability, findings from objectives one and two are combined as the six recruitment categories are presented.

Program spotlight through immersion included immersive opportunities for students before they enroll in the program (see Table 2). Within this category, program tours (M = 3.62) was the most commonly used strategy. The recruitment strategy perceived most effective was also program tours (M = 4.29).

Table 2

Program Spotlight Through Immersion

	Reported Use		Perceived Effectiveness	
Recruitment Strategy	*M*	*SD*	*M*	*SD*
Program Tours	3.62	1.21	4.29	0.75
Open House	3.49	1.48	3.83	0.89
Student Orientation	3.20	1.48	3.66	0.82
Course Observations	2.59	1.29	3.95	0.94
Freshmen Orientation	2.35	1.70	3.77	0.88
Summer Camp within Program	1.84	1.21	3.48	0.73
"Meet the Advisor" Night	1.77	1.30	3.55	0.91

Note. Reported use measured on a five-point scale from 1 (*Never*) to 5 (*Every Time*). Perceived effectiveness measured on a five-point scale from 1 (*Extremely Ineffective*) to 5 (*Extremely Effective*). To decrease repetition, this note is only provided on Table 2; however, it applies to Tables 3-7 as well.

Program spotlight through presentation included verbal presentations about the program to potential students (see Table 3). The most commonly used strategy was current SBAE students presenting to younger students (*M* = 3.97); the strategy with the highest perceived effectiveness was teacher one-on-one conversations with potential students (*M* = 4.40).

Table 3

Program Spotlight Through Presentation

	Reported Use		Perceived Effectiveness	
Recruitment Strategy	*M*	*SD*	*M*	*SD*
Students Presenting to Younger Students	3.97	0.96	4.31	0.71
Teacher One-on-One Conversations	3.54	1.03	4.40	0.66
Teacher Presenting to Younger Students	3.37	1.17	3.84	0.77
Teacher Presenting to Parents	2.84	1.40	3.77	0.73

Programmatic features include tangible aspects of the program which may encourage participation (see Table 4). Providing academic credit had the highest reported use (*M* = 4.20). Offering middle school ANFR education course(s) ranked highest in perceived effectiveness (*M* = 4.47).

Table 4

Programmatic Features

	Reported Use		Perceived Effectiveness	
Recruitment Strategy	*M*	*SD*	*M*	*SD*
Providing Academic Credit	4.20	1.13	4.26	0.75
FFA Announcements During Class	4.04	1.28	4.02	0.75
Showcase/Trophy Case in School	3.53	1.60	3.23	0.82
Reduced FFA Dues	3.49	1.78	3.81	0.88
Fun Trips with First-Year Students	3.28	1.29	4.00	0.82
FFA Announcements to School	3.26	1.53	3.70	0.77
Bulletin Board in School	2.90	1.59	3.44	0.76
Offering Middle School AFNR Course(s)	2.74	1.73	4.47	0.68
Schoolwide FFA Meeting Flyers	2.67	1.66	3.54	0.84
Recruitment Committee within Program	2.41	1.37	3.89	0.66
Alumni Visits to Program	2.37	1.17	3.50	0.64

Programmatic culture included more abstract programmatic elements which may encourage participation (see Table 5). Within this category, emphasizing hands-on learning had the highest reported use (M = 4.72) and the highest perceived effectiveness (M = 4.75).

Table 5

Programmatic Culture

	Reported Use		Perceived Effectiveness	
Recruitment Strategy	*M*	*SD*	*M*	*SD*
Emphasizing Hands-On Learning	4.72	0.57	4.75	0.47
Emphasizing Outdoor Learning	4.51	0.72	4.58	0.61
Being “Exciting” as the Teacher	4.36	0.76	4.28	0.75
Creating an Inclusive Classroom	4.36	0.87	4.22	0.66
Advertising College Credit	4.03	1.09	3.95	0.75
Emphasizing Leadership Contests	3.96	0.88	3.84	0.77
History of Program Success	3.29	1.21	3.92	0.76
Changing Program Name	1.94	1.09	3.44	0.80

Informal strategies are approaches commonly requiring less planning by the educator to enact (see Table 6). The most used strategy was word of mouth (*M* = 4.27), which was also perceived to be most effective (*M* = 4.52).

Table 6

Informal Recruitment

	Reported Use		Perceived Effectiveness	
Recruitment Strategy	*M*	*SD*	*M*	*SD*
Word of Mouth	4.27	0.80	4.52	0.57
Community Presence of Advisor	3.83	0.94	4.00	0.69
Teacher as "Salesperson"	3.63	0.90	3.90	0.81
FFA Member Guiding Recruitment	3.62	1.10	4.00	0.76
Parent/Family Influence	3.38	0.96	4.10	0.77
"Bring a Friend" to FFA Meetings	2.53	1.19	3.94	0.63

Administration education includes involving administration in the SBAE program to increase their knowledge (see Table 7). Sending success highlights had the highest reported use (*M* = 4.06) and the highest perceived effectiveness (*M* = 4.05) within this category.

Table 7

Administration Education

	Reported Use		Perceived Effectiveness	
Recruitment Strategy	*M*	*SD*	*M*	*SD*
Sending Highlights to Administration	4.06	0.93	4.05	0.79
Administrator on Advisory Committee	3.56	1.38	3.77	0.83
Increasing Administrator Involvement	3.46	1.03	4.00	0.85
Presentation to Guidance Counselor	3.29	1.21	3.98	0.81

Discussion, Recommendations, and Conclusions

Across all types of recruitment strategies studied, emphasizing hands-on learning followed by emphasizing outdoor learning were the most common strategies and the strategies perceived to be most effective. According to research within the Recruitment Theory (Winston, 2001), courses that have interesting material are most effective in recruiting students. Through our research, highlighting engaging and inclusive classroom experiences was consistently rated as most effective. Therefore, agricultural educators must acknowledge effective recruitment starts with quality learning experiences. The importance of engaging curriculum found in our research,

however, diverges from research conducted by Myers et al. (2003) which highlighted curriculum as the fifth most important aspect to recruitment. The top strategy identified by Myers et al. (2003) were middle school feeder programs, which ranked fourth in effectiveness across all areas we studied. Importantly, the time between our study and research conducted by Myers et al. (2003) suggests factors motivating students to engage in SBAE may have evolved. Current students may decide to engage based more on the nature of the experience as opposed to factors motivating students in prior years.

Shifting to recommendations for research and practice, we first recommend educators start an evaluation of their recruitment strategies by considering the needs of *all* students within their community to ensure the strategies employed are inclusive and relevant. For those seeking to enhance their recruitment, we recommend implementing the recruitment strategies identified as most effective within this study (e.g., emphasizing hands-on learning, emphasizing outdoor learning). To do this, we recommend increasing hands-on and outdoor learning opportunities within the curriculum *and* emphasizing these types of experiences within communication to potential students. For scholarship within recruitment, we recommend research evaluating student perceptions of recruitment strategies to uncover the efficacy of strategies perceived by the individuals making the decision to engage. In addition, we recommend research exploring the impact of remote instruction, required during the COVID-19 pandemic, on recruitment strategies, SBAE enrollment, and student engagement.

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School Based Agricultural Education Teachers' Perceptions of Supporting Student Relatedness

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Introduction

The connection between student and teacher, which leads to motivation, is referred to as relatedness, and teacher actions and beliefs are central to cultivating relatedness (Deci, 2009; Deci & Ryan, 1985; Deci & Ryan, 1991; Mikami et al., 2017; Klassen et al., 2012; Quin, 2017). Teachers who are successful at cultivating relatedness are "reported to have rules…while avoiding the restriction of autonomy" (Urdan & Schoenfelder, 2006, p. 340). Also, the teacher's age, length of service at their school, gender, and the number of shared interests with students can all influence relatedness (Deci & Ryan, 1991; Deci & Ryan, 1985; Klassen et al., 2012; Urdan & Schoenfelder, 2016). Additionally, continued exposure to the same peers and teacher for more than one year has allowed positive relationships to grow (Mikami et al., 2017).

School Based Agricultural Education (SBAE) programs allow for student engagement throughout high school, maximizing the impacts of relatedness (Mikami et al., 2017). In addition, SBAE offers exposure to environments that foster relatedness through teamwork and novelty (Anderson, 2013; Baker & Robinson, 2017; Bowling & Ball, 2020). Given the variety within programming, it's easy to understand why SBAE teachers are a source of student motivation (Anderson, 2013; Bowling & Ball, 2020). Furthermore, teachers perceive that their ability to build relationships within their program is based on accessible relationships, student connection to SBAE, accessible mentorship, and student collaboration (Swinehart Held et al., 2020).

Relatedness and motivation are built from teacher pedagogy (Deci, 2009; Klassen et al., 2009; Mikami, et al., 2017). Therefore, SBAE teachers need to be intentional about their pedagogical choices (Anderson, 2013; Bowling & Ball, 2020). Furthermore, teacher perspectives are essential to understand as relatedness builds motivation for engagement in academic settings (Bowling & Ball, 2020; Curry, 2017). Thus, it is crucial to explore how teachers perceive relatedness within SBAE. Specifically, this study will examine the perceived use of relatedness supportive strategies (Swinehart Held et al., 2020) within SBAE programs.

Theoretical Framework

Self Determination Theory (SDT) served as the theoretical framework for this study. SDT examines motivation and its impact on individual actions (Deci & Ryan, 2020; Deci et al., 1991). SDT identifies the psychological needs of autonomy, competence, and relatedness as innate needs all humans possess (Deci & Ryan, 2020; Deci & Ryan, 1985; Deci et al., 1991). Relatedness is defined by Deci and Ryan (2020) to be the feeling of connection between people in a group or space, specifically, within educational environments where it is built through demonstrations of respect and care.

Students within relatedness supportive environments are more engaged in class, try new experiences, seek out more support within the learning environment, and feel more connected to others involved with the class (Deci & Ryan, 1985; Deci & Ryan, 2020; Deci et al., 1991; Mikami et al., 2017; Klassen et al., 2012; Quin, 2017). In addition, relatedness can build both internal and external motivation for students, leading to more effort and drive in the classroom (Deci & Ryan, 2020). However, it's important to note that as students age, their ability to feel psychologically supported decreases (Deci &

Ryan, 2020). Therefore, teachers can minimize the impact of age on psychological support by intentionally utilizing pedagogy to help build self-esteem and reduce apathy (Deci & Ryan, 2020).

Purpose and Research Objectives

The purpose of this study was to determine teacher perceptions about the presence of relatedness strategies in their SBAE program and describe relationships between demographics and relatedness strategies. These research objectives guided this study:

1) Describe the perceptions that SBAE teachers held about the presence of accessible mentorship, attainable relationships, student commitment, and student collaboration to support relatedness.
2) Describe the relationship between teacher age, years of service, years of service in their school, gender, and the presence of the four strategies of relatedness in their SBAE program.

Methods

This study utilized a descriptive relational quantitative design to describe teacher perceptions about relatedness strategies in their program and the relationship teacher demographics shared with these strategies.

Population and Sampling

The target population was teachers in National Association for Agricultural Educators (NAAE) Region IV *(n* = 2,229) with at least one year of experience. Stratified probabilistic sampling was utilized using contact information that was collected from directories from each state. Participants were stratified by state then randomly sampled based on NAAE membership percentages. The sample included: Illinois (*n* = 69), Indiana (*n* = 47), Kentucky (*n* = 43), Michigan (*n* = 25), Missouri (*n* = 76), and Ohio (*n* = 74), with a total sample of *n* = 334, which represents 15% of the population (Krejcie & Morgan, 1970). An additional 5% was added to the sample due to anticipated low response due to COVID-19 (McKim & Sorensen, 2020; Sastry et. al., 2020). Through distribution, 14 emails bounced, resulting in a revised sample of 320. After five reminders, the response rate was 22% (*n* = 71) and the usable sample was 21% (*n* = 67). Most of the teacher participants taught in a rural school district (71%, *n* = 65), taught in a single-teacher programs (60%, *n* = 54), had a student enrollment between 1 to 100 students (60%) in their SBAE program, were 36 years old (*M* = 35.76, *SD* = 9.48), taught SBAE for 13 years (*M* = 12.71, *SD* = 8.75), taught at their current school for 11 years (*M* = 10.70, *SD* = 8.22), and shared 60% (*M* = 59.33, *SD* = 15.58) of their interests with students.

Instrumentation

The questionnaire was researcher-developed using guidance from Dillman et al. (2014). The questionnaire consisted of four constructs that measured relatedness within SBAE programs and were developed using SDT as the frame to measure the four strategies of relatedness identified within Swinehart Held et al. (2020). In addition, the questionnaire included select teacher demographics which previous research has identified as potential influencers of relatedness.

The questionnaire posed questions to the participants within one of the four previously mentioned strategies. Sample questions, below, are provided to give a glimpse into the content of the questionnaire:

Table 1

Sample Questions from the Researcher-Developed Questionnaire

Strategy	Sample Questions
Accessible Mentorship	1) My students view me as a role model. 2) My program is not engaged with community events. (County Fair, Festivals, Booster Events, etc.) 3) My program only engages with adults who can serve as role models for students.
Attainable Relationships	1) I know my students on a personal level. 2) My program values respect among all students. 3) My program offers experiences that make students want to engage more.
Student Commitment	1) My students convince new students to join the program each year. 2) My students participate in activities at their level of knowledge. 3) I do not allow students to plan events.
Student Collaboration	1) My students are not encouraged by each other. 2) My students convince each other to try new activities. 3) My program has an Officer Team that encourages other students.

A panel of experts (n = 5) established the validity of the questionnaire (Creswell & Creswell, 2018). Members were selected due to their expertise in SBAE quantitative research and motivation. A pilot study was conducted to estimate reliability. We sent the questionnaire to teachers who were representative of the study's sample (n = 24). Cronbach's Alpha for all four constructs was above α = .70, which is acceptable for exploratory studies (Creswell & Creswell, 2018).

Data Collection

Using Qualtrics, five reminders were sent to participants utilizing the tailored design method (Dillman et al., 2014). Nonresponse was addressed by randomly selecting 10% (n = 24) of nonparticipants; each person was contacted three times (Dillman et al., 2014). The constructs were compared using Paired Sample t-tests, and no statistically significant differences were found ($p > .05$).

Data Analysis

Objective one was analyzed using descriptive statistics. Using guidelines from Fife-Schaw (2006), real limits were set for the teacher perceived amount of truth for each statement: score of 1.00 to 1.50 was considered not true, 1.51 to 2.50 was considered somewhat not true, 2.51 to 3.50 was considered neutral, 3.51 to 4.50 was considered somewhat true, and 4.51-5.00 was considered true. Descriptive correlational analyses were conducted for objective two. Pearson Product Moment Correlations were performed between continuous variables; Point Biserial Correlation was conducted between the binary and continuous variables. As an exploratory study, due to the descriptive nature of the correlations being presented, the focus was on describing the relationship using direction and magnitude using Davis (1971).

Findings

Objective one sought to describe the teacher perceptions about the presence of relatedness strategies in their program. It was found that teachers perceived it is true that accessible mentorship (M = 4.56, SD = 0.37) is present in their program. Additionally, teachers perceived it was somewhat true that attainable relationships (M = 4.46, SD = 0.32), student connections (M = 4.39, SD = 0.43), and student

collaboration (*M* = 4.33, *SD* = 0.41) all are present. All strategies displayed a slight spread in range scores and standard deviation, indicating slight variation within the teachers' perceptions.

Table 2

Prevalence of strategies in SBAE programs (n = 91)

Tenant	*M*	*SD*	Min	Max
Accessible Mentorship	4.56	0.37	4.49	4.63
Attainable Relationships	4.46	0.32	4.40	4.53
Student Commitment	4.40	0.43	4.31	4.48
Student Collaboration	4.33	0.41	4.25	4.42

Note. Real Limits: 1.00 to 1.50 = *not true*, 1.51 to 2.50 = *somewhat not true*, 2.51 to 3.50 = *neutral*, 3.51 to 4.50 = *somewhat true*, and 4.51-5.00 = *true*.

Objective two sought to describe the relationship between demographics and the presence of the relatedness strategies. A Pearson Product Moment Correlation was conducted between age, years of service, years of service at their school, perceived shared interests, and gender and the strategies of accessible mentorship, attainable relationships, student connection, and student collaboration. All variables shared negligible relationships; however, perceived shared interests and accessible mentorship (r = -.14) and years of service and student collaboration (r = -.12) shared the highest relationships. Second, a Point Biserial Correlation was conducted between gender, and the strategies shared negligible and negative relationships (r = -.05 *to* r = 0.08).

Table 3

Pearson Correlations between strategies and demographics (n = 91)

	Accessible Mentorship	Attainable Relationships	Student Commitment	Student Collaboration
Age	.04	-.02	.01	-.09
Years of Service	.03	-.09	-.04	-.12
Years of Service at Current School	.07	.-.02	.05	-.08
Perceived Shared Interests	-.14	-.07	-.03	-.09

Table 4

Point Biserial Correlation between strategies and demographics (n = 91)

	Accessible Mentorship	Attainable Relationships	Student Commitment	Student Collaboration
Gender	.003	-.02	-.05	.08

Conclusions, Implications, and Recommendations

We explored teacher perceptions about relatedness strategies present within their SBAE program. We also explored the relationships between demographics and relatedness strategies in SBAE programs. The study sample was comprised of teachers within NAAE Region IV; thus, the interpretation of this study is limited to describing the perceptions of teachers in this region.

Regarding objective one, teachers agreed that the four strategies were present in their program. The perceptions regarding the presence of the strategies varied; however, each strategy held a high level of perceived presence. This is consistent with previous research, which has also identified that the presence of a welcoming environment, access to interesting activities, a teacher who students can connect with, a teacher role model, and the ability to work with peers are present in educational settings, including but not limited to SBAE programs (Anderson, 2013; Ball et al., 2016; Deci & Ryan, 1985; Mikami et al., 2017; Quin, 2017; Reeve, 2009; Swinehart Held et al., 2020). In addition, the potential presence of relatedness in SBAE programs may lead to students experiencing an increase in motivation (Bowling & Ball, 2020; Curry, 2017) and engagement (Deci & Ryan, 1985; Deci & Ryan, 2020; Deci et al., 1991;).

Regarding objective two, it was concluded that there were negligible, positive and negative relationships between demographics and the strategies. This demonstrates that the studied demographics could not describe why relatedness was present within SBAE programs. This conclusion contradicts previous research that states that these specific teacher demographics can impact building relatedness (Deci & Ryan, 1991, Deci & Ryan, 1985, Urdan & Schoenfelder, 2016, Klassen et al., 2012). This finding could highlight other factors, not explored in this study, to be impactful when working toward building relatedness in an SBAE program.

We recommend that all SBAE teachers intentionally use pedagogical and programmatic strategies which can build relatedness. Strategies could include involving students in team-based CDEs, student cooperative group SAEs, community mentors, and program decision-making. Since this study found that teachers perceive this to be present in their programs, SBAE teachers might consider refining and modifying their current practices to better support the construction of relatedness with their student population. When making considerations in pedagogical and programmatic strategies, SBAE teachers must keep the needs of the students enrolled in their program at the center of their decision-making process. Further, we recommend teacher educators model the relatedness-building strategies explored in this study for preservice teachers. These strategies would include activities such as encouraging teamwork in class and getting to know students personally. Specifically, modeling a professional, appropriate student-teacher relationship would be impactful for preservice teachers. Teacher educators can also incorporate relatedness-building pedagogy in their classes, such as conducting team projects, training mentors, and program management, including students implementing events into their teacher preparation coursework.

Future research should explore other teacher or program-based factors that could influence relatedness. In addition, since students benefit from relatedness, their perceptions are valuable in understanding the impact of pedagogical choices and thus should be studied. Finally, research that allows for comparing teacher and student perceptions would be beneficial to SBAE motivational literature.

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Gender and Hometown as Predictors for School-Based Agricultural Education Teacher Ingroup Prejudices

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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 supports, and speaking against disparaging remarks (Cano & Moore, 2010; Newcomb et al., 1993; Phipps et al., 2008). However, while much discussion focuses on disenfranchised students and teachers, there has been little focus 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.

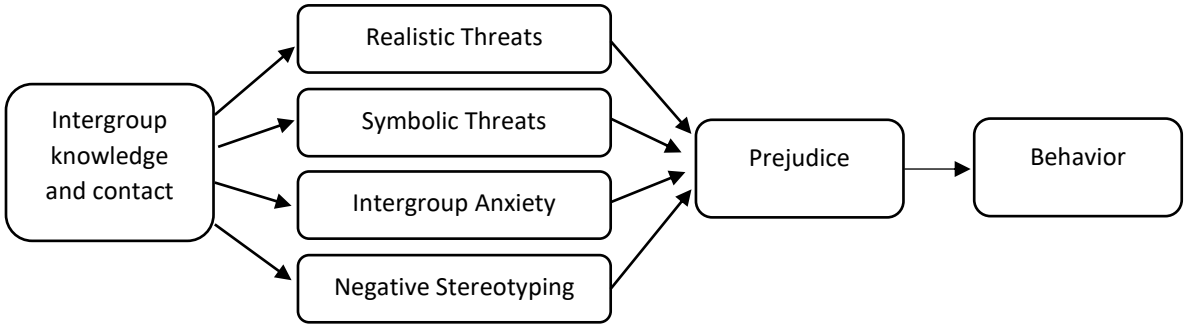
Theoretical Framework

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), that individuals' other identities create complex contexts, creating further ingroups and outgroups within common categories (Crisp et al., 2006).

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.

Figure 1

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



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. The study was guided by the following objectives:

1. Describe the levels of Social Desirability in Region IV SBAE teachers.
2. Describe levels of prejudice 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 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. A stratified random sample (n = 333) was drawn from state directories by calculating the proportions of state populations to the overall region population. The average participant 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 was established by modifying summated rating scales from previously published studies measuring social desirability (α = .88) (Crowne & Marlowe, 1960; Strahan & Gerbasi, 1972; Fischer & Fick, 1993), Neosexism (α = .76) (Tougas et al., 1995), Modern Homophobia toward Lesbians (α = .95) and Gay Men (α = .95) (Raja & Stokes, 1998), and Attitudes Toward Diversity in Coworkers (α = .78) (Montei et al., 1996). These scales were measured with five points ranging from *strongly disagree* to *strongly agree* except for social desirability which was measured using *true* and *false*.

Validity 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 (n = 41) where 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. Constructs from the present study followed the same pattern, with an alpha for social desirability of .61. This indicates that caution should be used in interpreting social desirability findings.

Data Collection and Analysis

Surveys were distributed via Qualtrics with six reminders (Dillman et al., 2014), resulting in a response rate of 21.6% (n = 72). Non-response error was addressed by distributing a second survey to a random sample of 20% of nonrespondents (n = 53) (Lindner et al., 2001; Dooley & Lindner, 2003; Miller & Smith, 1983). Independent-samples t-tests were conducted to compare nonrespondents to respondents and no differences were found ($p > .05$). Variables were thus

considered generalizable to the sample and population. The data were combined, resulting in an overall response rate of 37.5% (n = 125). Data were analyzed using descriptive statistics, Pearson correlations, and multivariate analysis of variance (MANOVA) to compare prejudice variable differences among participants based on gender and the population of the community they were raised. 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. Three univariate outliers in the data did not influence any significance values, thus were not removed.

Results

Objective one showed that teachers show moderate socially desirable behaviors (M = 3.34, SD = 1.65). Since no prejudice variables correlated with social desirability, it was determined that the data were not influenced by this bias (Nederhof, 1985).

For objective two, all prejudice scales were scored from 1 to 5, with higher scores indicating higher prejudice. Scores from the sample can be found on Table 1 and 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.

Table 1
Psychometric Properties for Study Scales (n = 124)

	M	*SD*	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 (possible range of 0-6)

Objective three was to examine prejudice differences based on gender and population of participant hometown. To examine their 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 2, 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, $F(4, 101) = 0.611$, $p = .656$.

Table 2
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 3, indicate that both factors 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 3

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

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. 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). This is particularly important in terms of teacher retention, where it's been indicated that SBAE teacher connectivity is a predictor of career commitment (Moser & McKim, 2020). It is possible that existing prejudices could impact career commitment in minority teachers, but more research is needed in this area. While no participants were without prejudice, 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).

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 address one (or more) of the four threats that can feed into prejudice. Examples of this could include implicit bias training to counter negative stereotyping threat, or cultural events that could help counteract intergroup anxiety. 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 or the learning, motivation, or engagement of their students.

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Impact of Shifting Agrarian Ideologies on School-Based Agricultural Education

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Introduction

Agriculture teachers do not work in a bubble, insulated from events in society. Agriculture teachers and students, as well as stakeholders and adult constituents, experience societal changes. These experiences have included massive ideological shifts in our recent political life, such as the Tea Party and Occupy Wall Street movements, the reemergence of political populism from both major parties, the Black Lives Matter protests, two contentious Presidential elections, and the insurrection at the Capital Building. These events have created lasting change in how people think about and engage with society in the United States and inevitably impact how students learn as well (Giroux, 2002). We must question how these ideological shifts have possibly impacted our work in school-based agricultural education (SBAE) and identify potential promising practices for agriculture teachers working in an evolving society.

Agrarian ideologies can impact the work of agriculture teachers because their work is often situated in agriculture topics, the agricultural sector, and/or rural communities in which these ideologies are prevalent. The literature suggests that conservative leaning agrarian ideals (i.e, agrarian populism) may prevail in SBAE (Martin & Kitchel, 2013). Liberal agricultural values (i.e., neo-agrarianism) exist in a variety of SBAE contexts, however conservative agrarian ideals often dominate more traditional agricultural education settings, including rural communities. However, research which explores how shifting agrarian ideologies, primarily prompted by concurrent social and political movements, will impact SBAE is needed.

Conceptual Framework

This philosophical study was framed by Agrarian ideology. Agricultural ideologies are the cultural norms, values, and rules which govern and explain how people within agricultural groups behave. Agrarianism has history in the United States that dates to Revolutionary Era; President Thomas Jefferson is the father of Agrarianism in the United States. Currently, two Agrarian ideologies are widely present in the United States, Neo-agrarianism and Agrarian Populism. Neo-agrarianism emerged in the 1990s and placed a high value on organic and local agriculture, environmentalism, and food awareness, as well as connecting consumers to their food (Berry, 1977; Thompson, 2010). Agrarian populism emerged as a response to Neo-agrarianism and argued for protecting farming practices, rural morality, efficiency of food production, as well as linking individual agriculturalists to multi-national corporations (i.e., Hanson, 1996; Murphy, 2007). These descriptions are simplistic as there is variation in each ideologic (e.g., differing views of farmers and ranchers). Both ideologies have strong elements of Neo-liberalism, which places emphasis on free market capitalism for guidance. There are other Agrarian ideologies (i.e., Critical Agrarianism and Black Agrarianism) though they are not as pervasive in society. Ideologies emerge, evolve, and even disappear over time as values in society shift, thus we should expect Agrarianism to have shifted over the past five years.

Purpose and Research Questions

The purpose of this philosophical examination is to explore how the recent ideological shifts in society away from neo-liberalism have impacted agrarian ideologies and agricultural education. The following research questions guided this study:

1. How have the shifts away from neo-liberal ideology impacted and reshaped the ideology of neo-agrarianism?
2. How have the shifts away from neo-liberal ideology impacted and reshaped the ideology of agrarian populism?
3. How will these agrarian ideological shifts impact agricultural education?
4. How can agricultural educators respond to these agrarian ideological shifts?

Methodology

This abstract employed a philosophical methodology to analyze how Agrarianism is evolving and ways agricultural education will be impacted by those changes. While there are no prescribed methods attached to the philosophical research in education, generally the methodological approach requires critical reflection and analysis on actions and ideas that impact education (Burbules & Warnick, 2006). I utilized current understanding of Agrarian ideologies, then examined how those ideologies have shifted in the recent past, and how those shifts will impact agricultural education utilizing recent social movements as a frame of reference.

Findings

The shift to second wave Neo-agrarianism is the reconceptualization of liberal agriculture and those associated values. The values of the first wave of Neo-agrarianism (i.e., local agriculture, organic production, and animal welfare) are still important. There are Neo-agrarians who would prefer to keep the focus on these values. However, those people identifying with the second wave of Neo-agrarianism call for greater accountability within agriculture along economic, environmental, and racial lines. They are more progressive in their calls for equality and demand that changes happen faster than the forces of the free market. Thus, the second wave Neo-agrarian shift is directly challenging the Neo-liberal tendencies of first wave Neo-agrarianism. This second wave is being characterized by movements such as the 1619 project which connects the racial injustices and legacy of enslaved people from Africa to the wealth generated from agriculture for four hundred years in the United States (Hannah-Jones, 2019). Another example would the growing movements to protect undocumented works in the United States who provide the bulk of the low-wage agricultural labor (e.g., De La Rosa, 2020).

The evolution of first wave Agrarian Populism to the second wave is also a rejection of Neo-liberal ideals, though viewed from a different and counter acting perspective. Mirroring the conservative populist movement embodied by President Trump (not directly equating the two movements), second wave Agrarian Populism might identify governmental institutions to be part of the problem of society. For example, free trade agreements, which are a hallmark of Neo-

Liberalism, have come under scrutiny by many conservatives. The canceling of these agreements would often work against the best economic interest of agriculturalists (e.g., Johnson & Fromartz, 2017). Also, second wave Agrarian Populist are growing increasingly more skeptical of governmental institutions and multi-national corporations (e.g., Siegler, 2020), which is a further break from first wave Agrarian Populist. While it is difficult to precisely identify the number of people who more closely identify with second wave of Agrarian Populism, there are still people who align more with first wave, which puts these two groups at odds on certain issues. Figure 1 represents the differences between first and second wave neo-agrarianism and agarin populism.

Figure 1

Key Tenets of Frist and Second Wave Agrarians

Frist Wave Neo-Agrarianism
- Environmental Responsibility
- Organic and Local Agriculture/Food Systems
- Consumer Food Awareness
- More Equality in Agriculture/Food Systems

Frist Wave Agrarian Populism
- Rural Morality and Tradition
- Agricultural Production Efficiency
- Ties with International Businesses

Second Wave Neo-Agrarianism
- Environmental Accountability
- Organic and Local Agriculture/Food Systems
- Empowered Consumers
- Greater Equity in Agriculture/Food Systems

Second Wave Agrarian Populism
- Agricultural Production Efficiency
- Adherence to Conservative Ideals (e.g., Rural Traditions & Morality)
- Skepticism of International Businesses and Government

The impact of these agrarian ideological shifts will be felt by agriculture teachers as more agriculture students and community members identify with second wave neo-agrarians and agrarian populists. This could create a couple of challenges for agriculture teachers. Frist, there will be a growing demand to represent a particular agrarian ideological value sets in their work. The ability for teachers to maintain some level of neutrality will be challenged. The second wave neo-agrarians would name neutrality and maintenance of the status quo as a tool of the oppressor against the oppressed (Bell, 1992), while second wave agrarian populists would claim that neutrality is a tool of political correctness which works to subvert traditional, conservative values (French, 2019).

The shifts in agrarian ideology in such a short amount of time will also lead to more fractured audiences. There will be students and community members ideologically positioned in the first and second wave of either agrarian ideology in the same classroom, meeting, and/or event. Ideas and arguments which might have appealed to followers of a first wave might be less appealing or unappealing for those who identify with the second wave. This situation will place greater strain on agriculture teachers. For example, they will have to prepare for audiences identifying with agrarian populism that could be divided on the issues of free trade, as well as

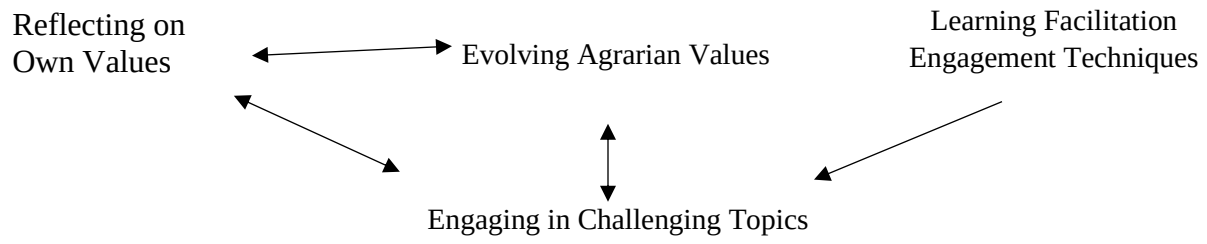
varying degrees of (dis)trust in governmental institutions and international businesses. Conversely, neo-agrarian audiences will likely be more divided on advocating for gradual change to food and agriculture systems versus those wanting more progressive approaches and greater equality.

Agriculture teachers should be prepared to handle these issues which could emerge from the shifting agricultural ideologies. The first and most critical action educators could take is to learn about differing agricultural ideological positions. Furthermore, agricultural educators should then reflect on how those positions and ideas align to their own personal set of agricultural values. We must fight the notion that educators are completely impartial. Many of our students and constituents view this attitude with growing suspicion (Dunn, Sondel, & Baggett, 2018; Sleeter, 2016). They want honesty and expect open-mindedness. We must be able to balance our own beliefs with an open mind. The second suggestion is to prepare agriculture teachers with the tools of facilitation. There are variety of teaching methods which could help educators work through different opinions and help build a community among learners.

Finally, agriculture teacher should not avoid challenging conversations and topics. Agriculture students and community members need to be engaged in difficult conversations. They should strive to develop a lesson or conversation strategy which illuminates an issue from many perspectives. Ideally, these interactions will allow people to make up their own mind on an issue, whether that position aligns to the educator's personal stance or not. We must be able to model the critical thinking we want to instill in our students and constituents through our educational interactions (see Figure 2).

Figure 2

How Agricultural Educators Can Prepare for Working with Differing Agrarian Values



Discussion

This study explored how shifting political and social movements away from neo-liberalism have created second waves of both neo-agrarianism and agrarian populism. The shift to second wave neo-agrarianism is the reconceptualization of liberal agriculture and those associated values. The evolution of first wave agrarian populism to the second wave is also a rejection of neo-liberal ideals, though viewed from a different and counteracting perspective. While it is difficult to precisely identify the number of people who more closely identify with second wave of either agrarian ideology, there are still people who align more closely with first wave, which puts these two groups at odds on certain issues.

The recommendations from this philosophical work suggest that professional development is important. Agriculture teachers need to learn teaching methods for facilitating communication as differences will increase even within groups which might have similar ideological backgrounds. Agriculture teachers should also be encouraged to reflect on their own value sets on a regular basis in order to be able to have meaningful conversations about challenging topics. This reflection process may also require professional development.

The research related recommendations from this study include both theoretical and applied work. Theoretically, more research is needed to explore how these differing agrarian ideologies and their related values manifest in SBAE. For example, research suggests that the FFA has traditions and rituals centered on more conversative agrarian values (Martin & Kitchel, 2013), however, there could be different agrarian ideological positions being represented in the local SBAE program on the whole. We must also examine how these agricultural values sets are related and nuanced. For example, an organic farmer can operate as a large corporation, straddling the lines between neo-agrarianism and agrarian populism. Furthermore, we should explore how agrarian ideologies intersect with other identities in agricultural education (i.e., Cline et al., 2020; Murray et al., 2020; Barajas et al., 2020). Ideally, this research will emerge on a regular basis as we should expect agrarian ideologies to continue to morph over time.

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An Exploration of College of Agriculture Students' Media Literacy

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Introduction

Colleges of agriculture must produce career-ready graduates to meet the needs of the 21st century (Stripling & Ricketts, 2016). Graduates need to possess technical skills related to their discipline in addition to essential skills, including media literacy (National Research Council [NRC], 2012; Media Literacy Now, 2020). The public mostly receives scientific information from mass media channels, but people are skeptical of the media's accuracy due to perceived biases and issues of transparency (Gallup, 2020; Gottfried & Funk, 2017). A lack of media literacy education integrated into American schools has also made it challenging for the general public to differentiate between accurate and inaccurate news (Media Literacy Now, 2020). Students are not consistently learning how to assess the quality of information they receive in the media or how to make decisions based off the information they receive, which can have dangerous impacts on scientific disciplines if the news is inaccurate or misleading (Gallup, 2020; Media Literacy Now, 2020). Additionally, researchers have linked media literacy to critical thinking (Hobbs, 2013) and science literacy (Cooper, 2011), which makes it critical for colleges of agriculture to understand students' current media literacy to identify opportunities for media literacy education. The purpose of this study was to explore college of agriculture students' media literacy, which aligns with priority number three of the national research agenda to produce a "sufficient scientific and professional workforce that addresses the challenges of the 21st century" (Stripling & Ricketts, 2016, p. 29).

Conceptual Framework

The Media Literacy Triangle was used as the framework for this study. Eddie Dick initially developed this framework for the Scottish Media Council, but it has since been adapted by other countries to guide media literacy education (Association for Media Literacy [AML], 2021, Wilson, 2012). The triangle's three sides represent the media's text (values, codes, connotation, etc.), audience (race, culture, gender, etc.), and production (control, ownership, distribution, etc.), which all interact with one another to form meaning behind the media's message.

This study specifically focused on the production side of the Media Literacy Triangle and centered on *news media literacy*, which accounts for how people understand and engage with news media (Maksl et al., 2015). News media were a specific area of interest for this study because increased news media literacy can improve civic engagement and democratic participation (Hobbs, 2010). Additionally, there has been a decline in interest in the news from younger generations of consumers due to increased information options offered on the internet (Mihailidis, 2014; Poindexter, 2012), which could threaten the positive impacts of the news media. Lee (2018) argued that teaching media literacy in the classroom could help students identify fake news in the media. This finding coincides with a report from The Media Insight

Project (2018) that concluded individuals who were exposed to media literacy concepts in educational settings possessed higher trust toward the media. Researchers have found that while media literacy is more often addressed in higher education opposed to K-12, there are few classes dedicated to the area (Schmidt, 2013). To ensure colleges of agriculture are producing graduates with the skills necessary to differentiate between accurate and inaccurate science stories in the media, there is a need to understand students' current media literacy. This information can guide future media literacy education efforts to improve critical thinking and science literacy skills in colleges of agriculture (Cooper, 2011; Hobbs, 2013).

Methods

To fulfill the purpose of this study, a pilot instrument and assignment was distributed to undergraduate students enrolled in an agricultural communications class at the University of Nebraska-Lincoln (UNL) and Oregon State University (OSU) at the beginning of the Fall 2020 term. Both courses were in colleges of agriculture and open to all students. Additionally, these courses were selected due to their ability to pilot a larger curricular effort focused on literacy that aligned with course objectives.

The data reported in this paper comes from the first assignment of the semester in both classes. This *Literacy Reflection* assignment asked students to complete a 33-question, online survey. Sections of the survey focused on media use and trust, media literacy, agricultural literacy, and science literacy. Students were also asked to submit a one-page reflection based on their literacy scores. Only responses to the media literacy questions have been reported in this paper.

UNL and OSU are both land-grant universities. The fall 2020 enrollment for the UNL course was 31 (n = 31) students who were mostly juniors and seniors. All students in the class either majored/minored in agricultural communications or minored in an animal science degree. A total of 75 students were enrolled in both the remote (n = 29) and online (n = 46) sections of the OSU course. Students ranged from freshmen to seniors, and most majored in programs offered by the College of Agriculture Sciences.

Upon receiving IRB approval for this study, all students in both courses completed the Literacy Reflection assignment. Twenty-three students (n = 23) from UNL participated in the study (71.9% participation rate), and 75 (n = 75) from OSU participated (100.0% participation rate), for a total of 98 respondents (n = 98, 92.4% total participation rate). Approximately one-third of the total respondents indicated their family's primary source of income was from agriculture (32.7%, n = 32). The majority of respondents came from rural hometowns (71.4%, n = 70), followed by suburban (16.3%, n = 16) and urban hometowns (12.2%, n = 12).

Media literacy was measured with nine, multiple choice questions that covered media production knowledge (Maksl et al., 2015). Each question had a "Don't Know" option to reduce the probability of correct answers from random answer selection (Burton, 2002). Questions were coded as correct or incorrect, and the number of correct answers were added together to create the scale. The Kuder-Richardson formula (KR20) was used to establish reliability due to the

dichotomous nature of the scale, which was initially .66 (Huck, 2008; Kuder & Richardson, 1937). Removal of one question increased the reliability to .68, and removal of additional items did not increase reliability. While a reliability of .70 is preferred (Field, 2013), Nunnally (1978) has reported a reliability of .50 is acceptable for social science construct reliability, particularly in early stages of development. More discussion about this measurement has been included in the conclusion section for this paper.

All data were analyzed in SPSS, and descriptive statistics have been reported. It should be noted the data for this study were collected at the beginning of fall 2020 and corresponded with media coverage of both the 2020 Presidential election and the COVID-19 pandemic. During this time, there were extreme divergences in media trust across political groups (Jurkowitz et al., 2020) that may have impacted the responses to this study. Because the researchers were also the class instructors, demographic questions like political affiliation, gender, and race were excluded from the study to protect the students' identity. Another limitation to this pilot study is the findings are not generalizable beyond the study respondents, which should be considered when interpreting the results.

Findings

Respondents answered an average 5.12 media literacy questions correctly out of eight (M = 5.12, SD = 1.91). The majority of respondents were able to correctly identify the media's impact on public perception (92.9%, n = 91; Table 1). However, less than half of the respondents could correctly identify the number of companies who controlled the media (45.9%, n = 45) or which media companies did not rely on advertising for financial support (40.8%, n = 40). Only 29.6% (n = 29) were able to correctly identify who would be responsible for writing a press release.

Table 1

Description of Media Literacy

Statement	Correct *%(f)*	Incorrect *%(f)*	Don't Know *%(f)*
If a topic gets a lot of coverage in the news, people who pay attention to the news are: *Answer: More likely to think the topic is important*	92.9 (91)	3.1 (3)	4.1 (4)
People who watch a lot of televisions news often think the world is: *Answer: More violent and dangerous than it actually is.*	85.7 (84)	9.2 (9)	5.1 (5)

Who has the most influence on what gets aired on the local TV news? *Answer: The producer/editor*	81.6 (80)	6.2 (6)	12.2 (12)
One common criticism of the news is that it is not objective. What do people who make that criticism typically mean by it? *Answer: The reporter puts their opinion in the story*	69.4 (68)	21.4(21)	9.2 (9)
Most media outlets in the United States are: *Answer: For profit businesses*	66.3 (65)	10.2 (10)	23.5 (23)
In 1983, around 50 companies owned most of the media outlets Americans consumed. How many companies own most of the media we consume today? *Answer: 5*	45.9 (45)	9.2 (9)	44.9 (42)
Which of the following news outlets does NOT depend primarily on advertising for financial support? *Answer: PBS*	40.8 (40)	16.3 (16)	42.9 (42)
Writing a press release is typically the job of: *Answer: A spokesperson for CocaCola*	29.6 (29)	41.8 (41)	28.6 (28)

Conclusions & Implications

Even though media literacy is not often taught as a singular-focused class in higher education (Schmidt, 2013), the participants in the study did appear to be somewhat knowledgeable about the production side of the Media Literacy Triangle. However, the scale did not have adequate reliability and should be interpreted with caution (Field, 2013). The scale used in this study was originally designed for high school students (Maksl, et al., 2015), so the shift to a population to undergraduate students may have impacted the reliability of the instrument. Responses to individual answers can still provide meaningful insight for media literacy education though, including potential areas of strengths and weaknesses related to undergraduate students' understanding of the media. Participants were able to correctly answer questions about the effects of the media, like how it can impact society, but were not clear in their understanding for how the media operates. This heightened awareness of the impact of media on public perceptions coupled with limited knowledge for how the news is reported may lead to continued skepticism of the media (Gallup, 2020). This skepticism of the media would continue to influence science literacy as people struggle to differentiate between fake and true news (Gallup, 2020). The lack of knowledge related to media production would also affect students' ability to accurately extract

meaning from media messages and limit their ability to engage in civic discourse and critical thinking (Hobbs, 2010, 2013; Wilson, 2012).

Recommendations

Colleges of agriculture should consider the Media Literacy Triangle when developing curriculum to improve media literacy. This pilot study identified a need to increase students' knowledge of media production as a way to improve media literacy. Agricultural communication courses, particularly those serving the college, should integrate assignments teaching about the production of media as well the interpretation of media messages and analysis of the media's audience (AML, 2021; Wilson, 2012). Similarly, agriculture teacher preparation programs should equip future teachers with the knowledge for how to integrate media literacy into their programs. When creating learning activities about media literacy, there should not only be an emphasis on how the media shapes public opinion but how the news media operates as well. Increasing knowledge of the media would potentially facilitate trust in the media and help people to make informed decisions related to science (Media Literacy Now, 2020) and increase students' critical thinking skills (Hobbs, 2013).

Due to the nature of this study using the authors' students, some data were not collected to help protect respondent identity that would provide a more in-depth understanding of media literacy. Examining the effects of gender, race/ethnicity, and political values on media literacy would be valuable to collect in the future. Additionally, the respondents were enrolled in agricultural communications classes that broadly served agricultural colleges, which may have skewed the findings from this study. Future research should also include a wider variety of students to determine how their major or agricultural background would impact media literacy.

Measuring the other sides of the Media Literacy Triangle, including students' analysis of media text and audiences, would also offer more robust implications for media literacy education (AML, 2021; Wilson, 2012). Research could also be done to improve the media literacy measurement to also account for digital media literacy. Because this study served as a pilot, it should also be replicated at other universities to add to the body of knowledge related to college of agriculture students' media literacy.

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An Exploration of Student Trust in the News Media

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Introduction

The news can be viewed as a manufactured product, subject to a variety of influences like news staff, production values, characteristics of the organization, influences of social institutions, and effects of ideology and culture (Shoemaker & Reese, 1996). From the outside, the news media are influenced by players including issue advocates (Nisbet & Huge, 2006), conflicting interest groups (Andsager, 2000), and political elites (Bauer, 1995). Despite its many influences internally, the media cannot function without consumers. When societal problems arise without clear causes, the news media define the issue (Kim & Willis, 2007). The news media communicate to audiences what to think about and how to think (Kim et al., 2002), which can influence public opinion related to agriculture (Ruth et al., 2005).

Regardless of factors involved with the creation and consumption of the news media, one critical element remains – news consumers have limited energy or capacity for consuming news (Chaffee & Schleuder, 1985). As a possible result of this limitation, consumers are driven to consume media based upon uses and gratifications (Katz et al., 1973), and may select media in line with their pre-established or existing views and come to prefer messages consistent with their attitudes (Sears & Freeman, 1967). How one seeks news has impacts on one's understanding of an issue. In turn, how one interacts with and consumes the news is influenced by their levels of trust (Fletcher & Park, 2017).

Conceptual Framework – Media Literacy

Given the multitude of media options, and the varying influences on media consumption, media literacy is needed to make sense of the seemingly endless number of media choices. Media literacy is "the ability to assess, analyze, evaluate and create messages across a variety of contexts," (Livingstone, 2004, p. 18). A goal of media literacy education is "to help recipients of mass communication become active, free participants in the process rather than static, passive, and subservient to the images and values communicated in a one-way flow from media sources," (Brown, 1998, p. 47).

Previous research has indicated an individual's levels of trust or skepticism toward the news media influence the amount of news media exposure. For example, Tsfati and Cappella (2003) found those who were exposed to higher levels of news media had higher levels of trust – greater skepticism was correlated with less news media exposure. However, Maksl (2015) argued that while skepticism may influence exposure, skepticism may be "ill informed – one can be skeptical of news based on faulty assumptions or lack of knowledge about news gathering processes," (p. 32).

News media literacy is key to maintaining journalism as a profession and will help to ensure economic survival by sustaining demand for content news organizations can provide (Maksl et al., 2015). From the consumer perspective, media literacy enables an individual to be informed to engage in democratic activities (Maksl, et al., 2015). An increased appreciation for and consumption of quality journalism is an additional benefit of news media literacy (Hobbs 2010, Mihailidis 2011).

Studies involving media literacy in the discipline agricultural communications are rare. Ruth et al. (2005) argued of the importance to consider the ways in which the news media influences the understandings of issues. Before this effort can be fully achieved, there is need understand the state of individuals' media literacy, specifically how individuals perceive the news media in terms of trust or skepticism.

Purpose and Research Questions

The purpose of this study was to investigate one element of media literacy – trust of the news media. Specifically, this study sought to determine and explain students' perceptions of trust in news media, which supported priority one of the national research agenda (Roberts et al., 2016).

The following research questions guided this study:

RQ1: What were students' perceptions of trust toward the news media?

RQ2: How did students explain feelings of trust or skepticism toward the news media?

Methods

An embedded design was implemented to address the research questions and allows one form of data to support another in a single study (Ary et al., 2018). For this study, "qualitative data can support statistical results by addressing questions that are unanswerable" with other research designs (Ary et al., 2018, p. 522). Data were collected via an activity assigned in two different courses at University of Nebraska-Lincoln (UNL) and Oregon State University (OSU) where students were tasked to complete a survey instrument with quantitative and qualitative components. As part of the survey, students were asked to rate items based upon trust of the news media, and respond to an open-ended question to explain their responses. Quantitative data and qualitative data exploring trust in media were collected in the same instrument administered through Qualtrics. Collecting two forms of data allowed the researchers to obtain a more complete understanding of overall student perspective of media trust.

The population for this study was students enrolled in an agricultural communications course offered at UNL and OSU. The classes were selected for this study given their similar course outcomes and the connection between the course content and the research questions for this study. Participating students from both universities represented a variety of majors, mostly

within the colleges of agriculture. A total of 97 student responses were included for analysis with 23 students from UNL participating and 74 students from OSU. The total course enrollment during the fall academic term for UNL was 31 students and the total enrollment for OSU was 75 students in both remote (n = 29) and online (n = 46) sections. The majority of students from UNL and OSU said they were from rural hometowns (78.3%, 66.3%, respectively). Data for this study were collected in October of 2020 during a time of heavy coverage of the COVID-19 pandemic and the 2020 presidential election. These times were accompanied by substantial divisions in media trust throughout political groups (Jurkowitz et al., 2020), which may have impacted responses in this study. Political affiliation was not solicited in an effort to protect any vulnerable students participating in this study.

News media trust was measured through eight Likert-type items adapted from an instrument developed by Maksl et al. (2015). Reliability for this measure was confirmed via Cronbach's alpha (α = .85). Using a five-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*), students responded to statements pertaining to trust of the news media. At the conclusion of these items, students were asked to respond to the open-ended prompt, "Please explain why you feel trust or skepticism toward the news media." Data were exported to Microsoft Excel where incomplete responses were removed. Quantitative data were exported and analyzed in SPSS v. 27. The qualitative responses were compiled into a Microsoft Word document to establish a permanent record of the data, and to aid in credibility and transferability by providing a safeguard from potential researcher bias (Foster, 2004; Gill et al., 2008; Merriam, 1998). Peer debriefing was implemented to ensure trustworthiness (Creswell & Creswell, 2017). The qualitative data were organized in NVivo Release 1.3.2 data management software and coded by common theme by the researchers (Morse & Richards, 2002). To refine singular codes into higher-level themes present in the data, *in vivo* coding techniques were applied to allow the researchers to develop deeper perspectives or understandings (Saldaña, 2013).

Findings

Research question one determined perceptions of trust toward the news media (Table 1). Analysis of this measure indicated most students had low trust in the news media. An overwhelming 88.7% of participants strongly or somewhat disagreed with the statement "I think the news media tell the whole story" and 85.6% strongly or somewhat agreed with the statement "I think the news media prioritize being first to report a story." Additionally, 72.1% strongly or somewhat disagreed with "I think the news media are fair." \

Table 1

Student Trust Toward the News Media (N = 97)

Statement	Frequency % Strongly / Somewhat Disagree	Frequency % Neither Agree nor Disagree	Frequency % Strongly / Somewhat Agree
I think the news media tell the whole story.	88.7%	10.3%	1.0%
I think the news media are fair.	72.1%	25.8%	2.1%
I trust the news media to report the news fairly.	68.1%	24.7%	7.2%
I think the news media get in the way of society solving its own problems.	65.9%	21.6%	12.3%
I have confidence in the people running the institutions of the press.	65.0%	26.8%	8.2%
I think the news media are accurate.	48.5%	40.2%	11.3%
I don't think the news media can be trusted.	15.5%	43.3%	41.2%
I think the news media prioritize being first to report a story.	3.1%	11.3%	85.6%

The second research question aimed to explain students' feelings of trust or skepticism toward the news media. Participants offered an abundance of perspective to address this research question. Perceptions of bias within the news media appeared to fuel feelings of skepticism. For example, several participants noted sentiment of one-sided reporting. As one participant said, "It seems like the news media always takes a side and is clearly biased to that side so I don't feel like we get the whole story or all of the facts." Other participants noted the impacts of bias said things like, "I am skeptical towards the news media because they are biased towards their own agendas." Suspicions about reporting motives also emerged. For example, one participant

explained, “I think news media has gotten to the point where getting a story out quickly is more important than having completely accurate information, which makes me skeptical.”

Participants also discussed the belief in the news media’s goal to monetize and said, “News media is more for getting subscribers than they are about reporting the truth.” For those who expressed skepticism about the news media, themes of questionable credibility, conflicting news reports, and dramatic reporting also emerged. Few participants expressed explanations of trust. Of those who expressed trust, one theme – fair reporting – emerged. Within this theme, participants discussed belief in upholding journalistic values, careful reporting, and fact checking.

Conclusions and Recommendations

Participants in this study expressed relatively low levels of trust toward the news media. However, a skepticism of the media may not be completely harmful as efforts are taken to create a more media literate society. While one’s level of trust may influence the amount of news exposure they seek (Tsfati & Cappella, 2003), it is important to acknowledge the potential role of false assumptions about the news process (Maksl, 2015). Low levels of trust may not translate to adamancy to avoid the news media.

The finding that participants were skeptical of one-sided reporting and selfish motives of media organizations suggests a potential lack in understanding of media practices that must be addressed. This finding also helps to explain why the vast majority of students indicated they do not believe the news media tells the whole story. Viewed collectively, these findings suggest participants have likely thought critically about the nature of news media organizations and how they operate. This finding is also helpful for agricultural communications faculty who seek to build a curriculum about media literacy. Specifically, efforts to teach students about the nature of the news cycle, framing, and news production may help students to make better sense of how news stories are created, which would allow them to make more informed decisions related agriculture.

Understanding student perceptions of news media trust is just one construct worthy of exploration when it comes to media literacy. As a whole, media literacy offers a variety of potential for future research in agricultural communications. Agricultural communications faculty and staff should replicate this study to reveal any differences between institutions and to further validate the findings presented in this study. Future studies on other constructs associated with media literacy should be conducted to inform curriculum for teaching media literacy skills. By helping agricultural communications students to increase their media literacy skills, there is also potential to increase appreciation for quality journalism (Hobbs, 2010) and help maintain the economic survival of news organizations (Maksl et al., 2015).

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Guiding Preservice Teacher Identity Development through Check-in Meetings

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Introduction and Literature Review

Identity is complex and nuanced. Teacher identity is socially constructed (Buchanan, 2015), associated with roles, actors and cultural scripts (Daneielwicz, 2014), and connected with agency (Zembylas, 2018). Teachers grow to define their identities through various purposes and foundational philosophies. Understanding teacher identity means understanding the intrinsic link between personal and professional lives of teachers and those becoming teachers (Beauchamp & Thomas, 2009). For the teacher candidate, all of these inputs of identity construction are compounded by experiences which can attack their confidence and lower their sense of agency (Zembylas, 2018).

Teacher candidates in Career and Technical Education (CTE) face the additional challenge of preparing to administer a CTE program. In addition to traditional teacher identity development, they face challenges of maintaining technically relevant curriculum, running a classroom and laboratory setting, forming community partnerships, and advising a Career and Technical Student Organization (CTSO) (Phipps et al., 2008). The use of field experience in CTE teacher preparation programs is not new, it allows teacher candidates to engage with current high school CTE program and interact with in-service teachers (Barrick & Garton, 2010; Miller & Wilson, 2010; Retallick & Miller, 2007) and explore what it means to administer a CTE program, an importance aspect of their teacher identity.

Reflection allows us to define and contextualize our beliefs and knowledge; for teachers, this can be thought of as the process of evaluating and re-evaluating what we think and know about teaching and ourselves as teachers (Borg, 2003). Self- and professional development is driven by reflective practice (Maaranen & Stenberg, 2017). However, several studies of teacher candidates highlight a lack of meaningful reflection across teacher education prior to practicums and field experiences (Akbari, 2007; Nelson et al., 2016; Tom, 1997). Nelson and colleagues (2016) found that multiple and varied opportunities to reflect, beyond simple single-post reflection responses and using merely teaching experiences as a catalyst, were beneficial to teacher candidate development. We explored what students would discuss and how they would develop when meeting directly with faculty in one-on-one check-ins.

Purpose and Objectives

The purpose of this study was to explore experiences related to teacher identity development. The central guiding questions were: In what ways does the opportunity to directly

reflect with faculty mentors effect teacher identity development? And what components of their teacher education program did teacher candidates attribute their most growth?

Methods

We utilized a grounded theory approach. A primary goal in grounded theory is to better explain a phenomenon by identifying components and questions about the phenomenon and then categorizing the relationships derived from the research study (Creswell, 2018). This study focuses on teacher candidates, specifically CTE preservice teachers in the agriculture and family and consumer sciences areas, in our teacher education program at a rural, Midwest university. The unit of study is the check-in meeting that we, the researchers and faculty in the program, schedule with teacher candidates to discuss their progress in the program. Check-ins are defined as required meetings for students with the faculty at strategic points in the course. Each faculty member meets with students in all teacher education and several CTE-specific courses two to three times a semester for around 15 minutes to talk through competencies and individual goals and progress. The analysis in the study concerns data collected in the Fall 2019 and Spring 2020 academic semester. This includes data from 66 CTE teacher candidates (n = 66) at sophomore, junior, and senior levels enrolled in a variety of courses across the secondary teacher education program. Participation among teacher candidates was voluntary and did not carry any course extra credit.

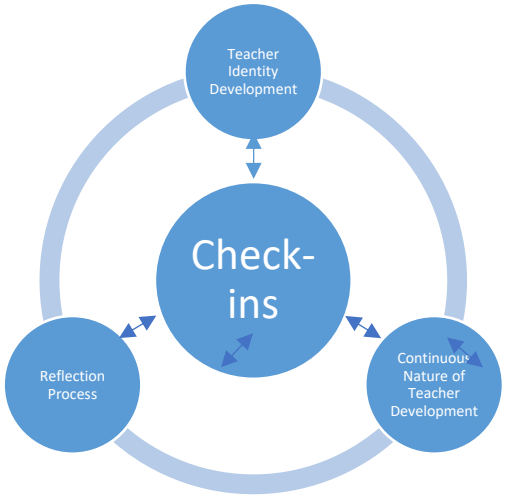
Each researcher took notes of check-in meetings with teacher candidates. We asked specific questions of each candidate and also included additional reflection related to the work we were doing with teacher candidates dependent on our courses. The three questions we commonly asked were 1) Given what you have learned in class, what has most contributed to your growth as a teacher?, and 2) How have the education courses and your field experiences helped you develop as a teacher? Throughout the Fall and Spring semester we took part in a constant comparative analysis during regular meetings to frame our findings as we collected data (Charmaz, 2006). Employing constant comparative analysis in qualitative research comprises a systematic process. For our purposes in this study, we followed a coding system described by Charmaz (2006). We employed open coding, axial coding, and selective coding. See Table 1 for example coding.

Table 1. Research Question 1 Coding Example.

Research Question 1: In what ways does the opportunity to directly reflect with faculty mentors effect teacher identity development in teacher candidates?		
Open Coding	Axial Coding	Selective Coding
Focus on desire for specific strategies of teaching	Verbal reflection and development of teaching style through discourse with faculty mentors	Check-in offers opportunity for reflection on thinking about developing teacher identity
Lack of confidence; teacher voice concerns; personal challenges		
Content value and focus	Focus on the who and how of teaching more than only the what	
Knowing more about students		
Teaching philosophy		

Findings

Three primary themes emerged. The following section dissects each of these themes, but the model below shows the integrated nature of these themes.



Reflection on field experiences and specific teaching strategies lead to the most growth.

Despite the design of the curriculum being focused on a move from broad education topics to specific teaching skills and strategies, students largely gravitated toward the specific skills and strategies of teaching and how they connected with their field experiences. They noted growing in confidence about managing laboratory settings connected with CTE classrooms and CTSO activities connected to the program. Students indicated these field experiences as key to shaping their thinking and development as teachers. From a reflective standpoint, teacher candidates were most likely to speak about practical experiences when situating their learning

from coursework. In this way, specific strategy development and field experiences in classrooms were intrinsically linked for teacher candidates.

The teacher candidates were able to note specific takeaways from the field experiences. Teacher candidates' challenges related to developing their own teaching style, creating relationships, and running a CTE program. Among refrain among the students was to describe what they were seeing and followed by "I know why they do that, but I would . . ." Additionally teacher candidates could apply knowledge of pedagogy and more abstract concepts from courses, but with less confidence. Teacher candidates were asked in check-ins about how they would use certain theories, strategies, or approaches in their imagined future classroom; those with less field experience were less specific and focused more on the content, while teacher candidates with more field experiences focused more on the students being taught. This shift from a focus on content to a focus on students is notable change and one that carries implications for the development of teacher candidate teacher identity.

Becoming a teacher as a continuous process.

Many teacher candidates understood the need for development after leaving the program. Some teacher candidates seemed to view this through the lens of teaching is a continuous professional development process. While all teacher candidates stressed the importance of future professional development to stay up to date on the technical knowledge needed in CTE, the vast majority focused on the importance of improving as a teacher and the need to join CTE teacher organizations to make it happen. Some maintained a view that teaching was a skill that only really began to develop once they got their own classroom, and the experiences in the teacher education program were "jumping through hoops" until they could actually learn to teach. Through the reflective check-in process, these types of ideas came to the surface and faculty could target reflection questions to help candidates understand their current growth and development as teachers.

Check-ins contributed to teacher identity development.

Direct interaction during the check-ins with teacher candidates contributed to notable shifts in thinking about teaching and reflection regarding their teacher identities. Many teacher candidates noted the check-ins themselves were one of the most valuable aspects of their teacher preparation program. The check-in process we employed required teacher candidates to sit down with another person and discuss their current work and development toward becoming a teacher. In this way, a more tailored process of reflection could occur. A regular feature of check-ins were students noting that through discussion their thinking had shifted. Students would regularly say that they "had not thought of it that way" or that something was a good point, followed by being able to talk about how that new idea might fit into their concept of teaching.

Through check-ins, teacher candidates were pushed to note specific takeaways about their learning and experiences. Teacher candidates, particularly those earlier in their program, tended to want to be more general and speak about what other teachers, usually from their high school

CTE program or a neighboring program had done. Being coached through the reflection process regularly in the teacher education program, not just in a student teaching-style setting, led to more time spent developing thinking about who they were as teachers. There is a power in a shift from “teachers should” to “I will” with regard to teacher identity development.

Discussion

It is important to note, qualitative work is not generalizable beyond the study population. However, there are several key elements of this study that may inform practice in other teacher preparation programs. If teacher candidates report limited opportunities to meaningfully reflect on their process in teacher education (Akbari, 2007; Nelson et al., 2016; Tom, 1997), then different strategies must be employed to aid in the development process. We found our teacher candidates thought check-ins provided an opportunity for development through a direct, guided reflection process. Teacher education programs should seek out ways to get students to reflect on their teacher identity development process in direct means. We must move beyond simply relying on reflective essays and discussion board posts which can become a passive form of mimicry. The elements what were successful included direct interaction and clear feedback related to progress and goal setting.

Another area which could carry implications for teacher education programs is the value placed on field experiences and teacher strategies. Other studies have had similar findings (Barrick & Garton, 2010; Danielewicz, 2014; Nelson et al., 2016; Retallick & Miller, 2007, Zembylas, 2018). This means that a tighter connection between theory and practice is continually necessary to help teacher candidates situate course content into their field experiences, which is where they attribute their growth as teachers. Likewise, as specific skills and strategies are presented, they should be tied with research-based theoretical and conceptual frameworks explaining why it works rather than an isolated instances or takeaways.

The check-ins allow individual coaching and tailored feedback to happen. That active discussion allows for growth that is more discernable to both faculty and teacher candidates. Students can articulate that they have changed or gained new thinking in clear, personal terms that either holds up or adapts under the scrutiny of faculty questions. Additionally, teacher candidates become more comfortable with the process of answering questions about their perspectives and choices. Many of them noted how this might serve them in their career, especially when speaking with administrators and colleagues. Future research should be done to determine if or how check-ins impact career-long growth and development.

The findings in this study also carry additional implications for future research directions. More research is needed to specifically explore how teacher candidates construct their concept of teaching and running a CTE program as it relates to research and philosophies they are exposed to in their teacher education programs. Teacher candidates were likely to gravitate more towards the concrete and tangible experiences and strategies than the broad, conceptual processes of teaching. Research could determine what strategies or approaches help teacher candidates to

better bridge the divide in theory and practice to help them see growth in exploring broader, research-based concepts in education.

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Assessing Essential Pre-Service Agricultural Education Dispositions

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Introduction

Dispositions have long been considered an important component of teacher development (American Association for Agricultural Education [AAAE], 2017; Council of Chief State School Officers [CCSSO], 2013; National Council for Accreditation of Teacher Education [NCATE], 2008). Dispositions are the personal qualities an individual possesses, such as attitudes, beliefs, interests, and values. There is a great amount of research that indicates teachers' attitudes, values, and beliefs about teaching strongly impact students' learning and development (Combs, 1974, as cited in Taylor & Wasicsko, 2000).

Prior empirical evidence connects possessing important teaching dispositions to successful teaching careers (Edwards & Edick, 2006). However, there are only a few studies based around agricultural education teachers specifically. Eck et al. (2019) sought to identify the characteristics of effective in-service agricultural education teachers. Some of the important qualities listed include being passionate about agriculture, genuine, and having patience (Eck et al., 2019). Agricultural Education teachers share many similarities with other teachers though there are also distinct differences. Agricultural Education teachers not only have to manage a classroom and laboratory, but they are also expected to supervise work-based learning experiences in the form of Supervised Agricultural Experiences (SAEs) and advise an FFA chapter for the purpose of developing student leaders (Phipps et all., 2008; Talbert et al., 2007). Additionally, Agricultural Education is a type of Career and Technical Education, which further distinguishes it from other content areas. Therefore, it is justified to evaluate teacher dispositions required of agricultural education teachers independently of teachers from other disciplines.

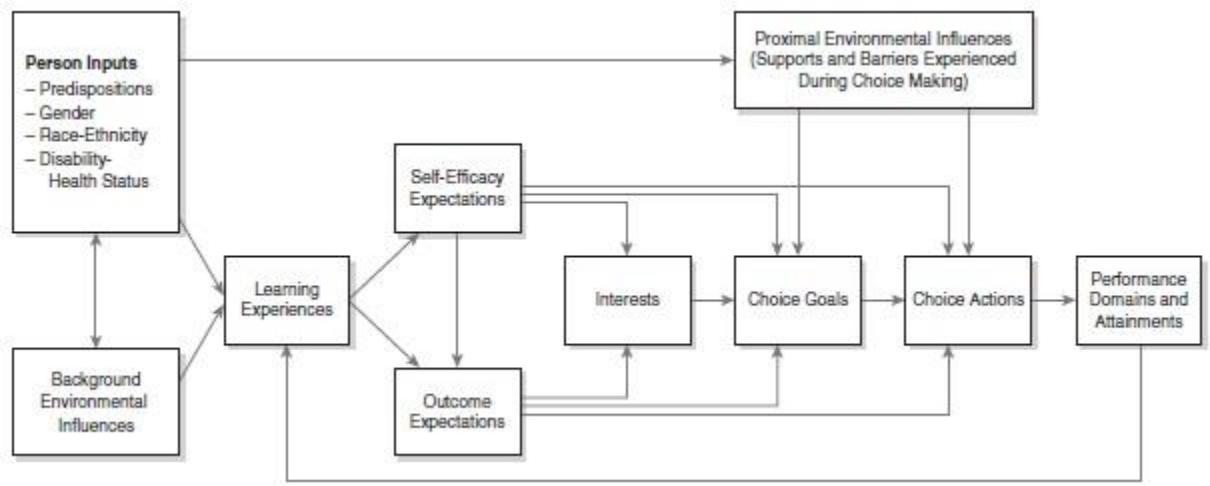
Framework

Social Cognitive Career Theory (Lent et al., 1994) was used as the theoretical framework for this study to assess necessary pre-service agricultural education teacher dispositions (Figure 1). The Social Cognitive Career Theory was developed from Bandura's Social Cognitive Theory (1986).

Because this study is interested in assessing the necessary dispositions of pre-service teachers, it was logical to utilize a theory focused on career-related choice behavior. Dispositions fit within the person inputs of the model. All students bring a different set of predispositions to a teacher-preparation program. As students engage in learning experiences through their teacher preparation coursework, they have the opportunity to further develop those dispositions by connecting them to their future work as a teacher. Hopefully, successful demonstration of necessary dispositions develops positive self-efficacy. In cases where the pre-service teacher may not yet demonstrate the necessary dispositions, those learning experiences offer opportunity for reflection and critical thinking regarding how to move forward on their chosen career path.

Figure 1

Model of personal, contextual, and experiential factors affecting career-related choice behavior



Note. From Lent, Brown, & Hackett, 1994.

Purpose and Objectives/Research Questions

The purpose of this study was to determine the necessary dispositions required of pre-service agricultural education teachers based upon the opinions of current agricultural education teachers, former agricultural education cooperating teachers, and pre-service mentor teachers within agricultural education.

1. Describe current agricultural education teachers' opinions of the importance of pre-service teacher dispositions.
2. Describe former agricultural education cooperating teachers' opinions of the importance of pre-service teacher dispositions.
3. Describe agricultural education pre-service mentor teachers' opinions of the importance of pre-service teacher dispositions.

Methods

This exploratory, descriptive study assessed the importance of pre-service agricultural education teachers' necessary dispositions. The population of interest for this study was current agricultural education teachers in North Dakota. The total population was 108 (*N*). The study employed a one-measurement cross-sectional survey design (Cohen et al., 2011) where secondary teacher subjects completed a questionnaire on Qualtrics to gather pertinent demographic data and acquire their perceptions of the importance of various pre-service teaching dispositions. Data were collected via email using a census of all current agricultural education teachers in the state of North Dakota during the second semester of the 2020-2021 school year. A total of 28 surveys were completed ($N = 28$), achieving a 26% response rate. Questionnaires were checked for errors, outliers, and response set. Two surveys were removed from the data set

for being incomplete, which resulted in a final useable sample of $N = 26$, which accounted for 24% of the population of agricultural education teachers in North Dakota.

Instrument

A list of 47 dispositions was compiled using existing lists and teacher education resources (AAAE, 2017; CCSSO, 2013; NCATE, 2008). The list was assessed for face and content validity by faculty in agricultural teacher education ($n = 2$). Survey participants were then asked to rate the dispositions using a 100-point scale based upon how important they believed it is to possess each disposition by the time a pre-service teacher graduates from college on a scale of 1 to 100, using the descriptors 0 = not important at all and 100 = extremely important.

Additionally, three demographic questions were included to gather information about their current teaching status, whether or not they have served as a cooperating teacher to a student teacher in the past, and whether or not they have hosted a pre-service agricultural education student for field experiences or observations in the past.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software version 27. Descriptive statistics were run to analyze the dependent variables (opinions of the importance of dispositions), including means and standard deviations. The first data set was ran using all respondents to assess the opinions of current teachers ($n = 26$). The second data set was assessed by selecting all teachers who responded yes to having served as a cooperating teacher in the past ($n = 11$). The third data set was analyzed by selecting all teachers who responded yes to having mentored a pre-service teacher during an observation or field experience in the past ($n = 9$).

Description of Respondents

Descriptive statistics were used to analyze demographic information of the respondents. All 28 respondents were current agricultural education teachers. Additional characteristics of the sample are found in Table 1.

Table 1

*Demographic Characteristics of Participating Teachers (*N *= 28)*

Variable	*n*	%
Cooperating Teacher Experience		
Yes	11	39
No	17	61
Pre-service Mentor Experience		
Yes	9	32
No	19	68

Results

Objective 1

Objective one was to describe current teachers' opinions of the importance of pre-service teacher dispositions. Table 2 includes the top 10 dispositions ranked from most important to least important, based upon the opinions of all of the participants in the study who were current agricultural education teachers.

Table 2

*Descriptive Statistics of Teachers' Opinions of the Importance of Pre-service Teacher Dispositions (*N = *28)*

Pre-service Teacher Disposition	*M*	*SD*	Range Min	Range Max
1. Hard worker: willing to put in the time necessary	93.12	9.21	64	100
2. Commitment to student learning: believes all students can learn	92.69	8.19	80	100
3. Receptive to feedback	91.55	10.39	58	100
4. Builds community: makes students feel valued	91.30	12.10	57	100
5. Listens	90.91	9.29	75	100
6. Has appropriate verbal communication skills	90.91	11.98	60	100
7. Relatable	90.62	11.56	57	100
8. Commitment to the profession: dedicated to teaching and learning	90.55	8.90	74	100
9. Builds community: establishes a respectful learning environment for all learners	90.48	12.44	62	100
10. Commitment to the profession: Dedicated to the content (agriculture and agricultural education)	90.36	11.10	55	100

Note. Teachers' Opinions of the Importance of Pre-service Teacher Dispositions was rated on a scale of 1 to 100 with 1 being not at all important and 100 being extremely important.

Objective 2

Objective two was to describe former cooperating teachers' opinions of the importance of pre-service teacher dispositions. Table 3 includes the top 10 dispositions ranked from most important to least important, based upon the opinions of those teachers who mentored at least one student teacher in the past.

Table 3

*Descriptive Statistics of Former Cooperating Teachers' Opinions of the Importance of Pre-service Teacher Dispositions (*N *= 28)*

Pre-service Teacher Disposition	*M*	*SD*	Range Min	Range Max
1. Ethical	97.27	9.05	70	100
2. Hard worker: willing to put in the time necessary	93.55	1.17	64	100
3. Receptive to Feedback	92.73	3.24	58	100
4. Commitment to student learning: believes all students can learn	92.64	8.85	80	100
5. Reliable/responsible	92.36	4.77	51	100
6. Listens	91.64	9.38	77	100
7. Builds community: makes students feel valued	91.11	3.78	57	100
8. Builds community: establishes a respectful learning environment for all learners	90.80	2.04	62	100
9. Commitment to student learning: takes responsibility for student learning	90.27	1.59	71	100
10. Able to work with others	90.00	3.12	62	100

Note. Teachers' Opinions of the Importance of Pre-service Teacher Dispositions was rated on a scale of 1 to 100 with 1 being not at all important and 100 being extremely important.

Objective 3

Objective three was to describe pre-service mentor teachers' opinions of the importance of pre-service teacher dispositions. Table 4 includes the top 10 dispositions ranked from the most important to least important based upon the opinions of teachers who have served as mentors to pre-service teachers during observations or field experiences.

Table 4

*Descriptive Statistics of Pre-service Mentor Teachers' Opinions of the Importance of Pre-service Teacher Dispositions (*N *= 28)*

Pre-service Teacher Disposition	*M*	*SD*	Range Min	Range Max
1. Commitment to the profession: dedicated to teaching and learning	93.38	8.96	74	100
2. Able to work with others	93.00	10.39	72	100
3. Builds community: establishes a respectful learning environment for all learners	92.57	13.93	62	100
4. Hard worker: willing to put in the time necessary	91.78	11.55	64	100
5. Commitment to student learning: believes all students can learn	91.67	8.35	80	100

6. Advocates for their students (communicates their needs)	91.25	12.93	64	100
7. Builds community: makes students feel valued	91.14	15.71	57	100
8. Receptive to feedback	90.88	14.41	58	100
9. Not afraid to ask for help	90.71	7.41	80	100
10. Committed to being a lifelong learner	90.29	15.20	59	100

Note. Teachers' Opinions of the Importance of Pre-service Teacher Dispositions was rated on a scale of 1 to 100 with 1 being not at all important and 100 being extremely important.

Conclusions, Recommendations, and Discussion

Through this study, we were able to determine the most important pre-service agricultural education teacher dispositions based upon the opinions of current agricultural education teachers from the state of North Dakota. Further, the results of the study were broken out to examine the specific opinions of agricultural education teachers who have served as cooperating teachers in the past and those who have served as mentors to pre-service teachers. The results of this study can be used to better prepare pre-service teachers in agricultural education teachers by clearly defining the dispositions required of them by the time they are ready to enter their first teaching position. Additionally, connecting the results to Lent et al., (1994), providing students with the opportunity to utilize the necessary dispositions during placement experiences, internships, and practice teaching has the potential to develop teacher self-efficacy and thus build their commitment to a career in teaching.

Interestingly, there were some noticeable discrepancies in the opinions of pre-service teacher dispositions based upon the groups of teachers. For example, *ethical* was determined to be the most important disposition according to the opinions of former cooperating teachers, but it did not even make the top 10 based upon the opinions of all agricultural education teachers. We assume cooperating teachers have had different experiences, which led them to rate ethical higher than general agricultural education teachers, but the difference in opinion between groups highlights the importance of gathering multiple perspectives before establishing a final list of necessary dispositions.

A limitation of this study was the sample size. For an exploratory study, the results give us a starting point to work from, however, many more participants are needed before the results could be used to make decisions within teacher education with any sense of confidence. Moving forward, we hope to expand this study to include more agricultural education teachers from neighboring states, teacher educators in agricultural education and other content areas, and administrators that oversee agricultural education programs to gather a broader range of perspectives to strengthen the findings.

It is our goal to eventually use the results of this study to construct a new pre-service agricultural education dispositions evaluation at North Dakota State University. Currently, the dispositions are used very little by teacher educators and we would like to see the school move towards consistent evaluation of dispositions by the student, faculty, mentor teachers, and cooperating teachers to create an opportunity for growth and reflection. This means the

dispositions need to be clearly defined so pre-service teachers know what is expected of them. Further, identifying gaps in dispositions early in a pre-service teachers' career could lead to positive interventions earlier on in the program, versus towards the end of their college career. Though the list included in the survey is comprehensive, it is unrealistic to evaluate 47 different dispositions. Ideally, the final list would include a much more manageable number of assessable pre-service dispositions.

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Exploring Identity Development Among Preservice Agriscience Teachers During An Early Field Experience: A Phenomenological Study

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Introduction and Theoretical Lens

A professional teaching identity is the perception that teachers have of themselves in the role of a teacher. Developing a teaching identity requires a continuous and dynamic process of interpretation of learning experiences that are influenced by social interactions and personal, social, and psychological factors (McGuinness, 2011). These experiences begin to accumulate well before a teacher enters the profession. In education, and specifically agriscience education, it is important for teachers entering the profession to have a strong sense of who they are as an educator. Professional educators can make informed decisions regarding curriculum, classroom management, and teacher collaboration when they have developed a teaching identity (Shoulders, 2018).

While literature emphasizes the importance of identity development in teachers, understanding identity and the issues related to it can be a challenging endeavor (Beauchamp & Thomas, 2009). A teaching identity is a product and process that is not fixed, but an ongoing dynamic interaction with teacher development (Chong, 2011); therefore, it becomes a complex phenomenon that changes over time. For preservice teachers, identity development can be a vulnerable process from one experience to the next. Each experience during a preservice program can differ and preservice teachers can struggle to process and make meaning of each experience (Cattley, 2007). Educators, including agriscience educators, are expected to improve their teaching skills and enhance student learning through professional development, yet there is a gap in assisting teachers with developing a professional identity within professional development opportunities (Shoulders & Myers, 2011). The existing gap of identity development among in-service teachers makes it an even more critical need to establish a professional teacher identity in preservice teachers. Understanding identity development in preservice teachers who are in the early stages of their professional career provides teacher preparation programs the opportunity to better support their students as they prepare to enter the teaching profession.

Robert Kegan's (1994) Theory of Evolution of Consciousness is an important framework in understanding the professional development of preservice teachers. According to Kegan, the development process of an individual takes effort in resolving a specific desire for differentiation and immersion in one's surroundings (Evans et. al., 2010). Growth takes place intellectually through an evolution of understanding, or the periodical shifts of an individual's stability and instability as they learn. Kegan purports five prescribed developmental shifts throughout a person's life: 1) impulsive mind, which focuses on reflexes, under age six; 2) instrumental mind, which focuses on impulses, ages seven through adolescence; 3) socialized mind, which focuses on needs, interests, and desires, post-adolescence; 4) self-authoring mind, which focuses on interpersonal relationships, forming an individual identity, and problem-solving, early to mid-

adulthood; and 5) self-transforming mind, which focuses on self-authorship and ideologies, generally over the age of 40.

It is through these shifts in stability that allow the learner to progress cognitively with their intrapersonal and interpersonal experiences, or levels of consciousness (Evans et. al, 2010). Through the lens of Kegan's Theory, it should be noted that the participants of this study were beginning to transition out of Order 3 (Socialized Mind) and into Order 4 (Self-Authorship). During preservice field experiences, specifically an early field experience, preservice teachers are beginning to consciously separate and evolve from their role of "student" to a new role of "teacher" as they begin to develop an identity as a teacher.

Purpose, Objective and Methods

The purpose of this phenomenological, qualitative study was to better understand the development of teacher identity in preservice agriscience teachers during an early field experience (EFE) placement. The objective of this study was to describe trends of identity development in preservice agriscience teachers throughout their EFE placement. This study explored the development of teacher identity among early field experience students in an agriscience education program at The Ohio State University. The population ($N=6$) consisted of students enrolled in an early field experience during the autumn semester of 2020. Participants were considered traditional college-aged students, between 18-20 years old, and enrolled in their second year of their agriscience education licensure program. Two participants were male and four were female. Preservice teachers were placed at an Ohio public school and required to complete 60 hours of observation in a school-based agriculture program. Early field experience is the first substantial field placement for agriscience students, generally occurring during the second year of the program.

This study utilized three sources of data: a) written self-reflections; b) photovoice reflections; and c) a semi-structured exit interview. The three data sources were utilized to not only triangulate data as an attempt to better understand the phenomenon of identity development among preservice agriscience teachers throughout their field experience semester, but to also provide clarity to the researcher on how the participants were shifting from Kegan's Socialized Mind to Kegan's Self-Authoring Mind.

Written reflections submitted after each placement site visit were submitted at inconsistent dates among the participants because of the self-selected pace of the field experience. The photovoice assignments had prescribed due dates. We chose to analyze written reflections as they were dated within identified bands of time. The bounded timeframes aligned with the photovoice submission due dates (Table 1). This allowed us to explore trends of identity development in a sequential manner across the span of the semester.

In phenomenological research there is a common goal of finding meaning behind participants' understanding of experiences (Koro-Ljungberg et al., 2009). To fully understand the participants' development of their professional teacher identity, a paradigm process was used when analyzing the data. A paradigm data analysis provides set questions created by the researcher that aid in identifying relationships between contextual factors from the data (Corbin & Strauss, 2008). Utilizing the paradigm process outlined by Corbin and Strauss (2008), each of

the reflective prompts and interview questions were perspective-based and made applicable to the responses that were recorded by allowing the participants to reflect on their personal experiences and relationships that they formed during their placement.

This process allowed the responses to include "key words" that help with analyzing the data during an axial and open-coding process (Corbin & Strauss, 2008). Axial coding strategies from Corbin and Strauss (2008) were utilized across the three data sources to identify themes/concepts that the participants discussed. During the axial coding process, the written reflections were organized into coding groups that closely aligned with the photovoice reflection turn-in dates from weeks 1, 3, 6, 9, 12, and 15 (Table 1). These processes were used to provide strong validity practices to help identify the "because I experienced this… I felt…" or "when I was in that situation at this time…" phenomena that each of the participants displayed in their reflections.

To ensure trustworthiness of the data, we used triangulation and bracketing. Triangulation was utilized in relying on several data sources. Bracketing is a tool that is commonly used when the researcher has a close belief system or base of prior knowledge in relation to their participants (Chan et al., 2013). Given the proximity of the lead researchers and the research topic, bracketing was used to mitigate subjectivity. My personal biases related to this study include my established career as a high school agriscience educator and my completion of an early field experience at Ohio State during my undergraduate degree.

Table 1

Written Reflection Coding Groups and Dates for Data Analysis

CODING GROUP	DATE RANGE	PHOTOVOICE TURN-IN DATE	NUMBER OF WRITTEN REFLECTIONS CODED
1	Aug 25-28	August 28	5
2	Aug 29-Sept 11	September 11	8
3	Sept 12-Oct 2	October 2	15
4	Oct 3-23	October 23	17
5	Oct 24-Nov 13	November 13	16
6	Nov 14-Dec 4	December 4	9

Findings

The analysis of data identified four primary themes that emerged to address the research objective. The four themes were: 1) A Change of Personal Feelings from Excitement to Anxiousness; 2) Recognizing the Multiple Roles of the Agriscience Educator; 3) Preservice Teacher Adoption of Professional Roles Throughout the Field Experience; and 4) A Perception of a Need for Passion with the Profession.

In summary, theme one reflected that during the first nine weeks of the semester, participants showed excitement toward their engagement in the field experience. Students initially shared excitement of being in the classroom. Participants shared photos and GIFs that portrayed smiley-faced emojis, caterpillars turning into butterflies (signifying growth), and pictures of the class pet (portraying having fun in the classroom). Excitement was also portrayed through responses from the exit interview, where Participant G shared, "I was excited to be in the classroom from beginning to end…". After week nine, participants experienced a shift in their feelings and reported an extensive number of anxiety-themed reflections. Participants submitted photos such as a scared kitten (nervousness to move forward), an emoji with gritted teeth, and a clipart of a head with puzzle pieces (signifying confusion). Participants also showed nervousness and anxiety through their written reflections. Participant B noted, "I feel a lot less prepared about becoming an ag teacher.".

Theme two reflected that throughout the field placement, participants keenly recognized the number of roles that an agriscience educator holds in relation to both the teaching and learning process, and serving as a support system for their students. Participants identified the roles of an agriscience teacher through a shifting lens. When asked to share a photo that communicated their perception on the role of an agriscience educator, participants unanimously showed images that portrayed the hands-on role that an agriscience educator takes on in the classroom, taking place in multiple different learning environments. Photos highlighted planting seeds in a greenhouse, using science equipment in a classroom, harvesting crops in an outdoor garden, and helping a student with a worksheet at their desk. Participant B, shared in their written reflection, "The highlight of my experience today was acting as a judge for the students. I got to see a different, hands-on side of the agriculture educator experience". This reflection highlighted an understanding of the hands-on role that an agriscience educator holds in the classroom. In addition to being active in the classroom, participants were also able to develop an awareness of the support system the teacher provided for their students. Participant G shared that the agriscience educator is often trusted by their students on a different level than compared to the general education teachers through their reflection, "The ag teacher is the go-to over any general education teacher to help students mentally or be that positive figure for them. Potentially even playing the role of a parent." Similarly, Participant A shared, "I learned ag teachers are not only ag teachers. They are the math teacher, the counselor, and the parent at different times."

Theme three reflected a shift in how participants adopted new roles throughout their placement. At the start of the experience, participants adopted the role of "observer" in the classroom. Participants shared several reflections portraying this role by writing, "[Today I] observed a lot of shop projects and some shop maintenance" and "[Today I] observed teaching

lessons, shop projects, and the overall environment of the classroom". Throughout the majority of the semester participants spent an overwhelming amount of their time "observing" in the classroom. As the semester progressed, preservice teachers transitioned into the role of "helper" where they adopted more responsibilities and engagement in the classroom alongside their cooperating educator. Participant D shared a role change that they experienced during the exit interview, "I definitely changed from an observer to a co-collaborator. My educator asked me advice and new ideas since I could relate to the students because of my age". Participant B echoed this feeling by sharing, "Toward the end I became the 'helper' because students felt comfortable coming to me."

The final theme reflected a perception that preservice teachers identified a need for a strong passion for teaching to continue with the preservice program. Participants shared openly about identifying with this passion or not identifying with this passion after their field experience. Participant A felt they had a strong reinforcement throughout the semester in continuing with their choice of majoring in agriscience education. During the exit interview, they shared, "It didn't change my desire but more so reinforced it. I believe this is truly what I want to do." Participant E shared similar feelings by sharing, "My desire didn't change. I am set and where I am meant to be." At the completion of the semester, half of the participants identified a desire to continue the path of becoming an agriscience educator, while the other half identified a desire to change majors; references of having this identified passion was at the core of these conversations. Participant B shared, "My EFE confirmed that I could teach in the classroom, but I could also go into the industry. I'm going to continue to get my license, I'd rather have it and not need it versus the other way around." These feelings were also shared by Participant D who stated, "I was 50/50 on formal classroom or informal Extension. I learned that I really have to want the classroom, so I think I'm more comfortable with Extension." Participant C felt the need to change majors completely. They shared, "I switched my major from Agricultural Communications to Agriscience Education to give it a try. I liked my EFE. But I realized that if I don't want to teach, then I shouldn't continue. I'm switching my major back." The participants recognized a stigma that, to fully adopt the role of being a professional agriscience educator, one needed to obtain a strong desire and "passion" to be successful in the field.

Conclusion and Discussion

This study aimed to better understand the development of a teacher identity in preservice teachers during an early field experience. Using the lens of Kegan's Theory of Evolution of Consciousness, the data supported that preservice teachers were starting to show evidence of shifting between Order 3 (Socialized Mind) and Order 4 (Self-Authoring Mind), where they begin to develop an identity. Through their experiences, participants were able to construct a new reality of this professional role. The excitement of being in the classroom as a preservice teacher at the start of the semester evolved into anxiety as the participants began to recognize the multiple roles of an agriscience educator, recognition of the work of an agriscience educator, and the need for a 'passion' to be successful in the profession.

While more research is warranted to continue understanding identity development in preservice teachers, the results of this study provide insight for how a professional identity

begins to form, specifically during an early field experience. To better prepare preservice teachers for the teaching profession, it is important for teacher preparation programs to recognize the process of developing a teaching identity, have resources available to support preservice teachers during this process, and to develop a stronger support system for these preservice teachers prior to entering the teaching profession. Providing a strategy which encourages the preservice student to engage as "co-collaborator" or "helper" earlier in the experience could expand the preservice teachers' notions of being an active member of the learning community.

Although it was reported that half the participants of this study decided to change majors after completing the field placement, it is important to recognize that one of the objectives of field placement is to help preservice teachers confirm their career choice. While several of the preservice teachers recognized that the agriscience profession was not a good fit for them, it was decided early in their undergraduate program which may have prevented a student from completing the program before recognizing their career goals.

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Expanding Curriculum Development in Higher Education for a Budding Industry: An Analysis of a Cannabis Curriculum Professional Development Event

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Introduction

Cannabis has a long history as a crop produced across the globe for fiber and food. In addition to its industrial uses, cannabis strains containing psychotropic properties from high composition of delta-9 tetrahydrocannabinol (THC), commonly referred to as marijuana, has been consumed for medical and recreational uses for centuries. Despite marijuana's federally illegal status in the U.S., marijuana has become legal at a state-wide level for medical use in 36 states. The production of hemp, varieties of cannabis that contain negligible amounts of THC ($\leq$ 0.3%), became federally legal in the U.S. under the 2018 Farm Bill (USDA, 2019). Annual hemp retail sales in the U.S. alone have surpassed $800 million (Hemp Business Journal, 2018) and there is optimism that hemp can revitalize the agricultural economy (Cherney & Small, 2016). The rapid expansion of the cannabis industry in the U.S. demands a skilled cannabis workforce.

Institutions of higher education, ranging from community colleges to land-grant universities, have begun to create cannabis courses and programs (Campanile, 2021; McDonald, 2020; VOA, 2019). As curricula is developed and implemented across the U.S., professional development (PD) in cannabis education for teachers, curriculum specialist, administrators, and cannabis stakeholders, can strengthen programming and networking in cannabis education.

PD programs designed for faculty and others involved in higher education have been identified as valuable tools to promote effective teaching (DiBenedetoo & Whitwell, 2019). PD programs have the capacity to develop faculty's skills and knowledge in specific teaching contexts, and have been identified as critical to foster quality instruction in post-secondary agricultural education (Myers & Roberts, 2004; Rocca, 2010).

The Cannabis Curriculum Convening (CCC) brought together members of higher education from institutions across the U.S. who were involved in or had interest developing cannabis programming. The event served as a PD event to collaborate on cannabis curriculum development. The inaugural two-day event was held in the spring of 2021 in a virtual format due to COVID-19. The first day of the event included eight one-hour sessions and the second day had three one-hour sessions. This research provides an evaluation of the CCC and identifies future PD needs of cannabis educators.

Conceptual Framework

Desimone (2009) proposed a framework to analyze teacher PD. The framework includes core features of PD that should be considered during design and evaluation. The core features include: *content focus* – the subject matter of the PD; *active learning* – how teachers will be engaged and interact with the content; *coherence* – alignment to existing knowledge, beliefs, and academic standards; *duration* – the length and amount of contact time of the PD; and, *collective participation* – sustained discourse and collaboration among teachers. Shoulders and Myers (2014) extended the framework to guide and examine PD in Agriscience education. Figure 1 illustrates Desimone's framework.

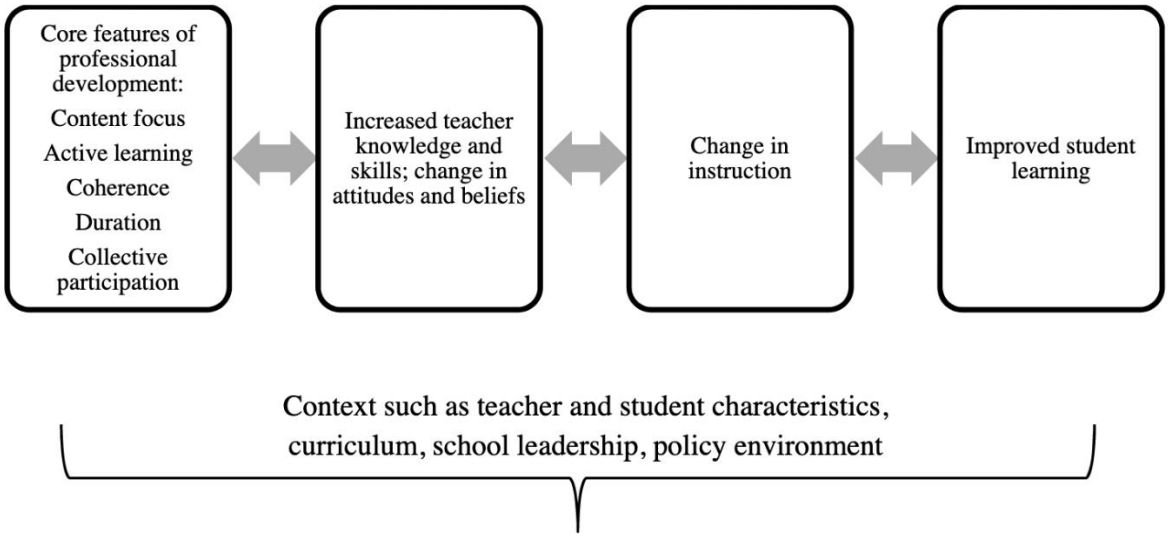

Figure 1. Desimone's (2009) framework for analyzing teacher PD.

Purpose and Research Objectives

The purpose of this research was to examine the impact of the CCC and to identify strategies to strengthen future PD opportunities for cannabis educators. The research objectives that guided this study were:

(1) Determine participants' satisfaction with CCC workshop sessions.
(2) Identify changes in participants' perceived knowledge, importance, and confidence incorporating cannabis education.
(3) Identify PD needs (curriculum development, content knowledge) and the resources used for cannabis pedagogical content knowledge development.

Methods

A total of 146 individuals registered for the CCC and each registrant's name and email address were kept on-file. Each registrant was given zoom links via email to attend sessions. Approximately 90 individuals attended all or portions of the event. Several days after the

workshop, all registrants were sent a follow-up email requesting their participation in a research study to evaluate the event and determine future PD needs in cannabis education.

The follow-up email directed participants to a survey administered through Qualtrics. The survey included an informed consent page and ensured that respondents attended one or more sessions. The survey included two main sections that corresponded with this study's objectives: (1) workshop evaluation and (2) PD needs. Participant demographics (primary occupation, institutional characteristic, education level, gender, race, age, and state) were collected. The Tailored Design survey method (Dillman et al., 2014) was used and included personalized emails and follow-up reminders to non-respondents.

Measuring Satisfaction, Knowledge, Confidence, & Importance

Each participant identified the CCC sessions they attended and indicated their satisfaction of each session through a 5-item Likert scale (*1=extremely dissatisfied* to *5=extremely satisfied*). Six questions measured changes in participants' knowledge level on cannabis curriculum in higher education, confidence to incorporate cannabis instruction in higher education, and perceived importance of cannabis education in higher education. A *post + retrospective pre-test* method (Cantrell, 2010) was used (e.g., before attending this event…, after attending this event…) and statements were measured through 5-item Likert scales (e.g., *1=not knowledgeable at all* to *5=extremely knowledgeable*). Paired samples *t*-tests were used to determine mean differences.

Professional Development Needs

Future PD needs for cannabis education were assessed by two questions asking participants to rank 10 topics from *1=most needed* to *10=least needed*. The first question focused on cannabis curriculum development and the second question focused on content knowledge needs related to cannabis. An additional question asked participants to identify which resources they have used in the past to learn about cannabis and cannabis education. Participants were asked to select all that apply given a list of 11 resources.

Results

Respondent Characteristics

A total of 36 survey responses were recorded indicating a response rate of 40%. Thirty-three participants completed the entire survey, indicating a completion rate of 91.6%. Nearly half of respondents identified as female (n=16, 48.5%) and a majority of respondents held a terminal degree (e.g., Ph.D., J.D.) (n=19, 57.5%). Approximately half of respondents (n=16, 57.5%) identified as a faculty member in higher education, while five indicated an association with higher education (e.g., administrator, instructional designer). Nine respondents (27.3%) were professionals in the cannabis industry. Of identified faculty members, a majority (n=10) were tenured (professor, associate professor) and most faculty (n=14) were actively teaching one or more course related to cannabis. Eight faculty members were employed at a community or junior college.

Objective 1: Participant Satisfaction

Given the format of the workshop, some sessions were more attended than others. Overall, participants were more satisfied than dissatisfied with the sessions. The average mean of responses for each session were within .5 of being *somewhat satisfied* (4.0). Six sessions achieved an average satisfaction rating at or above a 4.0. Respondents were most satisfied with the *science-focused cannabis curriculum* session (*M*=4.33), *importance of social just in cannabis curriculum* (*M=4.20*), and *community college cannabis curriculum* (*M=4.18*). Table 1 illustrates respondents' satisfaction level for sessions attended.

Table 1. Workshop sessions and participant satisfaction.

Session Topics	*n*	*M*[*]	*SD*
Science-focused cannabis curriculum	15	4.33	1.01
Importance of social justice in cannabis curriculum	5	4.20	1.17
Community college cannabis curriculum	11	4.18	1.11
Medical-focused cannabis curriculum	9	4.11	0.87
Opening session: Why cannabis curriculum?	30	4.03	1.28
Discipline assemblage and summary	14	4.00	1.07
Inter-institutional panel	12	3.92	1.26
Hemp-focused cannabis curriculum	11	3.82	1.27
The role of continuing and adult cannabis education	21	3.76	1.27
Law-focused cannabis curriculum	4	3.75	1.09
Cultivation-focused cannabis curriculum	6	3.67	1.60

Note. [*] 1=extremely dissatisfied to 5=extremely satisfied

Objective 2: Changes to Participants' Perceived Knowledge, Confidence, and Importance

Prior to participating in the CCC, participants indicating being somewhat knowledgeable (*M*=3.41) on integrating cannabis curriculum in higher education. After attending the workshop, participants indicated an increase in knowledge (*M*=3.79). The .38 change was statistically significant. Participants' confidence toward integrating cannabis curriculum significantly increased from 3.68 to 4.12. Participants' initially held a high level of importance (*M*=4.12) toward cannabis education, and although this increased to 4.35, the positive change was not significant. Table 2 illustrates participants' perceived knowledge, confidence, and importance incorporating cannabis education before and after attending the workshop.

Table 2. Respondents' (n = 34) self-assessment of pre- and post-knowledge of cannabis education, self-confidence toward integrating cannabis curricula in higher education, and perceived importance of cannabis education

	Pre-assessment		Post-assessment		Paired-Samples t-test	
Construct	*M*	*SD*	*M*	*SD*	*t*	*p-value*
Knowledge	3.41	1.10	3.79	0.98	3.419	.002[*]
Confidence	3.68	1.22	4.12	1.17	2.325	.026[*]
Importance	4.12	1.07	4.35	1.04	1.311	.199

Note. Significance at p<.05

Objective 3: Professional Development Needs & Resources Used

Respondents ranked 10 areas of PD needs related to cannabis curriculum from one, most desired, to ten, least desired. Mean scores for item were compared to determine the largest needs of respondents. Forming cannabis industry partnerships were most desired (*M*=3.91), followed by providing non-formal education (*M*=4.13). The least desired area was working with administrators on cannabis education programs (*M*=7.38). Table 3 illustrates mean scores and rank for each of the ten items.

Table 3. Respondents' (n=32) ranking of PD needs related to cannabis curriculum (1 = most desired to 10 = least desired)

Rank	*Item*	*M*	*S.D.*
1	Forming cannabis industry partnerships	3.91	2.78
2	Providing non-formal education (e.g., workshops)	4.13	2.32
3	Identifying/assessing cannabis program/course learning outcomes	5.09	2.43
4	Designing cannabis certificates or degrees	5.41	3.00
5	Collaborating with other institutions (e.g., cannabis ed. agreements)	5.41	3.15
6	Creating online/remote cannabis education programs/courses	5.56	2.28
7	Incorporating hands-on learning experiences in cannabis instruction	5.66	2.73
8	Forming interdisciplinary cannabis education programs	5.72	2.45
9	Marketing cannabis education programs	6.75	2.80
10	Working with administrators on cannabis education programs	7.38	2.89

Respondents also ranked 10 areas of PD needs related to cannabis content knowledge and mean scores were compared to determine items of most need. Respondents indicated the most need for medical cannabis (*M*=4.00), cannabis history (*M*=4.63), and cannabis regulation, testing, and compliance (*M*=5.07). Least desired content knowledge areas were environmental sustainability and cannabis (*M*=6.83) and cannabis business management (*M*=6.40). Table 4 illustrates mean scores and rank for each of the ten content knowledge items.

Table 4. Respondents' (n=30) ranking of future PD needs (1 = most desired to 10 = least desired)

Rank	*Item*	*M*	*S.D.*
1	Medical cannabis	4.00	2.34
2	Cannabis history	4.63	3.16
3	Cannabis regulation, testing, and compliance	5.07	2.61
4	Cannabis processing	5.37	2.61
5	Cannabis cultivation in controlled environments (e.g., greenhouse)	5.40	2.40
6	Cannabis biology and genetics	5.40	2.84
7	Cannabis and social justice	5.73	3.32
8	Cannabis cultivation in outdoor environments (e.g., field-based)	6.17	2.38
9	Cannabis business management	6.40	3.32
10	Environmental sustainability and cannabis	6.83	2.37

Respondents use of resources for their own continuing education on cannabis were determined by frequencies. Twenty-nine of 32 respondents indicated using website resources to learn more about cannabis. The second most commonly used resource was published journal articles (*n*=23, 71.8%). Over half of respondents indicated using non-formal education and books as cannabis resources. A little over one-third of respondents used magazines, TV (e.g., news/documentaries), and academic organizations. The least used resource were massive open online courses.

Table 5. Frequency of respondents' (n=32) use of resource type for continuing education on cannabis

Resource	*n*	*%*
Websites	29	90.6
Published Journal Articles	23	71.8
Non-Formal Education (e.g., short courses, workshops, seminars)	19	59.4
Books	18	56.3
Friends and Colleagues	15	46.9
Formal Education (credit or certificate bearing courses)	13	40.6
YouTube or online video	13	40.6
Academic Organizations/Societies	12	37.5
TV (e.g., news/documentaries)	11	34.4
Magazines	11	34.4
Massive Open Online Courses (MOOCs)	4	12.5

Conclusions & Recommendations

Cannabis education will play an important role in preparing a workforce for the rapidly advancing cannabis industry in the U.S. Although a wide variety of educational programs will exist, including programs with distinct focus and at varying credential levels, a network of cannabis educators and PD programs are needed to strengthen cannabis education curricula. The illegal period of cannabis in the U.S. created extensive gaps in research, educational resources, and foundational curriculum related to cannabis.

This research provided an initial observation of the impact of PD for cannabis curriculum development. We conclude that providing PD opportunities in cannabis education can be used to increase participants' knowledge and confidence to incorporate cannabis curriculum. As most desired by our research participants, future PD should include topics on forming partnerships with the cannabis industry and providing non-formal cannabis education, among other topics. Highly desired cannabis content knowledge areas include medical cannabis, cannabis history, and cannabis regulation, and these topics should be incorporating into future PD events. There were many limitations to this study, including a small sample size and low response rate. The constructs (e.g., knowledge, confidence, and importance) measured in this study were based on participants' perceptions and were limited to single-item questions in order reduce the overall survey length. Despite this study's limitations, there are tremendous gaps in cannabis education research and this study contributes as a case study on PD for cannabis education.

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Utilizing Lesson Study for Agriculture Instructor Professional Development and Social Support

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Lesson study is a form of teacher professional development designed to improve instructional techniques by collaborating with other teachers to develop and test a lesson, examining its effect on learners. Lesson study is designed for in-person meetings and observation. Agriculture teachers do not have enough teachers in one school to facilitate a lesson study group. This study attempts to determine if lesson study, led in a virtual environment, leads to an increase in knowledge and skills related to instructional practices, attitudes, and beliefs related to instructional practices and an increase in social support for agriculture teachers. Twenty-six agriculture teachers participated in six lesson study groups during the spring 2021 semester. A comparison of pretest and posttest surveys of skills related to instructional practices revealed that teachers perceived fewer skills after lesson study than before. However, the decrease may be due to a response shift bias as teachers realized they did not know as much as they thought about the instructional skills. A social network analysis revealed only one teacher added a teacher from their lesson study group to their list of people they would contact for support of content-related and classroom management issues. Although twelve of the participants specifically mentioned a benefit of lesson study was engaging with teachers from other areas of the state with whom they might not usually interact. The positive comments revealed in open-ended questions lead to the need for more research on the benefits of including virtual lesson study in professional development plans for agriculture teachers.

Introduction

Teacher retention is a well-documented issue impacting both school-based agricultural education specifically and education in general. In 2019, there were not enough agriculture teachers to meet the current demand across the nation (Foster et al., 2019). Therefore, efforts to retain current teachers and improve their job satisfaction are of primary concern.

One successful avenue for increasing job satisfaction and job retention among teachers is participation in professional development opportunities (Allen & Sims, 2017; Brill & McCartney, 2008; Easterly & Myers, 2019). Many studies address the professional development needs of agriculture teachers (Figland et al., 2019; Roberts & Dyer, 2004; Smalley et al., 2019; Smalley & Smith, 2017; Sorensen et al., 2014). More studies could address specific methods of professional development impactful in meeting the needs of school-based agriculture educators.

Lesson study is a form of professional development designed to improve instructional techniques by guiding collaborating teachers to develop a lesson and examine its effect on learners through systematic inquiry (Lewis & Hurd, 2011). Lesson study originated in Japan and has since been introduced to the American educational system and implemented worldwide

(Takahashi & McDougal, 2016). Instead of relying on an external expert for a "one size fits all" approach to professional development, lesson study draws on the existing expertise of the collaborating lesson study teachers to share their knowledge and learn together (Stepanek et al,, 2007). Lesson study allows for relationships to form between participating teachers, often described as a professional learning community (Gutierez, 2015; Lieberman, 2009).

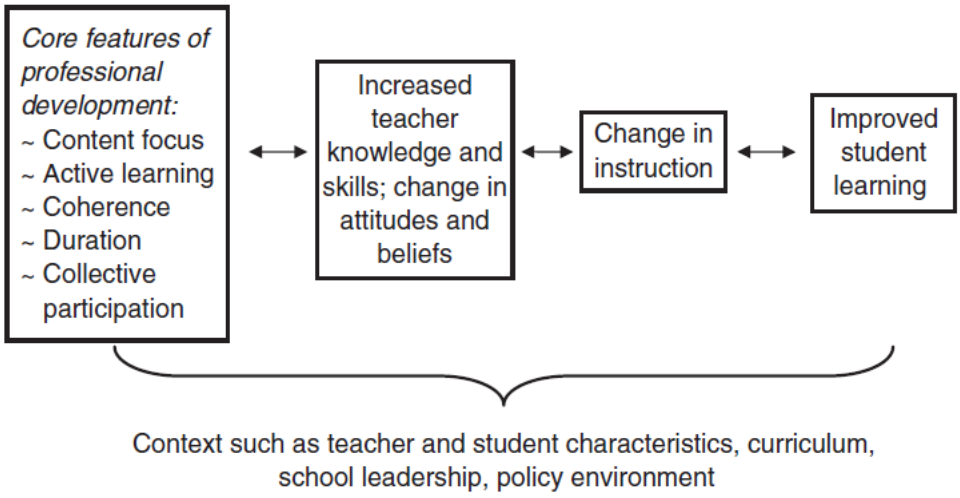
Lewis & Hurd (2011) described lesson study as a specific, replicated process that takes multiple weeks to complete. First, participants select a lesson that can be taught in one class period to focus the work. Participants must also determine the research theme, or the desired outcomes when teaching the lesson (i.e., students increasing knowledge of the topic or showing an increased interest in the lesson). Next, one lesson study participant teaches the lesson, and the group observes, watching for the research theme concepts. After the lesson, the group meets and discusses what they observed. From this discussion, they make changes to the lesson, and another participant teaches the lesson. This cycle continues until all participants have taught the lesson and the group decides they are satisfied with the edited lesson. A final reflection of the process completes the lesson study process.

Many studies have found lesson study to benefit teacher knowledge development, teacher attitude towards professional development, and student outcomes (Huang & Shimizu, 2016; Karlsen, 2019; Xu & Pedder, 2015). Lesson study has also been found to increase social support among teachers (Groth et al., 2020; Stokes, 2020). The current study attempts to measure the results of lesson study professional development modified for a virtual collaboration format, allowing agriculture educators from schools in various parts of the state to participate.

Conceptual Framework

Desimone (2009) created a conceptual framework for studying the impact and quality of professional development among teachers. As shown in Figure 1, the framework links the core concepts of the professional development opportunity to increased participants' knowledge, skills, and attitudes, leading to teachers altering their instruction techniques to improve student learning. The framework identifies five core features of professional development, including (1) content focus, (2) active learning, (3) coherence of teacher beliefs with school policies, (4) duration of professional development training, and (5) collective participation (Desimone, 2009). Lewis and Perry (2017) used Desimone's framework to evaluate lesson study for mathematics teachers teaching fractions, positing that the core features of professional development are included in the lesson study practice.

Figure 1. Desimone's Conceptual Framework for Studying Professional Development



Research Questions

The following research questions guided this research:

1. To what extent does participating in virtual lesson study increase agriculture teachers' knowledge and skills related to instructional practices?
2. To what extent does participating in virtual lesson study increase agriculture teachers' attitudes and beliefs related to instructional practices?
3. To what extent do agriculture teachers report an increase in social support from participating in virtual lesson study?

Methods/Procedures

To pilot the virtual lesson study process, we recruited agriculture teachers from Illinois to participate in one of six lesson study groups. All high school agriculture teachers in this state were sent an email explaining the project and were invited to a virtual meeting explaining the process. Thirty-nine teachers initially expressed interest. Of those, 27 teachers chose to participate. These teachers were divided into one of six topic groups determined by matching teachers with others who reported teaching the same course topic during the test semester, spring of 2021.

Lesson study groups were facilitated by agriculture education consultants employed by the state to assist agriculture teachers with curriculum, materials, and training supports throughout the year. The facilitators were given introductory training on lesson study as well as materials and a process outline to guide their groups through the lesson study process. Each lesson study group was tasked to (1) develop their lesson materials and their research theme, (2) allow each teacher to teach and record the lesson, (3) watch the recording and give feedback to modify the lesson, (4) repeat the teach and feedback process until they were satisfied with the modified lesson. Meetings and recordings were through either Zoom or Google Meets. The groups met first in January 2021 and finished by May 2021. A grant from the Illinois State Board of Education funded $150 Amazon gift cards for each teacher who chose to participate and

followed through with the process. Participants were also offered professional development credit for their time.

Participants completed a pretest before their lesson study experience and a posttest after their lesson study experience, asking participants their perceived competence and confidence in instructional and assessment knowledge related to past lesson study outcomes. Specifically, a 9-item scale of Perceived Teaching Competence with components of pedagogical competence was adapted from research on lesson study with a sample of junior high teachers (Jhang, 2020). The scale had an alpha coefficient of .91 (Jhang, 2020). While the original scale had a 5-point scale, the current study increased the scale to a 9-point distribution to allow participants more room for individual variance in their answers between the pretest and posttest (Lehmann & Hubert, 1972). Next, eleven questions related to teacher confidence in a more specific set of pedagogical constructs were included. This list came from the nine constructs used in the Teacher Self-Evaluation Survey to measure lesson study in a sample of primary and secondary schools (Godfrey et al., 2019). In addition, questions asking the participants their confidence in evaluating their own and their peers' teaching practices were included.

During both the pretest and posttest, participants were asked to complete a social network analysis, asking for the names of the top five people they would turn to for assistance with (1) teaching the content of your classes and (2) classroom management (Wasserman & Faust, 1994). Demographic questions, including gender, age, and years of teaching, were included in the pretest but not the posttest. Participants were asked their names to allow researchers to connect their pretest and posttest answers. Names were removed from the quantitative and qualitative analyses. Lastly, participants were asked open-ended questions about their expectations for lesson study during the pretest and the benefits and challenges of lesson study during the posttest.

Findings/Results

Of the 27 teachers participating in lesson study groups, 26 completed the lesson study process, 25 (93%) completed the pretest survey, and 23 (85%) completed the posttest survey. From the pretest data, 18 (72.0%) identified as female and 7 (28.0%) identified as male. Most participants were under the age of 30 (75%). While 60% of the participants had been teaching three years or less, the sample also included two teachers teaching 29 and 30 years, respectively, and one student teacher collaborating with a cooperating teacher. The majority of the sample held a traditional teaching license (84.0%).

Change in Knowledge and Skills

Results from the pretest survey were compared to results from the posttest survey using paired sample t-tests. The Perceived Teaching Competence scale had a Cronbach's alpha coefficient of .91 on both the pretest and the posttest. However, the scale as a whole did not have a significant mean change between the pretest and the posttest. In fact, the mean score decreased between the pretest and the posttest.

The questions within the Perceived Teaching Competence scale and the questions based on the Teacher Evaluation Survey resulted in a mean decrease between the pretest and the posttest. In general, participants rated their perceptions and confidence in their ability lower at the end of the lesson study experience compared to the beginning of the experience. The reported decrease in skills may result from a response shift bias. The participants used a different frame of reference during the posttest; after learning about and participating in lesson study, they realized how much they did not know about the topics (Howard, 1980).

At the end of the lesson study period, five of the six groups successfully created a lesson plan in a format to share with others, therefore completing the lesson study process. The group that did not complete a lesson reported challenges related to scheduling meetings and COVID-related class requirements that hindered their completion.

Change in Attitude and Beliefs

When asked how likely they were to participate in lesson study in the future, 65% of the teachers said they would participate again, and 30% said they might participate. Only one responded that they would not participate in lesson study in the future. This person stated their primary reason for not participating again was moving out of the state.

All survey respondents listed at least one way that lesson study had impacted their teaching, from the benefit of learning different ways to teach a lesson to learn how to reflect on their teaching to gaining content knowledge. Some comments included:

I am now more open to reflecting on lessons that I have taught and then working to improve them—1st-year teacher.

Understanding that everyone has a different view on how to teach a lesson, what various concepts are, and what is important. Everyone places different values on specific concepts so it helps to understand where each person is, what they feel is important—16-year teacher.

Change in Social Support

To complete the social network analysis, the lists of persons to be contacted for content knowledge or classroom management knowledge were compared between the pretest and posttest answers. The posttest responses were compared against the participants' lesson study group to determine if any members were added to their lists. After participating in lesson study, only one participant added a person from their lesson study group to their list. Two participants listed a lesson study group member on both the pretest and posttest list, revealing they already saw that group member as someone to offer support. While the specific naming of individuals did not show an increase in potential contacts as part of an immediate social network, in the comments about lesson study, 12 participants specifically mentioned a benefit of lesson study was engaging with teachers from other areas of the state with whom they might not usually interact.

Conclusion and Recommendations

The impact of teaching during the COVID pandemic clouded the experience of virtual lesson study for participants. The challenges related to everything happening in a virtual environment and fatigue from virtual meetings created a barrier not present when this project was envisioned before March 2020. Some teachers expressed the desire for an in-person lesson study, which mirrors Stokes et al.'s (2020) findings that an in-person lesson study was more impactful than a virtual lesson study. However, future lesson study opportunities with agriculture teachers in Illinois would likely occur virtually due to the distance between schools and added drive time.

While the teachers who participated in the lesson study pilot expressed positive experiences with the professional development process, this sample chose to participate. It is reasonable to believe that teachers choosing lesson study are also teachers interested in learning new methods of instruction and continually improving their teaching techniques. Teachers that may not have the same attitude towards instructional improvement may feel that the amount of work outweighs the potential benefits. In addition, this study only looked at teacher knowledge and beliefs changes, not Desimone's final two stages of change in instruction and student learning.

Even though pre-posttest comparisons did not show an increase in skills gained from participating in lesson study, the number of participants who said they would be willing to participate in the future and the positivity of the open-ended comments speak to an attitude change in participants that should not be discounted. As a result, lesson study could be added to a more extensive professional development portfolio for agriculture teachers, and meeting needs not always met by traditional professional development speakers and workshops.

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School-Based Agricultural Education Teachers' Self-Efficacy Related to Educational Technology Professional Development

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Introduction and Review of Literature

Technology is continually woven into education as we progress toward a more digitally dependent world. Educational technology (ET) is technology which has been created or adapted for the purposes of teaching and/or learning and requires teachers to use the technology in combination with appropriate pedagogy. In order to prepare students for life in that world, teachers need to use ET in their classroom in an attempt to familiarize students with technology (Schrader, 2016). The pandemic has further emphasized this need. School districts, almost universally, are giving devices to students and expecting teachers to use them as a tool in their curriculum.

There is a gap in ET research conducted in school based agricultural education (SBAE). Forty years have passed since the first article was published in the *Journal of Agricultural Education* regarding the challenges of ET in SBAE and yet, the report of challenges and barriers is unchanged today. From 1989 to 2018, the same obstacles (specifically the price of the technology, a lack of teacher self-efficacy to use the ET, and a lack of professional development specific to the implementation of ET in the classroom) have been found and reported. Researchers posited numerous recommendations for further research on these or related matters, however, there has yet to be a study published which addresses the reoccurring nature of these challenges in integrating ET.

Over the four decades of published research, many researchers' findings detailed a major need for in-service professional development specific to ET as SBAE teachers have both requested and been given ET (Kotrlik, et al., 2000). A teacher's lack of training on how to use ET is an obstacle to proper and effective implementation (Burke, et al., 2018; Cuban, 1986; Cuban, 2001; Dormody & Torres, 2002; Johnson, et al., 2010; Jones, 2017; Koehler & Mishra, 2009; Raven & Welton, 1989). As seen across the literature, the lack of teacher involvement in the planning of technology inclusion has resulted in the downfall of many advances in their time (Cuban, 1986; Cuban, 2001). Nonetheless, policy makers have pushed for the purchase of technology and its integration into the classroom because they see the importance for learning (Cuban, 1986; Cuban, 2001). Yet, the existing problem lies in the lack of teacher education and professional development focusing on technology and its application in that learning (Johnson, et al., 2010).

Supporting this, Raven and Welton (1989) found SBAE teachers did not integrate computers into their classroom due to a lack of computer related in-service and computer-based curriculum. Camp and Sutphin (1991) concluded there were "too few computing and computer-related curriculum materials and guidelines are available for agriculture teachers" (p. 43). Direct and applied instruction on the use of technology in the curricular context seems to offer some answers to these issues. Teachers who complete moderate to high amounts of professional

development specific to ET regularly and more frequently used ET in their classroom and contributes to the frequency and accuracy of student use (Burke et al., 2018; Hastings, 2009).

Simply handing out devices to students and teachers will not result in the effective use of ET among the students and teachers. Given the preponderance of technology associated with agriculture, we lack perspective on what role teacher self-efficacy plays in ET use in the SBAE classroom. Therefore, it is necessary to look deeper into the self-efficacy of SBAE teachers regarding their ability to integrate ET in their classrooms.

Conceptual Framework

Guiding this study is the TPACK framework. The TPACK framework is composed of the relationships between a teacher's technological knowledge, pedagogical knowledge, and content knowledge and each interworking overlap (Mishra & Koehler, 2006; Koehler & Mishra, 2009). Implications for TPACK, as defined by Koehler and Mishra (2009), include the promotion of research in teacher education, teacher professional development, and teachers' use of technology, specifically, technology integration as an additional resource for students and teachers. A major influence for this theoretical framework is teacher self- efficacy. Those with low self- efficacy often see challenging tasks as threats and thus avoid them, while people with high self- efficacy approach such tasks as a potential accomplishment to be mastered (Bandura, 1993).

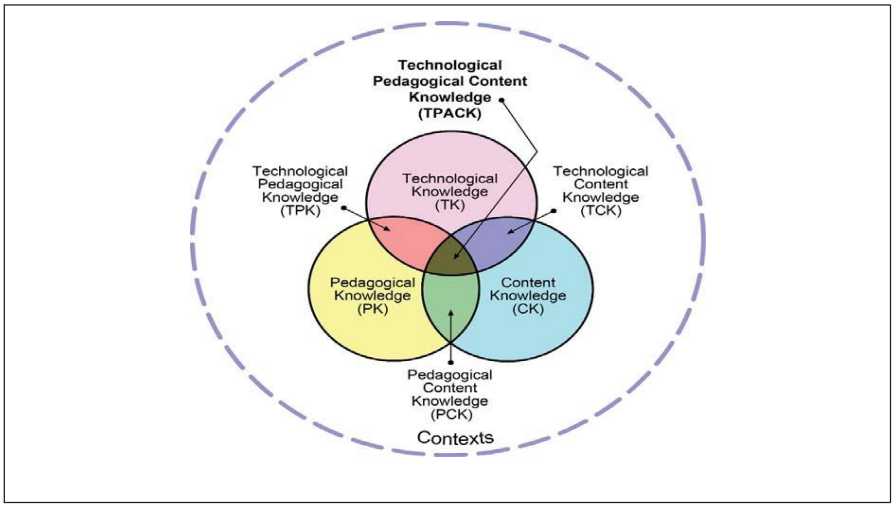

Figure 1. TPACK framework (graphic from http://tpack.org).

Purpose and Objectives

The purpose of this study was to determine the perceived teacher self-efficacy of in-service SBAE instructors regarding the integration of 1:1 ET. The following research objectives guided this study:

1) Describe agricultural educators' programs and access to ET in the selected states.
2) Describe professional development experiences related to ET for agricultural

educators in the selected states.

3) Describe the influence of professional development on teacher self-efficacy and TPACK.

Methods

The target population for this study was in-service agricultural education instructors in four upper-Midwest states (*n* = 752). From the selected states, 120 (*n*) teachers completed the survey from the available sample of 752 in-service teachers, and a total of 16 surveys were excluded from the results of the study due to incompletion or response set yielding a 14% usable response rate. The survey was distributed at the end of a spring semester and early into summer which we believe ultimately contributed to a lower overall response even with three reminder messages. The states included were within a convenient geography to the researchers.

Table 1
In-Service Teacher Demographics

Variable	*n*	%
Gender		
Male	38	36.5
Female	66	63.5
Age		
20-25	14	13.5
26-30	23	22.1
31-40	29	27.9
41-50	20	19.2
51+	18	17.3
Education		
Bachelor's	58	55.8
Master's	46	44.2
Licensure		
Traditional Teacher Prep Program	90	86.5
Graduate Licensure (TLO or Great Plains IDEA)	4	3.8
Alternative Access	6	5.8
PRAXIS Test (or similar licensure test)	4	3.8
Experience		
0	1	1.0
1-5	30	28.8
6-10	23	22.1
11-15	14	13.5
16-20	14	13.5
21+	22	21.2

Instrumentation

The survey instrument used for this research study was a combination of TPACK and the Intrapersonal Technology Integration Scale (ITIS). The TPACK instrument contains 46 items categorized in seven sections, three of which, Technological Content Knowledge, Technological Pedagogical Knowledge, and Pedagogical Content Knowledge were included in this research survey. Schmidt et al., (2009) developed and internally reliable instrument with

alphas ranging from 0.78-0.93 across the TPACK constructs. The ITIS instrument uses a five-point Likert scale for 25 items which are divided into three main categories: self-efficacy, outcome expectations, and interest (Niederhauser & Perkmen, 2008). Niederhauser and Perkman (2008) reported a Cronbach's alpha for internal reliability of 0.96 for the entire ITIS scale. Items combined from demographic items, ITIS, and the sections of TCK, TPK, and PCK from the TPACK instrument create a total of (N) 40 Likert-scale matrix items.

The survey was available via Qualtrics and distributed to the SBAE teachers in the selected states by a link included in the email requesting participation. Descriptive statistics were run to analyze independent and dependent variables, including means and standard deviations. Group means for objective three were analyzed using a one-factor between subjects ANOVA.

Findings

Objective one was to describe agricultural educator's programs and access to ET in the selected states. Most SBAE programs averaged 51-100 students (40.4%, *n* = 42) while the next most common size program is 101-150 students (18.3%, *n* = 19), and 1-50 students (17.3%, *n* = 18) being third most common. The number of students in a high school ranged from 40 to 2500 with the most common high school size being 100-200 students (20.2%, *n* = 21). Access to ET and frequency of use showed some variation. A surprising 76 percent (*n* = 79) of in-service teachers reported being 1:1 in the classroom/ school. Only 2.9 percent (n = 3) reported no access to devices and only one (*n* = 1) teacher utilized BYOD in their classroom. Usage characteristics were: 47.1 percent (*n* = 49) are using the devices daily in instruction and 31.7 percent (*n* = 33) are using them at least three times a week.

In objective two, teachers were asked to report the number of hours of specific professional development they had engaged in the past five years. Teachers indicated a range of one to 50 hours of professional development related to ET with the mean (M) estimate over five years being 19.45 hours (SD = 14.9

Table 2
Teacher Professional Development (PD)

Variable	*n*	%
Where/How PD was obtained		
School Employer	90	86.5
Professional Organization	72	69.2
Other	23	22.1
Most effective PD		
School Employer	36	34.6
Professional Organization	48	46.2
Other	17	16.3
Technology Course in Undergrad		
Yes	41	39.4
No	54	51.9
Yes, in both degrees	9	8.7

	n	M	SD	Range
Hours of PD in the past 5 years	101	19.45	14.92	1-50

Teachers received their professional development related to ET primarily from their school employer (86.5 %, *n* = 90). An 'other' option was included for this item and teacher responses were categorized into nine groups including; College (*n* = 6), Workshops/ Conferences (*n* = 5), and Google/Apple trainings (*n* = 4). When asked why the professional development was effective, 54.6 percent of teachers' (n = 48) responses related to an application to either the agricultural education classroom/ their curriculum or the school-issued device they utilized in their classroom. Other responses included current or relevant, involved collaboration with other teachers, and included some sort of hands-on or experiential learning component. The majority of respondents did not take a teaching with technology related course in their undergraduate or graduate preparation (n = 54).

In Objective three, data was interpreted using an Analysis of Variance (ANOVA) model
for hours of professional development in relation to both teacher self-efficacy (ITIS) and TPACK (PCK, TCK, and TPK). A significant ANOVA model ($p < .05$) was rendered for self-efficacy (ITIS) of in-service SBAE teachers engaging in 11-20 and 21-50 hours of professional development related to ET ($p = .030$, $df = 2, 88$, $F=3.65$). A second significant ANOVA model was rendered for TPK of in-service SBAE teachers engaging in 1-10 and 21-50 hours of professional development ($p = .045$, $df = 2, 94$, $F = 3.20$). No other TPACK variables for in-service teachers contributed significantly ($p < .05$) to the overall ANOVA model. The significant difference came from those in-service teachers who had reported 21-50 hours of professional development (see Table 3).

Table 3
The Impact of Hours of PD on Teacher Self-Efficacy and TPACK

Variable	SS		df	MS	F	Sig. (P)
ITIS	Between Groups	1.994	2	.997	3.655	.030
	Within Groups	24.010	88	.273		
PCK	Between Groups	.058	2	.029	.065	.937
	Within Groups	44.140	98	.450		
TCK	Between Groups	1.772	2	.886	2.671	.074
	Within Groups	32.504	98	.332		
TPK	Between Groups	1.700	2	.850	3.203	.045
	Within Groups	24.952	94	.265		

Conclusions/Recommendations

The outcomes of this research project cannot be generalized beyond the sample. That said, we feel there are some important insights to consider for teacher development across

career stages. The TPACK framework allowed us to parse out the development of teacher understanding with ET. Our findings and population contribute a unique component to the scope of this framework, but supports the necessity for focused contextualized development in each discipline. While it has been assumed that 1:1 has been introduced to most school systems (Herold, 2016), the data show that SBAE teachers are using these devices frequently, some religiously, in their classroom. To that end, it is imperative that a teacher is able to select, use, and troubleshoot ET best suited for their content area (Koehler & Mishra, 2009). In their professional development in the past five years, teachers are participating in about 19 hours, equating to four and five hours a year. Most of that was attained from the school employer, indicating that school officials recognize the importance and need in educating their teachers to use the devices or applications. But, creating content area working groups could help to push teacher's self-efficacy with ET and consequently the educational experience, further.

According to the ANOVA model findings, the more professional development specific to ET a teacher participates in, the more likely the teacher is to build self-efficacy in using ET. This is congruent with previous findings in SBAE (Camp & Sutphin 1991, Kotrlik, et al., 2000), DiBenedetto, et al., 2018). It was also determined that teachers participating in 1 to 10 and 21 to 50 hours of ET professional development were more confident in their abilities to teach using ET (TPK). Indicating that more professional development can influence the likelihood teachers build pedagogical strategies for ET in their curriculum and teaching.

Professional development does not necessarily lead to the development of teacher's TCK or PCK. While it seems logical that professional development specific to ET did not strengthen teachers' understanding of agriculture content (PCK), there is something to be said about the lack of association to TCK. Johnson, et al. (2010) determined the problem lies in a lack of professional development focusing on ET and its application in the classroom. ET professional development should focus on information about the technology being shown and discussed along with how the technology can be used and integrated into the agriculture content (Koehler & Mishra, 2009; Burke, et al., 2018). SBAE teachers are being taught how to implement the device into their classroom, but they are missing instruction about the technology itself and how to apply it to the agriculture content they are teaching. Also lacking is a presence of ET education in preparatory coursework for agricultural education majors. If exposed to ET and taught how to integrate as pre-service teachers, would these in-service teachers hold higher self-efficacy in relation to ET? To partially help accomplish this, teacher educators could include instruction on ET to expose pre-service teachers to ET in hand with content curriculum writing.

Future research could focus on a qualitative analysis of the in-service SBAE teacher self- efficacy in relation to ET. The detailed, in-depth analysis could be the missing piece to answering the lingering questions regarding teacher self-efficacy on ET. A similar mixed methods longitudinal study of SBAE teachers' levels of professional development specific to ET integration could be helpful in identifying more specifically, what should professional development regarding ET include in order to be effective in building teacher self-efficacy?

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Determining the Professional Development Needs of Iowa School-based Agricultural Education Teachers Related to Program Design, Leadership, and SAE Development

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Introduction

Within the past few years, reports have continued to show the shortage of school-based agricultural education (SBAE) teachers in the United States (National Teach Ag. Campaign, 2014; Foster et al., 2016). Research indicated the teacher shortage could increase from 64,000 in 2016 to 112,000 this year (Sutcher et al., 2016). National Teach Ag Campaign (2014), and Foster et al. (2016) recognized agricultural education is suffering as well. Long (2016) reported more than 200,000 teachers leave the profession on an annual basis. Early-staged teacher retention has served as a focus for many years. Findings from Ingersoll (2003) indicated teachers are likely to leave the profession within the first five years, which coincides with findings of previous research in agricultural education (Myers et al., 2005).

Regardless of the teaching career stage, each teacher faces challenges and difficulties. Teachers experience burnout, work and family life balance, and in addition to time management. Each one of these factors contribute to teachers leaving the profession (Boone & Boone, 2009; Chenevey et al., 2008; Clark et al., 2012; Murray et al., 2011; Torres et al., 2009). In support of career attrition, professional development needs of agricultural educators should be addressed. Fessler and Christensen (1992) indicated a teachers' work and personal lives change over their course of their career, therefore, the professional development differs from the beginning of their profession. Garton and Chung (1996) study resulted in the desires in professional development requested by educators was much different than state representatives. Providing curriculum that is challenging and diverse is one of the top needs indicated. In addition, the support of FFA and Supervised Agricultural Experience (SAE) have been identified (Layfield & Dobbins, 2002; Miller & Scheid, 1982). Research suggested the needs of teachers in each state should be evaluated, therefore we have sought to bring light to the needs of current SBAE in the state of Iowa. This sentiment was also expressed in the American Association for Agricultural Education's National Research Agenda, Research Priority Area Five: Efficient and Effective Agricultural Education Programs (Thoron et al., 2016).

Conceptual Framework

Malcom Knowles (1980) theory of andragogy was utilized as the conceptual framework for this study. This theory is defined as "the art and science of helping adults learn" (Knowles, 1980, p. 43). Knowles posed a set of assumptions regarding adult learners which include: 1) as the learner matures their learning is directed, 2) adult learners draw on their own experiences to aid in their learning, 3) they are motivated to learn, 4) they set a cooperative climate for learning, 5) they assess the needs of the learners, 6) development of learning objectives are based on the learners interests and skills sets, 7) activities are designed in a sequence in order to achieve the objectives, 8) learning is done in a collaborative way with other learners, and 9) the quality of the learning experience is evaluated (Knowles, 1980).

Purpose and Objectives

The purpose of this study was to evaluate the professional development needs of SBAE teachers in the state of Iowa. More specifically, this study sought to determine the program development, leadership and SAE development needs of Iowa SBAE teachers, which aligned with the need areas predicated by the Iowa Governor's Council. The following two research objectives guided this inquiry:

1. Determine the professional development needs of SBAE teachers associated with program design and management.
2. Determine SBAE teachers' professional development needs regarding leadership and SAE development.

Methods

Population

A census was attempted on Iowa SBAE teachers (n = 263). A total of 147 (96.1%) responded to the instrument, yielding a response rate of 55.89%. The average age of the SBAE teachers involved in this study was 37.45 (SD = 12.19) and the teachers reported an average of 13.32 (SD = 11.79) years of teaching experience. The reported biological sex of the respondents (n = 145) was almost an even split between males (n = 66, 45.5%) and females (n = 79, 54.5%). In regard to the teachers' highest educational degree attainment, 92 (62.6%) teachers indicated they had earned a bachelor's degree and 55 (37.4%) reported earning a master's degree. The teachers reported having an average of 94.33 (SD = 59.11) unduplicated students in their SBAE program.

Instrumentation

The survey instrument was comprised of 32 items. Twenty-five of the items were needs assessment items which ascertained the SBAE teachers' perceived importance of and knowledge associated with agricultural education topics related to program design and management (12 items) and leadership and SAE development (13 items). A pair of five-Point Likert-type scales were used to operationalize the teachers' perceived importance. The instrument also contained seven items, which sought to determine the demographic and background characteristics of the Iowa SBAE teachers.

Data Collection and Analysis

Upon the attainment of IRB approval, the SBAE teachers were sent a recruitment email asking for their participation in the needs assessment study. The instrument distribution schedule was guided by recommendations by Dillman et al., (2009) and Yun and Trumbo (2000). All demographic and background information was analyzed using IBM's Statistical Package for Social Sciences (SPSS©), version 25. The Excel-Based Mean Weighted Discrepancy Score Calculator (McKim & Saucier, 2011) was used to calculate the mean weighted discrepancy scores (MWDS) for the 25 needs assessment items. Based on the calculated Cronbach's alpha coefficients (Importance α = .94; Knowledge α = .95) the instrument was determined to have met the tolerable threshold of reliability (Ary et al., 2010).

Findings

The first research objective sought to determine the professional development needs of Iowa SBAE teachers associated with program design and management. The SBAE teachers perceived to have some level of professional development needs for 11 of the 12 topics related to program design and management (see Table 1).

Table 1
Agricultural Education Training Priority Areas for Professional Development Related to program design and management as Perceived by SBAE Teachers.

			Rank	
Item	*n*	MWDS	Category	(Overall)
Ability to use the local advisory committee to acquire resources.	148	4.24	1	(3)
Evaluating the local program with National Quality Program Standards (NQPS).	152	4.08	2	(5)
Repairing and maintaining laboratory equipment.	152	3.97	3	(6)
Developing an effective public relations program.	151	3.81	4	(8)
Utilizing an advisory committee to promote the local agricultural program.	152	3.78	5	(9)
Organizing a local alumni/agricultural booster program.	151	3.73	6	(10)
Coordinating activities with local agricultural organizations/agencies.	149	3.08	7	(16)
Establishing a program advisory committee.	153	2.59	8	(18)
Developing relations with fellow teachers and administrators.	150	2.32	9	(20)
Organizing fund raising activities for the local FFA chapter.	150	1.98	10	(21)
Completing annual FFA report.	151	1.45	11	(23)
Planning banquets.	151	-0.11	12	(25)

Note. MWDS = Mean Weighted Discrepancy Score. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*. *Knowledge* Scale: 1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*.

The top-ranking needs of the Iowa SBAE teachers associated with program design and management were the "ability to use the local advisory committee to acquire resources" (MWDS = 4.24), "evaluating the local program with NQPS" (MWDS = 4.08), and "repairing and maintaining laboratory equipment" (MWDS = 3.97).

The second research objective was to determine Iowa SBAE teachers' professional development needs associated with leadership and SAE development. In contrast to the program design and management category, all items related to leadership and SAE development were reported to represent areas of need (see Table 2).

Table 2
Professional Development Needs as Perceived by Iowa SBAE Teachers Related to Leadership and SAE Development, Using the Borich Needs Assessment Model

			Rank	
Item	*n*	MWDS	Category	(Overall)
Teaching record keeping skills.	145	4.50	1	(1)
Developing Research SAE opportunities for students.	144	4.30	2	(2)
Developing School-Based Enterprise SAE opportunities for students.	145	4.22	3	(4)
Developing Service Learning SAE opportunities for students.	145	3.83	4	(7)
Preparing proficiency award applications.	145	3.55	5	(11)
Supervising students' SAE programs.	146	3.48	6	(12)
Developing Ownership/Entrepreneurship SAE opportunities for students.	143	3.40	7	(13)
Preparing students for Career Development Events (CDE).	144	3.23	8	(14)
Developing Placement/Internship SAE opportunities for students.	144	3.09	9	(15)
Preparing students for Leadership Development Events (LDE).	145	2.96	10	(17)
Preparing FFA degree applications.	145	2.43	11	(19)
Conducting local FFA chapter activities.	145	1.79	12	(22)
Planning and conducting student overnight trips (National Convention).	145	0.71	13	(24)

Note. MWDS = Mean Weighted Discrepancy Score. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*. *Knowledge* Scale: 1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*.

The SBAE teachers indicated the highest perceived levels of professional development needs with "Teaching record keeping skills" (MWDS = 4.50), "Developing Research SAE opportunities for students" (MWDS = 4.30), and "developing School-Based Enterprise SAE opportunities for students" (MWDS = 4.22).

Conclusions, Implications, and Recommendations

Comparing the overall perceived level professional development needs by category, the indication of training needs were fairly consistent amongst the categories (program planning and management and leadership and SAE development). The average MWDS for the program planning and management category was 3.19 and the average MWDS for items in the leadership and SAE development category was 2.91—representing a 0.28 difference in average MWDS. The higher MWDS score in the areas of planning and management indicate the teachers viewed these topics to be larger areas of need in regard to PD. Furthermore, the Iowa SBAE teachers indicated some level of professional development needs for 24 of the 25 needs assessment items presented on the instrument. Based on the tenets of Andragogy (Knowles, 1980), these areas of expressed needs serve as an important indication of the adult learners' desires to receive further PD on these topics. As self-directed learners, this needs assessment served as a valuable metric to determine the learning needs of the teachers. The results from this study can also serve as resource to teacher educators working in Agricultural Education teacher certification programs. An implication can be made that the training needs of the in-service teachers could provide insight on the training needs of preservice teachers. These results should be viewed with caution as they cannot be generalized to the entire population of teachers.

Teachers felt they needed more training associated to program planning and management. One area pertaining to program planning and management which teachers expressed professional development needs was establishing and working with advisory councils. This is consistent with previous research as it has been found new and beginning teachers struggle with being able to utilize their advisory committee effectively (Myers et al., 2005). The Iowa SBAE teachers indicated a strong need for professional development related to SAE development and supervision, with associated MWDS ranging from 3.09 to 4.30 for these items. Based on the similar findings expressed in previous research (Wilson & Moore, 2007; Wolf, 2011), the Iowa SBAE teachers' perceived needs associated with this area is not an anomaly. Teachers should use the SAE For All (National Council for Agricultural Education, 2017) guide as a resource for developing and advising students on SAE projects. The guides created are specific to the teacher and student which will aid each individual through their SAE projects (National Council for Agricultural Education, 2017).

Record keeping was perceived to be an area of professional development need and has been listed as an area of training needs for SBAE teachers (Layfield & Dobbins, 2002; Wilson & Moore, 2007). Agricultural educators also had a strong need for assistance with preparing their students for Career Development Events and Leadership Development Events. This need is consistent with previous research (Ball et al., 2016; King et al., 2013; Washburn et al, 2001). Some agricultural educators are preparing their students for CDEs by using the Internet as a resource, volunteers to assist with coaching, and addressing students specific learning styles (Ball et al., 2016; Harris 2008). Professional development opportunities regarding Internet resources and how to get volunteers involved would be beneficial to all teachers.

Future research should be conducted on preparation needs of specific CDE and LDEs. Understanding which event agricultural educators struggle with the most will allow for specific professional development opportunities. Professional development opportunities regarding CDE and LDEs should take place during Iowa Agriculture Teacher's Conference to impact the most teachers. Future research should be conducted about the benefits of teachers utilizing the SAE guide for all.

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Availability and Use of Agricultural Laboratories in Indiana SBAE Programs

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Introduction

School-Based Agriculture Education (SBAE) utilizes a three-pronged approach to instruction consisting of classroom and laboratory instruction, engagement in leadership education through membership in the National FFA Organization, and experiential learning through maintenance of a Supervised Agricultural Experience (SAE) program (Talbert et al., 2014). One of the hallmark experiences in SBAE includes "learning to do" through hands-on instruction, which typically occurs during laboratory-based instruction. Career and Technical Education, previously known as vocational education, has evolved from a chiefly preparing students for specific jobs, to preparing students to "be college- and career-ready by providing core academic skills, employability skills, and technical, job-specific skills" (ACTE, 2019). To build these academic, employability, and technical agriculture skills, SBAE teachers use a variety of instructional spaces for laboratory-based instruction. Availability of laboratory teaching spaces can vary based on location and school program, as agricultural education often is shaped to meet the needs of the local community. Prior research has found that the majority of available agricultural teaching laboratories include agricultural mechanics facilities and greenhouses (Shoulders & Myers, 2012), and that while the focus of SBAE may have evolved over time, program teaching facilities have remained somewhat static (Twenter & Edwards, 2017).

As faculty at Purdue University prepared to offer a new course in Laboratory Teaching Practices in Agricultural Education for preservice SBAE teachers, it was necessary to take inventory of the availability of agricultural teaching laboratory spaces in Indiana SBAE programs. Identifying the current status of the teaching landscape ensures that the content and skills emphasized in the course will align with the needs of the agricultural education profession in Indiana.

Theoretical/Conceptual Framework

To appropriately align the new Laboratory Teaching Practices course with present needs of the Indiana Agricultural Education workforce, it was necessary to first identify desired learning outcomes, following a backwards design curricular model (Wiggins & McTighe, 2005). To develop these learning outcomes, we first needed to determine the current status of teaching laboratory spaces in Indiana Agricultural Education programs. To do so, we conducted a needs assessment aligned with the Lee Educational Needs Assessment Model (1973). In this model, Lee described educational needs as being the difference between the desired learning outcomes and current accomplishments of a program (see Figure 1).

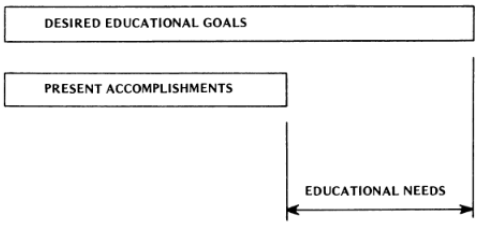

Figure 1. Basic educational needs assessment model (Lee, 1973).

To further structure this basic model, Lee described three major phases: 1) Identify desired results, 2) Assess how well students are achieving the desired results, and 3) Begin problem-solving to address gap in performance. To be able to establish our desired educational goals for the Laboratory Teaching Practices course, we needed to first determine what is presently happening in the field.

Purpose and Hypotheses

The purpose of this study was to explore the availability of agricultural teaching laboratory spaces in Indiana SBAE programs. Based on prior research (Shoulders & Myers, 2012) on national data sets, we hypothesized that Indiana SBAE programs would predominantly have access to Agricultural Mechanics Facilities and/or Greenhouses.

Objectives

This study was guided by the following objectives:

1. Identify courses currently taught by Indiana SBAE teachers.
2. Describe agricultural laboratory teaching spaces regularly used by Indiana SBAE teachers.
3. Identify agricultural laboratory teaching spaces desired by Indiana SBAE teachers.

Methods/Procedures

This study used a non-experimental descriptive survey design to identify agricultural laboratory teaching spaces available to Indiana SBAE teachers. Data reported in the current study are part of a larger research project exploring how Indiana SBAE teachers utilize laboratory teaching spaces. All Indiana SBAE teachers for the spring 2021 semester were considered as the population of this study (N = 316). Contact information for all Indiana SBAE teachers was obtained from the Indiana Agricultural Education email Listserv, which is maintained by Purdue University faculty. The survey instrument consisted of four sections: 1) Classes Taught, 2) Laboratory Spaces, 3) Supports and Barriers, and 4) Demographics. This manuscript focuses on data derived from sections 1, 2, and 4.

The survey instrument was pilot tested in February 2021 among 14 student teachers at Purdue University. Current student teachers were selected as the pilot test group based on their proximity to the profession, being currently situated within SBAE programs across Indiana. This pilot group was not eligible to complete the actual survey, as they were not employed as Indiana SBAE teachers during the spring 2021 semester. Results of the pilot test suggested that the survey constructs were reliable with Cronbach's alpha ranging from .88 to .90.

Survey responses were collected via an email-based survey utilizing Dillman's (2014) Tailored Design Method. Participants received individualized emails inviting them to participate in the survey instead of a generalized message broadcast on the statewide Ag Ed listserv. A prenotice email was sent on March 8, 2021, followed by an initial survey invitation email on March 10, 2021. Reminder emails were sent out one week later on March 17, and two weeks later on March 24. Participation in the survey was incentivized through the use of an opt-in at-random drawing for up to five participants to have the cost of their individual conference registration paid for the statewide summer Ag teacher conference. All email invitations were sent using Qualtrics® software using a Purdue University faculty member's email. Official departmental logos were used as letterhead on the emails to increase participant trust.

Findings/Results

For the purposes of data analysis for this study, a completed response was one in which 80% of the survey had been completed. One hundred six participants consented to participate in the study. After removing responses that had completed anywhere between 5% and 78% of the study, there were 79 usable completed responses for a final response rate of 25%. Frequencies and descriptive statistics were run using SPSS© version 24.

Objectives 1 and 2

Respondents identified which of the state-approved courses they regularly taught in their programs. Using the list of agricultural teaching laboratory spaces identified by Shoulders and Myers (2012), Indiana SBAE teachers indicated which facilities were regularly accessible to them in their programs. Table 1 shows the courses regularly taught by respondents compared to the facilities they regularly can access.

Table 1. Courses Regularly Taught versus Regularly Accessible Laboratory Teaching Facilities (n = 79)

Course Taught	% of respondents who regularly teach this course	Laboratory Teaching Facility	% of respondents who regularly access this type of facility
Animal Science	78.5	Ag Mechanics Shop	64.6
Intro to AFNR	78.5	Greenhouse	60.8
Agribusiness Management	58.2	Test Plot/ Field Crops	35.4
ALS Animals	54.4	Landscaping Area	27.8
Ag Power	51.9	Aquaculture Tank/Pond	26.6
Horticulture Science	38.0	Food Science	25.3
Plant and Soil Science	35.4	Garden	22.8
Middle School Exploring Agriculture	32.9	Forestry Plot	15.2
Food Science	32.9	Other*	13.9
Landscape Management	30.4	Small Animal/Veterinary Laboratory	13.9
Natural Resources	25.3	Biotechnology/Science Laboratory	8.9
ALS Plant and Soils	16.5	Livestock/Equine Facility	8.9
ALS Foods	15.2	Turf Grass Management Area	3.8
Sustainable Energy Alternatives	6.3	Nursery/Small Orchard/Grove	1.3
Landscape Management II	0	Apiary	0
		Vineyard	0

*Other facilities noted by participants included Family and Consumer Science classrooms, head houses, nature trails, shop space with no equipment or tables, and “other lab space.”

Objective 3

To analyze objective 3, respondents selected from the same list of facilities derived from Shoulders and Myers (2012). Respondents were asked to identify facilities that they did not currently have access to, but would like to see added to their program. Results of this question can be seen in Table 2, listed in order of the percentage of respondents desiring these facilities.

Table 2. Frequency of Desired Laboratory Teaching Facilities (n = 79)

Facility	% of Respondents Desiring this Facility
Livestock/Equine Facility	40.5
Food Science Laboratory	35.4
Small Animal/Veterinary Laboratory	34.2
Greenhouse	25.3
Garden	25.3
Aquaculture Tank/Pond	20.3
Meats Laboratory	19.0
Landscaping Area	19.0
Biotechnology/Science Lab	16.5
Nursery/Orchard/Grove	16.5
Apiary	13.9
Test Plot/Field Crops	13.9
Forestry Plot	11.4
Vineyard	8.9
Turf Management Area	7.6
Ag Mechanics Shop	7.6

Conclusions & Recommendations

According to the results of this survey, the top five courses most regularly taught by participants included Animal Science; Introduction to Agriculture, Food, and Natural Resources; Agribusiness Management; Advanced Life Sciences: Animals; and Agriculture Power, Structure, and Technology. This is unsurprising given typical student interest in Animal Science, the state Career and Technical Education funding structure, and new Next Level Programs of Study requirements. Programs enrolling students in ALS Animals, Animal Science, and Agribusiness Management are all deemed to be moderate value courses based on workforce projection needs, so schools are awarded $400 per student enrolled. Ag Power courses earn schools $680 per student enrolled as it is deemed to be a high value workforce area (Indiana Workforce Development, 2020).

The top five most regularly accessible laboratory teaching spaces for Indiana SBAE teachers included 1) Ag Mechanics Shop Facility, 2) Greenhouse, 3) Test Plot/Field Crops, 4) Landscaping Area, and 5) Aquaculture Tank/Pond. It appears that the majority of respondents in this study work at programs which have Ag Mechanics facilities (64.6%) or Greenhouses (60.8%) supporting previous work by Shoulders and Myers (2012) and Twenter and Edwards (2017). As Twenter and Edwards (2017) noted, facilities such as these reflected the historical roots of vocational agriculture programs but may need to be updated to meet the needs of future agricultural education efforts. It is interesting to note that although the top two courses taught by a majority (78.5%) of

respondents (Animal Science and Intro to AFNR), that animal science related facilities were not readily accessible to participants.

When asked to articulate which facilities would be desirable to add to existing program infrastructure, participants responses reflected this discrepancy, with 40.5% of respondents desiring to add an equine or livestock facility, and 34.2% requesting a small animal or veterinary facility. Other highly desirable facilities included a food science laboratory (35.4%), a greenhouse (25.3%), garden (25.3%), and aquaculture tank/pond (20.3%).

Based on the results of this survey, it will be necessary for Purdue Agricultural Education faculty to design instructional experiences for preservice teachers that prepares them to meet the instructional and management needs of existing Ag Mechanics and Greenhouse facilities. They will also need to focus on how to incorporate how to teach in hands-on ways without necessarily having access to animal facilities. Continued research on how inservice agriculture teachers are able to navigate these pedagogical and programmatic demands will be necessary to conceptualize how SBAE can continue to provide contextualized learning that meets the needs of the local community, while also preparing students to enter the 21st century workforce.

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

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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" (Myers et al., 2005, 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 preparation/maintenance and 7% on CDE preparation (Torres et al., 2008). If time represents teachers' priorities, teachers in this 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 spend the least amount of their time supporting SAEs.

Purpose & Objectives

This research sought to understand the experiences of beginning agricultural education teachers in Kansas related to SAEs. The research objectives were 1) to understand the successes and 2) to understand the challenges beginning agriculture teachers face when supporting 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." 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) require 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 incorporated 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 part 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. Everyone 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, and the demographics 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 including SAE experiences. After the protocol and questions were established, IRB approval and a pilot study followed.

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.

Each of the three years 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.

Data Analysis

Data analysis was guided by grounded theory using the constant comparative method (Glaser & Strauss, 1967). The constant comparative technique was used to analyze the data by employing multiple rounds of coding including open, axial, and selective coding (Creswell, 2018). During data analysis, the researcher allowed themes to emerge from the data.

NVivo 12 was utilized to provide organization and structure to the coding process completed by the researcher. Reflexive exercises were utilized extensively through the study including reflective journaling during and after the interviews and during the coding process by creating an audit trail to document the thinking process the researcher utilized to make organization decisions (Creswell, 2018). A researcher subjectivity statement positioned the researcher for data analysis as a former high school teacher and University agricultural education faculty member who taught the participants most of their undergraduate agricultural education course work. The researcher was positioned (Jones, et al., 2006) within the research. Furthermore, the data were provided to a peer/colleague for review.

Practices of quality qualitative research were established 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. Triangulation (Tracy, 2010) was established through multiple data sources. Through the coding, the theme of "SAE" emerged.

Results

Eight teachers completed the first year of the study. In the second year, one participant continued to teach, but withdrew from the study. In the final year there were six participants after one left the classroom to pursue a production agriculture career. All participants were white, ranged in ages from 22-25 years old during their first year of teaching, and were traditionally certified. 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 experience.

Including when teachers moved between schools, they taught in eleven different communities throughout the three-year study. The schools were in communities spread across Kansas. Utilizing the United States Department of Agriculture (USDA) definitions, two communities were greater than 2,500 in population and would be considered "urban clusters" while the other nine communities meet the definition of "rural," with populations less than 2,500 (USDA, 2019, para. 2). All the communities had predominately white populations.

The Frist Year

At the beginning of their first year, the participants ranged significantly in their implementation of SAE's. Some had everyone on AET on the first day of school 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 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 second 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 challenge. 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.

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 training, it broadened their definition, and decreased the limitations to SAEs. 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.

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 FAE 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.

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 utilized the AET recording keeping program and finding time to guide students in establishing and maintain SAEs.

As Baker et al. (2012) identified, experiential learning through agricultural education should "require purposeful and planned support from the agricultural education instructor" (Baker et al. 2012, p.6). This research suggests there is evidence of planning and support for at least some students, but not always all. Baker et al. also states experiential learning "requires purposeful and planned support from the agricultural education instructor" and this research shows there is purposeful and planned support, but the type of support and planning varies for each teacher. Finally, Baker et al (2012), states experience 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 that supporters and mentors in agricultural education help beginning teachers break down barriers to SAE development. These many 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 further examine the SAE experiences of non-traditionally certified teachers and conducting a similar study with participants from a more diverse background and in suburban and urban communities.

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