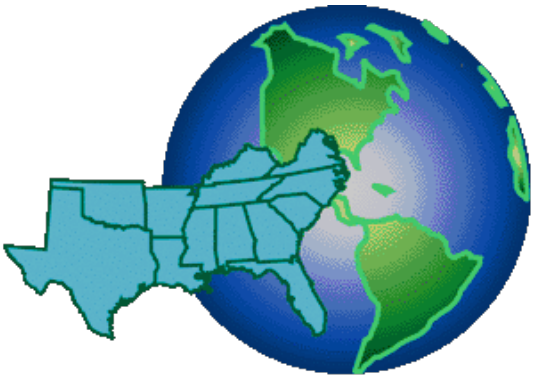
SOUTHERN REGION CONFERENCE

OF THE

2020 PROGRAM

HELD IN CONJUNCTION WITH THE MEETING OF THE SOUTHERN ASSOCIATION OF AGRICULTURAL SCIENTISTS (SAAS)



February 1 – February 4, 2020 – Louisville, Kentucky

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Saturday, February 1st

3:00 – 6:00 pm **Registration**, *Second Street Prefunction*

Sunday, February 2nd

8:00 – 9:00 am **Student Breakfast**, *Commonwealth 5*
(pre-registered students)

8:00 – 10:00 am **Registration**, *Second Street Prefunction*
Light refreshments provided for faculty

8:45 – 9:15 am **Vespers**, *Commonwealth 2*

9:30 – 10:00 am **Agricultural Education Opening Session**, *Commonwealth 2*

10:15 – 11:45 am **Concurrent Research Session I** – *15 minute presentations, 7 minutes of discussion*

Session A – Preservice Development & Retention, *Olmsted 2*
Discussant and Chair: Don Edgar **Facilitator:** Katrina Alford

Images from the Trenches: A Visual Narrative of the Teaching Concerns of Agricultural Education Majors, *Dr. Richie Roberts and Dr. Kristin S. Stair*

Intent to Teach: Perspectives from Pre-Service Agricultural Education Teachers, *Christopher J. Eck, Jessica M. Toombs, and J. Shane Robinson*

First-year Agriscience Teacher Personal Resilience and Well-being, *Isabella S. Damiani, Dr. Ed Osborne, Dr. Andrew Thoron, and Dr. J. C. Bunch*

A Longitudinal Study on the Impact of Time Spent Student Teaching on the Decision to Enter the Field, *William Doss, Dr. Keith J. Frost, and Dr. John Rayfield*

Session B – STEM and Teacher Retention, *Nulu*
Discussant and Chair: Ed Osborne **Facilitator:** Carrie Baker

A Study of the 4-H STEM Career Pathway Model: Perspectives from Youth, Parents, Community Volunteers, Corporate Volunteers, and 4-H Professionals, *Joseph L. Donaldson and Karen L. Franck*

STEM Education in Virginia 4-H: A Qualitative Exploration of Engineering Understandings in 4-H STEM Educators, *Chelsea Corkins, Dr. Donna Westfall-Rudd, Dr. Hannah H Scherer, and Dr. Jacob Grohs*

Agriscience Teacher Professional Development Focused on Teaching STEM Principles in the Floriculture Curriculum, *Natalie Kincy Ferand, Dr. Catherine A. DiBenedetto, and Dr. Andrew C. Thoron*

Differences in Teacher Development Needs Between Beginning and Experienced Agriculture Teachers: Implication for Teacher Retention, *Gangseok Hur and Dr. T. Grady Roberts*

Session C – Challenges, Burnout, and Mentoring in Extension, *Olmsted 1*
Discussant and Chair: Barbara Kirby **Facilitator:** Lauren Cline

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Challenges of Early Career Extension Agents in Florida, *Dr. Matt Benge, Peyton N. Beattie, and Jessica A. Steele*

Elements of Burnout Experienced by Extension Professionals in Georgia, *Victoria Corbin, Ashley Yopp, Barry Croom, and Bo Ryles*

Administrator's Perspectives on Environmental Factors Facing Cooperative Extension, *Jeremy Elliott-Engel, Donna Westfall-Rudd, Megan Seibel, Eric Kaufman, and Rama Radhakrishna*

Coaching and Mentoring Experiences of Early Career Extension Agents in Florida Received from County Extension Directors, *Dr. Matt Benge, Jessica Steele, and Peyton Beattie*

12:00 – 1:30 pm **Luncheon and introduction of graduate students and new faculty**, *Commonwealth 5*

1:30 – 2:15 pm **Committee Meetings**
Membership Services, *Oak*
Program Improvement, *Rye*

2:15 – 3:00 pm **Professional Development**, *Charred*
Research, *Barley*

2:45 – 4:00 pm **Innovative Poster Session,** *Olmsted 4*

No Words: A Non-Narrative Approach to Education, *Jacelyn D. Nesmith, Andrew L. Hauser, and Dr. Rebekah B. Epps*
University of Kentucky

A Need for Mechanization Training for Pre-Service Teachers, *Don Edgar*
University of Georgia

An Innovative Assessment of Emotional Intelligence in Texas A&M AgriLife Extension Agents, *Peyton M. Thomas, A. Brant Poe, J. Chris Haynes, T. Wayne Atchley, Chandra Andrew, and Ty Tidwell*
Tarleton State University

Argentinian Agricultural Teachers Experience North Carolina Agricultural Education Programs, *Joy Morgan, Jason Bullock, Travis Park, Wendy Warner, Omar Jaramillo*
North Carolina State University

Be the Leader You Would Follow: Promoting Minority Leaders in Agriculture, *Jason Bullock, Joy Morgan-Fleming, Wendy Warner*
North Carolina State University

Cardboard Confessions: A Critical Starting Point for Culturally Responsive Teaching, *Graciela Barajas, Brett M. Wasden, Stacy K. Vincent*
University of Kentucky

Challenge Me: Using Livestock to Connect SAE for All!, *Kimberly A. Bellah, Matthew Shultz, Sara Edwards, Jonathan Sink, and S. Graham Cofield*
Murray State University

Creating Great Educators Using Maker Education, *Mr. Andrew L. Hauser, Ms. Jacelyn D. Nesmith, Dr. Rebekah Epps*
University of Kentucky

Dishing up Agriculture: A Unique Approach to Strengthening Agricultural Literacy, *A. Brant Poe, J. Chris Haynes, David Frazier, Chandra Andrew*
Tarleton State University

Emphasizing the 'T' in STEM by using Smart Phone Technology for Data Collection, *Jacob Koch, Catherine A. DiBenedetto*
Clemson University

Empowering the Next Generation of National Leaders through Experiential Leadership Training, *Wacey Newman, David Frazier, J. Chris Haynes*
Tarleton State University

Establishing a 4-H Facilitator Guide to Teaching Youth About Sustainability, *Savanna Turner & Dr. Laura Warner*
University of Florida

Experiential Learning through an Agricultural Policy Curriculum Design, *MaKayla Arthur, J. Chris Haynes, A. Brant Poe, Jacob Manlove, Ted Ford, The Honorable Charles Stenholm*
Tarleton State University

Facilitating student engagement during international service learning: Utilizing the mini-ethnographic case study design, *Catherine E. Dobbins; Dr. Leslie D. Edgar; Dr. Kim E. Dooley*
University of Georgia; Texas A&M University

Getting your Floriculture Curriculum to Bloom, *Catherine A. DiBenedetto, Natalie K. Ferand, Andrew C. Thoron*
Clemson University, University of Florida

Not Horsin' Around: Learning Mathematics the Horse Way, *Juliana D. Gardner, Jacelyn D. Nesmith, Andrew L. Hauser, and Dr. Rebekah B. Epps*
University of Kentucky

Optimizing the Food and Agricultural Workforce: A Summer Research Experience Program for Community College Students, *Tiera M. George, Joseph L. Donaldson, Kimberly D. Gwinn, Stephen Chumbley, Carrie Stephens*
North Carolina State University, University of Tennessee, Knoxville

Organizational Socialization: Becoming An Agricultural Teacher Educator in the Professoriate, *Bradley M. Coleman; Natalie K. Ferand; J.C. Bunch; Matthew C. Albritton; Katrina R. Alford; Debra M. Barry; R. G. (Tre) Easterly III; Gangseok Hur; Brian E. Myers; Edward W. Osborne; T. Grady Roberts; Jason Steward*
University of Florida

Pack Peers Make a Mentoring Difference, *Mary Kate Morgan, Joy E. Morgan, Wendy J. Warner, Travis D. Park*
North Carolina State University

Professional Development for Social Science Agriscience Fair CDE Projects, *Jessica M. Toombs, Kathryn L. Teixeira, Robert Terry, Jr., J. Shane Robinson, and Jon W. Ramsey*
Oklahoma State University

Promoting Culture, Diversity, and Inclusion in Agricultural Education and Extension, *Jason Bullock, Joy Morgan-Fleming, Daniel P. Collins*
North Carolina State University

Purposeful STEM Integration in Agricultural Teacher Preparation at Oklahoma State University, *Christopher J. Eck, Haley Kinney, & J. Shane Robinson*
Oklahoma State University

Reframing Early Field Experiences: Use of Participant-Generated Photos to Facilitate Social Reflection among Preservice Agricultural Education Teachers, *Morgan A. Richardson; Richie Roberts*
Louisiana State University

Rural Education Centers in Tanzania, *Mohammed Mwinyi and Rick Rudd*
Virginia Tech

Scotland: A Service-Learning Study Abroad Trip in Agricultural Education, *Eric Rubinstein, Jason Peake, Savannah White*
University of Georgia

Solving Problems in Agricultural Education, Communications, and Leadership through Undergraduate Research: A Mentoring Opportunity for Doctoral Students, *Audrey E. H. King and Lauren L. Cline*
Oklahoma State University

Using a Point System to Motivate Students and Enhance the Delivery of Secondary Agricultural Education Programs, *Brynn M. Wittie, Richie Roberts*
Louisiana State University

Using Bitmoji Coaches to Promote Learning and Engagement in Online Courses, *Sharon Wagner*
Texas A&M University

Using VR Technology for Graduate Education in Agriculture, *Carrie Baker, Jessica Spence, OP McCubbins*
Texas A&M University

Wicked Solution to Wicked Problems: A Systems Approach to Teaching, *Katrina R. Alford, Dr. T. Grady Roberts*
University of Florida

4:00 pm	**SAAS General Business Meeting**, *Commonwealth 3* Special Speaker Dr. J. Scott Angle, Director National Institute of Food and Agriculture
5:00 pm	**SAAS Reception/ Super Bowl Party** *Griff's* 133 W Liberty St.

Monday, February 3rd

8:00 – 10:00 am	**Registration**, *Second Street Prefunction*
8:00 – 9:00 am	**Continental Breakfast**, *Commonwealth 1*
9:00 – 10:30 am	**Concurrent Research Session II** – *15 minute presentations, 7 minutes of discussion*

Session D – Teacher Development and Experiential Learning, *Nulu*
Discussant and Chair: Brian Myers **Facilitator:** Matthew Albritton

Professional Life Phases: Identifying Professional Development Needs Relating to Instructional Practices and Teacher Development for Florida Agriscience Teachers, *Kelsey M. Thornton, Dr. J.C. Bunch, Dr. T. Grady Roberts, and Dr. Andrew C. Thoron*

The Dimensions of Professional Development Needs for Secondary Agricultural Education Teachers Across Career Stages: A Multiple Case Study Comparison, *Dr. Richie Roberts, Brynn M. Wittie, Dr. Kristin S. Stair, Dr. J. Joey Blackburn, and Dr. H. Eric Smith*

SBAE Student Teachers' Sense of Importance and Competence per Selected National Quality Program Standard Indicators: A Then-Now Borich Needs Assessment, *Jessica M. Toombs and Dr. Jon W. Ramsey*

Examining the Effects of Reflection Type and Abstraction Order on Content Knowledge and Content Knowledge Retention During Experiential Learning, *Bradley M. Coleman, Dr. J.C. Bunch, Dr. Andrew C. Thoron, and Dr. T. Grady Roberts*

Session E – Diversity in Agriculture, *Olmsted 2*
Discussant and Chair: Kathleen Kelsey **Facilitator:** Hannah Bailey

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Acceptance, Tolerance, or Distance: Determining a Degree of Closeness to Multicultural Student Profiles, *Dr. Stacy K. Vincent and Ashley C. Austin*

The Role of NFA Camps in Agricultural Education for Rural African American Boys in North Carolina, *Susan L. Jones, Barbara M. Kirby, and Wendy J. Warner*

What We Can Learn From a "DeaFFA" Community, *Ms. Sarah D. Warren and Dr. Rebekah B. Epps*

Students for Cultivating Change: Perspectives on LGBTQ+ Inclusion in Virginia Tech's College of Agriculture and Life Sciences, *Jeremy Elliott-Engel, Ryan J. Amaral, Donna Westfall-Rudd, and Rick Rudd*

Session F – SBAE Curriculum, *Olmstead 1*
Discussant and Chair: Dennis Duncan **Facilitator:** Jason Bulloch

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A Historical Review of the Curriculum for Agricultural Science Education (CASE), *Mr. Andrew Hauser and Dr. Rebekah Epps*

Considering Trail Users' Perceptions and Preferences of Their Environment as a Tool for Plant Selection in Future Landscape Design, *Rachel Bechtold, Dr. Catherine Shoulders, Dr. Donald Johnson, Dr. Lisa Wood, Dr. Jennie Popp, and Dr. Elena Garcia*

Linking Residential Landscape Practices and Personal Well-Being to Inform Agricultural Education Programs, *Dr. Laura Warner, Dr. John Diaz, Dr. Ed Osborne, Dr. Faith Oi, and Caleb Reed*

Agribiotechnology as a Career Pathway: An Assessment of Student Learning of New Introductory Biotechnology Curriculum, *Dr. Tanya C. Franke-Dvorak, Dr. Joey J. Blackburn, and Dr. Sue E. Nokes*

10:45 – 11:45 am **SR-AAAE Business Meeting Session I**, *Olmsted 2*
Travis Park, SR-AAAE President

12:00 – 1:30 pm **Luncheon and Distinguished Lecture**, *Commonwealth 6/7*

1:30 – 2:45 pm **Research Poster Session**, *Olmsted 4*

Time is a Son of a B#*&h: Students' Reflections of Performance and Mental State throughout a Graduate Course, *Bradley D. Borges, Catherine W. Shoulders, Donald M. Johnson*
University of Arkansas

A Comparison of Preservice Teachers' Self and Peer Perceptions of Teaching Dispositions, *Mary Samoei, Catherine W. Shoulders*
University of Arkansas

A Delphi Study of Cooperating Teacher Needs, *Debra M. Barry, John M. Diaz, Brian E, Myers*
University of Florida

A Longitudinal Analysis of SAE Engagement Through Record Book Data, *William Doss, Dr. Roger Hanagriff, Dr. John Rayfield*
Texas Tech University

A Ten-Year View of Georgia Agriculture Teacher Attrition and Mobility, *Green, D., Byrd, B., Potter, E., Peake, J., Rubenstein, E.*
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An Analysis of Pre-Service Agricultural Educators' Self-Efficacy with Exceptional Learners, *Sara Edwards & Kimberly A. Bellah*
Murray State University

An Exploration of Secondary Single-Sex Agricultural Classrooms, *Brett M. Wasden, Stacy K. Vincent*
University of Kentucky

Assessing the Importance and Competence of Undergraduate Agricultural Education Students Related to Teaching Sustainable Bioenergy, *Christopher J. Eck & J. Shane Robinson*
Oklahoma State University

Barriers Influencing the Use of Social Media by Mississippi Extension Professionals, *Kirk Swortzel*
Mississippi State University

Catering Teacher Professional Development to Plant Propagation in Horticulture, *Keomba McNeely, Catherine A. DiBenedetto*
Clemson University

Curriculum Development For Elementary Agricultural Education, *Jason Peake, Eric Rubenstein, Dalton Green, Emily Potter*
University of Georgia

Effectiveness of Brainwriting as an Alternative to Idea Generation in Agricultural Education, *J. Chris Haynes, Jacob Manlove, Chandra Andrew, David Frazier, T. Wayne Atchley*
Tarleton State University

Evaluation of state leadership program objectives, *Mary Annabelle Stokes, Michael E. Newman, and Carley C. Morrison*
Mississippi State University

Exploring Engagement of English as a Second Language Latino Youth in Agricultural Education, *Graciela Barajas, Katie Crump, Stacy K. Vincent*
University of Kentucky

Exploring the Implementation of Food Science Curriculum in Southern Region States, *Rachel DuRant, Dale Layfield, Catherine DiBenedetto, and Kirby Player*
Clemson University

Extension Agents' Perceptions of Early Intervention and Suicide Prevention Resources for Farmers: A Pilot Study, *Kathryn Grant, Dale Layfield, Preston Byrd, and Richelle Kleman*
Clemson University

Identifying Needs of Early Career Extension Agents Beyond the First Year: Perspectives from County Extension Directors in Florida, *Annie Muscato, Peyton N. Beattie, Dr. Matt Benge*
University of Florida

Impact of a Problem Based Learning Experience on Students' Interest in Agricultural Science Careers, *Austin Wise, Catherine W. Shoulders, Donald M. Johnson*
University of Arkansas

Investigation of Culturally Responsive Teaching: Undergraduate vs. Graduate Experiences, *Christien Russell and Carla Jagger*
Mississippi State University

Lived Experiences during International Service Learning: A Semiotic Analysis of Photo Journals, *Catherine E. Dobbins, Dr. Leslie D. Edgar, Kristin E. Gibson, Dr. Kim E. Dooley*
University of Georgia

Navigating Dissonance during a Study Abroad Course to Costa Rica: An Examination of the Antecedents to Transformational Learning for U.S. University Agricultural Students, *Janiece M. Pigg; Richie Roberts; Kristin S. Stair; Morgan A. Richardson*
Louisiana State University

Peer Mentoring Experiences of Early Career Extension Agents in Florida, *Matt Benge, Jessica A. Steele*
University of Florida

Perceptions of Agricultural Careers among Minority Community College Students in a Summer Agricultural Research Program, *Tiera M. George, Joseph L. Donaldson, Kimberly D. Gwinn, Stephen Chumbley, Carrie Stephens*
North Carolina State University, University of Tennessee, Knoxville

Relationship Between Student Self-Efficacy in Completing Animal Science Industry Skills and the Number of Years with an SAE Project, *Matthew Huston; John Rayfield*
Texas Tech University

Sex-Types of Agricultural Careers, *Natalie Ferand & Brian Myers*
University of Florida

Should I Stay or Should I Go?: Analyzing Predictors of Retention Among Aollege of Agriculture Freshman, *Tyler Granberry, Dr. Eric Smith, Dr. Kristin S. Stair, Dr. J. Joey Blackburn, Dr. Michael Burnett*
Louisiana State University

Stakeholder Perceptions of the Proper Role and Focus of a Flagship Land Grant University, *Donald M. Johnson, Catherine W. Shoulders, Isabel Whitehead*
University of Arkansas

Teachers' Use of Social Media-based Professional Development Deliverables by Focus Area, *Catherine W. Shoulders, Marshall A. Baker, Michael S. Retallick, and Brian E. Myers*
University of Arkansas, North Carolina State University, Iowa State University, and University of Florida

Training Needs of Mississippi Extension Agents in Organic Agriculture, *Kirk Swortzel*
Mississippi State University

Who is Supporting Early Career Extension Agents?, *Peyton N. Beattie, Annie Muscato, Dr. Matt Benge*
University of Florida

3:00 – 4:30 pm **Professional Development Sessions**
Each workshop will be 25 minutes in length and will be run three times. Participants will choose three workshops to attend and will rotate through.

Teaching Identity and Inclusion Courses in CALS, Dr. Donna Westfall, Dr. Kristin Stair
Commonwealth 8

Keys for Advising Graduate Students, Dr. Rick Rudd
Olmsted 1

Cultivating Community Connections through Coursework, Dr. Laura Greenhaw
Olmsted 2

Connecting the Dots: Infusing Multiculturalism Throughout the Undergraduate Degree Program, Dr. Stacy Vincent
Olmsted 5

5:30 – 7:30 pm **Host State Social, *The Kentucky Derby Museum at Churchill Downs***
704 Central Ave. Louisville, KY 40208
Transportation provided by bus. Please meet in lobby at 5:00pm for first shuttle.
Heavy hors d'oeuvres and cash bar

Tuesday, February 4th

8:30 – 9:30 am **SR-AAAE Business Meeting Session II**, *Olmsted 2*
Travis Park, SR-AAAE President

9:45 – 11:15 am **Concurrent Research Session III** – *15 minute presentations, 7 minutes of discussion*

Session G – Women and Gender Roles in Agriculture, *Olmsted 1*
Discussant and Chair: Leslie Edgar **Facilitator:** Craig Kohn

A Phenomenological Approach to Understanding Research at the Intersection of Gender and Graduate Student, *Catherine E. Dobbins, Whitney A. Stone, Maddison Holder, and Dr. Abigail Borron*

A Critical Study of Women Graduate Student Experiences in Agricultural and Extension Education, *Lauren Lewis Cline, Dr. Haley Rosson, and Dr. Penny Pennington Weeks*

Women in STEAM: Barriers to Advancement, *Alyssa L. Hutcheson, Natalie R. Money, and Carley C. Morrison*

Home Demonstration Work in North Carolina: Leading the Way for Rural Women, *Daniel A. Radford, Joy E. Morgan, and Barbara M. Kirby*

Session H – Future Direction of Extension, *Old Louisville*
Discussant and Chair: Michael Newman **Facilitator:** Natalie Ferand

Extension at the Crossroads: An Assessment of Organizational Strengths, *Dr. Kevan W. Lamm, Nekeisha Randall, Dr. Alexa J. Lamm, Dr. L. Rochelle Sapp*

Improving Extension Support to Organic Growers by Building Bridges, *Amanda Olbrick Marabesi and Dr. Kathleen D. Kelsey*

Developing Conflict Management Capacity: A Longitudinal Leadership Development Program Evaluation, *Dr. Kevan W. Lamm, Dr. L. Rochelle Sapp, Dr. Alexa J. Lamm, and Nekeisha Randall*

The Development and Validation of a Community Diagnostics Scale Based in the Community Capitals Framework, *Dr. Kevan W. Lamm, Dr. Abigail Borron, and Dr. Keith Atkins*

Session I – Undergraduate Student Education and Urban Agriculture, *Olmstead 2*
Discussant and Chair: Jason Peake **Facilitator:** Jessica Toombs

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Examining the Relationship Between Organizational Citizenship Behaviors and Class Conditions in Undergraduate Agricultural Students, *Dr. Kevan W. Lamm, Alyssa Powell, Dr. Alexa J. Lamm, and Dr. Eric D. Rubenstein*

Predicting Undergraduate Project Team Satisfaction: Test of a Structural Model, *Dr. Kevan W. Lamm, Alyssa Powell, Nekeisha Randall, Nhu Ngoc "Tina" Nguyen, and Dr. Alexa J. Lamm*

Investigating the Effects of Cognitive Diversity on the Hypothesis Generation and Troubleshooting Ability of Undergraduate Students Enrolled in an Introductory Agricultural Mechanics Course at Louisiana State University, *Whitney L. Figland, J. Joey Blackburn, Kristin S. Stair, and Michael F. Burnett*

Perceptions of Arkansas Agriculture County Extension Agents Toward Urban Agriculture, *Catherine E. Dobbins, Don W. Edgar, Casandra K. Cox, Dr. Leslie D. Edgar, Dr. Donna L. Graham, and Dr. Amanda G. Philyaw Perez*

11:30 – 1:30 pm **Awards Luncheon**, *Commonwealth 5*

SR-AAAE Conference Adjourns After Lunch

Conference Notes

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Images from the Trenches: A Visual Narrative of the Teaching Concerns of Agricultural Education Majors

Richie Roberts, Louisiana State University
Kristin S. Stair, Louisiana State University

Abstract

The study described how agricultural education majors at Louisiana State University visually represented and narrated their concerns about teaching. To accomplish this, students captured photos of their concerns during an early field experience (EFE) and then critically reflected on such through a community of practice. As a product of our analysis, we offered a visual narrative of students' concerns through three themes: (1) Blurred Expectations: Representations of Incompetence; (2) Framing Success: Depictions of Achievement; and (3) The Narrowest Lens: Views of Time. As a result, the first theme represented how students grappled with feelings of incompetence. Meanwhile, in the second theme, they depicted success as a secondary agricultural education teacher as winning banners and awards, which emerged key tensions during their community of practice. As students assigned new meaning to this concern through co-construction and critical reflection, however, their perspectives began to mature. The final theme spoke to how the EFEs opened students' eyes to the realities of teaching, especially regarding the time required to be effective. As a consequence, we offered recommendations and implications for teacher preparation programs to better respond to the concerns of agricultural education majors preparing for careers as secondary teachers.

Introduction and Review of Literature

The discipline of agricultural education is experiencing a crisis regarding the recruitment and retention of highly qualified and effective teachers (Kantrovich, 2010; Talbert, Vaughn, Croom, & Lee, 2007; Smith, Lawver, & Foster, 2018). For example, in the 2017-2018 school year, it was reported that 868 teachers were not returning to the profession, with retirement only accounting for 18.2% of the reason why such individuals were leaving (Smith et al., 2018). To complicate this matter further, however, over one-fourth of graduates who were license-eligible, program completers of teacher preparation programs in agricultural education chose not to enter the profession (Smith et al., 2018). Unfortunately, such trends do not appear to be changing, as they have remained relatively consistent in recent reports commissioned by the *American Association for Agricultural Education* (Foster, Lawver, & Smith, 2015).

As a consequence, teacher preparation programs in agricultural education are tasked with not only recruiting high-quality candidates but also ensuring that they are prepared to successfully enter the workforce (Torres, Kitchel, & Ball, 2010). However, preparing individuals for such responsibilities remains complicated, as the job duties of school-based, agricultural education (SBAE) teachers far exceed classroom instruction (Roberts & Dyer, 2004; Talbert et al., 2007). For example, Roberts and Dyer (2004) reported that seven characteristics of effective agricultural education teachers gained 100% consensus among a panel of 36 experts: (1) cares for students, (2) planning for instruction, (3) evaluate student success, (4) promotes moral and honesty, (5) effectively advises the program's FFA chapter, (6) communicates with stakeholders,

and (7) uses and maintains laboratory spaces. Although we now have a better understanding of the characteristics of effective SBAE instructors, one of the challenges faced by teacher preparation programs is equipping agricultural education majors with the knowledge and skills they need to thrive in their future careers and, thereby, reduce their desire to leave the profession (Stair, Warner, & Moore, 2012).

It is imperative, therefore, for teacher preparation programs to better understand the concerns of preservice teachers so they can respond by providing tailored coursework, experiences, and programming designed to meet their needs (O'Conner and Taylor, 1992). In response to such needs, Fuller (1969) introduced the concerns based adoption model (CBAM). The model helped describe the evolution of teachers' concerns as they adopt research-based practices introduced through teacher preparation (Fuller, 1969). In particular, Fuller (1969) theorized that as education majors mature, they evolve through three specific developmental stages – self, task, and impact – of concern. In the first stage, *self*, university students begin to question their capability and how various forces will affect them as a teacher (Fuller, 1969). Meanwhile in the second phase, *task*, they become more concerned with process-based variables that may effect them in the classroom such as organization and implementation. The final stage, *impact*, reflects the maturation of students' concerns as they begin to question how various factors will affect their future students and how they can make their teaching more impactful (Fuller, 1969). Despite such insights, however, more work is needed to distill the early teaching concerns of agricultural education majors. As a consequence, Stair et al. (2012) called for deeper investigation into the phenomenon.

To this point, the literature has illuminated a number of intersecting concerns for preservice teachers and beginning SBAE instructors across several states (Claycomb & Petty, 1983; Edwards & Briers, 1999; Fritz & Miller, 2003; Garton & Chung, 1997; Hillison, 1977; Johnson, Lindhardt, & Stewart, 1989; Paulsen, Anderson, & Tweeten, 2015). In particular, themes from existing evidence have illuminated that agricultural education majors' concerns are grounded in a lack of confidence in their teaching abilities, perceived deficiencies in their content knowledge, and little self-efficacy to deliver agricultural education's, comprehensive three-circle model in a balanced way (Fritz & Miller, 2003; Paulsen et al., 2015; Stair et al., 2012).

To help preservice teachers navigate such concerns, several researchers have advanced early field experiences (EFEs) as an essential component of teacher preparation (Baker, Culbertson, Robinson, & Ramsey, 2017; Retallick & Miller, 2007a, 2007b; Smalley & Retallick, 2012; Wells, Smalley, & Rank, 2018; Rank & Smalley, 2017). EFEs occur before a preservice teacher engages in student teaching and include an array of observations, microteachings, and other opportunities "to immerse themselves into the complex world of teaching and serve as a means for students to think as teachers" (Retallack & Miller, 2007b, p. 20). As a result, EFEs have been shown to help improve preservice teachers' self-efficacy, desire to enter the profession, and ability to conceptualize the multifaceted characteristics of effective teaching and learning (Aiken & Day, 1999; Guyton & Byrd, 2000; Miller & Wilson, 2010). It is important to note, however, that Fritz and Miller (2003) argued that critical reflection on EFEs was essential to help agricultural education majors process their concerns so that they can better understand how to navigate the complexities of teaching in SBAE. One approach used to facilitate critical reflection

on EFEs is through the formation of a community of practice (Cumming-Potvin, 2009; Paulsen et al., 2015).

A community of practice is a constructivist approach to teaching and learning that emphasizes the role of social interaction, discussion, and reflection on topics and issues to socially construct knowledge and develop new solutions to problems (Wenger, 1998). One way that communities of practice have been used is by having education majors socially reflect on the concerns they encounter during EFEs (Paulsen et al., 2015). Then through critical reflection, students co-construct meaning and develop a strategy to overcome these concerns moving forward. Communities of practice have been used in an array of educational settings; for example, they have appeared in classrooms, online forums, and social media groups to provide resources and support to education majors as they grapple with teaching concerns (Ferriter, 2010; Lock, 2006; Lieberman & Miller, 2011). However, more work is needed to explain how this approach could assist students in processing their concerns as they co-construct meaning of their EFEs. Such an understanding could illuminate the ways in which discourse, social processes, and their conceptualizations of concerns merge to influence the professional identity development of postsecondary agricultural education students (Korthagen & Kessels, 1999). This deficit in knowledge motivated the current study.

Theoretical Lens

We approached this investigation from the epistemological lens of *constructionism*, which advances the notion that individuals construct reality internally (Crotty, 1998). However, such constructions are influenced by engagement with others and interpreted through a lens heavily influenced by society, culture, and historical influences (Crotty, 1998). Ultimately, therefore, an individual's worldview is shaped by their upbringing, prior experiences, and exposure to divergent perspectives (Crotty, 1998). In designing this investigation, therefore, we maintained that agricultural education majors' concerns were internally constructed and foregrounded by a number of contextual forces. We also maintained that such contextual influences were the result of students' interactions with objects in their environment (Crotty, 1998). As a consequence, when investigating this phenomenon, we also drew on the theoretical perspective of *symbolic interactionism* (Crotty, 1998). Through the lens of symbolic interactionism, individuals engage through multiple, intersecting lines of action (Crotty, 1998). And, objects that are positioned within this social environment hold distinct meanings for each individual; however, shared meanings emerge as individuals interact socially (Crotty, 1998).

Using these philosophical perspectives, we grounded this investigation in Wenger-Trayner's and Wenger-Trayner' (2014) *Communities of Practice* framework. Through this lens, learning is a social process that occurs as individuals engage in various communities of practice and begin to construct a more complex identity (Wenger-Trayner & Wenger-Trayner, 2014).

As a consequence, in the design of this study we placed particular value on the *objects* and *symbols* that represented agricultural education majors' concerns about teaching in SBAE. For example, during students' EFEs, we were interested in understanding which items, relics, architectural features, and other objects they encountered elicited a visceral response of concern. As such, we were keenly attuned to their visual representations of teaching concerns. However,

our primary interest was in understanding how students co-constructed meaning of such visual representations through narrative discourse as they critically reflected on their EFEs during a community of practice.

Purpose and Research Questions

The purpose of this study was to describe the ways in which agricultural education majors at Louisiana State University *visually represented* and *narrated* their concerns of teaching as they critically reflected on an EFE during a community of practice. Because identifying and addressing postsecondary students' concerns is critical to retention and teacher success, it addressed the American Association for Agricultural Education's Research Priority Area 3: *Sufficient Scientific and Professional Workforce that Address the Challenges of the 21st Century* (Stripling & Ricketts, 2016). Two research questions framed the investigation: (1) How did agricultural education majors visually represent their teaching concerns encountered during an EFE? and (2) How did students co-construct a narrative of their teaching concerns as they critically reflected on an EFE during a community of practice?

Background of the Study

Foundations of Agricultural and Extension Education is the first in a series of courses for students at Louisiana State University. Traditionally, the course is taken during agricultural education majors' freshmen or sophomore year; however, exceptions exist due to scheduling and because some students transfer later in their academic career. Per the syllabus, the course is designed to "provide an introduction to of the philosophical foundations for agricultural education" (Roberts, 2018, p. 1). Further, students also gain practical experience through an EFE by which they complete 10 required hours of observation at two different secondary agricultural education programs. In the fall 2018 semester, nine students were enrolled in the course. At the beginning of the semester, the course's lead instructor introduced a new component to the EFE in which students were required to capture two photographs at each EFE site, i.e., *in the trenches of SBAE*, that represented their teaching concerns. Then, during the final session of the course, the lead instructor introduced the concept of *Community of Practice* (Wenger-Trayner & Wenger-Trayner, 2014). Over a period of two hours, the students critically reflected on the concerns represented in the photos and suggested ways to address such moving forward. Therefore, our beliefs about teaching and learning and the value we placed on the *Community of Practice* approach influenced this investigation's conceptualization. As such, it was essential to provide our researcher reflexivity.

Reflexivity

Before offering our methodology and interpretation of the study's findings, it is critical to disclose our relevant backgrounds, experiences, and bias that may have influenced this investigation. To begin, it is important to acknowledge that we are former SBAE teachers. Further, the lead researcher for this investigation also served as the primary instructor for the course under investigation. As such, our views on teaching and learning and relationships with students could have influenced the data collected and our interpretation of such. Further, because we held a position of power over the participants in this study, they could have chosen not

provide honest responses because they perceived it might negatively affect them in the course. To mitigate such power imbalances, we ensured students that what they shared would not affect their grade or their standing in our program. We also attempted to foster an open atmosphere during a community of practice so that the students felt comfortable sharing and providing ideas about how to navigate teaching concerns to their peers. Despite such attempts, however, we recognize that vulnerabilities persisted. Therefore, in the description of our methodology, we provide more detail in regard to how rigor and trustworthiness were emphasized throughout each phase of the investigation.

Methodology

In this study, we used a visual narrative approach (Pink, 2012). Visual narratives are premised on the idea that humans interact in the world using symbols and imagery that are assigned a socially constructed meaning (Rose, 2016). As an illustration, when engaging with others, individuals often refer to a range of objects and metaphors to add critical layers of meaning and evoke vivid imagery as they story critical events and experiences. Therefore, visual narratives focus on how individuals use imagery to depict aspects of their beliefs, perceptions, and lived experiences (Pink, 2012; Rose, 2016). In particular, the approach allows individuals to examine how visual representations, and the meaning individuals assign to such, influence the social world (Riessman, 2008). Although it shares similarities with the photovoice approach, visual narratives do not place emphasis on critiquing issues of power and injustice (Rose, 2016). Instead, researchers attempt to story the ways in which participants use imagery to co-construct knowledge and narrate shared meanings regarding issues, problems, and concerns (Pink, 2012). Therefore, a common procedure used to facilitate visual narratives is to invite individuals to capture and discuss photographs through a community of practice (Pink, 2012). A description of our participants and how the visual narrative approach was used in this investigation follows.

Participants, Data Sources, and Procedures

Participants ($N = 9$) in this study were students enrolled in the *Foundations of Agricultural and Extension Education* course at Louisiana State University in Fall 2018. Of the participants, seven identified as female and two as male. Regarding classification, there were four freshmen, four sophomores, and one junior. It is also important to note that data for this investigation were furnished from three primary sources: (1) participant submitted photographs and captions, (2) a video recording of a community of practice regarding agricultural education majors' teaching concerns, and (3) observations and fieldnotes. To collect data, the students captured four photos that represented their concerns about teaching they encountered during EFEs at two secondary agricultural education programs as a requirement for the course under investigation.

Students were informed at the beginning of the semester that their photos and captions would be shared with other students in the course to facilitate a voluntary focus group interview as an element of a research project. The students were also given specific instructions *not to* take photographs of the students they interacted with during their EFEs, as mandated by the Internal Review Board (IRB) at Louisina State University. The students then submitted the four photographs, accompanying captions, and other required artifacts through the course's online learning platform three weeks before the end of the course. After students submitted the

assignment, the course's instructor compiled the 36 photographs and captions into a single document and removed all identifying information. Then, on the last class session of the semester, the students were given the option to earn bonus points in the course by engaging in a community of practice; however, their attendance was not mandatory.

After the lead instructor introduced the concept of a community of practice, the photographs and captions were distributed to each student. Participants were then asked to share their photographs and describe (a) what the photograph depicted, and (b) why it represented a concern they had about teaching in SBAE. During this phase, we encouraged the other participants to respond by sharing similar or divergent perspectives and experiences. We also asked participants to reflect critically on ways they could address such concerns as they progressed in their teacher preparation. As a result, the process was highly interactive as the students co-constructed knowledge and assigned meaning to the concerns depicted in the photographs. Occasionally, however, the discussion would pause and we restart the conversation by posing a probing question. The community of practice lasted for two hours and was captured using a Sony® video recorder. Throughout the exercise, we took fieldnotes to record key interactions and critical moments in which students exchanged visceral responses (Emerson, Fretz, & Shaw, 2011).

Data Analysis

After data collection, we transcribed the video recordings verbatim. All data sources were then uploaded to NVivo® qualitative analysis software to examine their complexities. To facilitate analysis, we systematically engaged the data through the use of coding (Saldaña, 2012). In particular, we began our initial cycle of analysis using an *in vivo* coding approach in which participants' words were used to create textural codes. This process allowed us to become familiar with participants' language and the concerns they emphasized. Further, we were also provided unique insights into emotional journeys that participants endured during the meaning making process. A product of this process was the development of a textural description of the students' concerns that depicted the intersecting storylines that emerged from the data corpus through use of participants' words (Riessman, 2008).

For the second cycle of coding, we used Labov's (1972) narrative structure coding to conceptualize each source of data – photographs, captions, narrative responses, and field notes – as storied units, that when considered in tandem, formed a rich narrative. Such was accomplished by interrogating the data in the following ways: *What and who was involved in this story? What is the central issue? What was the result?* and *What does the story mean?* (Labov, 1972). Through this structural analysis of the data, we dissected confirming and disconfirming evidence and began to distill participants' co-constructed meanings of their visual representations of teaching concerns. And a result, we created a structural description that portrayed the ways in which the data functioned as a storyline (Labov, 1972). In our final level of analysis, we used Saldana's (2012) notion of codeweaving to merge findings from two previous coding cycles while also negotiating existing discrepancies. To accomplish this, we approached the data using a symbolic interactionism lens (Crotty, 1998) to synthesize and integrate the textural and structural descriptions. As a consequence of this process, a narrative of participants' teaching concerns emerged through three themes. Before offering our interpretation of the findings, however, it is important to provide insight into how we imbued rigor and trustworthiness.

Building Quality into the Study

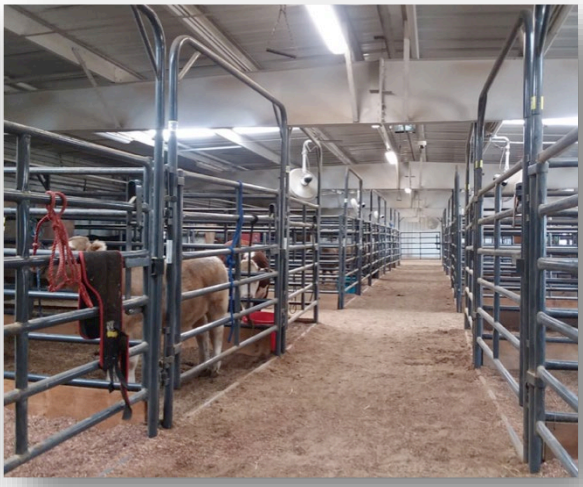
For this investigation, we used Tracy's (2010) criteria for qualitative quality to ensure that our findings were honest and valid. For example, we began this process by designing an investigation that focused on the concerns of students, which was relevant, timely, and significant for the discipline of agricultural education (Tracy, 2010). Then, we instilled *rich rigor* by using sufficient data collection and analysis techniques (Tracy, 2010). In this phase, we also promoted *sincerity* by recognizing our biases and minimizing them when possible (Tracy, 2010). Meanwhile, *credibility* was achieved by providing a rich description of our procedures and triangulating data sources. We also provided evocative descriptions of our participants and findings to promote *resonance* (Tracy, 2010). Finally, we stressed *ethics* throughout each phase of the investigation to ensure our work provided a *significant contribution* (Tracy, 2010). We feature this contribution in our narration of this study's findings next.

Findings

Findings from this investigation emerged through a codeweaving process in which we wove our textural and descriptions together and narrated the final product through three themes: (1) *Blurred Expectations: Representations of Incompetence*; (2) *Framing Success: Depictions of Achievement*; and (3) *The Narrowest Lens: Views of Time*. The themes tell the story of the concerns that students encountered from the *trenches* of secondary agricultural education during an EFE. In particular, the themes draw on the visual representations that the students captured through photographs while also using their words to describe the ways in which they co-constructed knowledge and assigned meaning to their teaching concerns.

Blurred Expectations: Representations of Incompetence

One thing that I am concerned about when I become an agriculture teacher is helping students with their SAE's. This picture above is a student's aquiculture SAE. The reason I am concerned about SAE's is the fact that I want my students projects to be successful. Many of the possible projects my students could have, I may know nothing about. The fact that in some areas I may not have any knowledge or prior skills can affect my students in a negative way. That's my biggest concern – Participant #1, Photo Caption



My biggest concern is about SAEs. This program ha[d] a lot of livestock, cattle, sheep, pigs, goats, and I have no experience in those areas. When I took ag classes, I took Olericulture which I enjoyed. I never got involved with the animals or other SAEs. I majored in Ag because I really like the type of people that these programs attract and produce. So, I'm just am worried I won't be successful because I do not have the right skills. Participant #3, Photo Caption

Figure 1. Photos and captions from Participant #1 and Participant #3.

The students encountered a host of concerns about teaching during their lived experiences in the field. And as a consequence, they chose to represent their concerns through capturing photographs of items, relics, and other salient objects that elicited an emotional response of concern. Although the photos the agricultural education majors captured were largely high quality in regard to resolution and pixel strength, their interpretations of such were often *blurred.* For example, the photos and captions sampled in Figure 1 stoked emotive exchanges from the students in the meaning-making process. As an illustration, Participant #5 shared, "These photos represent a concern of mine. I feel like there is so much that I do not know, especially for SAEs. I just feel disadvantaged because I did not have much ag experience, so I feel unprepared." Feelings of incompetence were also echoed by Participant #7, who shared "agricultural education is just so broad. During my early field experience, I just felt overwhelmed. I mean how am I going to be able to do all of this in a few years?" These sentiments appeared to form the basis of most students' concerns, but they also provided scaffolding for intense moments of co-construction of knowledge, and, in turn, shaped the ways in which the students planned to move forward. Participant #2 explained,

> When I first saw these pictures, I was straight up like, yup, that's me, that's exactly where I am at right now. But I think we also have to remember that like nine times out of ten, this is going to happen to us everyday. I think we just have to start taking these moments

> as learning experiences because you'll learn something from it that you can use in the future. And eventually, you'll get the confidence and the knowledge you need to teach it better down the line.

In essence, the representations of incompetence captured by the students helped elicit the meaning they collectively assigned to this concern as a result of their EFEs. However, after recognizing that other peers shared this concern, the participants began to negotiate meaning and develop a new way forward. Nevertheless, it is important to recognize that sentiments of incompetence appeared to serve as a foundation for other concerns narrated by the students in this investigation, especially regarding how they framed success.

Framing Success: Depictions of Achievement

"My biggest concern is making sure students are successful. I want to make sure they are proud their program and this is best achieved by hanging up banners. But achieving this is my biggest concern." –Participant #9, Photo Caption

"My biggest concern is I want them [future students] to feel the success of winning their desired contest. But I am worried that all of hard work and commitment it takes to win will make me burned out." – Participant #2, Photo Caption

Figure 2. Photos and captions from Participant #9 and Participant #2.

As the students began to come to terms with feelings of incompetence, their tensions reemerged after viewing photographs (see Figure 2) that depicted success in agricultural education. For instance, Participant #8 shared:

> The idea that you have to win banners to be considered successful is a big concern for me. My FFA chapter was really competitive in high school and we brought home a lot of banners, but I kind of saw some downsides. One of my ag teachers actually got divorced.

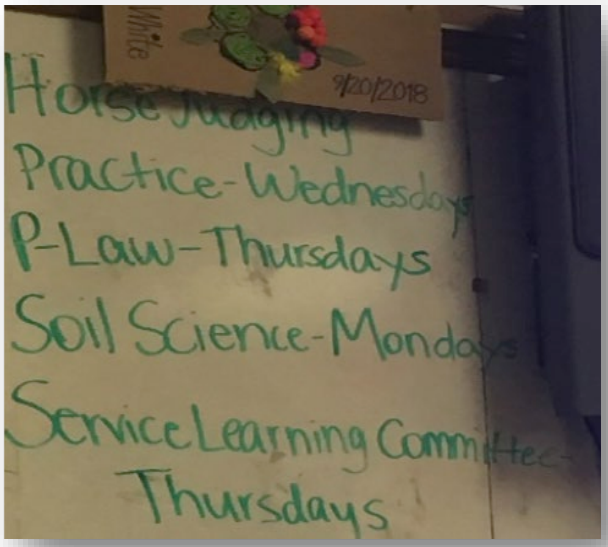
Other students echoed these views as well. As an illustration, Participant #1 revealed that she felt pressure from various individuals to "win and bring home banners." As the students wrestled with such depictions, they began to acknowledge that, perhaps,

the parameters of success could be expanded. Participant #6, for instance, argued, "Obviously winning is important, but I think we just have to keep reminding ourselves to see the big picture." In response, the students began to collectively consider how definitions of success and achievement could be reframed in agricultural education. Participant #9, for instance, argued that more empathy should be shown when *representing* and *talking* about successful teachers in SBAE. She explained,

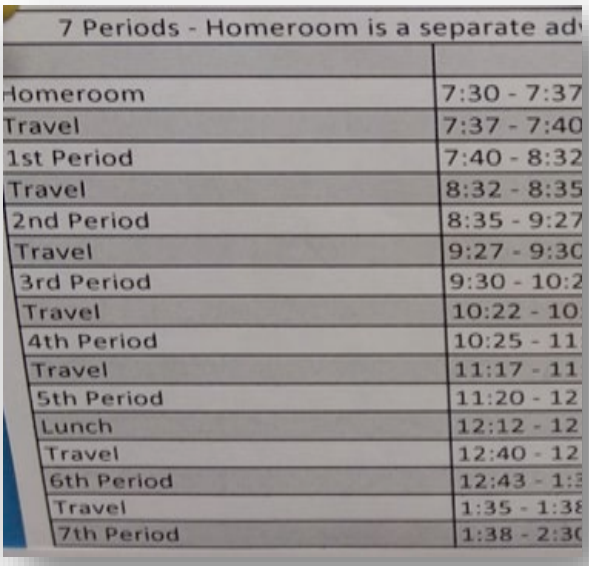
> These photos made me realize that I need to change my perspective on what it means to be a successful ag teacher. I place too much value on winning when in reality it should be about more than just winning.

As students came to understand the role that their representations played in shaping their teaching concerns they began to reevaluate their prior assumptions. For example, Participant #7 shared, "I think if we start picturing it [success] differently maybe it will help relieve some of our worries and stress when we become ag teachers." As such, the students navigated new understandings and acknowledged that their original perspectives should, perhaps, be reframed.

The Narrowest Lens: Views of Time



This is a photo of the white board in Ms. Brock's room. It has her after school schedule. My main concern is the time it takes to ensure students are successful in similar activities. -Participant #10, Photo Caption



7 Periods - Homeroom is a separate ad	
Homeroom	7:30 - 7:37
Travel	7:37 - 7:40
1st Period	7:40 - 8:32
Travel	8:32 - 8:35
2nd Period	8:35 - 9:27
Travel	9:27 - 9:30
3rd Period	9:30 - 10:2
Travel	10:22 - 10
4th Period	10:25 - 11
Travel	11:17 - 11
5th Period	11:20 - 12
Lunch	12:12 - 12
Travel	12:40 - 12
6th Period	12:43 - 1:
Travel	1:35 - 1:38
7th Period	1:38 - 2:30

Mr. Carrie's schedule represents my biggest concern because time seems to be the biggest constraint when teaching. Depending on how much time you are given affects what activities you can do. And this does not even take into account time after school. – Participant #4, Photo Caption

Figure 3. Photos and captions from Participant #10 and Participant #4.

As the students witnessed glimpses of everyday life during their EFEs, the realities of teaching became more real. As a consequence, they began to reject their neat and tidy views of teaching and, instead, represent it in more authentic ways. This notion was especially prevalent regarding the issue of *time*. For example, Participant #2 shared: "These photos make me think about how realistic it is to teach ag. Your schedule is so packed you have very little free time." Participant

#4 added:

> Basically teaching ag is almost like a 24-7 job. Yes, you get to go home, eat, and sleep, but then you wake up, go to school, have class all day, then there is always something going on after school. You've got to work with your students, do stuff for your program, schedule this and that. You have a certain time that you teach, but you still are going to have a way longer day than most people.

The students also felt pressure to emphasize work over their personal time once they enter the teaching profession. Participant #5 elaborated: "I worry that if I am not willing to sacrifice my personal life, someone else will, and I might be out of a job." However, Participant #3 emphasized the importance of coming to terms with this concern. In a moment of critical reflection, she revealed, "when thinking about the big picture, I think this concern could be really good for me. I now recognize that I need to work on my time management and learn how to say no" (Participant #3). As the students began to internalize the realities of time, they articulated that engaging in social reflection catalyzed key shifts in their perspectives regarding their teaching concerns. And, as a result, they would approach their remaining teacher preparation experiences with a new sense of resolve.

Conclusions

The purpose of this investigation was to describe the ways in which agricultural education majors at Louisiana State University visually represented and spoke about their teaching concerns as they critically reflected on an EFE during a community of practice. To accomplish this, we narrated our findings through three themes: (1) *Blurred Expectations: Representations of Incompetence*; (2) *Framing Success: Depictions of Achievement*; and (3) *The Narrowest Lens: Views of Time.* When interpreted through the lens of social interactionism (Crotty, 1998), the findings suggested that students encounter a range of teaching concerns during EFEs (Fritz & Miller, 2003; Paulsen et al., 2015). However, we also conclude that for students in this study, participation in a community of practice in which they reflected on their EFEs helped broaden and expand their perspectives on their teaching concerns in productive ways – a notion supported by existing evidence (Ferriter, 2010; Lock, 2006; Lieberman & Miller, 2011). These findings are encouraging in light of calls for teacher preparation programs in agricultural education to discover ways to help students better navigate their teaching concerns (Claycomb & Petty, 1983; Edwards & Briers, 1999; Fritz & Miller, 2003; Garton & Chung, 1997; Hillison, 1977; Johnson, Lindhardt, & Stewart, 1989; Stair et al., 2012).

In our analysis of students' emergent concerns, the first theme suggested that students grappled with feelings of incompetence. This finding aligns with those reported by Stair et al. (2012) concerning the role that self-concerns play in shaping agricultural education majors' efficacy. We conclude, therefore, that building their self-efficacy and competence through critical reflection on EFEs is a crucial strategy to help ensure that students enter the profession confident in their abilities. Perhaps, this strategy could also be useful for other teacher preparation programs in the U.S. as they seek to address agricultural education's current teacher shortage (Smith et al., 2018). In our second theme, students' depictions of success as *winning banners and awards* emerged key tensions. As they assigned new meaning to this concern through co-

construction, however, the agricultural education majors embraced a more sophisticated view of success. To this point, little evidence exists regarding the role that social reflection on EFEs plays in shaping postsecondary agricultural education students' views of success as secondary agricultural education teachers. The final theme spoke to how the EFEs opened the students' eyes to the realities of teaching, especially in regard to the time required to effectively deliver agricultural education's comprehensive, three-circle model. This notion aligns with some existing evidence reported by other researchers (Baker et al., 2017; Smalley & Retallick, 2012). However, we also conclude that a critical reflection on the concerns that students encountered during EFEs allowed them to glean valuable insights and, perhaps, matured their perspectives on teaching – a notion not currently reported in the literature.

Implications, Recommendations, and Discussion

Because of the critical need for teacher preparation programs to enhance the recruitment and retention of SBAE teachers (Kantrovich, 2010; Talbert et al., 2007; Smith et al., 2018), this study's findings illuminated a number of possibilities for future research and practice. However, more work is needed to understand how society, culture, attitudes, interactions, and previous experiences shape students' concerns. For instance, future research should examine the ways in which agricultural education majors' concerns may influence their use of teaching methods, assessments, and coaching strategies after becoming SBAE teachers. Additional effort is also needed to understand how students' concerns influence the outcomes of EFEs. In this investigation, for instance, we described three critical dimensions of agricultural education majors' concerns. Moving forward, we recommend that teacher educators emphasize such concerns in their teacher preparation courses. This practice could open up critical conversations in which the students disclose more concerns, which allows teachers educators to better respond through additional resources and support.

Through our analysis of data, we also demonstrated how students' concerns formed an evocative narrative. Despite this, however, additional examination is needed to determine whether this storyline can be applied across agricultural education's diverse teacher preparation programs. Therefore, we recommend that future investigations explore how students' concerns influence the discourse, curriculum, and EFEs in teacher preparation. Our findings also suggested that social reflective practices during a community of practice helped the students come to terms with their concerns. For example, students articulated the importance that the co-construction of knowledge played in facilitating their new perspectives. As a consequence, additional research should explore the reflective techniques that most profoundly help students to successfully process and make meaning of their concerns over time.

We also recommend that professional development opportunities be created for teacher educators so that they can acquire a better understanding of effective strategies that can be used to assist students in navigating their teaching concerns. Further, teacher educators should also consider new ways to engage students in EFEs to help mitigate their concerns. For example, perhaps the use of video and virtual reality could be used to augment agricultural education majors' EFEs in the future. Such could be achieved by teacher preparation programs partning with agricultural education state supervisors, teachers, and students to create content that students could engage in though coursework more frequently.

To this point, existing research in agricultural education has largely attempted to measure students' concerns (Fritz & Miller, 2003; Stair et al., 2012). However, by interrogating the phenomenon from a qualitative approach, this study provided unique insights into students' concerns. Further, symbolic interactionism (Crotty, 1998) served as flexible and useful lens for storying the phenomenon. However, we recommend that future investigations design their research using a variety of conceptual and theoretical perspectives. Perhaps, by examining this phenomenon with a different lens and set of assumptions, more complex dimensions of agricultural education majors' concerns might be discovered. Through our intent to story students' concerns, we demonstrated how such helped broaden opportunities for future research and practice. By more intensely investigating how such concerns intensify, blend, and collide in diverse settings, we argue that further limits and possibilities of agricultural education majors' concerns could be revealed.

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Intent to Teach: Perspectives from Pre-Service Agricultural Education Teachers

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Abstract

Historically, less than two-thirds of all newly certified agricultural education students enter the school-based agricultural education (SBAE) teaching profession. Teacher educators must understand preservice teachers' intention to teach to help fulfill the demand for SBAE teachers. This study examines the motivations to consider a teaching career in SBAE for eight Oklahoma State University preservice teachers in the early, mid, and late stages of their teacher education coursework. Qualitative methods were employed to describe these individuals' intention to teach SBAE. Interviews and artifacts in the form of participant drawings and autobiographies were collected and analyzed. Six categories emerged from the data analysis, including: expectations of the teaching profession, the love of the FFA, the need for relevant instruction, community, a variety of learning environments, and career intent. Researchers found the theory of planned behavior (Ajzen, 1991) explained SBAE preservice teacher's intention to teach. Additional research within a larger sample is recommended.

Introduction and Review of Literature

"Numerous challenges continue to face the agricultural education profession, but none more important than the preparation and provision of qualified teachers" (Eck & Edwards, 2018, p. 12). Weaver (2000) emphasized the need for the agricultural education profession to develop an approach to recruit and retain effective SBAE teachers. Although teacher preparation programs are preparing record numbers of potential SBAE teachers, only 60% tend to enter the profession, based on over 50 years of trend data (Camp, 2000; Foster, Lawver, & Smith, 2016). Miller (1973) recommended further investigation into the following questions, "What factors deter prospective students from entering the [SBAE] profession?", and "Why do those trained in the profession choose not to enter it?" (p. 25).

Roberts, Harlin, and Briers (2009b) found the greatest predictors of intent to teach were the teacher preparation program and students' motivation to teach prior to their student teaching internship. Other studies have indicated an individual's intention to teach was influenced greatly by their previous experience in an SBAE (Ingram, Sorensen, Warnick, & Lawver, 2018; Kasperbauer & Roberts, 2007). Therefore, intention to enter the profession should by studied in early preservice teachers, before the student teaching internship, "to determine when this decision is typically made" (Roberts et al., 2009a, p. 134).

Multiple sources of motivation exist for those entering the teaching profession (Evans, 2011). Gilad and Alkalay (2014) summated the motivational factors as a mixture of altruism and narcissism. That is, teachers enjoy helping students for the personal satisfaction they receive in return. Evans (2011) identified more specific motivators such as interest in subject area, potential

for social impact, and a stable working environment. In addition, teachers are motivated by support systems, self-efficacy, and opportunities to impact students (Sylvia & Hutchison, 1985).

Intrinsic motivators also play a role in intention to teach (Grabski, 2015). Various teachers choose to enter the teaching profession based on their enjoyment of school as a student (Landrum, Guilbeau, & Garza, 2017). Ingram, Sorensen, Warnick, and Lawver (2018) identified the majority of SBAE teachers entering the profession had previous personal experience in SBAE. They identified the themes of social influence, values, passion for agriculture, and agricultural education experience as influential factors for why people choose to teach SBAE.

In general, SBAE teachers are satisfied with their job duties and responsibilities (Kitchel et al., 2012; Walker, Garton, & Kitchel, 2004). In fact, Solomonson and Retallick (2018) found SBAE teachers who decided to leave the profession had the same level of satisfaction as those who remained. However, various stressors of the job have been shown to lead to SBAE teachers exiting the professin before retirement (Lambert, Ball, & Tummons, 2011). Attrition rates are greatest among SABE teachers within the first three to five years in the profession (Allen, 2005; Kantrovich, 2007). Walker et al. (2004) found SBAE teachers who remained in the profession had an increase in overall job satisfaction, as the duties became easier and the workload more manageable. Roberts and Dyer (2004) related the stressors in education to strict graduation requirements, high-stakes testing, and school grades, all of which "are indicative of an increased emphasis on student and teacher performance" (p. 82). Other studies identified administrative support to be a stressor for early career teachers (Boone, 2003). Dealing with parents (Billingsley & Cross, 1991), having other vocational goals, receiving low pay, laboring long hours, and working with and for difficult administrators have all been found to be additional stressors for teachers which result in their premature exit from the profession prior to retirement (Moore & Camp, 1979). The two greatest detractors for candidates desiring to teach generally revolve around "money and status" (Sinclair, Dowson, & McInerney, 2006, p. 1133).

Attracting and retaining the right kinds of teachers is vital for the profession and "is important for financial and personal reasons" (Sinclair et al., 2006, p. 1133). People are generally motivated in activities they find attractive (Dowson & McInerney, 2003). Teaching is no different. Although numerous studies have focused on reasons teachers choose to remain in or leave the profession, little work has been done to assess the reasons people choose to teach in the first place. Knowing why pre-service teachers desire to enter the profession may help "teacher education providers and courses to appeal to those motivations" (Sinclair et al., 2006, p. 1134). Therefore, what are pre-service agricultural education teachers' motivations to teach?

Theoretical/Conceptual Framework

The theory of planned behavior (TPB) framed the study (Ajzen, 1991). TPB focuses on an ". . . individual's intention to perform a given behavior" (Ajzen, 1991, p. 181). In the context of this study, the behavior is entering the profession as a SBAE teacher. Identifying the intentions related to a career as a SBAE teacher allows the researchers to determine how ideas and/or theories, ultimately lead to a specific behavior.

Intentions are key factors in motivating the eventual behavior or action (Ajzen, 1991). An individual's intentions are assumed to encompass the motivating factors leading to the behavior (Ajzen, 1991). Using Ajzen's (1991) model, we considered three determinants of a student's intention, i.e., attitude toward the behavior, subjective norm, and perceived behavioral control (see Figure 1). An individual's attitude toward the behavior can be either favorable or unfavorable depending on the situation being experienced (Ajzen, 1991). The subjective norm relates to social pressure the individual perceives from peers based on his or her intention to perform the behavior (Ajzen, 1991). The perceived behavioral control explains an individual's perceived level of difficulty related to the behavior in question, assuming past experiences and observations (Ajzen, 1991). All three determinants have the potential to influence intention, ultimately impacting a person's behavior (Ajzen, 1991).

For our study, we posited agricultural education students align their beliefs of attractors and detractors of a SBAE career with their intentions to teach SBAE. These factors potentially play a role in their decision whether or not to remain in the profession until retirement.

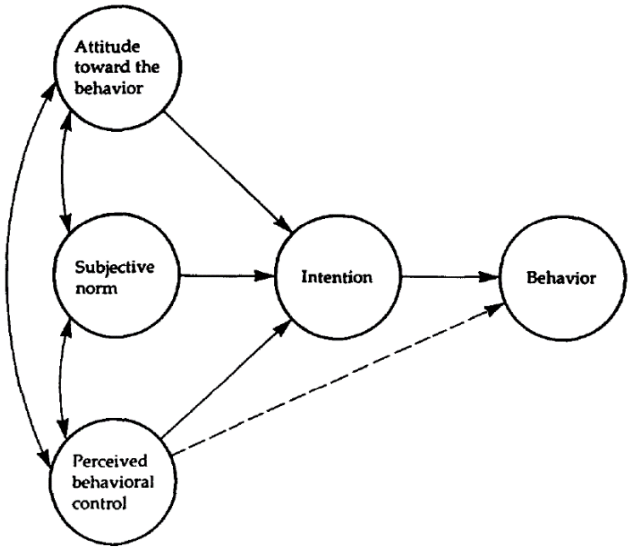

Figure 1. Ajzen's (1991) Theory of Planned Behavior Model. Retrieved from The Theory of Planned Behavior Article (p. 182), by Icek Ajzen 1991, in the *Organizational Behavior and Human Decision Process Journal, 50,* 179-211.

Purpose of the Study

The 2017 agricultural education teacher supply and demand study (Smith, Lawver, & Foster, 2018) identified the continued demand for SBAE teachers, along with the highest ever conversion rate of graduates (75%) entering the teaching profession. Agricultural education teacher preparation programs prepared 740 graduates nationwide in 2017; however, only 556 entered the teaching profession, requiring school districts to employ in excess of 400 alternatively certified or non-licensed teachers to fill vacant positions (Smith et al., 2018). Therefore, the purpose of the study and the overarching research question was to describe Oklahoma State University (OSU) pre-service teachers' intent to teach SBAE.

Methods and Procedures

This exploratory, qualitative inquiry investigated pre-service agricultural education teachers' interests and intentions as they pertain to a future career in SBAE. Qualitative inquiry was used because Roberts et al. (2009b) recommended "a qualitative lens [can] provide additional opportunities for understanding the decision making process [to teach]" (p. 143). Therefore, this study sought to provide deep, rich information regarding students' intent to teach.

Students in the agricultural education teacher preparation program at OSU served as the population of interest. A purposive sample was employed with OSU students throughout the program (n = 8), at each stage of the teacher preparation program. The sampling method included recruiting two students in their first semester of the agricultural education program (Course 1), three students in their final semester prior to student teaching (Course 2), and three students in their student teaching internship (Course 3). Students were sampled from each of these three points within the agricultural education program, as they represented various personal and programmatic characteristics important to the study: a mix of in-state and out-of-state students, a mix of sexes, and a mix of student classifications and years in the major (i.e., first semester of the major – Junior year, third semester of the major – Senior year, and final semester of the major – Senior year, student teaching internship).

Each participant was provided a pseudo name to allow proper tracking and triangulation across various the data sets. The pseudo names and participant descriptions are identified based on course enrollment (see Table 1). In addition to the information provided in the table below, it is important to know that each participant participated in agricultural education and FFA as a secondary student.

Table 1
Agricultural Education Students Who Participated in the Study (N = 8)

Pseudo Name	Sex	Course	Home Location	Classification
Clark	Male	Course 1	In-state	Junior
Garrett	Male	Course 1	In-state	Junior
Walker	Male	Course 2	In-state	Senior
Linda	Female	Course 2	In-state	Senior
Kerry	Female	Course 2	Out-of-state	Senior
Clint	Male	Course 3	Out-of-state	Senior[a]
Leonard	Male	Course 3	In-state	Senior[a]
Amanda	Female	Course 3	In-state	Senior[a]

Note. [a]Indicates participants conducting their student teaching internship.

Qualitative studies utilize multiple forms of data to analyze how an individual chooses to shape his or her own reality (Creswell & Poth, 2018). Personal interviews, drawings, and student teacher autobiographies served as points of data collection. The face-to-face interviews followed a flexible interview protocol. The protocol utilized six open-ended questions including: 1) How would you explain your ideal agricultural education program?; 2) What attracts you to a career as

an agricultural education teacher?; 3) What are the detractors regarding a career as an agricultural education teacher?; 4) Why do you intend to teach agricultural education?; 5) Where do you see yourself five years from now?; and 6) Do you intend to retire as an agricultural education teacher? Why or why not? The interview protocol also included probing questions to help facilitate conversation and was checked for face and content validity (Salkind, 2012) by two faculty members and two graduate students in the agricultural education department. All members had taught agricultural education previously at the secondary level for a minimum of three years and are currently preparing future SBAE teachers to enter the profession. Further, all members have completed coursework in qualitative research methods and have had experience with qualitative research studies. Therefore, each member was deemed competent at providing insight on the interview protocol. In addition to the six open-ended questions and probing questions asked in the protocol, the participants were asked to draw a sketch of their dream job as an agricultural education teacher and then explain the drawing. The sketches allowed us a visual mental model (Moseley, Desjean-Perrotta, & Utley, 2010) of the perceptions students have for their future as an SBAE teacher. These drawings served as important artifacts that were later used as a source for triangulation.

The interviews were recorded using the Temi app on an iPad. The lead researcher took detailed interview notes on students' expressions, emotions, and key points captured during the interview. The same interviewer conducted all eight interviews for consistency and trustworthiness of data collection. All students from Courses 2 and 3 had completed student teaching autobiographies as previous course assignments. These autobiographies are shared with potential cooperating teachers during the student teacher placement process. They contain demographic information in addition to self-perceived strengths and weaknesses in relation to teaching SBAE. Therefore, all students' autobiographies were used as data and analyzed for key themes to triangulate with interview themes. Unfortunately, the autobiographies were not available for the two students in Course 1 and could not be used for triangulation of themes for those students.

The interviews were transcribed using the Temi app software, producing transcriptions in a Microsoft Word document. The research team reviewed the transcriptions against the audio recordings to verify accuracy. Participants were assigned an interview number which connected them to their interview transcription and drawing artifact. Students' personal identifying information was removed from all data sources (i.e., interview transcriptions, drawing artifacts), and a corresponding number linking all three data sources for review, analysis, and comparison was used instead.

Privitera (2017) listed four criteria for ensuring trustworthiness of a qualitative study. These criteria include: credibility, transferability, dependability, and confirmability. Credibility was addressed through the use of audio recordings, interview transcriptions, and primary interview field notes, allowing the data to reflect the true opinions of the participants (Privitera, 2017). Although the data collection is limited to participants at OSU, the use of purposive sampling and collection of pertinent demographic information allow the data to have potential transferability to students in similar institutions. Using an interview protocol with a range of students (see Table 1) throughout the agricultural education program at OSU provides dependable, consistent data (Privitera, 2017) with students in the program. Confirmability speaks to need for the results to reflect the perspectives of the participants and not the researchers (Privitera, 2017), in which the

participants' voice was reflected throughout the research protocol, while also triangulating data with participant-developed artifacts, i.e., drawings and autobiographies.

The constant comparative method (Glasser & Strauss, 1967) was implemented for qualitative analysis of the interviews. The method is based in grounded theory, allowing the data to speak for themselves, with themes emerging from the analysis (Glasser & Strauss, 1967), producing a theoretical explanation (Corbin & Strauss, 2007). The research in this study focused on the process (Creswell & Poth, 2018) of completing an agricultural education degree at OSU and obtaining the required credentials to enter the teaching profession as a certified SBAE teacher in Oklahoma. Therefore, the coding process aimed to determine preservice teachers' intentions to enter the profession using Ajzen's (1991) theory of planned behavior as a framework. Using open-coding sources, themes were allowed to emerge during the first round of data coding (Creswell & Poth, 2018). Second-round coding followed axial coding principles, connecting similarities and identifying relationships between the open codes, resulting in categories (Creswell & Poth, 2018; Glasser & Strauss, 1967). The final round of coding was selective coding, determining the core variables from the emerged data, ultimately being connected to the theory of planned behavior (Ajzen, 1991).

In addition to three rounds of coding, student teaching autobiographies and the drawing artifact were analyzed to provide triangulation of students' intentions, as they relate their intent to pursue a career in SBAE. The drawing artifact emerged from the opening statement of the interview protocol, where students were asked to draw their dream job as an agricultural education teacher. Student teaching autobiographies are part of the curriculum in the agricultural education teacher preparation program at OSU and were available for six of the eight participants. The data collection was limited to eight agricultural education students at OSU in the Spring 2018 semester. This purposive sample is a limitation to the study as the data are not generalizable on a state or national level. Therefore, the findings of this exploratory study are intended only to inform practice at OSU, helping to guide future research, and potentially offer program-wide implications; although, this study has the potential to be transferable to peer institutions with similar characteristics. Readers are cautioned against generalizing the data, but they are encouraged to determine how the data might apply to students at their respective institutions based on comparing their personal characteristics to those represented in this study.

Reflexivity Statement

It is important that qualitative researchers reveal their identify and any inherent bias that may have impacted the study's results (Palaganas, Sanchez, Molintas, & Caricativo, 2017). Our research team consisted of two graduate students and a faculty member in agricultural education at OSU. Each of us had taught SBAE previously in three different states. In total, our team had 12 years of SBAE teaching experience. We recognize our bias toward SBAE instruction, and we attempted to harness that bias through field notes and bracketing of the data.

Findings

After three rounds of coding using the constant comparative method (Glasser & Strauss, 1967), three theoretical components emerged: attitudes toward teaching in SBAE, subjective norms within an SBAE program, and intentions to pursue a career in SBAE. The study's findings

emerged from the initial codes derived from the transcriptions, leading to pertinent themes and categories. We developed initial codes from the data, which lead to the themes and categories that ultimately tied back to the theory of planned behavior (Ajzen, 1991). The codes, themes, and categories were used to explain agricultural education students' intent to pursue a career as a SBAE teacher. Pseudo names were used to connect students' responses back to their drawings for triangulation purposes (see Figure 2). Six categories emerged from the findings. The six are: expectations of the teaching profession, the love of the FFA, the need for relevant instruction, community, a variety of learning environments, and career intent.

Category 1: Expectations of the Teaching Profession

The category, Expectations of the Teaching Profession, enabled students to discuss both the positives and negatives related to teaching: the two major themes of Category 1. Overall, pre-service teachers held positive attitudes regarding the teaching profession. Clark stated excitedly, "I'm really looking forward to teaching." He indicated that it (teaching) was his dream job. Similarly, Walker also noted that teaching "would be my dream job." Garrett aligned with this thought. He was especially encouraged by the variety of teaching opportunities SBAE offers. He stated, "I love the idea that not every day is the same." The term "passion" was used to describe Amanda's thoughts about teaching. In addition to emotional attitudes related to becoming a teacher, other students took more of a pedagogical outcomes approach to responding to the question. Kerry stated, "I want students to leave my class career or college ready." Linda admitted that education is important and that it should be valued. Leonard spoke to developing students' knowledge of agriculture as the reason he is excited to become an SBAE teacher.

Although students were largely positive about their future as teachers, they recognized the need to temper their excitement and refrain from over-romanticizing their future careers. Linda was perhaps most outspoken about this. She stated flatly, "I've seen educational hardships" and that "education isn't [always] beautiful." When discussing the drawbacks of becoming a teacher, Leonard and Kerry both admitted that dealing with parents can be a stressor, while Leonard and Amanda spoke about the program's ability to become a monster that has to be fed constantly as a negative to becoming a teacher. Leonard stated pointedly, "I do not want a program to become my life." Clark resonated with this thought by stating that long hours spent on the job was the biggest detractor for him regarding his desire to become a teacher.

Category 2: The Love of the FFA

Students spoke highly and at length of the FFA's ability to develop leadership skills within its members. Students recognized FFA as a major attractor of the SBAE program. The major themes emerging from Category 2 were: Leadership and Competition. Kerry admitted that she loved leadership as a SBAE student and FFA member. It was in the FFA that she found her calling to be a teacher. Linda agreed and was more precise by admitting it was the leadership development events (LDEs) that enabled her to flourish in high school. She added that LDEs had the greatest impact on her "personal development" as a youth. Leonard, Amanda, and Clark also recognized that the FFA was a tremendous portal for developing their leadership skills. In addition, they agreed with their counterparts that LDEs were the activities that enabled them to develop their skillsets best. However, each of them recognized a different LDE that made the greatest

contribution to their success. For Leonard, it was public speaking. Amanda found her stride with parliamentary procedure. Similarly, Clark noted "Conduct of Chapter Meetings" as the LDE that made the biggest impact on him and his career decision to become a SBAE teacher.

The second major theme emerging from the FFA Category was competition. Each of the students was a proponent of competition. Each admitted to thriving on competition as youth, and all recognized they remain competitive today. Leonard stressed, "I'm really, really competitive." Regarding the role competition would play in his teaching, Clark stated: "I know that I could coach a lot of students" to success. Leonard stated bluntly that his competitive edge would allow him and his students to "win a lot of stuff." Linda also admitted she was very competitive, but she provided a wider view of how competition drives her to become a teacher by advocating that she would be able to provide students with "opportunities to extend beyond FFA." In other words, she would use FFA as a context to teach her students about life beyond high school.

Category 3: The Need for Relevant Instruction

As students continued explaining their desire to become teachers, it became apparent that each had an affinity for being able to provide relevant instruction. Two themes: Teaching Opportunities and Class Offerings, emerged in their responses. Regarding the importance of teaching opportunities, both Clark and Leonard spoke to the appreciation they have regarding SBAE being an elective offering because it enables them the freedom to teach in such a way that is meaningful, relevant, and retainable to the students. Specifically, each mentioned the importance to facilitate hands-on instruction. Students hinted that SBAE is unique in its ability to teach in such a way that resonates with students. Linda also recognized that due to spending long hours with students both in and out of the classroom allows SBAE teachers to "advocate for students" and build deep, quality relationships with them that other teachers cannot. She also noted that the ability to provide adult education was a major attractor for her considering a SBAE teaching position. The idea behind her thoughts was that teaching adult education and investing intently with youth was a good way to earn trust and make a meaningful difference in the lives of her students and families.

Students also were quick to recognize that the classes and age groups of students they could ultimately teach was an appealing part of the job. Interestingly, each student shared a different class he or she was excited to teach. Both Walker and Garret were most excited to teach the younger students. Walker stated, "Having a freshman class would be outstanding!" while Garret advocated for teaching an eighth-grade class. Amanda, Kerry, and Clark were most interested in some of the advanced science offerings. Amanda hinted that she would "maybe [like teaching] a food science class. Her rationale for wanting to teach such a class stems from a general lack of the general public's understanding of where their food comes from and how it gets to their dinner table. Kerry mentioned horticulture is the class she is most excited about teaching. Her love of plants and the greenhouse led to her excitement to teach the curriculum and content related to the horticultural industry. Clark mentioned Natural Resources as the class he is most interested in teaching. As an outdoorsman, he loves hunting and fishing. Being able to teach those skills to his future students is appealing to him. Interestingly, Linda recognized the opportunity she would have as a SBAE teacher to instruct adults. This notion of adult education is intriguing to her. She mentioned her desire to offer a "weekend adult workshop" on the topic of "agricultural literacy."

Category 4: Community

Working and living in a close, tight-knit community was appealing to students regarding their intent to teach. Linda, Walker, and Leonard discussed their desire to teach in a small, rural community. The appeal of such places to these students resides in the community support (Linda, Amanda, and Kerry), the volunteerism (Leonard), and fundraising capabilities (Clark) where the entire community rallies behind the school and its needs.

Advocacy also emerged as a theme under the community category. Leonard stated that in small, rural towns the "community perceives the FFA chapter to be above and beyond" other disciplines and school-related activities. The opportunity to work extensively with students (Amanda) and facilitate agricultural literacy and education (Linda and Walker) with various members of the community are enticing aspects of teaching SBAE in small, rural communities.

Category 5: A Variety of Learning Environments

Students discussed the various learning environments of SBAE programs are unique aspects when compared to other disciplines. Two themes: facilities and educational opportunities emerged in Category 5. Regarding facilities, Amanda appreciated how "facilities are all right on campus." In her opinion, although there are a variety of learning environments in SBAE programs, the fact that they are all together in one location makes using them fun and doable. Other students spoke directly to the specific facilities they are most excited to use. The greenhouse (Clint and Kerry), school pickup (Clark), and classroom (Garret) were all referenced as positives when considering students' intent to teach.

The educational opportunities that SBAE offers students also was deemed a value-add for participants. Garret discussed his appreciation for being able to leave the school premises and take students on a field trip to solidify the content he was teaching. Although not against taking field trips, Amanda advocated that "learning can be wherever we are at." Perhaps Linda said it best when she stated, "My program will be shaped by kids' interest."

Category 6: Career Intent

When asked about their long-term plans as teachers, seven of the eight admitted they intend to teach. Walker plans to teach in Oklahoma, and Clark is open to teaching anywhere. Amanda stated excitedly that she "definitely intends to be in an ag classroom" somewhere. Leonard followed suit by stating, "I don't know where, but I will be teaching ag." Linda added, "I see raising my kids in the back of an ag truck." Clint was the sole pre-service teacher who replied, "I don't think so," when asked if he intends to teach SBAE.

Unfortunately, considering the overwhelming positivity regarding pre-service teachers' desire to enter the teaching ranks, only three intend to make it a lifelong career. Clark admitted, "I don't think it's (teaching SBAE) something I would want to do the rest of my life." Leonard also admitted that he is "not seeing it" pertaining to his desire to teach through retirement. Kerry offered that, in time, she might be interested in pursuing a different degree and making a career

change. In contrast, Linda and Amanda articulated their desire to retire as teachers. Linda stated pointedly, “I don’t want to leave this profession.” Amanda said simply, “I really see my career here (in SBAE).”

In addition to the interviews, pre-service teachers’ drawing artifacts (see Figure 2) and student teaching autobiographies were analyzed to compare the results and to triangulate the data. The drawing artifacts were prompted by asking pre-service teachers to draw their dream job as an agricultural education teacher. Each participant was provided roughly two minutes to complete the activity. Figure 2 provides each pre-service teachers’ drawings (n = 8). After drawing their sketch, the participants explained their depictions. Clark sketched a pig, along with a first-place trophy, and a welding cart to depict his interest related to an ideal SBAE program (see Figure 2). Garrett provided a drawing of three buildings, identifying them as a classroom, livestock barn, and greenhouse (see Figure 2). Amanda depicted an agricultural education building with the SBAE teacher and three students outside working with a cow (see Figure 2). Linda drew three students leaving the agricultural education building with the SBAE teacher to go to an event in the school pickup (see Figure 2). Leonard sketched multiple mini-drawings, depicting the facilities (i.e., agricultural education building and greenhouse), while also providing an image of the teacher and three students working in the classroom (see Figure 2). Clint took a different approach to drawing his ideal SBAE teaching position by listing the three courses (i.e., animal science, meat science, and mechanics) he preferred, as well as the three career development events (i.e., parliamentary procedure, meat judging, and livestock judging) he aspires to prepare students (see Figure 2). Walker drew a picture of a pig, explaining the importance of livestock in his ideal program (see Figure 2). Kerry provided a drawing of a large SBAE building with a teacher and three students outside, looking at the outdoor teaching resources, including flowers and livestock (see Figure 2).

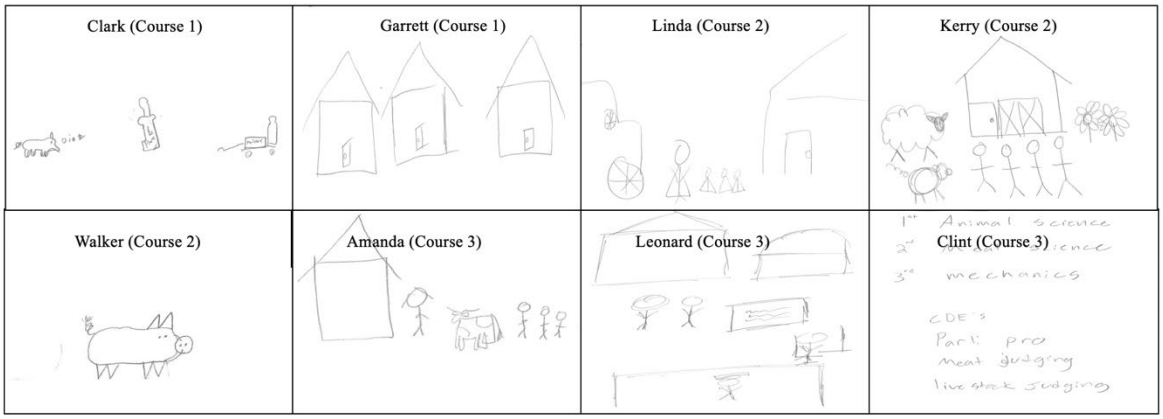

Figure 2. Drawings from Participant Interviews.

The six student teaching autobiographies available were analyzed and depicted past experiences in SBAE, intentions related to entering the profession, and beliefs about education, SBAE, and the FFA. Amanda stated poignantly: “I believe the education system is the backbone of the United States. Without educators we would have no jobs, business, or literacy.” In addition, her closing statement was, “I was inspired by a great teacher to be an educator, I only hope to do the same for my future students.” Clint wrote, “although agricultural education is only a small

portion of the educational system, it is one of the most important things a person could learn." Kerry concluded, "teaching agricultural education is both a privilege and honor. We get to be the ones influencing the future of agriculture every single day giving us a chance to shape and mold minds." Walker identified agricultural education as "something that should be a part of a high school student's educational career because agriculture affects everybody in more ways than one." He concluded his autobiography with the statement, "I am an agricultural education instructor with a passion to help students find their passion in agricultural education and in the FFA organization." Clark stated, "I believe school-based agricultural education programs can be an instrumental part of every kids' life." He followed his thought with, "I know that due to my time in SBAE I became a better person through exposure to new topics."

Conclusions

Aligning the findings with Ajzen's (1991) TPB model (see Figure 1), provides a lens in which to consider the attitudes, subjective norms, and behavioral controls associated with agricultural education students' intention to enter the SBAE profession, ultimately predicting their behavior. The majority of participants ($f = 7$, 88%) intend to enter the SBAE teaching profession, providing an overarchingly favorable attitude toward teaching SBAE (Ajzen, 1991). Although this study provided a small sample ($n = 8$), its findings in this regard align with the ongoing trend over the past 50 years with the majority of the students prepared to teach actually entering the profession (Eck & Edwards, 2018). Participants were attracted to a career in SBAE because there is always something new and they are passionate about developing students for college and career readiness and to become agriculturally literate citizens. These responses align with goal three of the national research agenda, providing a sufficient scientific and professional workforce that address the challenges of the 21st century (Roberts, Harder, & Brashears, 2016), as well as findings by Roberts and Ball (2009). In addition, participants in this study reported their involvement in SBAE as high school students led them to their intent to teach, which aligns with Ingram et al.'s (2018) study that positive previous involvement in SBAE can lead to an interest in becoming a SBAE teacher.

The subjective norms encompass the social pressure from peers regarding their intention toward the behavior (Ajzen, 1991). The participants were not only part of the same agricultural education teacher preparation program, but were also part of cohorts within the program that will student teach together. In the main, these pre-service teachers have a desire to remain in the profession for their entire career, as teaching SBAE is their passion. For those who stated they have no intention of retiring in the profession and are considering other options after initiating their teaching career, the reasoning was not due to dissatisfaction with SBAE, which parallels findings from Solomonson and Retallick (2018).

Regarding the perceived behavioral control, (Ajzen, 1991), much of the difficulty impacting a person's intention can be related to past experiences or observations related to the behavior (Ajzen, 1991). Since all participants were involved in SBAE as students and have had additional opportunities for SBAE observation throughout their teacher preparation program, multiple potential detractors arose. Parents were identified as a major potential stressor of an SBAE career, which is supported by the findings of Billingsley and Cross (1991). In addition, long hours and programs becoming monstrous in scope and size were concerns for these participants.

Such findings align with Moore and Camp (1979), suggesting not much has changed in limiting these detractors to teaching SBAE in the previous forty years. When asked about an ideal SBAE program and work environment, the community and the learning environment for students were the two greatest concerns. Students want to be in a community where the SBAE program is valued and there are community members who support the cause. In addition, having facilities such as a quality classroom, greenhouse, laboratory, and school vehicle to support student learning are all important components to potential SBAE teachers as they consider taking a position in the profession. With continual emphasis on student and teacher performance (Roberts & Dyer, 2004), the need for a supportive community and facilities conducive to a quality learning environment are of great importance. Overall, determining SBAE students' intentions related to a career in the profession is obtainable, and their attitudes and beliefs align with their intentions, which corresponds well with Ajzen's (1991) TPB.

Recommendations

The findings from the study can inform the SBAE teacher preparation program at OSU on pre-service teachers' intent to teach. Although this study was university and program specific, multiple aspects present potential implications for future practice for peer institutions with similar populations. It is recommended that the study be replicated with a larger pool of pre-service teachers. Additional interviews should be conducted to attempt to reach content saturation related to students' intent to enter and remain in the SBAE profession at OSU. Peer institutions should consider replicating this study to determine the intent of their potential SBAE teachers and how they compare to those found in this study. Conducting this additional research can help to determine if the findings of this study represent a phenomenon within Oklahoma or if similar perceptions exist regionally, or even nationally. Further, research should investigate the impacts of these attractors and detractors of the profession incrementally throughout these pre-service teachers' careers, i.e., after the first year, during year three, after year five, during year 10, and after year 20. Following these pre-service teachers throughout their academic career and into their teaching career, longitudinally, would allow us to determine the impact of these findings and if motivations change over time. This information should be shared with other pre-service teachers to create a dialogue regarding their intent to teach and how certain attractors and detractors could lead to longevity or impact a career choice prematurely.

Discussion

Pre-service teachers listed numerous examples of motivators for becoming a SBAE teacher. A healthy portion of these motivators were more intrinsic in nature (i.e., building relationships with students and parents and offering community workshops for adults). As such, these motivators may be more sustainable over time and lead to a longer tenure in the teaching profession (McInerney, 2006). In contrast, a few examples of what motivated pre-service teachers to enter the teaching ranks dealt with more extrinsic desires (i.e., driving a school vehicle, teaching in a greenhouse, and coaching winning LDE teams). These motivators are not as sustainable and, if overplayed, could lead to early migration on the part of these participants (McInerney, 2006).

Fortunately, the pre-service teachers alluded to numerous positive aspects of their intent to teach. Although each participant listed some drawbacks to the job (i.e., working with parents and

building program that is unsustainable), they did not appear to be overly motivated by negative aspects of their future profession. Perhaps teacher educators should focus on the intrinsic motivators that will lead to sustained performance in the profession and downplay the extrinsic motivators that initially attract candidates.

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First-year Agriscience Teacher Personal Resilience and Well-being

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Abstract

In this mixed methods study, quantitative data on demographic characteristics, personal resilience, and well-being were collected from first-year agriscience teachers. In the qualitative portion of the study, semi-structured interviews were conducted with four first-year agriscience teachers. On the quantitative measures, respondents had low to moderate levels of resilience across the seven dimensions of personal resilience. Mean well-being scores ranged from moderate to high for the 14 indicators of well-being. Six major themes emerged from the interview data: needing support, shortage of resources, heavy workload, student impact, staying motivated, and time for self. Childhood and adolescence experiences provided useful insight into the respondents' personal resilience and well-being scores. Agriscience teachers should proactively manage their resilience levels and become aware of the impact of personal resilience and well-being on their capacity and motivation for effective teaching. In addition, students graduating from agriscience teacher education programs should be well versed in mindset, personal resilience, and well-being and understand how these constructs can be operationalized in their teaching.

Keywords: mindset, personal resilience, hardiness, well-being, agriscience teacher

Introduction

Public school teachers endure high scrutiny and judgment from numerous sources, particularly policy makers and the strict regulation that accompanies these policies. Low levels of satisfaction with educational quality have become common in the United States (Gallup, 2018). Teachers are largely held accountable for educational quality and often face heavy blame when schools or students underperform (Ingersoli, Sirinides, & Dougherty, 2018). Teachers must adhere to governmental policies and requirements for standardized testing, yet many teachers feel the heavy emphasis on testing is counter to what they believe is best for their students (Glazer, 2018). Correspondingly, students have shifted their focus to simply passing tests at the expense of deeper learning. Additionally, the teacher accountability system has added increased pressure on teachers. (Glazer, 2018).

Across grade levels, teachers face a lack of autonomy. They often receive insufficient administrative support and face tight scrutiny in the beginning stage of teaching (Glazer, 2018). Some districts have adopted the practice of terminating non-tenured teachers at the end of each school year and rehiring them after all tenured teachers have been reappointed. This practice leaves beginning and new teachers with little job security or stability (Glazer, 2018).

Teaching, in general, has been classified as one of the most stressful careers in the 21st century (Kyriacou, 2000). High levels of stress lead to burnout, and burnout can lead to physical, mental, and psychological exhaustion (Byrne, 1998). Dissatisfaction with other educators, personal strain, work overload, and lack of self-care contribute to teacher stress (Chenevey, Ewing, & Whittington, 2008) and burnout (Brouwers & Tomic, 1999).

Teacher stress may be even more intense for agriscience teachers. These teachers typically have additional responsibilities associated with teaching and managing their school-based agricultural education program. These expectations, compounded by the already stressful nature of teaching, may contribute to attrition among agriscience teachers (Brouwers & Tomic, 1999).

School leadership and classroom teaching have been shown to be inherently stressful (Birkbeck, 2011). High levels of stress can result in ineffective educators. However, personal resilience has been shown to aid in maintaining teacher well-being (Day & Gu, 2014). Teachers across disciplines have shown resilience throughout their daily professional lives, even as their capacity for resilience has risen and fallen. Resilience is not an innate or fixed trait but is instead multi-dimensional and dynamic in its development (Day & Gu, 2014; Beltman, Mansfield, & Price, 2011). However, resilience is unique to the individual (Luthar, Cicchetti, & Becker, 2000).

Teachers develop relationships that can contribute to and influence their resilience over time (Palmer, 1998). Those who establish trust and connection with their students have long-term job satisfaction, contributing to positive well-being. Relationships with other teachers are crucial to the development of collaborative learning and support (McCallum & Price, 2010). Further, teacher relationships with administration influence teacher retention and effectiveness (McCallum & Price, 2010). Thus, personal resilience is a critical dimension of teacher retention and well-being.

Theoretical/Conceptual Framework

The theoretical framework for this study was based on the General Scales of Well-Being (GSWB) developed by Longo, Coyne, and Joseph (2017); Positive Psychology Framework of Well-Being (Seligman, 2018); personal resilience, as described by Hoopes (2017); hardiness, as presented by Maddi (2013); and mindset, as outlined by Dweck (2016).

Longo, Coyne, and Joseph (2017) identified fourteen common factors as lower-order indicators of well-being. These indicators include *Happiness*, *Vitality*, *Calmness*, *Optimism*, *Involvement*, *Self-awareness*, *Self-acceptance*, *Self-worth*, *Competence*, *Development*, *Purpose*, *Significance*, *Congruence*, and *Connection*. Seligman (2018) suggests that well-being is personal to the individual but additionally encompasses the environment, interactions, and external influences that the individual experiences.

Hoopes (2017) described resilience as the "ability to deal with high levels of challenge while maintaining or regaining high levels of effectiveness and well-being" (p.1). Personal resilience is comprised of seven dimensions, or "muscles," which include *Positivity, Confidence, Priorities, Creativity, Connection, Structure*, and *Experimenting* (Hoopes, 2017). Personal resilience is not

a fixed trait, is needed to effectively confront difficult situations, and can be strengthened through intentional effort (Hoopes, 2017).

Maddi (2013) defined hardiness as a pattern of attitudes and strategies that constitute the courage and motivation to turn stressful circumstances into growth opportunities.

Mindset reflects how individuals approach life and their beliefs about individual development, knowledge, and growth. Simply stated, mindset is one's view of oneself (Dweck, 2016). Dweck distinguished between two mindsets: fixed and growth. Growth mindset is the belief that one's most basic abilities can be developed through dedication and hard work. This view leads to a desire to learn and, therefore, a tendency to embrace challenges, persist in the face of setbacks, see effort as the path to mastery, learn from criticism, and find lessons and inspiration in the success of others (Dweck, 2016). A fixed mindset, on the other hand, is the belief that basic characteristics, like intelligence, are fixed. This view leads to a desire to look smart and, therefore, a tendency to avoid challenges, ignore useful constructive feedback, and feel threatened by the success of others (Dweck, 2016). Although Dweck differentiated mindset as either fixed or growth, these are simply the extremes of a continuum. Mindsets are malleable, and a growth mindset can be taught. Continuous progression towards a growth mindset is based on life experiences, perceptions, and learning (Dweck, 2016).

Research has shown a positive relationship between a growth mindset and psychological well-being. In a study involving 1260 primary and middle-school students (Zeng, Peng, and Hou, 2016), data were collected on personal resilience, psychological well-being, growth mindset, and school engagement. Based on the findings, the researchers concluded that high levels of a growth mindset correlate with high levels of psychological well-being. The authors concluded that a growth mindset is the primary foundation for developing and achieving well-being.

Stress can lead to teacher burnout, and this issue has become pervasive in education (Chenevey, et al., 2008). Hardiness allows individuals to remain optimistic and manage stressful situations effectively (Kaur & Sachdeva, 2017). A study was conducted to assess the effect of burnout and personal hardiness on organizational stress. A total of 524 secondary school teachers from both private and public schools were included in the sample. The Organizational Ross Stress (ORS) tool, the Maslach burnout inventory (Maslach & Jackson, 1986), and the personal hardiness scale (Maddi, 2013) were used to collect data. Kaur and Sachdeva concluded that a significant interaction exists between personal hardiness and organizational stress and between personal hardiness and burnout. Hardiness enrichment can aid in the development of effective teachers and can create a more supportive and fulfilling teacher work environment (Kaur & Sachdeva, 2017).

Unmanaged stress can impact well-being and dampen personal life enjoyment, job satisfaction, performance, and personal health (Thieman, Marx, & Kitchel, 2014). Expectations of public-school teachers have continued to rise, and, in turn, stress levels, burnout, and attrition have increased (Thieman, et al., 2014). With strong resilience, educators are able to manage and overcome stressful situations (Thieman et al., 2014). A study in 2011 examined the relationship between resilience, job performance, motivation, stress, and coping behaviors of preservice agriscience teachers. Data were in the form of interviews with student teachers, field notes, and

journal entries. Three themes emerged from the data: youth experiences are a key component toward reflection on resilience, the reality of the job can compromise resilience, and the belief that one is doing a good job is key to resilience in teaching (Thieman et al., 2014).

Prompted by calls to reduce teacher stress, Sorensen, McKim, and Velez (2016) conducted a national study on agriscience teacher work/family balance and job satisfaction. Results suggested that secondary agriscience teacher work/family balance is important in overall teacher well-being. However, only moderate levels of work/family balance were reported. In an exploratory case study approach involving 52 early career agriscience teachers, Traini, Claflin, Stewart, and Velez (2019) found that teacher success and balance in life are not compatible in the eyes of teachers, and teaching agriculture brings feelings of guilt, judgment, fear, and pressure.

A conceptual model, based on the key tenets in the theoretical framework, was developed to guide this study (see Figure 1). Although the elements of this model are specific in their support of teacher capacity to confront challenges in teaching, they are also interconnected.

This study addresses Research Priority Area (RPA) 3 of the American Association for Agricultural Education (AAAE) National Research Agenda. RPA 3 focuses on preparing a scientific and professional 21st century workforce and calls for research on methods, models, and practices that are effective in recruiting and supporting teachers and other professionals at all stages of their careers (Stripling and Ricketts, 2016).

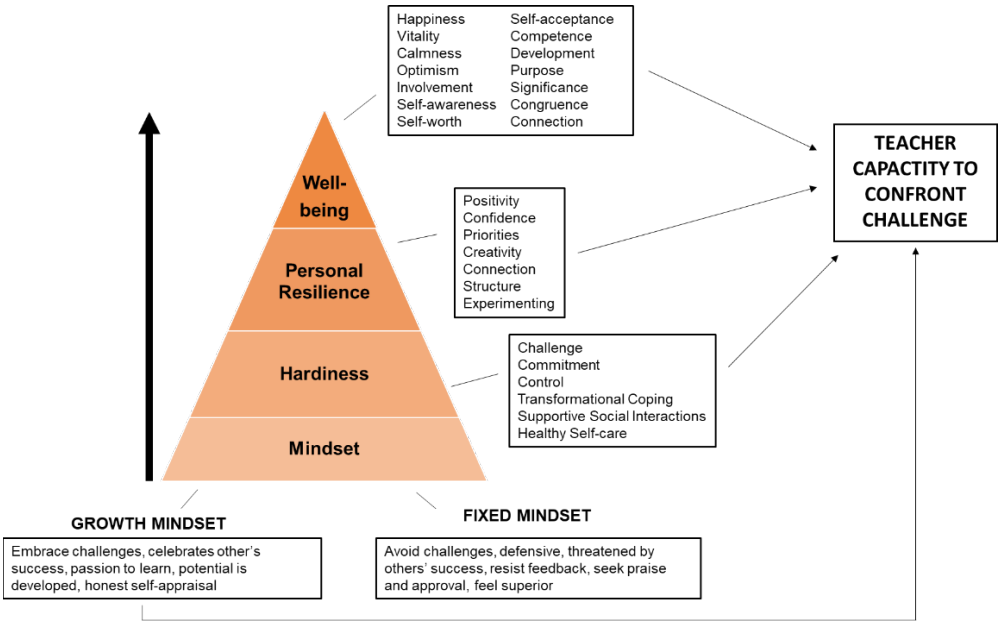

Figure 1. Conceptual Model of Teacher Capacity to Confront Challenge (Sources: Dweck, 2016; Day & Gu, 2014; Hoopes, 2017; Maddi, 2014; and Longo, Coyne, & Joseph, 2017).

Purpose and Objectives

The purpose of this study was to examine the personal resilience and well-being of first-year agriscience teachers in Florida. The objectives of the study were to (1) identify the professional

and program characteristics of first-year agriscience teachers, (2) describe the personal resilience and well-being of first-year agriscience teachers, (3) examine the relationship between personal resilience and well-being of first-year agriscience teachers, and (4) identify themes that contribute to personal resilience among first-year agriscience teachers.

Methods

We used a mixed methods sequential design to conduct this study (Ivankova, Creswell, & Stick, 2006). This design was selected because the quantitative data obtained from three instruments guided the research team in developing the teacher interview protocol. We used phenomenology as our approach to the qualitative portion of this research. Phenomenological studies rely on the assumption that multiple realities are rooted in subjects' perspectives. Each individual experiences an event differently. Semi-structured interviews are primarily used to elicit subjects to share their thoughts and feelings related to certain experiences. Phenomenological studies examine what the experience means to the individuals (Ary et al., 2010).

Population

This was a census study of the 49 first-year agriscience teachers in Florida at the beginning of the fall 2018-19 school year. Teachers were identified by contacting county career and technical education coordinators, reviewing postings shared over the state's messaging system, and directly communicating with schools. Four teachers were eliminated from the original list after discovering that they were in their second year of teaching. Fourteen teachers completed the study. External events that occurred in the fall 2018 semester prevented many teachers from participating in the study. Hurricane Michael impacted many schools, especially in the Panhandle.

Instrumentation and Data Collection

The University of Florida IRB Office approved the research protocol prior to beginning the study. Data were collected from agriscience teachers in Florida using both quantitative and qualitative techniques. All identified teachers were invited to participate in the study by email, an announcement at a new teacher workshop hosted by the state agriscience teachers' association, and direct mail letters. Respondents completed a well-being questionnaire, a demographic questionnaire, and the Personal Resilience Questionnaire (PRQ), available from Resilience Alliance, Inc., at the beginning of their first year of teaching. We contacted the selected teachers with an initial email in August introducing the study, followed by a postcard inviting their participation. Paper copies of the well-being instrument and demographic questionnaire were mailed one week later, along with instructions for accessing the online PRQ. We sent three email follow-ups over the next four weeks. Individual interviews were conducted with four teachers over a span of four weeks in November and December. These interviews were held at the teacher's school, with each lasting approximately 50 minutes.

Responses to the 75-item Personal Resilience Questionnaire were used to create a personal resilience profile, which was generated by Resilience Alliance, Inc. Using a sample of 50,000 cases, the internal consistency of the seven sub-scales that comprise the PRQ was estimated in a

study conducted by Resilience Alliance, Inc. Cronbach's alpha coefficients for each of the seven dimensions of resilience were reported as follows: *Positivity* (.83), *Confidence* (.81), *Priorities* (.82), *Creativity* (.71), *Connection* (.74), *Structure* (.68), and *Experimenting* (.65) (Resilience Alliance, 2010). The PRQ gauges an individual's resilience strengths and weaknesses in these seven dimensions of resilience (Hoopes, 2017). An individual's resilience strength in each of the seven areas is shown as a percentile score, based on a national norm group of more than 100,000 cases.

We developed the 14-item well-being questionnaire used in this study, based on the 14 indicators of general well-being, as identified by Longo et al. (2017). Participants rated their current state of well-being, as represented by the 14 statements, using a five-point, Likert-type scale with a range from (1) strongly disagree to (5) strongly agree. This questionnaire was further examined through the use of a pilot study. Paper questionnaires were mailed to 38 purposively selected agriscience teachers in Florida with one or more years of experience. These included experienced agriscience teachers and officers of the state agriculture teachers' association. The mailed questionnaires were accompanied by return envelopes, and 14 responses were received. Reliability statistics were run in SPSS, and Cronbach's alpha was determined to be .80 for the well-being scale.

A 31-item questionnaire was used to gather demographic data, including specific information regarding participants' teaching. Teachers were asked about their school's FFA membership, their school's facilities, the number of courses they taught, their degree(s), their history and connection to agricultural education, and the financial and professional support that they received for their program. The questionnaire used a variety of question formats, including multiple choice, text boxes, and single-choice responses. An expert panel of four agricultural education faculty members reviewed the researcher-designed demographic instrument for validity. Each faculty member had experience teaching in a middle or high school agriculture program, as well as experience in agriculture teacher preparation programs. The panel reviewed the survey for wordiness, clarity, balance, use of jargon, and completeness and also evaluated the effectiveness of the questions in obtaining the desired data.

Semi-structured interviews were conducted with the use of an interview guide. The interview guide was researcher designed and included five sections designed to obtain data on specific aspects of the teacher's personal resilience. The sections were current situation, challenging circumstances and how you have responded, life/career aspirations, childhood/adolescent experiences and home life, your personal resilience profile, and summary comments and other thoughts. The guide had varying numbers of questions and sub-questions within each section.

Data Analysis

Data were analyzed using IBM SPSS© version 24. The individual personal resilience profiles of respondents generated by Resilience Alliance, Inc. included percentile scores for each of the seven resilience dimensions. A summated score was calculated for the 14-item well-being questionnaire. We used Pearson correlations to examine the relationship between well-being and personal resilience. Transcriptions of the audio-recorded teacher interviews were checked for accuracy by the researchers and individual teachers. Two researchers independently coded the

interview transcripts and identified the themes that emerged across the four interviews. Key ideas, sub-themes, and main themes were discussed among the two coders at length until consensus was reached (Lombard, Snyder-Duch, & Bracken, 2002; Tracy, 2010).

Results

Professional and Program Characteristics of First-year Agriscience Teachers

Of the 45 teachers included in the study, 14 completed all survey instruments. Respondents were mostly female (*f* = 13, 93%), white (*f* = 14, 100%), not married (*f* = 10, 71%), and did not hold a bachelor's degree in agricultural education (*f* = 12, 86%). Nearly three-fourths of the respondents (*f* = 10, 71%) held a temporary teaching certificate. Most of the respondents were previously FFA members before becoming an agriculture teacher themselves (*f* = 9, 64%). Half of the participants taught in single-teacher agriculture programs (*f* = 7, 50%). Agriculture student program enrollment varied from 65 to 438 students, and FFA membership ranged from 0 to 120 members. A majority of the participants did not have an assigned mentor (*f* = 8, 57%) and did not have an active FFA Alumni chapter at their school (*f* = 8, 57%). Most of the participants had an active land lab (*f* = 12, 86%).

Personal Resilience and Well-being of First-year Agriscience Teachers

In consultation with Resilience Alliance, Inc., percentile scores for each of the seven resilience muscles were interpreted using the following guide: low $\leq$ 35, moderately low = 36-44, moderate = 45-54, moderately high = 55-64, and high $\geq$ 65. For the group of 14 responding teachers, on average, the strength of the *Positivity* muscle was found to be moderately low (*M* = 40, SD = 27), *Confidence* was moderate (*M* = 46, *SD* = 27), *Priorities* was moderately low (*M* = 37, *SD* = 28), *Creativity* was low (*M* = 32, *SD* = 22), *Connection* was moderately low (*M* = 39, *SD* = 29), *Structure* was moderate (*M* = 49, *SD* = 31), and *Experimenting* was moderate (*M* = 47, *SD* = 24). Although none of the resilience muscles for this group of teachers was found to be moderately high or high, on average, the strongest resilience muscles were *Structure*, *Experimenting*, and *Confidence*. The weakest resilience muscles for this group were *Creativity*, *Priorities*, *Connection*, and *Positivity*. We used a parallel guide for interpreting summative resilience scores as follows: low resilience $\leq$ 245, moderate resilience = 246-454, and high resilience $\geq$ 455. The summative resilience score for the respondent group was moderately low (*M* = 290; *SD* = 103). The overall resilience scores of the 14 respondents ranged from a low of 153 to a high of 517, with a possible range of 7 to 693.

Means for 12 of the 14 indicators of well-being were considered in the moderate to high range. The other two indicators, *Significance* and *Purpose,* had means of 4.6 and 4.5, respectively, placing them in the very high well-being category (see Table 1). *Happiness, Optimism, Self-awareness,* and *Congruence* were also among the highest scoring indicators. *Vitality, Calmness,* and *Self-acceptance* were the lowest scoring indicators. With a possible range of 14 to 70, the summative mean well-being for this first-year teacher group was considered to be high (*M* = 53.0, SD = 7.1), on a scale of ranging from very low to very high, based on the interpretive guide used by the researchers.

Table 1
Means and standard deviations of first-year agriscience teacher well-being indicators

Indicator	Description	*Mean*	*SD*
Happiness	Feeling happy and cheerful	4.07	1.07
Vitality	feeling energetic/full of energy	3.00	0.79
Calmness	Feeling cam/relaxed	3.00	0.95
Optimism	Being optimistic and hopeful	4.00	0.68
Involvement	Feeling completely involved in what you do	3.86	1.03
Self-awareness	Being in touch with how you feel	4.07	0.92
Self-acceptance	Accepting yourself the way you are	3.50	1.02
Self-worth	Liking yourself a lot	3.64	1.01
Competence	Feeling highly effective at what you do	3.62	0.87
Development	Feeling that you're consistently improving	3.93	0.83
Purpose	Having a purpose and mission in life	4.50	0.65
Significance	Feeling that what you do is important and worthwhile	4.64	0.63
Congruence	Feeling that what you do is consistent with how you see yourself	4.43	0.51
Connection	Feeling close and connected with the people around you	3.85	0.99
Summation		53.42	7.14

Note. n = 14. Individual well-being: very low = 1.00-1.49; low = 1.50-2.49; moderate = 2.5-3.49; high = 3.50-4.49; and very high $\geq$ 4.50. Summative well-being: very low = 14-20; low = 21-34; moderate = 35-48; high = 49-56; very high = 57-70. Low resilience $\leq$ 245, moderate resilience = 246-454, and high resilience $\geq$ 455.

Relationship between Personal Resilience and Well-being of First-year Agriscience Teachers

Using the convention recommended by Davis (1971), we found a significant, positive, and substantial relationship between the summative score for personal resilience and the summative score for well-being for this group of first-year agriscience teachers (r = .65, p <.001).

Themes that Contribute to Personal Resilience among First-year Agriscience Teachers

Theme 1: Needing support. Each of the teachers faced isolation in her teaching. Three of the four teachers were in single-teacher programs and lacked sufficient support. Each of the four teachers reported hesitation and discomfort in reaching out for help. They felt insecurity about needing help in their teaching, and one teacher experienced unprofessional behavior from her co-teacher, as well as her administration. She said,

> *I have one specific administrator who's very tough on me, and anytime he comes around my kids I just know that he always picks on me. It's hard to deal with that and know that he's always doing that, and I'm being treated like a child.*

Each of the teachers faced harsh criticism from parents, as one teacher stated,

> *I would say the biggest challenges come from parents. Those that are involved in FFA, they want what they want, which is not always the same thing I want, and they'll talk behind your back. They'll talk poorly about you to the principal.*

However, the teachers did not lack support entirely. One of the teachers relied on her community members and family to assist in supporting her agriculture program. Additionally, two of the teachers expressed being very supported by their principals. One teacher said, "When it's your first year of teaching and you get called to the principal's office, it really terrifies you, but she's super excited and loves it and is always positive, which really helps, because that's the big boss."

All four of the teachers reported having influential people in their lives – "champions" who encouraged and supported them. These people offered positive and reassuring messages about who they were and what they could do with their lives. These champions were especially impactful for those who faced significant family dysfunction during the formative years.

Theme 2: Shortage of resources. Each of the teachers faced financial challenges within their program. At the time of the interview, one teacher was still facing extreme financial hardship at her school. All four reported having some sort of challenges with their facilities and/or equipment. However, one teacher came into a program with facilities in complete disrepair. The animals were malnourished and much of the equipment did not work properly. One teacher at the time of the interview had been trying to get water for her classroom for months. She said, "I got this job in April or May of last year and started asking for water [in my classroom] then. I was hoping it would be ready to go by the time the school year started in August."

One of the schools was located near an orphanage and also served hearing impaired students in the county. Many students in this school faced financial hardship. However, by reaching out through her social media account, the teacher was able to secure funds her program and sponsor FFA participation costs for selected students.

Theme 3: The never-ending workload. All four teachers reported feeling overwhelmed in their first year of teaching. They each faced difficulty in handling their workload at various points throughout the year. Two teachers reported having difficulties sleeping, due to responsibilities and racing minds. One said,

> *Well-being, that's where it gets a little tougher. I did cry once. I think it was on like my third week of school because I'm also the swim coach. With FFA stuff and swimming I was, just… I got home on a Wednesday at 11pm and I just cried.*

Theme 4: Student impact. Each of the teachers reported being influenced and motivated by her students. One was able to reach students and engage them when they had been struggling to remain engaged in their other coursework. This boosted her confidence. This teacher enjoyed working with and learning from youth every day. Another teacher was also very inspired by her students. She said, "It's the kids that are with me now, they are the ones that are my why now. The five months they have been in Ag has had a huge impact on them."

Although each of the four teachers was focused on her students' experiences and their learning, student discipline was reported to be an issue among three of the four teachers. One teacher, who had over 20 years of teaching experience in another subject, reported she was well-versed in

classroom management. However, another teacher struggled with some of her students' behaviors. She said, "…classroom disruption is a lot of what my challenges are. Cell phones are one, obviously, and some days it's kind of pick your battles."

Theme 5: Staying motivated and committed. Three of the teachers were not originally interested in being teachers. One teacher was originally interested in a different field but switched to pursue education during her college career. Another teacher wanted to strengthen her program and then pursue graduate school. She said, "I really want to stay [at this] school long enough to build the Ag program back up and get it where it should be and then wrap it up in a box with a bow and give it away."

One teacher was dedicated to continually growing and developing her skills as an agriculture teacher. She described the importance of learning how to repair her own facilities and machinery. She said, "I don't know how to do it, but you know, I want to learn because if I tear up something, I hate to call everybody to help me fix it. I want to learn."
One of the teachers lacked commitment to teaching and was actively seeking alternative employment. Although another teacher was struggling with her teaching position, but she believed she was teaching for a larger purpose. She said, "Even though I don't want to be a teacher right now, there's a reason why I applied for this job. And it just happened to pop up as soon as I was looking." Despite the challenges they faced, all four teachers tried to remain positive about their teaching. One said, "even though you go through struggles, it's definitely worth it." Another said she didn't realize that she would develop such a close relationship with her students.

Theme 6: Finding time for self-care. Due to the heavy workload of an agriscience teaching position, coupled by individual experiences, each of the teachers expressed having challenges keeping up with adequate self-care. Two of the teachers reported difficulty sleeping, and one reported having to turn to sleep-aids. One teacher initially struggled to keep her home life and her work life separate. However, she began dedicating one day a week to spending time for herself. Another teacher described that on certain days she needsto step back from her responsibilities and focus on herself. She said, "Some days I go home, and I just need to eat supper, get a bath and go to bed, because I'm exhausted." Another teacher said, "There's just some days I shake my head and think why do I this, because I'm exhausted."

Conclusions, Implications, and Recommendations

School and life experiences during adolescence provide a beginning base for the personal resilience, well-being, and motivation of first-year agriscience teachers. In this study, the home environments of the interviewed teachers ranged from loving and supportive to highly dysfunctional. In a stable and loving home, children learn about themselves, explore their interests, and simply experience the immaturity associated with childhood. In contrast, in a dysfunctional home, this nurturing lifestyle is not provided. However, individuals who face adversity at a young age may develop a more heightened awareness of resilience and what it takes to overcome challenges and succeed in life. Messages that children and adolescents receive from others impact the development of their views of themselves and their perceived potential in life. If children receive negative messages and are degraded, they will be prone to self-doubt.

These messages are especially influential if they are from meaningful individuals in the child's life – both family and non-family members. As demonstrated by Dweck (2016), one's mindset (growth or fixed) is significantly shaped by these environmental factors.

Teachers interviewed in this study reported having close relationships with numerous teachers at some point during their high school years, viewing their teachers as mentors and motivators. However, they also viewed some of their non-agriculture teachers as bullies who were harmful to their self-esteem and development. Most agriscience teachers have experienced agriculture themselves and were influenced by their relationship with their agriscience teacher(s). Their perceptions of their past agriscience teacher's personal resilience and successes or failures may contribute to the development of their own personal resilience.

First-year agriscience teachers face many significant challenges in teaching, including lack autonomy, support, and understanding, not only from school administrators and their peers, but also from their students and the parents of their students. Teachers often feel unappreciated and are forced to conform to the expectations of those within and outside the school (Gallup, 2018; Ingersoli, Sirinides, & Dougherty, 2018). However, agriscience teachers who experience positive connection and support from peers and administrators are more resilient (Day and Gu, 2014).

Beyond challenges associated with support and understanding, agriscience teachers also face issues involving finances, resources, and other physical constraints. Additionally, agriscience teachers lack adequate time for self-care and for personal time. Teachers in this study often remained at their school long after other teachers to maintain facilities and provide additional support for the FFA. This inability to focus on oneself may, over time, contribute to a decrease in overall well-being and ultimately affect a teacher's motivation to teach.

First-year agriscience teachers often face isolation in their teaching which, in general, is counter to high levels of personal resilience and well-being. The phases of the first year of teaching are anticipation, survival, disillusionment, rejuvenation, reflection, and anticipation (Moir, 1990). Many agriscience teachers face a deep and extended period of survival and disillusionment during their first-year of teaching. This may be due to the isolation that often accompanies agricultural education because of single-teacher programs, separate or distant teaching facilities, and the many extra responsibilities associated with providing a high-quality instructional program.

In this study, only one of the 14 participants had overall high resilience. Respondents, on average, had moderately low levels of resilience, and none of the seven resilience dimensions were in the high or very high range. Teacher workload and isolation may be primary contributors to lower personal resilience among first-year agriscience teachers and may negatively impact the resilience of other agriscience teachers, as well. In addition, resilience is substantially and positively associated with well-being. In this study, the lowest scoring indicators of well-being were *Calmness* and *Vitality.* This supports the common perception that agriscience teachers often are overwhelmed and unsupported during their first-year of teaching. *Calmness* relates to serenity and peacefulness. *Vitality* is a feeling of energy and livelihood. During their survival period, first-year agriscience teachers are often overwhelmed and lack energy. In this study, the highest scoring well-being indicators were *Significance* and *Purpose*. Although first-year

agriscience teachers face challenges with maintaining their resilience and well-being, they are also still positively impacted by what they are doing.

Given the significant challenges faced by first-year agriscience teachers, the role of background school and life experiences in shaping the foundations of personal resilience and well-being, and the conceptualization of teacher capacity to confront challenges in their teaching, as presented in this work, preservice and practicing agriscience teachers should become well attuned to their own personal histories and deeply aware of the constructs addressed in this research. A continuing focus on developing and maintaining a growth mindset, personal resilience, and well-being may position agriscience teachers for greater success in their first year of teaching.

Regarding teacher preparation, honest and open conversations about the stresses of teaching should be held with pre-service teachers. The curriculum for teacher preparation should include personal resilience, growth mindset, hardiness, and well-being. Faculty members and those supporting agriscience teachers in the field should be well versed and well attuned to the constructs of well-being, personal resilience, growth mindset, and hardiness and how they can be operationalized in teaching. In addition, these faculty members should model high levels of awareness and support when working with their students to help them develop supportive, attuned, and nurturing interactions with the middle/high school students they teach.

Based on the findings of this study, several recommendations for further research can be made. A study with a complete census of first-year agriscience teachers should be conducted. A longitudinal study should be conducted to examine resilience and well-being throughout the teaching career of agriscience teachers. This study should be replicated with agriscience teachers in various career stages. A national study examining personal resilience and well-being among agriscience teachers should be conducted. An intervention should be created to aid first-year agriscience teachers in managing and maintaining their well-being during their first year of teaching. Given the workload stress experienced by teachers in this study, research should be conducted to document the hours and activities of agriscience teachers in each career stage.

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A Longitudinal Study on the Impact of Time Spent Student Teaching on the Decision to Enter the Field

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Abstract

Due to the lack of qualified agricultural education teachers needed to fill yearly vacancies on the secondary level, educators at Texas Tech University conducted a longitudinal study concerning how student teachers spend their time during their student teaching experience in an attempt to identify if this time spent has an impact on the decision to enter the field. Findings showed student teachers were engaged for a total of 713.83 to 931.23 hours on average during their student teaching experience. Longitudinally, time spent in the classroom, in FFA activities, and in SAE observations varied at different points in the semester. 18-28% of the variance in the decision to student teach may be explained by the amount of time grading student work with laboratory preparation and maintenance. Recommendations for practice include encouraging student teachers to participate in as many activities as possible. Further research should be conducted to identify more factors influencing the decision of student teachers to enter the field.

Introduction

The supply gap of agricultural education teachers has been identified as one of the most important and pressing issues in the profession (Myers, Dyer, and Washburn, 2005). In fact, in more than 50 years, there has not been a time where there was an adequate supply to fill the available positions and vacancies (Kantrovich, 2007). In 2009 the supply and demand data indicated a 26% shortage of qualified graduates needed to fill available positions across the nation (Kantrovich, 2010).

Some of the chronic shortage is a result of the high demand to fill attrition-based vacancies. In the most recent supply and demand report published by the American Association for Agricultural Education (AAAE), over 500 vacancies were created by individuals leaving the profession completely rather than moving laterally between states or retirement (Smith, Lawver, & Foster, 2018). Stress, burnout, and conflicts caused by the struggle to balance work and life expectations are some of the causes leading to the decision for teachers to choose another field (Ingersoll & Smith, 2003). Workload and finding a balance in workload expectations have been the subjects of multiple studies and have helped generated a better perspective on what is creating attrition based vacancies (Sorenson, McKim, & Velez, 2016; Hainline, Ulmer, Ritz, Burris, & Gibson, 2015; Murray, Flowers, Croom, & Wilson, 2011).

Investigating the causes for the high demand of agricultural education teachers is only part of the solution for addressing the shortage. A look at the supply side is needed as well. Camp, Broyles, and Skelton (2002) suggested the shortage of qualified agricultural education teachers was a result of agricultural teacher preparation programs not graduating enough newly certified

candidates. To combat this issue, recruitment campaigns like the national "Teach Ag" program have been created to help increase the number of students entering teacher certification.

Low collegiate level enrollment numbers are only part of the problem associated with the short supply of agricultural education teachers. Parmly, Bowen, and Warmbrod (1979) suggested the problem with filling vacancies was not a function of too few students graduating, but rather from a low percentage of newly certified teachers entering the field. This position was supported by Kantrovich (2007) who found only 53% of new graduates in agricultural education teacher certification programs entered the profession. This was followed with another study showing only 70% of new teachers entering the field (Roberts, Greiman, Murphy, Ricketts, & Harlin, 2009) and further supported by Lawver and Torres (2011) who concluded the number of vacant positions was smaller than the number of graduates available to fill the positions.

Theoretical Framework

The theoretical basis underpinning this study is the connection between student teaching experiences and Bandura's theory of self-efficacy. Bandura (1986) described self-efficacy as a person's perceptions towards their ability to plan and execute actions in a specific area and identified mastery experiences, vicarious experiences, social persuasion, and emotional/physical states as key developmental influencers of self-efficacy.

Within this study we primarily focused on mastery and vicarious experiences. Mastery experiences are activities engaged directly by the individual. Bandura (1986) concluded the more positive experiences one has in completing a task the more self-efficacy one will have in that area. The connection between time engaged in an activity and increased confidence in the activity was supported by McKim and Velez (2017) who noted a connection between time spent in leadership activities and leadership self-efficacy.

Vicarious experiences are those events in which an individual observes another engaged in an area of interest. Within the context of student teaching, these activities could be observing a cooperating teacher, watching other student teachers or teachers in a different field, and reflecting on shared experiences with peers. Aside from mastery experiences, vicarious experiences are the second greatest influencer on self-efficacy development (Bandura, 1977).

Social persuasion is the feedback one receives prior to or after engaging in an activity. In a student teaching experience, this is most often in the form of feedback from university supervisors and cooperating teachers but may also come from peers or family members. Physiological and emotional states are the physical and emotional feelings one is experiencing prior to, during, and after completing a task. Although studies have linked social persuasion and physical/emotional states to self-efficacy beyond Bandura's writings (Clark, Byrnes, & Sudweeks, 2015), the literature is limited regarding their influence on self-efficacy development contributing to the difficulty in measuring the constructs (Wolf, Foster, & Birkenholz, 2010).

This study adopted the conceptual model presented in Figure 1 which depicts the relationships between the elements of social persuasion and student teaching experiences. It is based on the idea that a student enters the student teaching experience with certain levels of self-efficacy

driven by past experiences and social persuasion factors. During student teaching individuals have extended opportunities for mastery and vicarious experiences that, when coupled with social persuasion factors following student teaching, lead to a career decision regarding entering the classroom (Frost, Rayfield, Lawver, & Ritz, 2018).

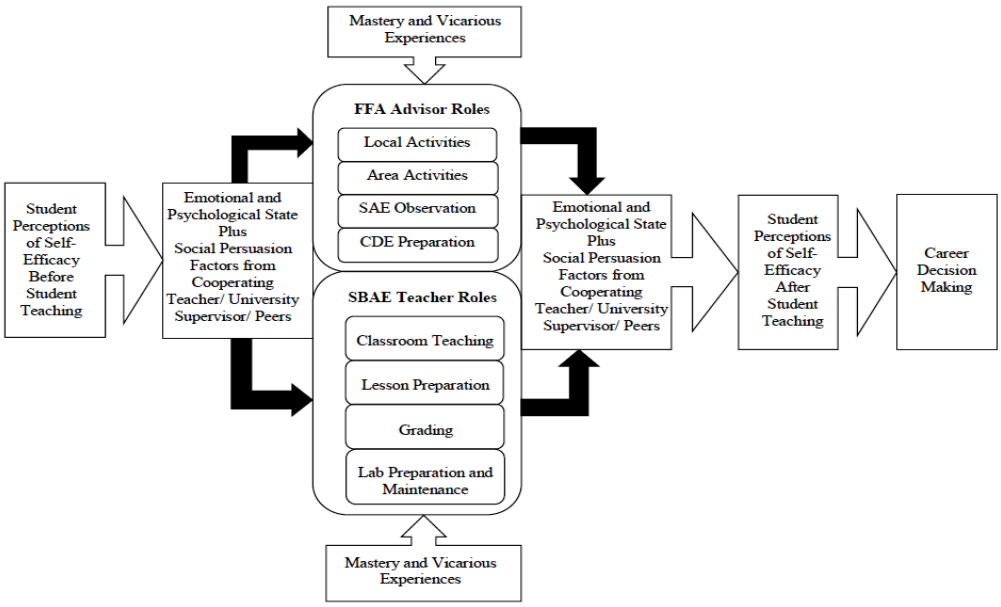

Figure 1. Conceptual model of self-efficacy development routes during the student teaching process (Frost, et al., 2018).

Purpose and Objectives

Because of the shortage of teachers choosing to enter the profession and the reported connection between heavy student teaching workload and early burnout (Fives, Hamman, & Olivarez, 2007), the teacher educators at Texas Tech University sought to critically examine the practices associated with its teacher certification program in agricultural education. The purpose of this longitudinal study was to quantify how student teachers spend their time during their student teaching experience at Texas Tech University and to determine the impact this time spent has on the decision to teach over a three-year period. The following research objectives were established to guide this study:

1. Compare the time devoted to the student teaching experience of students in the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University.
2. Compare the progression of time spent during the 15-week student teaching experience longitudinally between the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University.
3. Identify members of the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University who entered the field of secondary agricultural education.
4. Determine the relationship between time spent during student teaching and the decision to enter the field of agricultural education as a secondary agricultural education teacher.
5. Determine if there are significant predictors for the decision to teach agricultural education after student teaching based on time spent in student teaching activities.

Methods

This descriptive, longitudinal study was conducted over three years to quantify how agricultural education student teachers at Texas Tech University were spending their time during their experience and to determine the impact this time had on their decision to teach secondary agricultural education. Programmatic data were collected from the spring student teaching cohorts from 2017 (n = 15), 2018 (n = 21), and 2019 (n = 22) for a total of N = 58. As part of their course requirements, student teachers submitted weekly reports documenting hours worked. Student teachers classified their time in categories based on the work of Torres and Ulmer (2007). The categories were the following: 1) Observing Cooperating Teacher, 2) Conferencing with Cooperating Teacher, 3) Preparation for Instruction, 4) Classroom/Laboratory Teaching, 5) Laboratory Preparation and/or Maintenance, 6) Grading/Scoring Students' Work, 7) Administrative Duties (Program Management), 8) Professional Activities (Meeting, In-service), 9) SAE Observations and Livestock Shows, 10) Local FFA Activities, 11) District, Area, and State FFA Activities, 12) CDE Preparation, and 13) Adult Education.

Students in the 2017 and 2018 cohorts submitted reports using a Microsoft Word template that was completed and emailed to their university supervisor at the end of each week. The 2019 cohort used a Qualtrics instrument that was developed, identical in content to the original Microsoft Word template. The electronic survey was distributed every Monday morning and was submitted by the end of the week. Weekly data were collected and entered into Microsoft Excel spreadsheets, organized, and checked for missing or incomplete data. Any student reporting data sets with missing or abnormal values were contacted and the issues were corrected.

Data from the included years were combined into a single set and exported to IBM SPSS v 25.0 for analysis. Means, standard deviations, minimums, maximums, frequencies and percentages were calculated for descriptive data. A Pearson point-biserial correlation was calculated to determine the relationship with time spent student teaching and the decision to teach. This study met the requirements of Fraenkel, Wallen, and Hyun (2012) in that correlational research should be conducted with a minimum sample size of 30. Statistical significance was established *a priori* at a p-value of .05. To determine how much variance in the decision to teach that could be predicted by time spent engaged in student teaching activities, a logistic regression was calculated. All assumptions described by Field (2018) were met since the model was linear, constant, normally distributed and the variables were all the appropriate type for the model.

Findings

The first objective of this study was to compare the time devoted to the student teaching experience by students in the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University. To accomplish this objective, hourly information reported by student teachers was compiled and analyzed by cohort for the different areas identified by Torres and Ulmer (2007). During the 2017 student teaching cohort, the average greatest amount of time over the 15-week period was spent in classroom/laboratory teaching (M = 154.03, SD = 80.20). Closely behind was district, area, and state FFA activities with an average of (M = 114.60, SD = 132.44) total hours dedicated to the activity over the semester. A minimum of 0.0 hours and a maximum of 535.0 hours was reported for time in district, area, and state FFA activities. The lowest level of

student teacher engagement was in professional activities (*M* = 8.37, *SD* = 7.67). Finally, the 2017 student teaching cohort averaged a total of (*M* = 713.83, SD = 155.37) hours of engagement in the student teaching process over 15 weeks. For a complete summary of the 2017 cohort student teaching hours, refer to Table 1.

Table 1
Average Hours Spent Student Teaching for the 2017 Cohort Over a 15 Week Period (n = 15)

Time Category	*M*	*SD*	Min.	Max.
Observing Coop. Teacher	87.10	60.77	12.0	212.0
Conference with Coop. Teacher	43.39	30.06	0.0	113.0
Preparation for Instruction	60.27	40.04	15.5	156.0
Classroom/Laboratory Teaching	154.03	80.20	43.0	291.5
Laboratory Prep/Maintenance	21.50	29.23	0.0	113.0
Grading/Scoring Students' Work	35.33	17.40	9.0	72.0
Administrative Duties	13.30	32.70	0.0	131.0
Professional Activities	8.37	7.67	0.0	30.5
SAE Observations and Shows	66.67	101.00	0.0	413.5
Local FFA Activities	51.80	55.89	4.5	196.0
District, Area, State FFA Act.	114.60	132.44	0.0	535.0
CDE Preparation	48.67	22.09	10.0	78.5
Adult Education	8.80	17.84	0.0	70.0
Total Student Teaching Hours	713.83	155.37	385.0	1,079.0

In the 2018 student teaching cohort, there is a slight increase from the 2017 cohort in average total hours reported for the semester (*M* = 762.54, *SD* = 186.66). Hours spent in classroom/ laboratory teaching were similar at (*M* = 165.43, *SD* = 65.08). There was a decrease in hours devoted to district, area, and state FFA activities with the 2018 cohort (*M* = 71.56, *SD* = 52.97). Time spent on SAE observations and attending livestock shows (*M* = 149.05, *SD* = 167.53) was higher than that of the 2017 cohort. The minimum time reported for SAE observation and livestock show attendance was 0.0 hours while the maximum reported was 668.0 hours. Engagement in adult education was the lowest area reported with an average of (*M* = 0.48, *SD* = 1.36). A summary of the hours spent student teaching for the 2018 cohort is presented in Table 2.

Table 2
Average Hours Spent Student Teaching for the 2018 Cohort Over a 15 Week Period (n = 21)

Time Category	*M*	*SD*	Min.	Max.
Observing Coop. Teacher	88.31	62.53	2.0	229.5
Conference with Coop. Teacher	30.98	19.70	0.0	56.5
Preparation for Instruction	72.65	47.00	0.0	178.0
Classroom/Laboratory Teaching	165.43	65.08	38.0	272.0
Laboratory Prep/Maintenance	24.69	19.37	0.0	63.5
Grading/Scoring Students' Work	29.75	18.13	6.0	60.5
Administrative Duties	9.90	15.75	0.0	67.5
Professional Activities	14.61	14.08	0.0	48.0
SAE Observations and Shows	149.05	167.53	0.0	668.0
Local FFA Activities	43.39	48.32	2.0	180.0

District, Area, State FFA Act.	71.56	52.97	0.0	217.0
CDE Preparation	61.74	48.35	0.0	217.0
Adult Education	0.48	1.36	0.0	5.0
Total Student Teaching Hours	762.54	186.66	475.25	1,128.5

On average student teachers from the 2019 student teaching cohort were engaged in more total hours of experience for the entire semester (*M* = 931.23, *SD* = 161.11) than the students in the 2017 and 2018 cohorts. There was also an increase in time spent on classroom/laboratory teaching (*M* = 246.00, *SD* = 62.36) and SAE observations and livestock show attendance (*M* = 208.27, *SD* = 108.15). The area of lowest participation reported for the 2019 cohort was administrative duties (*M* = 7.77, *SD* = 10.65). The complete breakdown for the average time spent student teaching for the 2019 cohort over a 15-week period is presented in Table 3.

Table 3
Average Hours Spent Student Teaching for the 2019 Cohort Over a 15 Week Period (n = 22)

Time Category	*M*	*SD*	Min.	Max.
Observing Coop. Teacher	62.05	38.89	0.0	162.0
Conference with Coop. Teacher	39.32	30.94	3.0	121.0
Preparation for Instruction	115.05	68.05	20.0	245.0
Classroom/Laboratory Teaching	246.00	62.36	109.0	354.0
Laboratory Prep/Maintenance	19.86	23.06	0.0	74.0
Grading/Scoring Students' Work	32.18	26.72	1.0	86.0
Administrative Duties	7.77	10.65	0.0	38.0
Professional Activities	16.95	14.63	1.0	55.0
SAE Observations and Shows	208.27	108.15	47.0	480.0
Local FFA Activities	30.55	34.71	0.0	144.0
District, Area, State FFA Act.	55.14	41.10	0.0	144.0
CDE Preparation	81.36	81.99	0.0	296.0
Adult Education	16.73	47.98	0.0	227.0
Total Student Teaching Hours	931.23	161.11	579.0	1,268.0

The second objective of this study was to compare the progression of time spent during the 15-week student teaching experience longitudinally between the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University. For total hours spent student teaching, students reported a generally low number of hours for Week 1 (*M* = 36.17, SD = 16.89) in 2017, (*M* = 49.48, SD = 17.69) in 2018, and (*M* = 62.55, SD = 17.96) in 2019. A general increase in hours was observed through week 5, where there begins to be some variability between cohorts. The last third of the semester, there was a general gradual decrease in total hours reported, ending with (*M* = 34.70, *SD* = 16.89) in 2017, (*M* = 45.38, *SD* = 15.16) in 2018, and (*M* = 53.09, *SD* = 12.79) in 2019 for Week 15. A comparison of total hours for all 15 weeks for the 2017, 2018, and 2019 cohorts is presented in Figure 2.

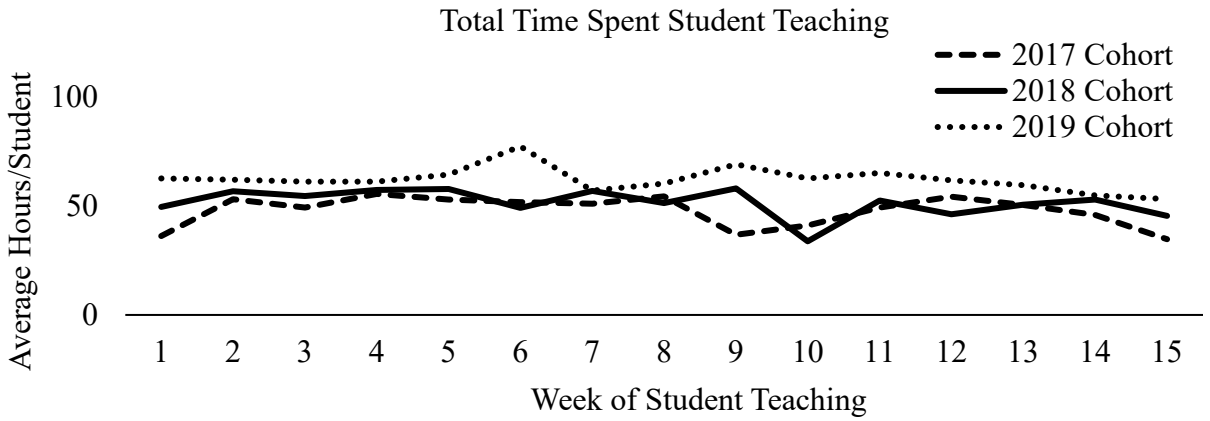

Figure 2. Comparison of the weekly progression of total hours student teachers were engaged in the student teaching process for 2017, 2018, and 2019 cohorts.

To compare the progression of instructor activities throughout the semester, hours were totaled for preparation for instruction, classroom/laboratory teaching, laboratory preparation and/or maintenance, and grading/scoring students' work. A general increase was reported from the beginning of the semester until about Week 5 in instructor activities. There was a consistent decline in instruction for Week 7 across all three cohorts with (M = 10.77, SD = 7.56) in 2017, (M = 13.04, SD = 14.63) in 2018, and (M = 8.14, SD = 7.44) in 2019. Student teachers finished the semester with instructor hours greater than Week 1 across all three cohorts. A comparison of instructor hours reported for the 15 weeks of the three cohorts is presented in Figure 3.

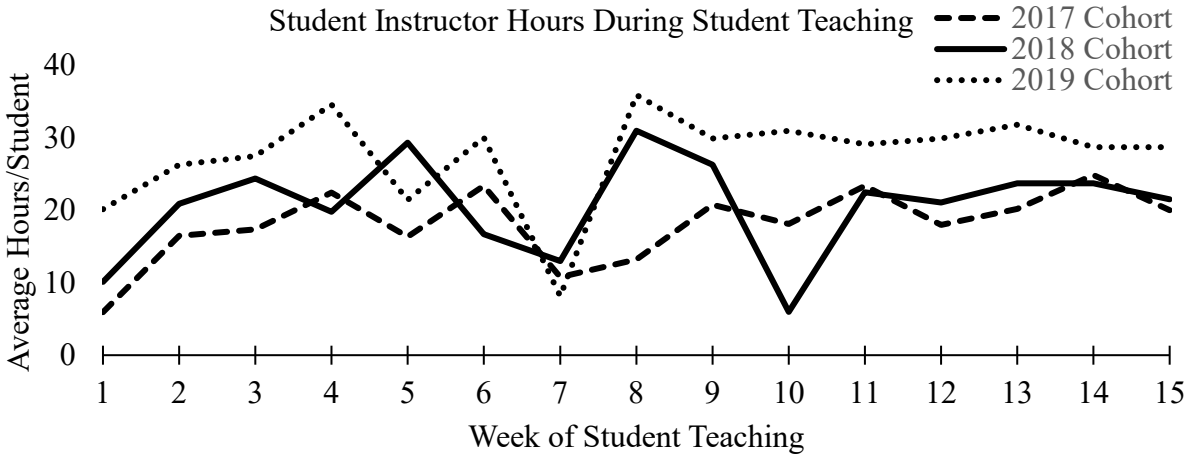

Figure 3. Comparison of the weekly progression of instructor hours student teachers were engaged in during the student teaching process for 2017, 2018, and 2019 cohorts.

A comparison of total FFA hours was conducted by summing the hours reported for local FFA activities, district, area, and state FFA activities, and CDE preparation. The greatest amount of time reported for FFA activities was generally reported in the second half of the semester. In 2017 this occurred in Week 8 (M = 31.03, SD = 30.54), in 2018 it occurred in Week 13 (M =

23.88, SD = 16.27) and in 2019 it occurred in Week 11 (*M* = 30.73, *SD* = 17.53). The 15-week comparison for FFA hours during student teaching for all three cohorts is presented in Figure 4.

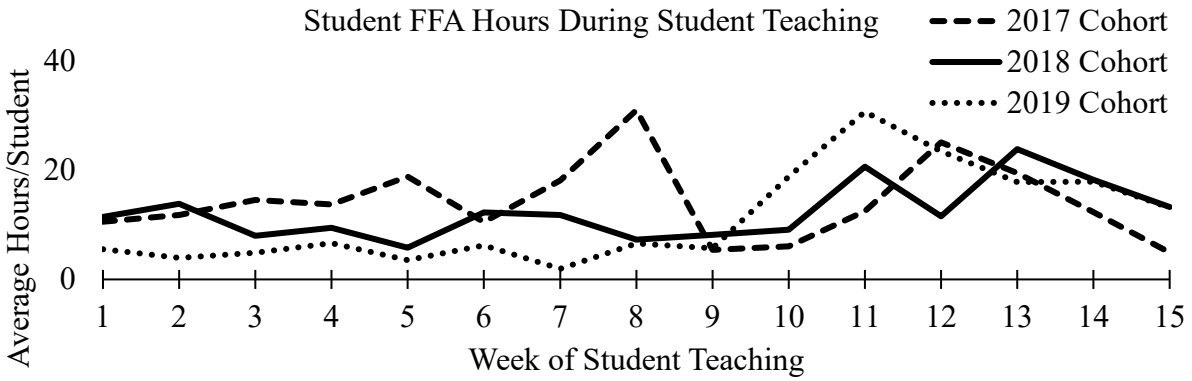

Figure 4. Comparison of the weekly progression of FFA hours student teachers were engaged in during the student teaching process for 2017, 2018, and 2019 cohorts.

Finally, a comparison was conducted of SAE observation and livestock show attendance hours reported by student teachers in the 2017, 2018, and 2019 student teaching cohorts. There are two points in the semester when SAE hours for student teachers peak; during the late first half of the semester and early in the second half of the semester. For all three cohorts, the maximum average hours reported for SAE observation and livestock show attendance occurs during the first half of the semester. The 2017 cohort peaked at (*M* = 11.70, *SD* = 22.34) in Week 5 and the 2018 and 2019 cohorts peaked at (*M* = 27.12, *SD* = 34.44) and (*M* = 33.59, *SD* = 29.05) respectively in Week 7. A complete comparison of average SAE hours reported by student teachers over 15 weeks is presented in Figure 5.

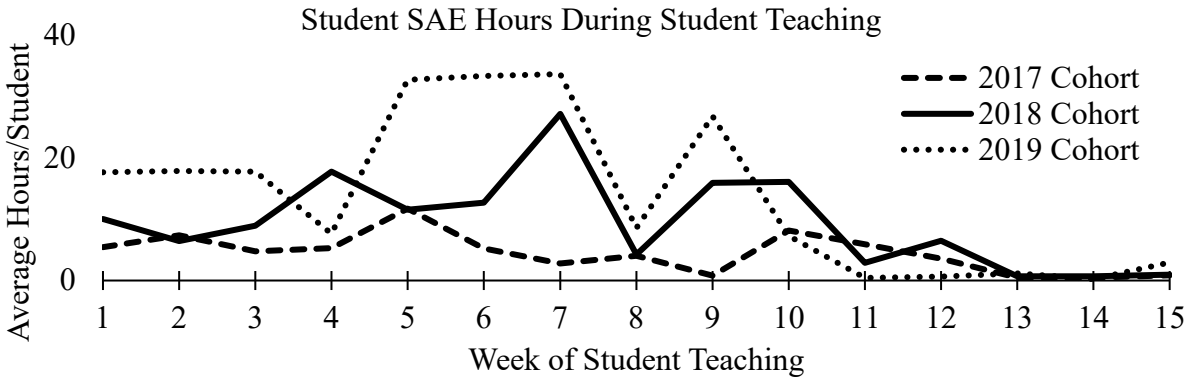

Figure 5. Comparison of the weekly progression of SAE hours student teachers were engaged in during the student teaching process for 2017, 2018, and 2019 cohorts.

The third objective of this study sought to identify members of the 2017, 2018, and 2019 student teaching cohorts at Texas Tech University who entered the field of secondary agricultural education. In the 2017 cohort (*f* = 13, 86.7%) entered the field, resulting in the greatest percentage teaching high school agricultural education. The 2019 student teaching cohort had the

lowest percentage of students entering the field (*f* = 16, 72.7%) with the 2018 student teaching cohort slightly above (*f* = 16, 76.2%). A summary of those choosing to teach secondary agricultural education is present in Table 4.

Table 4
Decision to Enter the Field of Secondary Agricultural Education (N = 58)

	Teaching		Not Teaching	
Cohort	*f*	%	*f*	%
2017 (*n=15)*	13	86.7	2	13.3
2018 (*n=21)*	16	76.2	5	23.8
2019 (*n=22)*	16	72.7	6	27.3
Totals	45	77.6	13	22.4

The fourth objective of this study was to determine the relationship between time spent during student teaching and the decision to enter the field of agricultural education as a secondary agricultural education teacher. Grading/scoring students' work (r_{pb} = -.32, p = .02) was the only category with a moderate relationship (Davis, 1971). The remaining categories were either low or negligible relationships. A complete list of correlation coefficients for time spent student teaching and the decision to teach is presented in Table 5.

Table 5
Relationships Between Time Spent Student Teaching and Decision to Teach (N = 58)

Student Teaching Time Category	Teaching Decision (r_{pb})
Grading/Scoring Students' Work	-.32*
Laboratory Preparation and/or Maintenance	.19
Overall Total Hours Spent Student Teaching	.18
FFA Activities – Local Level	.18
Professional Activities (Meetings, In-Service)	.16
Conference Time with Cooperating Teacher	.10
SAE Observations and Recording (Including Livestock Shows)	.09
CDE Preparation	.08
Adult Education	.08
Administrative Duties – Program Management	.08
FFA Activities – District, Area, and/or State Level	.08
Preparation for Instruction	-.07
Classroom/Laboratory Teaching	.04
Observing Cooperating Teacher	-.06

Note. Decision to teach coding: Decision not to teach = 0, Decision to teach = 1; *p < .05.

The final objective of this study sought to determine if there are any significant predictors for the decision to teach agricultural education after student teaching based on time spent engaged in student teaching activities. Since the decision to teach is a binary variable, a logistic regression was calculated. Before results of the logistic regression can be interpreted, a goodness of fit must be examined for the model. According to the Hosmer and Lemeshow Test, χ^2 = 3.48 and p = .45, therefore it is not statistically significant (α > .05) indicating an acceptable fit of the model. Results for the Hosmer and Lemeshow Goodness of Fit Test are presented in Table 6.

Table 6
Hosmer and Lemeshow Goodness of Fit Test

	χ^2	*df*	*p*
Step 1	3.48	8	.90

The initial regression model predicted 77.6% of the cases correctly. The final regression model improved to 81.0% of the cases predicted correctly. Nagelkerke's R^2 (0.285) and Cox & Snell R^2 (0.186) were calculated to determine practical significance of the regression model indicating between 18.6% and 28.5% of the variability in the decision to teach secondary agricultural education after student teaching was explained by the variables in the model. Grading student work and laboratory preparation and maintenance were the only two predictors that were statistically significant at the $\alpha = .05$ level and so were included in the model. Overall model results for the two predictors are presented in Table 7.

Table 7
Summary of Logistic Regression Analysis Predicting Decision to Teach

Predictor	*B*	*SE*	*OR*	95% CI	Wald	*p*
Grading Student Work	-0.05	0.02	0.95	[0.92, 0.99]	7.85	.01
Lab Preparation and Maintenance	0.04	0.02	1.04	[1.00, 1.08]	4.58	.03

Note. Alpha level for significant *p*-value established at .05 *a priori*.

Conclusions, Implications, and Recommendations

From the findings of this study, conclusions can be drawn about time spent in the student teaching experience and the decision to enter the field. Concerning total student teaching hours completed by each cohort, the 2019 cohort averaged over 150 hours more than cohorts of the previous two years. As with the previous two cohorts, the 2019 groups spent the greatest portion of their student teaching experience engaging in classroom/laboratory instruction. The extended practice with classroom/laboratory instruction should theoretically improve their self-efficacy in teaching ability according to Bandura's self-efficacy theory. In the area of SAE observations and livestock show attendance, the 2018 and 2019 student teaching cohorts had substantially higher participation rates than the 2017 student teaching cohort, while at the same time the 2017 student teaching cohort reported higher district, area, and state FFA time than in 2018 and 2019. This may in part be due to the location of student teacher placements. In Texas some programs have a higher emphasis on attending major livestock shows, while other programs have a higher emphasis on FFA CDE participation or classroom teaching during the spring semester.

Typically, at the beginning of the semester, student teachers are instructed to spend more time observing their cooperating teacher. The 2019 student teaching cohort averaged approximately 100 hours more in classroom/laboratory instruction than the previous two cohorts. The 2019 cohort also reported approximately 25 hours less in cooperating teacher observation, indicating they may have been able to start teaching earlier in the semester or they may have been allowed to teach a greater number of classes earlier in the semester. From the weekly longitudinal data, it can be seen that student teachers in the 2019 student teaching cohort started the semester teaching more hours weekly than in 2017 and 2018. With the exception of a few weeks, the 2019

cohort remained above the other two cohorts in terms of instruction time, supporting the possibility that the student teachers may have been assigned to teach more class periods per day.

By examining the weekly longitudinal data, a few trends emerged. The 2019 student teaching cohort consistently reported a higher total average in time spent engaged in the student teaching process compared to the 2017 and 2018 student teaching cohorts. This indicates these student teachers were more involved in the process on average than those of the previous two years. Concerning hours dedicated to instruction and preparation for instruction, all three cohorts reported a decline in time spent in this area during Week 7. This aligns with a major livestock show frequently attended by most schools in the state, the San Antonio Livestock Show. There is also some variability between the three cohorts between weeks four and 10. This likely can be explained by other major livestock shows in the state such as the Houston Livestock Show and Rodeo. Depending on which species of livestock a program emphasizes will determine when and where the program attends a livestock show, resulting in less classroom/laboratory instruction.

Aligning with the same period of time, weeks four through 10, the number of hours reported for observing SAE projects and attending livestock shows is the greatest. After week 10 there is a sharp decline to nearly no time dedicated to SAE observations. This is likely due to the end of livestock showing and sale of animals. While there are still a few SAEs to observe at the end of the school year that are not livestock projects, the greatest number of SAEs are animal related and therefore will be sold at that time.

In the last five weeks of the semester, there is an increase in reported student teacher hours dedicated to FFA activities. In Texas most FFA CDEs occur in April and early May, aligning with this increase in time spent. Some schools will attend invitational competitions, while most will attend area and advance to state level competitions. Advancement of teams and attendance of invitational CDEs likely contribute to the variability of the time spent between cohorts. Many district and area level FFA conventions take place during this time period too. At conventions FFA award and degree checks occur, requiring more time to help with these activities.

From the longitudinal data, it can be concluded student teachers are engaged in all three areas of agricultural education: classroom instruction, FFA, and SAE. These occur at various times in the semester, however the quantity of time dedicated to each area is similar. Student teachers that participate in all three areas of an agricultural program during their experience should in theory be exposed to many different activities to help them become more efficacious in directing a well-balanced program of their own in the future. However, according to Fives, Hamman, and Olivarez (2007), high workloads placed on student teachers may create early burnout, impacting their decision to enter the field. Is this the case with agricultural education student teachers?

To answer the early burnout question, the number of student teachers who chose to enter the field must be determined. This study found an overall average of 77.6% chose to teach secondary agricultural courses after student teaching. When this decision is correlated with the different categories of time measured during their experience, only grading student work had a significant, moderate correlation. This indicates the amount of time spent student teaching likely is not related to whether or not a student teacher decides to enter the field. Concerning grading student work, the negative correlation indicates the more time a student teacher spends grading student

work, the less likely he or she will decide to teach. According to the regression analysis from this study, roughly 18-28% of the decision to teach can be predicted by combining time spent grading and the amount of time a student teacher works on laboratory preparation and maintenance. Even with this information, there is still roughly 72-82% unknown for what affects the decision.

An implication of this study is the contradiction of the work of Fives, Hamman, and Olivarez (2007). The number of hours agricultural education student teachers are engaged in the student teaching process does not seem to create early burnout or prevent them from choosing to enter the field. Another area of interest was the percentage of students in the student teaching program at Texas Tech University was slightly higher compared to results reported in previous studies (Kantrovich, 2007; Roberts et al., 2009). Furthermore, the conclusions from the regression analysis of this study may indicate student teachers do not enjoy grading papers but may enjoy time in the laboratory. This information could be valuable for teacher education programs interested in improving student teaching experiences.

Several recommendations for practice emerged from this study. Teacher educators should encourage their students to engage in as many activities as possible during their student teaching experience so the students will have the opportunity to gain the most knowledge and experience. The allocated time for student teaching is limited at most institutions, therefore student teachers should be encouraged to participate in as many experiences related to secondary agricultural education teaching roles as possible, even if it is outside of the allocated student teaching time. Experiences such as attending district, area, and state meetings or conventions, degree checks, leadership and career development events, and livestock validations are all events that can reap additional benefits for a student teacher by increasing their awareness of their future obligations. However, caution should be exercised when recommending student teachers do as much as possible during the semester in order to prevent early burnout as identified by Fives, Hamman, and Olivarez (2007). Since there was a negative correlation with decision to enter the field of teaching and the amount of time spent grading student work, teacher educators should instruct their students in ways to grade or evaluate students more efficiently.

Further research should be conducted to identify what amount of time spent student teaching causes early burnout. Additional research should also be conducted at other institutions across the country to see if there are similar results on the decision to enter the field and to compare how student teachers are spending their time during the experience. Another area of research that should be conducted is gathering self-efficacy information from student teachers during their student teaching experience to determine if there is a relationship with time spent in student teaching activities and levels of self-efficacy. With little evidence pointing to time spent student teaching influencing the decision to enter the field, additional efforts should be made to identify reasons why pre-service teacher decide against entering the field to combat the problem of reoccurring teacher shortages.

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A Study of the 4-H STEM Career Pathway Model: Perspectives from Youth, Parents, Community Volunteers, Corporate Volunteers, and 4-H Professionals

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Abstract

This study sought to understand the 4-H STEM Career Pathway program, a three-year initiative to address the low supply of diverse and prepared workers for high-demand STEM careers such as computer scientists and engineers. The qualitative study described here used document reviews, focus groups, and individual interviews. Participants were 4-H youth, parents, corporate volunteers, community volunteers, and Extension 4-H professionals in 13 states. Findings were described in four major themes: (a) 4-H STEM programs were successful and engaging, yet participants described the need for more advanced experiences for youth; (b) 4-H STEM programs required considerable investment in partnerships as well as professional and volunteer development; (c) Girls and minority youth were involved in programming when local role models and local partnerships were leveraged, and (d) the 4-H STEM Career Pathway model needs clear concepts and definitions to be a sustainable approach in the 4-H movement. Recommendations include the need to provide effective volunteer and professional development and the need for outreach to corporate volunteers.

Introduction/Literature Review

The 4-H Science: Building A 4-H Career Pathway Initiative was a collaboration between National 4-H Council and Lockheed Martin to help youth develop STEM and workforce skills necessary for success; to immerse youth in the field of STEM work; and to engage with the science and engineering career pathway. A key goal was to involve more girls and minority youth in STEM and STEM career fields. Women are 50% of the population and 30% of the STEM workforce while individuals representing minority racial and ethnic groups are 27% of the population and 11% of the STEM workforce (National Science Board, 2018). The initiative was conducted in 13 participating states, and the project planning, implementation, and evaluation was guided by a framework known as the 4-H STEM Career Pathway. Ultimately, the initiative aimed to contribute to a robust pipeline for science professions in high-demand careers such as computer scientists and engineers.

Research and evaluative studies of 4-H STEM programs have shown that the programs help youth gain knowledge, seek new aspirations, develop life skills, and form positive attitudes about science. Flores-Lagunes and Timko (2014) found a positive association between 4-H participation and math and science standardized test scores. This finding is aligned with Noble's (2018) finding that Kentucky 4-H professionals base programming on Common Core and/or Next Generation Science Standards. Various 4-H science programs have been successful at teaching diverse STEM subjects as measured by self-report questionnaires including robotics (Barker et al., 2008) biotechnology (Ripberger & Blalock, 2013), and aquaculture (Horton & House, 2015).

Salle et al. (2019) used a pre- and post-test design to evaluate an animal science-based biotechnology and digital media workshop for Latino 4-H youth. Youth reported greater interest in obtaining a STEM job and greater perception of their science self-efficacy. In a study of youth in five rural 4-H robotics camps, researchers found that youth increased skills in decision-making, use of limited resources, and teamwork (Sage et al., 2018). Regarding youth attitudes, 4-H participation among youth has been correlated with taking more advanced science courses in school and developing positive attitudes about science (Heck et al., 2012; Lerner & Lerner, 2013; Rice et al., 2016). A survey of more than 400 youth participating in 4-H STEM programs in eight states found that 4-H youth self-reported that their attitudes about future science-related careers were greater than the National Assessment of Educational Progress benchmarks (Mielke & Butler, 2013).

4-H STEM and other 4-H programs are implemented with and through volunteer adult leaders who are managed by Extension 4-H professionals. Volunteers face a variety of complexities in nonformal educational settings such as youth who attend meetings sporadically and youth that represent a range of ages and stages of development (Worker & Ching, 2016). In addition, these volunteers frequently do not have the necessary competence and/or confidence to deliver STEM education. A nationwide study of Extension 4-H professionals found that slightly more than one-half identified a major challenge was finding qualified science content experts/volunteers to lead 4-H STEM programs (Turnbull, 2013).

The literature on nonformal (also known as out-of-school time) STEM education lacks strength (Nippolt, 2012). Yet, the research and evaluation that is available indicates that it is valuable for youth. In a longitudinal study tracking more than 3,000 cases from middle school to age 26, Gottfried and Williams (2013) found that when a student participates in nonformal STEM clubs in middle school, they are more likely to take STEM high school classes, and there was a positive correlation between middle school math club participation and pursuit of a STEM college degree.

Emerging research on nonformal STEM education suggests that having effective role models for youth produces substantial outcomes. In surveys and interviews with 167 alumni of a nonformal STEM program, women reported much greater increases in STEM interest than men because of the program. Interviews indicated that the outcomes for women were driven by relationships among female participants and female leaders (Price, Kares, Segovia, & Brittian Loyd, 2019). One avenue for nonformal STEM organizations in identifying and utilizing effective role models is corporate volunteerism. Corporate volunteerism may have an important role in nonformal STEM education. For example, UL employees have served in various volunteer roles for nearly 50 *FIRST* robotics events which expose youth to STEM careers in nonformal, interactive learning environments and competitions (Veleva et al., 2012).

Theoretical Framework

The 4-H STEM Career Pathway provided an overall outline of 4-H youth activities and corporate volunteer contributions (from an aeronautical engineering corporation). The model was proposed by National 4-H Council and funded by the same aeronautical engineering corporation. The proposed model was informed by two studies and the National 4-H Science Logic Model:

- Nippolt (2012) studied skills and confidence of lead trainers, of adult facilitators, and of overall program efficacy of a 4-H STEM program in five states. As opposed to a strict program checklist or a strict set of lesson plans, the approach was to examine the performance of the overall application model. An application model is concerned with the program concepts and the application to local contexts (Ottoson, 1997). The application model was operationalized in this initiative through the 4-H STEM Career Pathway.
- Riley and Butler (2012) conducted a national review of eight promising 4-H science programs. They recommended three practices which were performance goals for of the 4-H Science: Building A 4-H Career Pathway Initiative state grantees. The first goal was that science experts ought to lead local 4-H STEM programs, and the second goal was that under-represented youth ought to be recruited through schools and urban communities. The final goal was to expose youth to science careers. The corporation was to provide the science experts to serve as corporate volunteers in conducting the local 4-H STEM programs.
- The National 4-H Science Logic Model includes science, technology, engineering, and mathematics, and it describes programming and partnerships that will produce a diverse pool of youth pursuing education and careers in science related fields (4-H.org, 2010).

The 4-H career pathway was expressed by National 4-H Council (2015) with four phases.

- The first phase, explore, involves youth in introductory, short-term STEM projects focused in underrepresented communities. This phase is characterized by engineers (corporate volunteers) teaching youth in two STEM programs: Engineers in the Classroom, a corporation effort to reach youth with STEM education, and National Youth Science Day, a 4-H activity to enrich science literacy among youth.
- The next phase is the learn phase which involves long-term experiences to engage more girls and under-represented youth in engineering. In this phase, corporate volunteers visit, lead, or evaluate 4-H STEM projects.
- The third phase, practice, is composed of long-term, rigorous projects to build both STEM and leadership skills in preparation for a college STEM major. In this phase, corporate volunteers provide ongoing coaching and guidance to youth either virtually or in-person.
- The final phase is the experience phase in which youth collaborate with corporate volunteers to understand careers and gain marketable experience. Employees engage with training, shadowing, internship or other career readiness activities for youth.

Purpose/Objectives

The overall purpose of this study was to understand perspectives from youth, parents, community volunteers, corporate volunteers, and 4-H professionals regarding the 4-H STEM Career Pathway. The study supports National Research Priority six (Vibrant, Resilient Communities) which includes the needs to understand how Extension programs impact local communities and to engage volunteers in program delivery (Graham et al., 2016). The objectives were to understand perceptions of 4-H youth, parents, community volunteers, corporate volunteers, and 4-H professionals regarding:

1. Successes and challenges for the 4-H STEM Career Pathway Model in producing local impacts.
2. Ways to make the 4-H STEM Career Pathway Model a sustainable, quality approach for effectively engaging youth, especially girls and minorities, and volunteers.

Methods

This study was part of an intensive, three-year process evaluation of the 4-H STEM Career Pathway Model. As a mixed-methods and multimethod design, the study design was "contextually crafted" rather than modeled after other studies or research designs (Greene, 2015). The study represented a process evaluation which are conducted to document the extent to which program activities are implemented according to plan (CDC, 2017) with a focus on inputs/resources, activities, participation, and reactions (Fitzpatrick et al., 2004; Radhakrishna & Bowen, 2010). As a process evaluation, this research focused on direct programming activities and audiences involved as well as successes, best practices, and recommendations for future programming. This study was approved by the University of Tennessee Institutional Review Board (UTK IRB-15-02714-XP).

Participants

Participants were 4-H youth and parents, Extension 4-H professionals, and volunteers participating in 4-H STEM program funded by the 4-H Science: Building A 4-H Career Pathway Initiative. The actual 4-H programs varied by location and included an after-school 4-H STEM program, state 4-H conferences, and an in-school 4-H enrichment program focused on gardening. All participants signed consent forms for both the observations and focus groups. Researchers obtained both parental consent and youth assent for youth participants.

Procedures

The study was conducted in three phases. In Phase One, we collected and aggregated monthly activity reports via the Qualtrics Research Suite (2019) from all 13 state grantees. The monthly activity reports included information about:

- Youth participants (gender, race, ethnicity, total number of youth contacted, and the stage of 4-H STEM Career Pathway in which the youth participate);
- 4-H professionals (number involved in the project and the hours they contributed);

- Community volunteers (number involved in the project and the hours they contributed);
- Corporate volunteers (number involved in the project and the hours they contributed); and
- Curriculum used, approaches, and innovations in reaching youth.

In Phase Two, we selected the states to visit. We selected all three of the states implementing all four phases of the 4-H STEM Career Pathway because these states could provide the most depth and breadth regarding experience with the model. We also selected four of the 10 states that had exceeded benchmarks for total youth reached, had the highest percentages of girls reached, had the highest percentages of minority youth reached, and/or had the most developed partnerships with corporate volunteers. Of these four states, three were included in this research project as various natural disasters prevented scheduling the fourth state visit.

In Phase Three, we traveled to sites within each state selected by the state grantee, conducted focus groups with 4-H youth, parents, community volunteers, corporate volunteers, and 4-H professionals. We also observed actual 4-H STEM programs being conducted as part of this initiative, and focus groups typically were held at the same location and time as the 4-H STEM programs. Observations, made during the site visits, were designed and conducted using Patton's standards for evaluative site visits (2015).

Group and individual interviews were conducted to describe opinions and perceptions of project participants regarding the project's strengths and areas for improvement. Sample focus group questions included:

- Would you recommend this program to other youth and families? Why or Why not? (4-H youth and parents)
- What would make this program better? (4-H corporate and community volunteers)
- Talk about your most recent activity related to 4-H Science: Building A 4-H Career Pathway Initiative. Who was involved? What happened? (Extension 4-H professionals)

We interviewed 155 participants in six states and the STEM Futures Conference: 59 Extension 4-H professionals, 16 4-H community volunteers, 5 corporate volunteers, 49 youth, and 26 parents. In those cases we conducted individual interviews using the exact same set of questions.

The focus groups were recorded and transcribed. Researchers coded the transcripts using an open-coding approach. The categories from each individual focus group were then aggregated across all focus groups. This was a convergent mixed methods design whereby quantitative and qualitative data sets were obtained and combined. The data was triangulated to understand the project in summa, draw conclusions, and propose recommendations (Creswell, 2015; Creswell & Clark, 2007).

All of the interviews were recorded via digital audio recorders. The audio files were transcribed. We read and re-read the transcripts, and used an open-coding approach. All of the codes from the various transcripts were combined and key themes emerged. The observational data was collected via the Out of School Time (OST) Observation Instrument which helped synthesize observations to understand the extent to which 4-H STEM activities promoted skill-building,

active learning, relationships among youth and between youth and staff, and engagement in specific learning and/or developmental goals (Pechman et al., 2008). This observational data was triangulated with the interview data to understand the total 4-H STEM Career Pathway effort.

Findings

From our analysis, four major themes emerged: (a) 4-H STEM programs were successful and engaging, but needed advanced experiences for youth; (b) 4-H STEM programs require considerable investment of resources that include partnerships as well as professional and volunteer development; (c) girls and minority youth were involved in programming when local role models and local partnerships were leveraged, and (d) the 4-H STEM Career Pathway model needs clear concepts and definitions to be a sustainable approach in the 4-H movement.

Theme 1: 4-H STEM Career Pathway Activities Were Successful and Engaging, but Needed Advanced Experiences for Youth

The 4-H STEM activities provided as part of this grant received positive comments from youth, parents, community volunteers, corporate volunteers, and 4-H professionals. These activities were engaging, successful, and provided hands-on learning that complemented and reinforced knowledge and content from school science classes. Observed clubs and events demonstrated hands-on activities that were youth-driven with guidance from professionals and volunteers. Two key components contributed to the success of 4-H STEM activities: (a) youth engagement and enthusiasm for the activities, and (b) support and guidance for youth provided by 4-H professionals and volunteers throughout the activities.

Youth engagement and enthusiasm for the activities. Comments from youth, parents and volunteers and our observations indicated that youth were excited about these activities. Several parents commented that this was the first out-of-school activity that their children wanted to attend and did not want to miss. Parents and youth also appreciated the hands-on aspect of activities. Parents identified the way 4-H STEM activities included all youth who wanted to participate—not just the top students. Parents also appreciated how 4-H STEM was focused more on cooperation and helping others rather than winning competitions, as one parent explained: "The kids get to do things on their own. It's not adult-driven. It's child-driven. The children get to explore different things and figure out what works and figure out what doesn't work. They're working out their problems on their own."

Both parents and youth discussed how staff provided support and guidance. Youth reported that this support and guidance was in contrast to large school science classes where one-on-one instruction is limited. Typical comments included the sentiment expressed by one 4-H youth: "In school, since there's more students, you don't really get one-on-one help and then you don't really understand what you're doing. When you're here, since we have mentors, we get more help."

Lack of advanced STEM activities at the practice and experience phases. Extension 4-H professionals described the challenges of connecting 4-H youth with Lockheed Martin employees. First, youth were not permitted in many Lockheed Martin facilities for security and

safety reasons. Second, some facilities had limits on how far employees could travel. A typical comment from an Extension 4-H professional was: "I think that was part of our frustration too is that the grant required internships; however, the culture within and the security level of Lockheed Martin is what's going to be the prohibitive part of that whole."

Our interviews reveled that Extension 4-H professionals were not comfortable and had limited experience organizing advanced STEM activities. Specifically, Extension 4-H professionals were not comfortable organizing Lockheed Martin employees for coaching, job shadowing, internships, and other career development activities. Lockheed Martin employees and 4-H community volunteers echoed the need to provide more advanced experiences for youth at the practice and experience phases. In our interviews, this arose from the question, "What would make this program better?" One Lockheed Martin volunteer suggested that 4-H robotics programs should include "more…math, physics, science behind what's physically going on…"

Theme 2: For Effective Nonformal STEM Learning Among Youth, 4-H Must Continue to Invest in Partnerships as Well as Professional and Volunteer Development

The initiative was powered by significant human capital from Extension 4-H professionals, Lockheed Martin employees, and 4-H community volunteers. A project goal was to engage 500 Lockheed Martin employees and 1,000 4-H community volunteers. The project exceeded these benchmarks with 521 Lockheed Martin employees and 3,679 4-H community volunteers engaged. The typical Extension 4-H professional managed 214 4-H community volunteers and engaged 30 Lockheed Martin employees who collectively reached 5,212 youth per year.

Identifying win-win situations. Lockheed Martin and Extension 4-H professionals reported that through their interactions, they had learned to identify win-win situations to facilitate working together. One 4-H professional described their journey: "They [Lockheed Martin] didn't know us. We didn't know them. . . I don't think that they probably felt comfortable going to a foreign environment to go volunteer for an organization that I don't really know. . . So I think it took about a year to try to finally get our foot solidly in the door before we really established that relationship."

Limited STEM knowledge for 4-H professionals and community volunteers. Several 4-H professionals identified their limited knowledge and skills related to STEM subject matter: "I need someone to take time and go slowly with me on coding robots." 4-H professionals also felt that many potential community volunteers lacked STEM skills and abilities, and one 4-H professional described that "traditional 4-H volunteers are still scared to death of science. . . they see science as something in a lab."

Youth talked about the limitations of working with Extension professionals and club volunteers who did not have science backgrounds. This finding is a clear indication of the important need filled by corporate volunteers who provide the content expertise needed for deeper STEM learning. The 4-H professionals expressed the need for more Lockheed Martin involvement in their local programming which would increase STEM knowledge among youth, volunteers, professionals, and communities. One suggestion for overcoming limited science skills was

having prepackaged curricula that were readily accessible for 4-H professionals and community volunteers.

Limited youth development knowledge for volunteers. Interviews identified the need to improve youth development skills, particularly among Lockheed Martin employees. One employee described their experience this way:

> "I remember the first time I went into [agency]. I'd put a PowerPoint up and lost half of them about slide two or something. So I had the best intentions, but you have to know how to work with every different audience, and I think that's training is a very event-specific thing because it could be a different audience one time versus the next time." (Lockheed Martin volunteer)

Theme 3: The 4-H STEM Career Pathway Involved Girls and Minority Youth When Local Role Models and Local Partnerships Were Leveraged by Extension 4-H Professionals

A project goal was to reach 30,000 youth in STEM and career development programs with up to 60% representing girls and 50% representing racial/ethnic minority groups. Of the 89,291 youth reached in this initiative, 48% were girls and 53% represented racial/ethnic minority groups.

Providing role models. One successful practice was to engage STEM professionals who could serve as role models for girls and minority youth. A 4-H professional noted that her involvement with the project was positive for girls and minorities because she represented, "another black woman that's into science" for the youth. Several 4-H professionals also felt that it was important that volunteers be young so that 4-H youth were "building relationships with college and college-bound students."

Developing local partnerships. In addition to the key partnership with Lockheed Martin, local partnerships were formed to engage girls and minority youth. Examples include working with a women's basketball team to sponsor a 4-H STEM Awareness Night and recruiting volunteers from professional scientific organizations for minorities and women. The most notable professional association for volunteer recruitment were local chapters of the National Society for Black Engineers.

Utilizing the local 4-H program's diversity. Purposeful outreach proved essential in many cases, but in some cases, 4-H professionals reported that they did not employ any special outreach or approach to reach minority youth and girls. As a 4-H professional stated: "I don't think we've done specific recruitment for this project to increase female participation because they're already there participating."

Theme 4: The 4-H STEM Career Pathway Connects 4-H Youth to Careers, but Lacks Clear Concepts and Definitions

Momentum for connecting 4-H STEM to careers. Respondents identified the importance of connecting 4-H STEM activities to advanced educational opportunities and future careers. 4-H youth recommended 4-H STEM to others because "in the future we can get a job in

it." Parents view 4-H as providing youth the opportunity to pursue their passions and interests while connecting youth interests to higher education (including scholarships) and careers. The 4-H STEM Career Pathway model inspired some Extension 4-H professionals to want to incorporate career development in all 4-H projects and activities. However, observational data indicated a lack of connection between 4-H STEM activities and real-world applications and to educational pathways and careers.

Definition of concepts and expectations. 4-H professionals described the need for a 4-H STEM Career Pathway that was "more developed and articulated." They described how 4-H staff spent considerable time discussing the similarities and difference among the four different phases of the pathway. As one 4-H professional noted, "I feel like the theory and the potential of the pathway is not articulated well enough."

Discussion

When programs are complex, needs are great, and solutions are untested, a process evaluation is an important first step to evaluate activities, audiences, and best practices (Fitzpatrick et al., 2004). This study was part of an overall process evaluation, and this study has some important limitations and contextual factors:

- As previously discussed, all of the measures, including the OST observation form, were available to state grantees in advance. We do not know the extent to which having access to the observation form in advance may have influenced answers to focus group questions.
- The funding agency asked for observations and interviews only with those states that were meeting benchmarks. This provided an in-depth analysis of states that were performing, but no information about the barriers faced by under-performing states.
- Engineering was the predominate focus of the programs observed which may have been due to the donor and corporate volunteers who represented an aeronautical engineering firm. Extension 4-H professionals and corporate volunteers discussed the need for more advanced STEM program, especially in deeper STEM learning, job shadowing, and internships. The observations echoed this need. Yet, we noted a triangulation of data around the need for more program development.
- During the course of the three-year program, several state grantees expressed the need for stronger curricula, specifically in career development for youth and STEM skills for professionals. By the third year of the grant, all of the state grantees had access to the same tools, Build Your Career, Click2Science, and Couragion. Interestingly, these tools were not discussed in focus groups, and none of these curricula were seen by the researchers during program observations.

Additional applied research is paramount to understanding how 4-H, communities, and organizations work together to prepare youth to fully succeed in life and career. Future research is a critical contribution to building stronger career pathways for youth and ultimately, a robust pipeline for STEM professions.

Conclusions/Recommendations/Implications

This study revealed some common accomplishments and challenges across states. Youth received substantial support and guidance from a cadre of Extension 4-H professionals, 4-H community volunteers, and Lockheed Martin employees. This resulted in youth who were engaged and enthusiastic about STEM. Major outreach efforts that involved girls and minorities were identifying and engaging role models with STEM expertise to serve as 4-H STEM volunteers. Similar to Price et al. (2019), we found that relationships between girls and women role models are key to girls' STEM interest and success. However, in some communities, no special outreach was needed as the 4-H program had strong involvement of girls and minorities before the initiative.

Extension 4-H professionals felt that their STEM educational background is inadequate for today's youth. Professional development is recommended to "level-up" the STEM skills of Extension 4-H professionals (Worker et al., 2017). In addition to STEM skills, Extension 4-H professionals report being ill-prepared to implement job shadowing, internships, and other forms of career development for youth. Therefore, the Cooperative Extension System and National 4-H Council should explore ways to promote greater Extension professional engagement in career development activities (specifically the practice and experience phases). Virtual career development could mediate difficulties related to travel, time, and work demands. Extension 4-H professionals also reported the need to improve the training opportunities they offer to volunteers to focus on youth development and pedagogy. Extension 4-H professionals and corporate volunteers discussed the importance of having prepackaged STEM curriculum to serve youth in a more robust way.

Findings identified the need to further develop the 4-H STEM Career Pathway and align youth development and 4-H STEM curriculum. 4-H professionals consistently expressed difficulty understanding definitions, concepts, and different phases of the 4-H STEM Career Pathway. Yet, they also expressed that the initiative had developed their awareness of the need to integrate career development with all 4-H projects.

To scale-up 4-H STEM programming and reach more girls and minority youth, we proposed an enhanced 4-H STEM Career Pathway. This proposed 4-H STEM Career Pathway was validated by the National 4-H STEM Career Pathway Working Group, a committee of seven professionals and researchers representing four land grant universities and National 4-H Council. Of the seven working group members, five had been involved in this initiative and two had not been involved in the initiative. These different perspectives provided valuable counsel on how to enhance the existing 4-H STEM Career Pathway so that it would positively impact the entire 4-H movement. All of the working group members had either written 4-H career development curriculum or were practitioners with exceptional 4-H career development programming and local impacts. The working group examined our findings and our proposed 4-H STEM Career Pathway. Each member was tasked with applying the revised 4-H STEM Career Pathway to a local STEM program in their state which had not been part of the current initiative. This was done to understand if the revised model was specific enough to strengthen 4-H STEM programming, but conceptually broad enough to be useful across varied 4-H delivery methods and audiences. This group met one time face-to-face (for one day) and via video conference three times to discuss

ways to improve the model given the results of this study and the group's local experiences with the revised model. The Enhanced 4-H STEM Career Pathway (Figure 1) reflects the study results and our discussions with the working group.

4-H STEM Career Pathway for Youth Success

Growing a Generation Prepared to Succeed in Life & Career

	Explore	Learn	Practice	Career Experience
Youth Grade in School	All Grades		8-12th Grades	
Milestones	Youth explore concepts to develop awareness in STEM, college and career readiness for 21st Century success.	Youth learn skills and abilities in STEM, college and career readiness for 21st Century success.	Youth practice and apply real world skills and abilities in STEM, college and career readiness for 21st Century success.	Youth gain career experience in STEM that informs their college and career decisions for 21st Century success.
Outcomes	Youth will: • Express interest and be engaged in science related activities. • Express positive attitudes about science.	Youth will: • Demonstrate a capacity for science process skills. • See science in their futures and recognize the relevance of science. • Express positive attitudes about engineering. • Demonstrate a capacity for engineering skills.	Youth will: • Draw connections to real-world concepts and situations. [a] • Discuss STEM careers and their educational pathways. [a] • Apply science skills to issues in their community. • Make contributions to their peers, families, and communities.	Youth will: • Demonstrate professional communication appropriate to the academic and workplace context. • Demonstrate the social, emotional, character, and leadership skills necessary for academic or workplace success. • Make informed decisions about college aspirations that are personally meaningful. • Make informed decisions about career aspirations that are personally meaningful.

[a] These outcomes are from: Pechman, E.M., Mielke, M.B., Russell, C.A., White, R.N., Cooc, N. (2008). *Out-of-School time (OST) observation instrument: Report of the Validation Study*. Washington, DC: Policy Studies Associates. All other outcomes are from National 4-H Council Common Measures (2017)

Figure 1. Enhanced 4-H STEM Career Pathway

Because of the findings that indicate that this was a successful initiative, it is recommended that programming continue and expand throughout the country. Every youth, parent, corporate volunteer, community volunteer, and Extension 4-H professional interviewed recommended the initiative for broader implementation. We recommend that the Enhanced 4-H STEM Career Pathway Model be used for program development and evaluation, including curriculum development. Programs using the enhanced model need to undergo rigorous research to further understand how the model can contribute to better 4-H STEM programs that perform well for all youth. Additionally, research is needed to understand what current curricula, if any, supports the enhanced model.

Future research should examine the extent to which the 4-H STEM Career Pathway impacts performance of Extension 4-H professionals. When college lecturers were taught how to deliver STEM content in nonformal ways, lecturers improved their attitudes, leadership, social skills, and class creativity (Alonso Terrazas-Martin, 2017). Research is needed to understand if STEM education has these or other benefits for Extension 4-H professionals.

In the current study, it was important for parents and youth to be interviewed together for the ecological validity, and future research must look for ways to evaluate programs in nonformal environments where learning is highly social and interactive (Allen & Peterman, 2019). Youth and parents discussed the importance of one-on-one instruction and mentoring. This finding underscores the important role of 4-H in STEM learning and achievement. Interestingly, this finding echo's Bloom's groundbreaking research which emphasized the role of individualized instruction, mastery learning, and the need to explore how group instruction could be as effective as individual instruction (Bloom, 1984). Additional research should explore effective 4-H one-on-one instructional settings and curricula. Furthermore, Extension 4-H professionals may be able to use the 4-H organization's proclivities for one-on-one instruction and mentoring for marketing 4-H to youth and parents.

It is recommended that the Cooperative Extension System develop a long-range plan for involvement of corporate volunteers. For STEM nonformal learning, corporate volunteers are particularly important as Extension 4-H agents perceived that both themselves and community 4-H volunteers lacked the STEM expertise needed to help today's youth succeed. Corporate volunteerism shows great promise (Veleva et al., 2012), and research should explore how 4-H STEM programs reflect both work design and volunteerism theories (Grant, 2012).

Of the 10 states implementing only the explore phases of the 4-H STEM Career Pathway model, none met all of the benchmarks for total youth participation, female youth participation, and minority youth participation across all three years. The states visited were the ones with the highest overall participation numbers. The state grantees that failed to meet any benchmarks (for overall youth served, girls served, and minorities served) are not well understood. Yet, it is interesting that money is not the most critical limitation as all of the state grantees received the same amount of funding to implement the program. Future research is needed to understand the barriers and contextual factors this group of under-performing states faced. As an illustration, the explore phases emphasizes introductory, short-term activities. It is possible that long-term, in-depth 4-H programming, such as clubs, are encouraged in some counties and states which leaves little time for short-term activities that target new audiences. Information about barriers and contextual factors is critical to have in planning for future use of the 4-H STEM Career Pathway and making future investments in STEM programming so that barriers can be understood and mitigated.

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STEM Education in Virginia 4-H: A Qualitative Exploration of Engineering Understandings in 4-H STEM Educators

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Abstract

In 2007, 4-H made a specific commitment to improve Science, Technology, Engineering, and Mathematics (STEM) literacy in America's youth by forming the 4-H Science mission mandate. However, research suggests in order for educators to successfully implement STEM programming, they need to understand the content and best teaching practices, which presents a unique obstacle for 4-H educators as many lack formal education in both. By conducting interviews with current 4-H educators in Virginia, this research begins to highlight the importance behind STEM understanding and STEM teaching practices – particularly as they pertain to engineering projects. This interview and data analysis process uncovered common themes including connections between engineering and current 4-H educational approaches, as well as the existing barriers between volunteers as STEM educators and successful programming. In order to improve STEM education within 4-H, professional development strategies focusing on engineering characteristics, outcomes aligning with 4-H goals, and applications to real-world problems should be implemented.

Introduction

Science, Technology, Engineering, and Mathematics (STEM) education is supported by an economic and social need for cross-discipline understanding of complex, worldwide problems. While multiple understandings of STEM education are realistically utilized in both formal and non-formal education (Bybee, 2010), most common definitions articulate that STEM education is two or more subject areas taught throughout one instructional unit (Laboy-Rush, 2011; Sanders, 2009; Wells, 2015; Zollman, 2012) with intentional connections between the subjects discussed and demonstrated (Sanders, 2009; Wells, 2015). However, it is common for students to lack the ability to make these connections on their own, therefore requiring the assistance of an educator to clearly define the relationships between these content areas (Agustin, Agustin, Brunkow, & Thomas, 2012; Heibert & Lefevre, 1986). In order for educators to articulate these connections, they must possess a firm understanding of the individual disciplines through both content and pedagogical approaches.

Every year, 4-H engages with over six million youth between the ages of 5-19 in urban, suburban, and rural areas through programming and mentorship by adult educators and volunteers (Worker & Mahacek, 2013). 4-H demonstrates the role of out-of-school-time, non-formal programs by encouraging youth to excel through hands-on engagement (Worker & Mahacek, 2013). Since its inauguration in 1902, the 4-H Youth Development Program, administered by the USDA specifically through land-grant universities, showcases a history of

youth development towards engagement with science, engineering, technology, nutrition, leadership, and citizenship education (Worker & Mahacek, 2013).

In 2007, as a leader in non-formal technology, engineering, and science education, 4-H made a specific commitment to improve STEM literacy in America's youth by forming the 4-H Science mission mandate (Worker & Mahacek, 2013; 4-H, 2007). This National 4-H Science Initiative developed efforts to concentrate 4-H programming on teaching science, technology, engineering, and applied mathematics (Mielke, LaFleur, Butler, & Sanzone, 2013). Though a desired outcome of the programs would be to address the critical need for engineers and scientists in the workforce (Worker & Mahacek, 2013), 4-H recognized that the preparation of youth in STEM disciplines would not be accomplished simply through career competencies as rocket scientists or computer programmers; it would be accomplished through 21st century skills that encourage logical, organized, and systematic solutions to wicked problems (Kennedy & Odell, 2014; Shinn et al., 2003).

This initiative focused on the formation of non-formal, out-of-school-time science programming for youth based on experiential learning, inquiry based methods, and positive youth development (Worker & Mahacek, 2013). The goals of these programs are to address the critical need for a larger number of scientists and engineers within the workforce. The outcomes expected through this initiative include:

> (a) knowledge gains among youth--increased awareness of science; improved science, engineering, and technology skills and knowledge; and increased life skills; (b) a change in youth behavior--youth apply science, engineering, and technology learning to contexts outside of 4-H; youth adopt and use new methods or improved technology; and youth express aspirations towards STEM careers; and (c) long-term societal impact--increased number and more diverse pool of youth pursuing education and careers in STEM fields; and increased scientific literacy in the general population (Worker & Mahacek, 2013).

Intentional STEM Infusion (Elliott-Engel, Robinson, & Westfall-Rudd, 2019), and other integrated STEM curriculum, have helped introduce intentional connections by requiring the facilitator and/or volunteer to identify STEM problems and activities in the project work. However, application of an interdisciplinary STEM curriculum is not always effectively implemented in non-formal educational programs, including the 4-H Youth Development Program, where few of the educational agents are trained in engineering – a discipline less often content driven and rather an overarching approach to solving a problem. This lack of formal education is potentially compounded when 4-H educators are not confident in understanding engineering in a broader sense, therefore less likely to verbally emphasize the connections between engineering and STEM activities. This misalignment between necessary facilitation of STEM connections and specialized engineering content knowledge is cause for concern. Without understanding what engineering is or how engineering works, STEM education may not be reaching its full potential in 4-H programming, therefore driving the purpose of this study.

Based on available literature and theoretical frameworks, a lack of specialized engineering content knowledge within 4-H educators may result in an unbalanced understanding and verbal

identification of engineering connections to STEM programming. In order to learn about the understandings and articulations of engineering within 4-H educators, in alignment with Research Priority 4: Meaningful, Engaged Learning in All Environments (Edgar, Retallick, & Jones, 2016), the following research questions focused on strategies and applications of knowledge presented in a STEM focused program were considered:

1. How do 4-H educators see engineering integrated within the 4-H STEM curriculum, projects, or programming?

2. What characteristics of engineering are emphasized as important in the teaching of engineering within the 4-H curriculum, projects, or programming, and why are these characteristics important?

Theoretical Framework

Specialized Content Knowledge

While 4-H's model of experiential learning known as 'Do. Reflect. Apply.' closely aligns with Kolb's (1984) model of learning encouraging continual reflection to promote expanded thinking and context application, it cannot be fully utilized without content knowledge. In previous studies, researchers have looked at what an educator needs to know in order to teach a content area. Broadly speaking, this general approach to understanding content knowledge originating with Shulman in 1986 has since been divided into subdomains including 'Subject Matter Knowledge' (SMK), or the content necessary to teach, and 'Pedagogical Content Knowledge' (PCK), or the teaching practices necessary to teach. SMK has then further been split into 'Common Content Knowledge' (CCK), 'Specialized Content Knowledge' (SCK), and 'Horizon Content Knowledge' (HCK).

Extensive research has been conducted in the field of mathematics to determine the importance of mathematics content knowledge and pedagogical content knowledge (Ball, Hill, & Bass, 2005; Cai, Mok, Reddy, & Stacey, 2016; Hattie & Donoghue, 2016; Krainer, Hsieh, Peck, & Tatto, 2015; Silverman & Thompson, 2008). In engineering, however, research has focused on PCK, meaning that the content knowledge necessary to teach engineering has taken a backseat to the pedagogical approaches that can effectively communicate engineering. This lack of research specific to engineering content knowledge is at the detriment of the field as "PCK is inconceivable without a substantial level of CK [subject knowledge]" (Baumert et al., 2010, p. 163), suggesting that subject content knowledge is essential and therefore must proceed PCK (e.g., Cai et al., 2016; Krainer et al., 2015).

SCK is the specific knowledge necessary to teach (Ball et. al, 2008) and includes procedural and conceptual understandings and the ability for the educator to recognize errors that commonly occur from the students (Ball, Thames, & Phelps, 2008; Ball, Thames, Bass, Sleep, Lewis, & Phelps, 2009). Additionally, it includes the skill and understanding to analyze student interactions, provide clarification, and utilize suitable imagery for concept representation (Hill, Rowan, & Ball, 2005). Therefore, a professional engineer need not give reason behind multiple

iterations of the design process that result in optimization of a solution for a particular set of parameters, but this reasoning is necessary for an educator engaging with specialized engineering content knowledge in education.
While a specific SCK model does not exist for engineering content, the utilization of the framework developed by Lin, Chin and Chiu (2011) gives a solid guideline for implementation. They suggest that SCK is made of three components: representation, justification, and explanation. For engineering contexts, this would require the educator 1) choose and use the representation of engineering effectively and accurately, 2) describing and justifying engineering considerations and ideas, and 3) offer explanation of the process and procedures through common engineering practices.

Representations refer to both internal organization of knowledge as well as the external representations including real-world contexts, models, or expressions of engineering (Ipek, 2018). Explanation and justification then develop the meaningful higher-level learning by requiring students to express deep understanding and justification of thought (Schwarz, Hershkowitz & Prusak, 2010; Yackel & Hanna, 2003). For SCK to fully be realized, all three components should be satisfied, as it is not possible to solve a problem without inclusion of justification or usage of representations (Ipek, 2018).

Limitations and Research Subjectivity

Time was a limitation of this study as interviews were conducted independent of the relative frequency of engagement with STEM education programming. Data collection is also limited to interviews which do not allow for qualitative validity between reported and observed activity. Due to time and logistical constraints, not all 4-H agents engaging with STEM in Virginia could be included in this study. Additionally, research observations were not utilized in this study to validate or further assess the claims made by the agents, though this possibility is viewed as a potential future expansion on this research project. Also, based on the original study questions, volunteers who might lead or heavily interact directly with students were not included in this study. Inclusion of volunteers within future studies should be considered.

Qualitative research is a study of the lived experience, with the researcher positioned as the filter for data organization and synthesis. As the researcher, the author is therefore positioned within the study. The author was not involved in 4-H as a youth and has no experience as a 4-H educator or volunteer prior to this research. The author does have both a bachelors and master's degree in engineering with experience teaching STEM curriculum in a variety of non-formal arenas. This experience provided the author with content knowledge of engineering applications to real-world problems and industrial needs. Care was taken prior to data collection and analysis to address the bias points of view inherent to personal lived experiences and understandings.

Methodology

In order to answer the previously outlined questions relating to 4-H STEM programming and engineering implementation, the following qualitative methodology was implemented. Eleven educators of STEM curriculum from Virginia, having received traditional youth training from their respective 4-H system, were randomly selected for interviews. Criteria for the selection will

be prior experience teaching STEM programming in both classroom and out-of-the-classroom settings. Participants were not screened for educational background, location, years of experience, or professional development surrounding STEM or engineering as this metadata was considered within the data collection and analysis for potential population generalization (Bailey, 2018).

All participants identified as female and were located throughout Virginia including low to high density counties. Years of experience varied from a couple of years to upwards of fifteen, though it was noted that some participants included experience as educators outside of the 4-H context when answer such questions. While all participants indicated previous participation in STEM professional development, a majority described this professional development as project based with an emphasis on what to teach within a specific STEM program application. Professional development for a majority of participants was not described as an opportunity to learn why or how to teach STEM under a broader understanding.

During recruitment, it was assumed that educators self-identified as teachers of STEM curriculum within 4-H. Since responsibilities of 4-H educators range from direct programming to administrative tasks, the researchers were unable to predict how heavily any participant might engage with STEM or engineering curriculum. It was assumed that this number would be greater than zero and that the agents would feel comfortable discussing these activities, their feelings, and involvement open and honestly.

Data Collection Procedures

Once participants were recruited through snowball sampling (Bailey, 2018), video conference interviews were conducted that include a semi-structured, synchronous format with open-ended questions surrounding engineering understanding, engineering integration into STEM programming, and engineering implementation origins, as well as background educational information from the facilitator. Semi-structured formatting treated the question guide as a "living document" (pg. 107) and allowed for the "flow of the interview, rather than the order in the guide" (pg. 107) to dictate how and when the predetermined questions were asked (Bailey, 2018). Open-ended questions utilizing "what" and "how" phrases elicited thorough responses (Kvale, 1996) while synchronous video conferencing helped build rapport that "treats the respondent as an equal, allows him or her to express personal feelings, and therefore presents a more 'realistic' picture that can be uncovered" (Fontanta & Frey, 1994, pg. 371). This descriptive interview approach allowed for construction or reconstruction of knowledge to produce meanings and understandings of the phenomenon (Mason, 2002). Additionally, this format for qualitative interviews allowed for the knowledge, understandings, interpretation, and experiences (Mason, 2002) of the 4-H Agent to be explored through rich, thick description (Geertz, 1973).

Analysis Procedures

In order to make sense of the data, analysis occurred through the interrogation and organization of data for the production, synthesis, and evaluations of patterns, along with identification of themes and relationships (Hatch, 2002). Interviews were first be open-coded (Strauss & Corbin,

1990) by assigning descriptive labels for the production of significant characteristics (Bailey, 2018), with line-by-line coding utilized when possible. An iterative, inductive process was then be used "to form increasingly more abstract units of information" (Creswell, 2013, pg. 186) for comprehensive themes production. As multiple interviews were coded, each set of codes were likened through a constant comparative method (Glaser & Strauss, 1967) to check for accuracy and to produce qualitative validity (Creswell, 2013). This assessment of similarities and differences "allows the researcher to differentiate one category/theme from another and to identify properties and dimensions specific to that category/theme" (Corbin & Strauss, 2008, pg. 73) while systematically producing themes that are "consistent, plausible, and close to the data" (Glaser & Strauss, 1967, pg. 103) without utilizing provisional testing of hypotheses (Glaser & Strauss, 1967).

Results and Data Analysis

Research analysis revealed trends, gaps, and emergent themes surrounding STEM and engineering education within 4-H programming. Findings were analyzed to produce five themes emerging from the data. These findings are listed with their connections to research questions.

Research Question 1: How do 4-H educators see engineering integrated within the 4-H STEM curriculum, projects, or programming?

Theme 1: 4-H Agents Articulate STEM, Including Engineering, as Separate Content Areas – Often Only Identifying Science Content

4-H agents often defined STEM as the separate content areas of science, technology, engineering, and math. They were able to give example curriculums or programming that belonged in each content area separately, but provided no indication that STEM was interpreted as an integrated concept. Rhonda stated that:

> STEM education is anything related to science - Natural resources, animal sciences kind of things. Technology, like in computer programming those kind of topics. Engineering - the building, the physics, that type of stuff. And then math is kind of encompassed in all of those things.

This lack of integration continued throughout statements by participants, suggesting that engineering is not seen as integrated into 4-H STEM, but rather that engineering is articulated as its own content area that cannot integrate into established curriculum.

Furthermore, agents articulated STEM curriculum utilization as completion of only one content area. For Nicole, when she teaches science topics such as natural resources or agriculture in her in-school or out-of-school programming, she considers herself teaching STEM, regardless of whether or not this activity includes any direct or indirect correlations to technology, engineering, or math. This data suggest that while engineering might be considered a content area of STEM, there is disconnect between how content areas can and should interact within STEM programming. Additionally, when asked what STEM programming within 4-H

specifically looked like, agents gave examples dominated with scientific understandings, suggesting that STEM and science are understood as synonymous.

This level of knowledge surrounding science resulted in two common categories regarding science programming: increased comfort level and increased 4-H education. When asked about their comfort in teaching STEM curriculum, agents indicated they were very comfortable, though many specifically indicated this was only with science content. This indicates that there is a connection between the level of knowledge on a specific topic and the level of perceived integration of this content into STEM and 4-H programming. In other instances, agents indicated that a lack of knowledge, particularly around engineering applications, resulted in a lack of integration of engineering content and discussion into 4-H programming. This lack of confidence in engineering and connection to self-efficacy was outside of this specific paper's purview, but is considered in the wider research initiative.

Theme 2: Engineering Characteristics Exist Within Programming, but Are Absently or Incorrectly Labeled as Engineering

When asked to specifically identify engineering connections or characteristics, agents often struggled to verbalize terms or phrases utilizing engineering understanding. In some cases, engineering was used and identified by the agent, but those engineering connections were not articulated to students at the beginning or throughout the activity. The key importance of this finding connects to research on the Nature of Science, as well as recent understandings of the Nature of Engineering. These efforts indicate that science and engineering need to be explicitly understood and articulated by educators (Clough 2006; Pleasants & Olson, 2019), or else students do not realize they are engaging in authentic practice, which leads to the generalization to science of engineering as a field.

In one instance, an agent identified an engineering activity during the interview regarding vertical gardening and design of a trellis system. However, this activity was communicated to the students as a team building activity, but not as an engineering activity. Design challenges were also often communicated this way. In other cases, agents would describe common engineering characteristics, but would never verbalize their understanding of these activities as engineering. During one of her activities, Ava stated:

> Yeah when they're launching their rockets you know and they have to figure out how hard to step on the bottle, you know, are they gonna over shoot or under shoot? And does it go off to the right or off to the left? Or you know what if we added fins? What do you think would happen? … So they get to try different things and you know tell me what worked and what didn't.

In this instance, Ava described many components of engineering design including identifying variables around a problem, selecting possible solutions, building a prototype, testing and evaluating that prototype, redesigning, and communicating the results. Other agents articulated similar cases, many of which focused on the trying and retrying involved in design as a process. However, these steps were not communicated to the students through engineering connections,

therefore suggesting that there is not a lack of engineering integrated into 4-H programming, but rather there is a lack of known engineering terminology and phrasing.

Research Question 2: What characteristics of engineering are emphasized as important in the teaching of engineering within the 4-H curriculum, projects, or programming, and why are these characteristics important?

Theme 3: Engineering Characteristics Include a Variety of Complexities and Terminologies

The most dominant characteristic associated with the concept of engineering was design and the design process. When asked to describe how engineering was characterized, Stephanie stated "giv[ing] them an opportunity to work through that engineering design process where they would identify a problem and then come up with a solution… try that solution out and then go back to the drawing board and tweak it and try it again." Many agents echoed similarly, particularly around the idea of designing, redesigning, and evaluation of what went wrong or well. "Troubleshooting" and "prototype" were often used to describe the design process, mainly during the redesign phase. During engineering activities, students were also encouraged to report their findings to the wider group and often completed their designs in a group setting.

Of the agents who described engineering using design terms, their understanding of the process was cyclical, though very few utilized that term directly. Agents also communicated their lack of using these terms throughout the activity, stating more often that they might describe the process at the beginning of the project, but not as the students are moving through the process. The recognition of a problem definition was also common. Connections were made by the agents concerning the importance of the problem and its relationship to solving that need, and being able to utilize only certain materials to solve the problem.

Some agents also discussed constraints, criteria and variables within the design process. While most agents did not use the terms "constraints" or "criteria", they stated that they would limit the materials and give students requirements for their designs, as well as establish clear goals that defined what the design was required to accomplish. One agent, Madison, even went as far as to integrate monetary values into her project, therefore requiring students to determine which items they would use within a set budget. This data suggest that agents are not only considering physical limitations on materials, but additional complexities are being integrated, though it is unclear if this is considered to be an engineering characteristic.

Theme 4: Agents Relate Engineering Understanding to Personal Relations and Do Reflect Apply Model

In order for agents to have formed their understandings of engineering characteristics, they must have interacted with the concept of engineering in a previous way. For many agents, exposure to engineering has come in the form of family relationships, including nephews, brothers, and husbands. In one instance, Christina described her nephew, a mechanical engineer as a child who "always tinkered with stuff and you know, was one of those kids that would tear part toys and put them back together." Another agent described how her brother often observes physical

structures such as houses and questions why choices were made in the design of these buildings. In all instances, the ways in which the agent described the engineering through whom they interacted was reflective in the terms utilized in the characterization of engineering. It is worth noting that all personal relations mentioned in this data were with male engineers.

Additionally, data suggest that many agents have and can form an understanding of engineering through the Do Reflect Apply model often used as a base for experiential learning within 4-H. For some agents, these steps were internal to the programming, where the students would "Do" the design, would "Reflect" on what occurred and resulted from the design, and "Apply" a different technique of what they need to improve for the next round of changes. Erika expanded upon the importance of the "Reflect" phase, indicating that:

> The kids don't always recognize that they've made a prototype or that they've done troubleshooting, so sometimes it's in that reflection phase that I'll bring up the term and describe the term and ask if that's something that they did or how they can tell me about doing something in that. And then it's kind of like a light bulb goes off that "hey, we did that" and they explain, you know what they did that fits with that term.

This data suggest that it is important for agents to directly connect STEM and engineering concepts to the model in order for learning to occur, but that the exact phase in which application occurs is likely of less importance and can rather be guided by student interactions.

For some agents who strive to make applications to broader understandings external to the immediate lesson, the application phase is articulated as important but challenging. Further data continued to support this idea that agents are able to define an engineering curriculum in the "Do" phase, potentially characterize the importance of "Reflect" through the redesign, but few were able to "Apply" engineering concepts outside of this pre-established understanding. For examples, when asked to elaborate on why an identified project was considered engineering, they would simply restate the project, indicating that the characteristics around Keva Planks or Lego's Robotics is engineering, but further application was challenging.

Theme 5: Agents Identify Important STEM Characteristics and Concepts, Particularly With Lesson Planning Considerations

While the data suggest a limited ability to readily identify the importance of engineering characteristics and concepts, agents were able to connect STEM components to important skills and motivations. For example, many agents discussed STEM using community and local connections, particularly those related to environmental science settings. While interacting with watershed education or touring a local pond, agents would ask what students could do to positively affect their own watershed or pond. Erika expanded on this concept by stating "we look at specific practices that [students] can do based on what they've learned or that they could investigate further to find out more", suggesting that agents understand the importance of student knowledge being applied to personal connections. Another set of agents emphasized the importance of student motivated discovery and how STEM curriculum can be manipulated to fit the interests of all students for individualized learning within group curriculums.

Another level of flexibility inherent to STEM programming with 4-H is the time constraints. For example, Colleen articulated that her groups often meet for only one-hour timeframes, which require her to skip some of the steps in either the engineering design or scientific method. As a result, this skipping meant that "maybe [we're] not giving full attention to building a second prototype for example. So we get some things that don't work but they seem to learn from the failures as much as they do from, from making something that does work."

Discussion

Specialized Content Knowledge

Data collected within this study align with the many components of the theoretical framework and literature within STEM and engineering understandings. Throughout this research initiative, data supported the importance of Specialized Content Knowledge (SCK), or the procedural and conceptual understanding necessary for teaching and recognition of student errors (Ball et. al, 2008; Ball et. al, 2009), suggesting that when this understanding does not exist, educators are less confident and less likely to initiate engineering within their STEM programming. Data also indicated a lack of skill and understanding to analyze student interactions, provide clarification, and utilize suitable imagery for concept representation, details also important to SCK (Hill, Rowan, & Ball, 2005). This finding suggests that even when engineering occurs within 4-H STEM programming, agents are unable to identify these engineering connections and are unable to further assist students in the learning process surrounding engineering.

When SCK is broken down further into three components, representation, justification, and explanation (Lin, Chin, & Chiu, 2011), researchers can begin to analyze where exactly engineering knowledge is lacking. For many agents, this first level of SCK was inconsistently utilized, as some agents were not able to represent engineering effectively within their programming. Oftentimes these agents would not vocalize engineering terms or concepts when their students engaged with these ideas successfully. Additionally, these agents did not outline engineering activities within an engineering framework, therefore allowing for design, testing, redesign, and even evaluation without acknowledgment of a link to engineering concepts.

A second group of agents unsuccessfully navigated the second level of SCK, as these agents were unable to justify and describe engineering considerations and ideas. For example, some agents struggled to articulate components of the engineering design even though they identified design as an important part of engineering. Often agents would acknowledge the need for materials and testing, but would not outline the need for criteria, constraints, and formal evaluation of the prototype. Furthermore, this lead to a lack of meaningful, higher-level learning for the students, as they were not required to express deep understanding or justification for their actions. For example, while agents identified that students were encouraged to try their designs again after failure, there was no indication that students were required to think through why their design failed or what components of their design might specifically lead to more successful results. This missed connection is a result of the simplified understanding of the Process and Generalization steps within experiential learning, as 4-H combines these concepts within the "Reflect" stage. This lack of justification of engineering considerations and ideas, both with the

agent and materializing with the student, suggests that this second group of agents failed to meet the second SCK standard – justification.

For other agents, they were successful in representing engineering, as well as justifying engineering ideas, but when asked to physically manifest these understandings into curriculum, their answers fell short. For example, while many agents listed 4-H curriculum such as rockets or robotics as engineering focused, they were unable to explain the process and procedures within this curriculum through common engineering practices. Overall, this grouping suggests that some agents are able to identify engineering, potentially describe engineering considerations, but unable to articulate these items fully within an experiential learning activity, therefore failing to meet the third SCK standard – explanation.

It is important to note that some agents were in fact able to meet all three levels of SCK as they were able to articulate examples of effective engineering representation, describe a robust narrative of engineering considerations, and offer explanation for common engineering practices within engineering practices. However, data suggest that few, if any, agents are able to reapply their understanding of engineering to individually developed curriculum. This shift in understanding suggests that while agents are beginning to understand engineering, they do not yet have the ability to successfully apply and recognize engineering connections outside of standardized, predetermined engineering curriculum.

Pedagogical Content Knowledge

While not within the scope of this study, further discussion of Pedagogical Content Knowledge (PCK) is needed, particularly with regards to its applications within experiential learning and volunteers as STEM educators. Data from this study suggest that while Specialized Content Knowledge is still needed, and that Baumert et al. (2010) acknowledge PCK is unobtainable without some level of SCK, volunteers and teacher may already have the SCK necessary to successfully understanding engineering, or at a minimum, an ability to overcome the self-efficacy barriers seen with many agents.

Pedagogical Content Knowledge (PCK) focuses on the educator's ability to foster understanding of a concept or subject for the learner (Shulman, 1987). Additionally, PCK "also includes understanding of what makes the learning of specific topics easy or difficult; the conceptions and preconceptions that students of different ages and background bring with them to learning" (Shulman, 1987, p. 9). As indicated from the data of this study, some agents appeared hesitant to include engineering in curriculum for elementary students, which aligns with results from the Leonard Gelfand Center for Service Learning and Outreach at Carnegie Mellon (2008) which found that educators questioned whether engineering could be taught to younger students. In examples such as this, the Specialized Content Knowledge surrounding engineering is important, but potentially less important than the educator's abilities to recognize how young students might understand and engage with engineering appropriately.

When tied together with experiential learning, professional development surrounding PCK can be approached in a way that 4-H agents are already familiar. This is specifically important for engineering applications as the way one thinks about the experiential learning cycle is influenced

by the goals and learning objectives of the program or project. While it appears that the cycle can be aligned with both engineering and 4-H learning outcomes at the same time, it is not articulated in that way. For example, 4-H goals and learning objectives are heavily focused on team building and leadership, and often less on specific content. Therefore, when agents move through the experiential learning cycle and engage in processing and generalization, they often will focus primarily on the goals of 4-H instead of content of STEM or engineering alone. For future professional development, particularly with regards to PCK, practices that acknowledge and utilize both the knowledge of 4-H goals and the knowledge of engineering/STEM content simultaneously within the process and generalize portions of the model will likely be most successful.

Conclusions and Recommendations

This study is the first known to specifically target engineering understandings and utilizations within 4-H STEM programming. Within Virginia, multiple trends seen on the national level or in other states were confirmed. For example, many 4-H agents defined STEM education with a science first mind frame (Bybee, 2010), where some agents required other components of STEM to also be included while others defined science only curriculum as part of the STEM umbrella. Also indicated in previous research (Bybee, 2010), this study suggests that until STEM education, through model units, professional development, or assessment, intentionally integrate interdisciplinary STEM understandings, curriculum will continue to be viewed in this way. This finding is important for all future engineering education initiatives, as engineering is not only seen as the missing link that joins math and science skills and knowledge with technical and societal innovation, (NCTL, 2015, "The Missing Piece"), but is not a content area most 4-H educators or young students are directly knowledge on.

Specific professional development adjustments should be made to more effectively understand prior engineering knowledge of 4-H agents. For example, the finding that agents showcase a broad range of engineering characteristic complexities suggests that trainers may need to be more aware and respond more directly to the variety of understandings within one room – a concept that ties to adult education and adult program planning theory. In this way, it is important to separate where agents are with regards to the SCK – whether they are struggling with representation, justification, or explanation – as each calls for a slightly different approach to professional development. Future work regarding professional development should address self-efficacy barriers and consider how much engineering content is necessary for 4-H educators.

Another avenue through which to improve engineering connections and applications could be the concept of failure. This idea was heavily expanded upon throughout this research project and contained a positive level of comfort for the agents. Many agents articulated their comfort with asking students open-ended questions that could steer them towards an answer. Most agents identified their ability to successfully navigate student failure in design, even in instances where they were not communicating engineering connections. In a study from Gibson and Dembo (1984), high-efficacy teachers spent more time than low-efficacy educators utilizing questions to guide students towards possible answers, suggesting that while 4-H educators might not have high-efficacy specifically within engineering, they utilize strategies of high-efficacy educators.

This result suggests that future trainings that connect redesigns, necessitated by initial failures in design, could be a prime opportunity to engineering discussions and understandings.

Lastly, agents were continually able to articulate their use of the Do, Reflect, Apply model, as well as its connections to activities within 4-H. Even when presented with barriers including materials or time, agents commonly referred back to this model and how their learning experiences attempted to integrate this process, knowing this approach would successfully move the learning forward. By introducing engineering in a way that can be connected to previous experiences of 4-H agents, their initial distaste or discomfort can be decreased and allow for learning within engineering to occur. Therefore, recommendations for professional development could capitalize on this Do Reflect Apply approach and focus on ways to connect engineering design to this same model.

Ultimately, STEM and engineering education have a place within both formal and non-formal 4-H programming. These educational initiatives, ripe for improvement regarding understanding and implementation, play a key role in the ability of youth to expand their interest of the world alongside their capability to solve wicked, global problems. STEM and engineering education offer the interdisciplinary thinking necessary for the development of critical thinkers, an effort aligning with the national efforts of the 4-H Development Program.

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Agriscience Teacher Professional Development Focused on Teaching STEM Principles in the Floriculture Curriculum

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Abstract

Curriculum related to ornamental horticulture has been taught in school-based agricultural education (SBAE) programs where agriscience teachers can support the mission of the American Floral Endowment to inspire people to pursue careers working with plants. However, an overall understanding of how the horticulture industry is connected to the studies of science, technology, engineering and mathematics (STEM) has left a shortage of skilled professionals. To assist agriscience teachers with experiences to engage in content-focused professional development, a conference focused on STEM concepts taught in horticulture and floriculture curricula was planned and delivered where self-efficacy would determine participants' perceptions of their performance before and after engaging in three days of inquiry-based instruction. The Science Teaching Efficacy Belief Instrument was used to collect data. Significant differences were observed with teachers showing an increase in their efficacy beliefs to teach the steps of science in the horticulture/floriculture curricula. We recommend teacher educators consider how to create professional development experiences for agriscience teachers that target specific content to impact self-efficacy. We also recommend providing professional development opportunities for follow-up communication to determine if curricular resources are used and how the teacher's knowledge is transferred through instructional change to enhance student learning outcomes.

Introduction

For over fifty years the central mission of the American Floral Endowment (AFE) has been to fund research and scholarships in floriculture and environmental horticulture to the benefit of growers, wholesalers, retailers, allied industry organizations and the general public. There are many benefits of the floriculture industry from both the environmental and psychological perspectives. Lack of overall understanding of horticulture and awareness of the related industries impacts perceived importance and value of how ornamentals are deeply rooted in our lives, culture, and society. Consequently, the horticulture industry faces continued shortages of skilled professionals (Shepherd, 2011), as well as those with adequate knowledge and capacity to teach the science, technology, engineering, and mathematics (STEM) principles to prepare students for careers in this field. In 2017, AFE supported Seed your Future™ and established a strategic plan to help combat these deficits. The mission is to promote horticulture and inspire people to pursue careers working with plants. The strategic plan included five goals: awareness, education, workforce development, partnerships, and resource development.

Numerous reports throughout the past decade indicated a need to focus on developing skills for careers closely related to STEM. Further, research has indicated the time spent teaching specific content areas directly correlates to the teacher's perceived self-efficacy in that field meaning thus

if a teacher is not efficacious in a specific area, students will receive less of that topic. A low level of background knowledge in a topic, specifically science, has been reported as a primary reason for avoiding the content area, such as the science of agriculture (Ramey-Gassert & Shroyer, 1992). Starting as far as 1860 with the preamble of the Hatch Act, which enacted scientific investigation in the name of agricultural advancement, science and agriculture are indelibly linked (Hillison, 1996). Hillison (1996) also noted that in 1889, Chamber's encyclopedia defines agricultural education as a *science* and practice. Despite this strong connection, some students fail to link the science within agriculture and ornamental horticulture when they consider careers. Exposure to topics related to the ornamental horticulture industry may assist students in associating their experiences with the science interconnected in horticulture careers (Marsh, Cotton, Hashem, & Dadson, 2011) and thus help increase the supply of skilled professionals needed throughout the industry. More recently, research priority area three of the American Association for Agricultural Education's National Research Agenda called for a sufficient scientific and professional workforce that addresses the challenges of the 21st century (Stripling & Ricketts, 2016).

SBAE programs provide direct paths to career development for students in secondary school education. Agriscience teachers serve as mentors to their students (Roberts, Dooley, Harlin & Murphey, 2006) and can encourage students to enter agriculturally related careers. Through professional development, agriscience teachers may better understand the STEM principles that are interconnected between science and horticulture/floriculture concepts in the curriculum.

Teacher professional development is an intentional and purposeful process that can be considered fundamental to improving professional skills and is extremely important for one's advancement as an educator (Guskey & Huberman, 1995). The goal of professional development for teachers is to improve their professional knowledge, skills, and attitudes to enhance student learning (Guskey & Sparks, 2000). According to Guskey and Sparks (2000), professional development involves three defining characteristics that include intentional, ongoing, and systematic processes. Programs should be intentionally planned with clarity and include an intended purpose and worthwhile goals that can be evaluated. Professional development should be ongoing and embedded in the daily process of teaching (Guskey & Sparks, 2000).

It is important to create opportunities for teachers to experience similar types of scientific inquiry as is expected of their students. Given the relationship between teacher and student learning, professional development must be grounded in academic content to affect instructional practices and student outcomes. The program should also include structured time for discussion and planning, which can assist with the teachers' change in instructional practices (Jeanpierre, Oberhauser, & Freeman, 2005).

The goal of the STEM it Up Conference: Everything You Need to Know to Get Your Floriculture Curriculum in Bloom was to develop and deliver an intentional, systematic, and high-quality professional development program with embedded experiential learning opportunities focused on promoting exposure to horticulture/floriculture curricula. The main features of inquiry-based instruction (IBI) were also introduced (NRS, 2000). Aligned with the mission of AFE, and to address industry needs, the content focus included: laboratory investigations, unit plans, and curricular resources specifically related to the STEM concepts

present in the floriculture industry. An established criterion for selection was determined to target a very specific group of agriscience teachers from around the United States who were invited to apply and participate. The STEM it Up conference was supported by grant funds from AFE.

Literature Review

STEM and Curriculum

The topic of STEM integration related to SBAE has been a common line of research in recent years (Rice & Kitchel, 2018; Smith, Rayfield, & McKim, 2015; Stubbs & Myers, 2015; Stubbs & Myers, 2016). In a qualitative study aimed to investigate teachers' views of STEM and STEM integration in SBAE courses, Stubbs and Myers (2016) noted that teachers considered agriculture a scientific discipline with STEM consistently being integrated into agriculture before a name was devised to call it as such. STEM professional development and education allowed the teachers to successfully incorporate emphasized STEM concepts into their classes (Stubbs & Myers, 2016). However, how the teachers' use of and understanding of engineering and math concepts varied in a greater amount when compared to science. This was attributed to the teachers' level of personal experience with engineering, as well as their personal feelings toward math (Stubbs & Myers, 2016). While more teachers may have more experience with the science of agriculture, and have more neutral feelings toward the subject, teachers' past educational experiences influenced their perceptions, consistent with Ramey-Gassert & Shroyer (1992).

Smith et al. (2015) reported that teachers indicated high importance to integrate all four STEM areas, with science being ranked the highest in importance, followed by technology, mathematics, then engineering. While the authors found significant differences in perceptions of the importance of integrating STEM by gender, there was no identified difference between genders for confidence to embed STEM concepts. Further, the authors noted there were no differences discovered for either importance or confidence in integrating STEM concepts between traditionally and alternatively certified teachers, as well as when compared by the length of the teaching career. Results indicated that science and agriculture remain tightly connected ideas (Smith et al., 2015).

Specific to plant sciences, Rice and Kitchel (2018) indicated that plant science was an outlet for practical application of scientific ideas. The notion of complementing core science courses, such as biology, instead of replicating the content was also seen as a common theme (Rice & Kitchel, 2018). Additionally, the concepts in plant science are seen as more conventional in regard to many concepts students have been familiar with for many years (Rice & Kitchel, 2018). Rice and Kitchel (2018) suggested a focus in the classroom on scientific careers within plant sciences to complement the current emphasis placed on the integration of STEM concepts.

Faculty in higher education also recognized the importance of relaying STEM concepts to preservice agriscience teachers. Swafford (2018) remarked that faculty in agricultural education believe students in preservice teacher programs should be instructed on how to utilize experiential teaching, as well as how to highlight STEM concepts in their own classroom. A large majority of faculty reported modeling inquiry-based teaching methods in their classes, in

addition to integrating STEM into their courses (Swafford, 2018). However, even if these methods and concepts are being reported as taught in teacher education programs, teacher efficacy in teaching STEM areas should still be an area of concern and investigation (Swafford, 2018).

Teacher Self-Efficacy

Hasselquist et al. (2017) explored how the combination of factors influenced the self-efficacy and job satisfaction of beginning teachers. Overall, the teachers included in the study reported moderate levels of support and teacher efficacy, with a high level of job satisfaction. Further analysis found that collegial support was found to be a significant factor in teacher self-efficacy, while teaching and personal efficacy did not indicate significance in the model. Additionally, district, administration, colleague, and program financial support were also found to be significant factors in the teacher job satisfaction model (Hasselquist et al., 2017). The authors opined the value of teachers forming relationships within their administration and school district. These types of relationships were found to not only directly influence teacher efficacy, but also create an opportunity for peer support also mentioned by Wolf et al. (2010), and provided through professional development conferences where teachers are brought together to collaborate.

Through examining teacher candidates' professional development experiences, Wolf et al. (2010) sought to explore the impact of such experiences on self-efficacy and perceived level of preparedness to be an agriscience teacher. Using the *Teacher Sense of Efficacy Scale* (Tschannen-Moran, Hoy, & Hoy, 1998), the authors analyzed efficacy and preparedness in three domains of classroom management, instructional strategies, and student engagement (Wolf et al., 2010). The authors concluded that due to the similarities between self-efficacy and preparedness beliefs, the two areas coincide. Furthermore, while observations of teachers of similar skill level, were found to have a positive relationship with self-efficacy, this was not true when observing more experienced teachers. The authors suggested viewing teachers with greater skill sets might prove intimidating; therefore, limiting self-efficacy. Feedback was also found to be a significant factor in pre-service teacher self-efficacy. Written feedback was found not to impact self-efficacy, while verbal feedback indicated a moderate, positive influence on self-efficacy (Wolf et al., 2010). These results are similar to recommendations by Ulmer et al. (2013) for continued peer support and feedback. Ulmer et al. (2013) sought to explore the impact of the Curriculum for Agricultural Science Education (CASE) Institute and provided curriculum on teachers' science teaching efficacy. It was suggested that seeing peer teachers succeed in teaching as well as interaction with other teachers, who attended the same professional development workshop, successfully implement lessons into their curriculum increased self-efficacy.
McKim and Velez (2015) further considered self-efficacy among early career teachers. Specifically related to science teaching, teachers indicated mid-levels of science teaching self-efficacy. No significant difference in science teaching efficacy was found due to the number of years teaching. Science teaching efficacy was found to be a significant variable in career commitment indicating teachers may expect challenges related to teaching science concepts, which outweighs their perceived self-efficacy (McKim & Velez, 2015). Additionally, STEM learning opportunities have been credited for successful career preparation with interdisciplinary curricula, development of critical thinking, and problem-solving skills for students. Assisting

agriscience teachers to better understand the rationale for emphasizing STEM in the Agriculture, Food and Natural Resource curricula could provide occasions for improved teacher quality, career readiness, and increase student motivation and learning outcomes supportive of student success (Scherer, et al., 2019).

Teacher self-efficacy in both STEM concepts, particularly science and mathematics, as well as teacher personal efficacy in these subjects presented varied findings (Graves, Hughes, & Balgopal, 2016; Hasselquist et al., 2017; Haynes & Stripling, 2014; McKim & Velez, 2015; Stripling & Roberts, 2013; Ulmer et al., 2013; Wolf, 2011; Wolf et al., 2010). This can be aligned with findings of Ramey-Gassert & Shroyer (1992) which indicate inadequate foundational understanding of science can lead to varied levels of teaching. Thus, high quality, content focused professional development is needed for teachers to obtain adequate amounts of scientific knowledge in order to implement science into their curriculum.

Theoretical Framework

A positive relationship exists between self-efficacy and achievement (Bandura & Schunk, 1981; Schunk, 2012). Self-efficacy is defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p.361). When teachers experience occasions to become aware of their self-efficacy and are encouraged to set goals, they become more intrinsically motivated to change their instructional practices. Personal performance, observations of models (vicarious experiences), forms of social persuasion, and physiological indexes have been found to be the four main areas in which people develop information about their self-efficacy (Schunk, 2012). Beliefs related to personal mastery and perceived competence can be determined when investigating self-efficacy (Maddux, 2016). Directly related to Ramey-Gassert & Shroyer (1992), people engage in activities they believe they can do, such as teaching content of which they are more familiar (Maddux, 2016). Therefore, it was theorized that self-efficacy would determine our participants' perceptions of their own performance before and after engaging in the three-day (24-hour CEU credit) professional development conference.

Conceptual Model

The impacts of teacher learning and professional development that have been identified as significant indicators to improve the quality of schools in the United States are well documented (Borko & Putnam 1996; Darling-Hammond & McLaughlin 2011; Desimone, 2011). Schools are merely as proficient as the teachers and administrators who work within them (Guskey, 2002). As teachers work on the frontline of education, their roles increasingly become more difficult as they are challenged with numerous responsibilities that require continual support to meet the demands of the 21st century. Differentiating instruction for diverse student populations, teaching curriculum standards, preparing students for state testing procedures, regulating behavioral issues, adhering to evaluation procedures, allocating classroom resources and advancing knowledge of content and pedagogy are only a few of the obligations teachers face.

Desimone (2009) posited the successes and failures of educational reform could be measured by the effectiveness of teacher professional development. Research has indicated that high-quality

teacher professional development has the following factors: (a) content focus, (b) active learning, (c) coherence, (d) duration, and (e) collective participation. Therefore, the following conceptual model was used to guide professional development and research (Desimone, 2009).

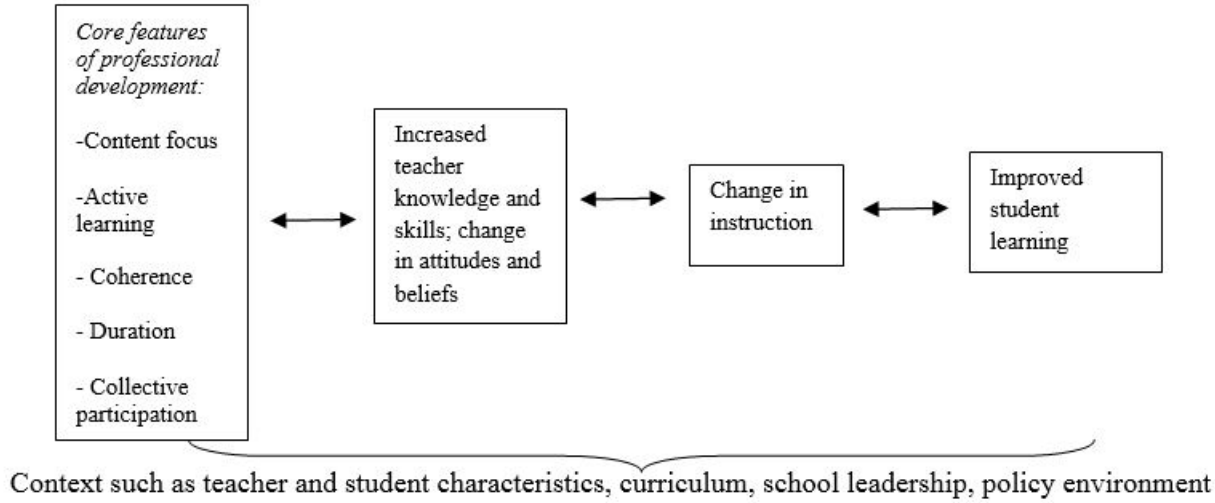

Figure 1. Proposed core conceptual framework for studying the effects of professional development on teachers and students (Desimone, 2009, p. 185).

In addition to the five core features that Desimone (2009) provided, professional development should also be intensive and sustained over time (Hawley & Valli, 1999). Bybee (1993) suggested participants must be engaged in inquiry, questioning, and experimentation through modeling. Since the mid-1990s emphasis of essential science content has been called for through the National Science Education Standards (NRC, 1996) and "programs that focus on subject matter knowledge and on student learning of particular subject matter are likely to have larger positive effects on student learning than are programs that focus on teaching behaviors" (Kennedy, 1998, p.11). Finally, the purpose of professional development is to generate exceptional teaching intended to render better student achievement (Supovitz & Turner, 2000). Policy, school environment and the type of professional development all drive the overall success (Figure 2). Darling-Hammond and McLaughlin (2011) asserted:

> Teachers learn by doing, reading and reflecting (just as students do); by collaborating with other teachers; by looking closely at students and their work; and by sharing what they see.... To understand deeply, teachers must learn about, see, and experience successful learning-centered and learner-centered teaching practices. (p. 83)

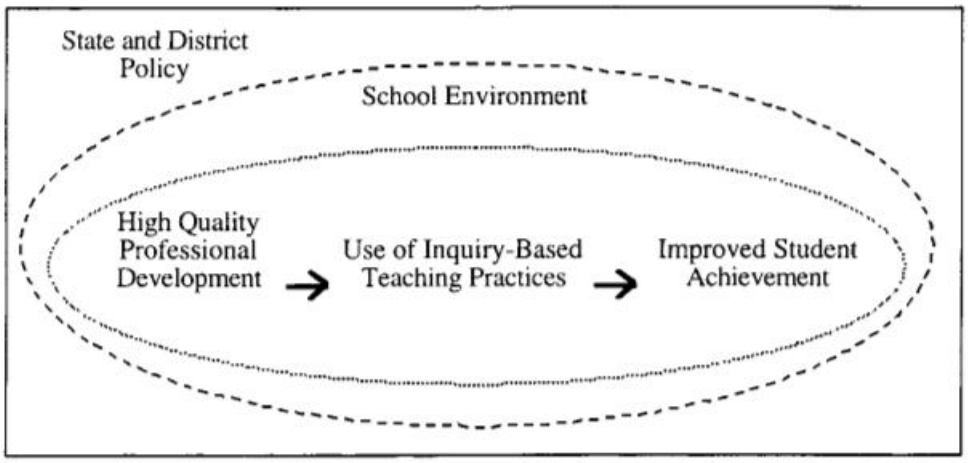

Figure 2. Model depicting the theoretical relationship between professional development and student achievement. (Supovitz & Turner, 2000).

Consideration of the conceptual model by Desimone (2009) and the theoretical model of professional development, inquiry-based teaching practices, and student achievement (Supovitz & Turner, 2000) led to the design and delivery of the STEM it Up Conference.

Purpose and Objectives

The purpose of this study was to determine our participants' perceptions of self-efficacy in teaching the science of agriculture before and after engaging in the STEM it Up Conference. Specific objectives of this study were:

1. Describe the mean levels of teacher efficacy in Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy for both pre- and post-test assessments.
2. Determine any mean differences between pre- and post-test efficacy beliefs for Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy.
3. Determine the mean difference between pre- and post-test efficacy beliefs by specific items examined by the instruments.

Methods

Population and Sampling

The target population for this study was all agriscience teachers ($N = 15$) registered for the STEM it Up Conference held at Clemson University in June 2019. It should be noted that the results of this study are limited to those teachers who attended and participated in teacher professional development. Participants were selected through an application process. In order to disseminate the application, state leaders in agricultural education were contacted in 20 states and were asked to nominate outstanding agriscience teachers who taught in the horticulture and floriculture pathways. The nominated teachers were then contacted and invited to complete an application. Twenty-four applications were received. Participants were selected based on the

curricula taught, level of self-perceived experience teaching floriculture and horticulture and depth of interest in learning about inquiry-based instruction and STEM concepts.

Data were collected during the first and last sessions of the three-day conference to obtain pre- and post-test scores. A hardcopy questionnaire was utilized and was collected face-to-face. A 100% response rate was achieved as all 15 teachers completed the questionnaire.

Most of the agriscience teachers who participated in this study had been teaching one to three years (*f* = 7; 46.7%), with 33.3% teaching for four to eight years (*f* = 5), and 20% for nine to fifteen years (*f* = 3). All teachers reported having only taught agricultural subjects during their teaching career (*f* = 15; 100%). Nearly half of the teachers reported teaching 50 – 99 unduplicated students (*f* = 7, 46.7%) with 100 – 150 students being the second largest group (*f* = 5; 33.3%). Horticulture was the most frequently reported course offered (*f* = 9; 60.0%), while introductory agriculture (*f* = 7; 46.7%), and advanced horticulture were the next frequently reported (*f* = 5; 33.3%). Some teachers reported teaching floral design (*f* = 3; 20%) and advanced floral design and others reported teaching floriculture (*f* = 4, 26.7%).

Instrumentation

Riggs and Enochs' (1989) Science Teaching Efficacy Belief Instrument was adapted for use in this study according to the authors' suggestion to align measurement to specific situations. Modifications included slight changes in language to tailor the instrument for high school teaching and the science of agriculture. The purpose of this instrument was to measure the self-efficacy of agriscience teachers towards teaching the science of agriculture. The instrument consisted of 25 items with response categories of “strongly disagree,” “disagree,” “uncertain,” “agree,” and “strongly agree.” Each of the five categories was scored one to five, with “strongly disagree” receiving 1, and “strongly agree” receiving a score of 5.

The instrument encompassed two constructs. The first construct, Science Teaching Outcome Expectancy (STOE), targeted teacher beliefs connected to inabilities to produce specific outcomes and consisted of 12 questions (Enochs & Riggs, 1990). Example questions included “The teacher is generally responsible for the achievement of students” and “The inadequacy of a student’s background in the science of agriculture can be overcome by good teaching.” Personal Science Teaching Efficacy Beliefs (PSTEB) composed the second construct which focused on behaviors specifically related to science teaching in order to be a more accurate predictor of distinct teaching behaviors (Riggs & Enochs, 1989). Example questions from the PSTEB construct included “I am continually finding better ways to teach the science of agriculture” and “I am typically able to answer students’ questions on the science of agriculture.” Cronbach’s alpha reliability coefficients from Riggs and Enochs' (1989) original instrument were .92 for PSTEB and .76 for STOE.

Data Analysis

Data were analyzed using SPSS version 25 for PC and Microsoft Excel. Descriptive statistics, which included frequency, mean, standard deviation, and percentage, were utilized to describe the population, as well as summarize data by item and construct. For objectives two and three we

used paired sample t-tests to determine any significant differences between pre- and post-test scores. Negatively worded items (3, 6, 8, 10, 13, 17, 19, 20, 21, 22, 24, and 25) were reverse coded prior to any analysis according to Riggs and Enochs (1989). Summated mean scores were calculated for each of the two constructs.

Post-hoc analysis was utilized in order to determine internal reliability using Cronbach's alpha coefficients. Pre- and post-test reliabilities for PSTEB were .80 and .64 respectively, while STOE pre- and post-test reliabilities were .63 and .69. A lower reliability score for the STOE construct is consistent with Riggs & Enochs (1989) who noted there are complexities in measuring outcome expectancy due to the large possible variations in teacher background, students' background, and student motivation. An alpha level of .05 was set *a priori*.

Results

The first objective of this study was to describe the mean level of teacher efficacy in Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy for both pre- and post-test assessments (Table 1). Teachers reported a mean PSTEB pre-test score of 3.44 ($SD = 0.49$) and mean STOE score of 3.31 ($SD = 0.41$). At the conclusion of the conference, teachers reported post-test mean PSTEB score of 3.79 ($SD = 0.34$, $d = .74$) and STOE score of 3.46 ($SD = 0.41$, $d = .71$).

Table 1
Mean scores and group differences for Personal Science Teaching Efficacy Belief and Science Teaching Outcome Expectancy (N = 15)

	Pre-Test		Post Test				
Measure	Mean	*SD*	Mean	*SD*	*t* (13)	*p*	Cohen's *d*
PSTEB	3.44	0.49	3.79	0.34	2.78	0.016*	0.74
STOE	3.31	0.41	3.46	0.41	2.58	0.023*	0.71

*$p < .05$

The second objective was to determine any mean differences between pre- and post-test efficacy beliefs for the Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy constructs (Table 1). A paired-samples t-test was conducted to evaluate the impact of the professional development conference on participants' Personal Science Teaching Efficacy beliefs and Science Teaching Outcome Expectancy. There was a significant increase in participants' PSTEB pre- and post-test scores, $t(13) = 2.78$, $p = 0.016$, as well as STOE pre- and post-test scores $t(13) = 2.58$, $p = 0.023$. Additionally, both constructs resulted in a Cohen's *d* effect size between 0.05 and 0.79, indicating a medium effect size (Cohen, 1992).

The third objective was to determine any mean difference between pre- and post-test efficacy beliefs by specific items. Paired sample t-tests were conducted to evaluate the impact of the professional development conference on pre- and post-test participants' scores by item (Table 2). Results show for item "I know the steps necessary to teach the science of agriculture concepts effectively" mean pre- ($M = 2.93$; $SD = 0.83$) and post-test ($M = 4.21$; $SD = 0.43$) scores increased significantly after participation in the professional development $t\ (13) = -5.26$, $p < 0.001$. The "I don't know what to do to turn students on to the science of agriculture" item also showed an increase in scores from the pre- ($M = 2.79$; $SD = 0.89$) to post-test ($M = 3.79$; $SD = 0.58$) $t\ (13) = 4.77$, $p < 0.001$. Cohen's d for effect sizes for both items were both above 0.80 indicating a medium effect size (Cohen, 1992).

Table 2
Group differences by item (N = 15)

Item	Pre-Test		Post-Test				
	Mean	SD	Mean	SD	*t* (13)	*p*	Cohen's *d*
When a student does better than usual, it is often because the teacher exerted a little extra effort.	3.64	0.84	3.71	0.73	0.37	0.72	0.10
I am continually finding better ways to teach the science of agriculture.	4.36	0.84	4.50	0.52	0.52	0.61	0.14
Even when I try very hard, I don't teach the science of agriculture as well as I do most other agricultural principles.	2.71	0.91	3.07	1.21	1.16	0.27	0.31
When the grades of students improve, it is most often due to their teacher having found a more effective teaching approach.	3.79	0.97	3.62	1.08	0.62	0.55	0.17
I know the steps necessary to teach the science of agriculture concepts effectively.	2.93	0.83	4.21	0.43	5.26	0.00*	1.40
I am not very effective in monitoring agriscience experiments.	3.00	1.04	3.36	0.93	1.44	0.17	0.16
If students are underachieving, it is most likely due to ineffective teaching.	2.57	1.02	2.57	0.94	0.00	1.00	0.00
I generally teach the science of agriculture ineffectively.	3.29	0.99	3.29	0.99	0.00	1.00	0.00
The inadequacy of a student's background in the science of agriculture can be overcome by good teaching.	4.21	0.58	4.14	0.86	0.32	0.75	0.09
Low achievement of some students cannot generally be blamed on their teachers.	2.07	1.00	2.50	1.02	1.58	0.14	0.19
When a low achieving student progresses, it is usually due to extra attention given by the teacher.	3.79	0.80	3.86	0.66	0.43	0.67	0.11
I understand science concepts well enough to be effective in teaching the science of agriculture.	3.36	0.74	3.93	0.83	2.10	0.06	0.56
Increased effort in teaching produces little changes in some students' achievement.	3.14	1.17	3.86	0.86	2.11	0.06	0.57
The teacher is generally responsible for the achievement of students.	3.29	1.07	3.50	0.76	0.82	0.43	0.22

Students' achievements are directly related to their teacher's effectiveness in teaching.	3.21	1.05	3.79	0.58	1.96	0.07	0.53
If parents comment that their child is showing more interest in the science of agriculture, it is probably due to the performance of their child's teacher.	3.86	0.53	3.93	0.83	0.32	0.75	0.08
I find it difficult to explain to students why agriscience experiments work.	3.43	1.22	3.43	0.94	0.00	1.00	0.00
I am typically able to answer students' questions on the science of agriculture.	3.64	0.74	3.79	0.80	0.81	0.44	0.23
I wonder if I have the necessary skills to teach the science of agriculture.	3.14	1.17	3.71	0.83	1.85	0.09	0.49
Effectiveness in teaching has little influence on the achievement of students with low motivation.	3.29	0.83	3.21	0.97	0.37	0.72	0.11
Given a choice, I would not invite the principal to evaluate my teaching on the science of agriculture.	4.14	0.86	4.14	0.77	0.00	1.00	0.00
When a student has difficulty understanding a concept in the science of agriculture, I am usually at a loss as to how to help the student understand it better.	3.57	0.65	3.86	0.53	1.30	0.22	0.35
When teaching the science of agriculture, I usually welcome student questions.	4.36	0.50	4.21	0.58	1.00	0.34	0.28
I don't know what to do to turn students on to the science of agriculture.	2.79	0.89	3.79	0.58	4.77	0.00*	1.27
Even teachers with good teaching abilities cannot help some students learn.	2.86	1.03	2.79	0.97	0.20	0.84	0.05

*$p < .05$

Conclusions, Discussion, and Recommendations

The results of this research are limited to the purposively selected population of the STEM it UP Conference. The authors note this as a limitation of the study. Therefore, the results of this study are only representative of the group of teachers who participated in the conference, and are not generalizable beyond the population utilized.

Overall, teachers displayed increased scores in both the PSTED and STOE constructs. This indicates the professional development was able to provide focused time and aid the teachers overall in the both Personal Science Teaching Efficacy and Science Teaching Outcome Expectancy. This conclusion is congruent with Ulmer et al. (2013), who also found increases in both areas after targeted professional development.

Furthermore, teachers showed a significant increase in their efficacy beliefs to teach the steps of science in the horticulture/floriculture curricula. The STEM it Up Conference highlighted many areas of the technical and scientific aspects of the floriculture and horticulture industries. The focus of the professional development on the scientific concepts which drive common practices within curriculum facilitated the teachers' belief they can convey the same concepts and ideas to their students.

A significant increase was found in teachers' beliefs in their ability to engage, or "turn on" students in the science of agriculture. When teachers have increased confidence in their personal level of knowledge, as well as the tools needed to deliver this information to their students, they can display higher levels of confidence in their abilities to assist and engage their students. Participation in a professional development conference provided teachers with the focused and specific content needed for increased efficacy. Rice & Kitchel (2018) noted similar findings, reporting teachers found ease in incorporating science into the plant science curriculum.

Lastly, the items which indicated decreases between the pre- and post-tests focus on student motivation, student ability, and student grades. Given, teachers had not yet had the chance to implement the information gained from the professional development into their teaching practices, it could be they were not yet able to gauge student outcomes at that point in time.

Recommendations

Evaluating self-efficacy helped determine our participants' perceptions of their own performance before and after engaging in a three-day professional development conference. Teacher educators should consider how to create professional development experiences for agriscience teachers that target specific content to impact self-efficacy. In this case, the STEM it Up Conference proved to be beneficial in assisting the participants in knowing the steps necessary to teach the science of agriculture concepts effectively, and know what to do to turn students on to the science of agriculture, more specifically with regard to horticulture/floriculture curricula.

At the conclusion of the research, teachers had not yet had the opportunity to apply their new knowledge and skills from the STEM it Up Conference to their own teaching practices. A follow-up study is recommended to determine mean scores from the PSTED and STOE constructs once the teachers have had the opportunity to implement the outcomes of the training in their horticulture/floriculture courses. Ulmer et al. (2013) also used a post-post design for CASE institute training. Similar studies should also be completed with professional development of different content areas of focus to see if this model could be applicable for other career pathways.

It is also recommended that some form of follow-up communication be planned to determine if and how the participants utilize what they learned as a result of participating in the three-day STEM it Up Conference to benefit student achievement. Supovitz & Turner (2000) posit that high-quality professional development, coupled with inquiry-based instruction increases student achievement. It would be helpful to know how agriscience teachers utilize the resources and transfer the knowledge they are exposed to in professional development sessions to alter their instruction and impact student learning. Data could be collected via survey design and/or qualitative research design to help inform decisions for future professional development . No matter the structure or focus of professional development, it is recommended to continue to follow the guidelines for high-quality professional development set forth by Desimone (2009) including content focus, active participation, coherence, duration, and collective participation.

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Differences in Teacher Development Needs Between Beginning and Experienced Agriculture Teachers: Implication for Teacher Retention

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Abstract

Agriculture teachers have faced many challenges and demands that contribute to their decision to leave the profession. The purpose of this study was to identify the teacher development needs of agriculture teachers in Florida to find an implication for teacher retention. Researchers suggest that teacher retention could be improved through professional development experiences. Professional development needs vary as teachers have different backgrounds and experiences. To identify the professional development needs depending on the career phases, the teacher career cycle model of Fessler & Christensen (1992) is used as the theoretical framework of this study. The results from this study indicated the professional development needs of teacher development areas are critically important regardless of years of teaching experiences. However, the level of professional development needs for two groups was different depending on years of teaching experiences. We recommend investigating professional development needs by teachers' career stage continually as well as considering other factors such as types of teacher certifications and gender to optimize agriculture teacher professional development programs and better support agriculture teachers.

Keywords: professional development; agriculture teachers; need assessment; teacher retention

Introduction

The concerns about the shortage of qualified agriculture teachers lead to making a scholarly effort to recruit and retain agriculture teachers across the state and nation (Doerfert, 2011; Kantrovich, 2010; Smalley & Smith, 2017). Agriculture teachers are faced with many challenges and demands that contribute to their decision to leave the profession (Myers, Dyer, & Washburn, 2005). Therefore, the challenges agriculture teachers face should be addressed to retain agriculture educators. Researchers suggest that teacher retention could be improved through professional development experiences, including induction, career development efforts, mentoring, and enhanced working conditions (Sutcher, Darling-Hammond, & Carver-Thomas, 2016). Many researchers reported various benefits of professional development, including increased teachers' self-efficacy and skills (King, Rucker, & Duncan, 2014), reduced job stress, and enhanced job satisfaction (Klassen & Chiu, 2010). In addition, professional development can lead to desirable changes in teacher practice and student outcomes (Darling-Hammond, Hyler, & Gardner, 2017).

Professional development needs vary depending on the types and experience levels of the teachers (Dibenedetto, Willis, & Barrick, 2018) as teachers have different backgrounds and experiences. In order to meet the specific needs of agriculture teachers, identifying agriculture teachers' professional development needs is critical. Need assessment of the teachers provides

direction to professional development activities for agriculture teachers (Touchstone, 2015). Based on the need assessment of agriculture teachers, it is feasible to offer effective professional development experiences to specific agriculture teachers and influence teachers' behavior positively. In return, this can improve their effectiveness as an educator and student learning (Darling-Hammond & Richardson, 2009).

Many types of researches have been conducted to identify the needs of agricultural teachers. These studies mainly sought to identify agriculture teachers' professional development needs related to overall areas by career phase (Figland, Blackburn, Stair, & Smith, 2019; Golden, Parr, & Peake, 2014; Smith & Smalley, 2018; Sorensen, Lambert, & McKim, 2014; Touchstone, 2015). These researches indicated that agriculture teachers have a great level of professional development needs in the personal management competency area (Davis & Jayaranten, 2015; Golden et al., 2014; Touchstone, 2015). However, there is a lack of research specifically focused on agriculture teacher's professional development needs of personal management areas. This research sought to identify the professional development needs regarding balancing work and personal life, financial planning, managing paperwork, managing time, managing stress based on years of teaching experiences to understand better agriculture teachers' needs of personal management competency areas. This study aligns with the American Association of Agricultural Education (AAAE) National Research Agenda Priority 3: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Stripling & Ricketts, 2016, p. 32).

Theoretical Framework

With the purpose of identifying the professional development needs depending on the career phases, the teacher career cycle model (Fessler & Christensen, 1992) is used as the theoretical framework of this study. This model has been utilized to investigate the professional development needs of agriculture teachers across career stages (Sorensen, Lambert, & McKim, 2014) and the core feature of professional development for agriculture educators (Easterly & Myers, 2017).

The teacher career cycle model describes the career stages of teachers and the personal and environmental factors that influence each career stage. The teacher career cycle model assumes that the needs of teachers are different depending on their career stages (Fessler & Christensen, 1992). In detail, the teacher career cycle model consists of eight different career stages of teachers, including pre-service, induction, competency building, enthusiastic and growing, career frustration, career stability, career wind-down, and career exit stages (see Figure 1).

The induction stage is the time when the new teachers adapt to the new environment of the school and begin to have confidence as an educator (Fessler & Christensen, 1992). With developing teaching experiences, the teachers in the induction stage move toward the competency building stage where the teacher makes an effort to improve as an educator, seeking professional development opportunities (Fessler & Christensen, 1992). The Enthusiastic and Growing career stage is the time when teachers have a high teacher self-efficacy and continue to develop and share their expertise (Fessler & Christensen, 1992). The Career Frustration stage is the career stage when teachers begin to feel burnt out and unsatisfied with their profession (Fessler & Christensen, 1992). In the Career Stability stage, teachers teach in their classroom

adequately but are not committed to developing their teaching skills better (Fessler & Christensen, 1992). In the Career Wind-Down stage, teachers consider leaving the teaching profession (Fessler & Christensen, 1992). Lastly, in Career Exit stage is the time after the teacher has left the teaching profession (Fessler & Christensen, 1992).

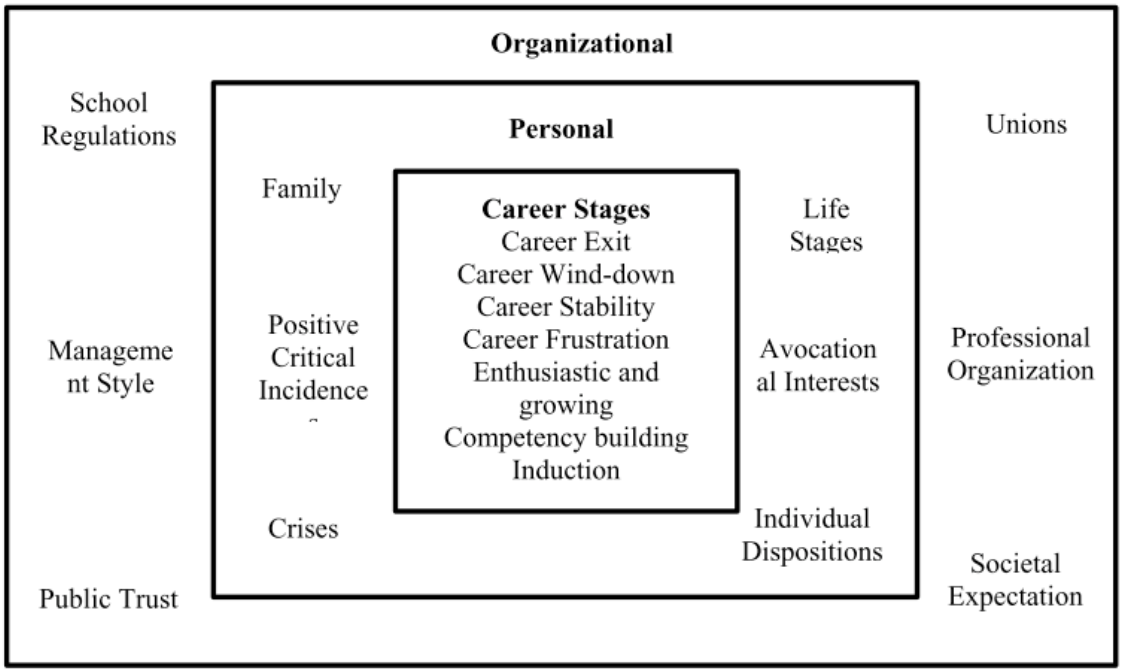

Figure 1. Teacher Career Cycle Model developed by R. Fessler & J. Christensen (1992), adapted by Greiman (2010).

The Teacher Career Cycle model posits that the career stages are not linear but flexible (Fessler & Christensen, 1992). Furthermore, the teacher career cycle model proposes that the career phases of a teacher are influenced by personal factors and organizational factors (Fessler & Christensen, 1992). Personal factors include family, critical incidents, life stages, avocational interests, individual disposition. In addition, organizational environment factors involve school regulations, management style, public trust, unions, professional organizations, and societal regulations (Fessler & Christensen, 1992).

Based on the teacher career cycle model, teachers of different career stages experience varying environments (Fessler & Christensen, 1992; Greiman, 2010). Therefore, agriculture teachers in Florida may possess unique professional development needs depending on their career stages or years of teaching experiences. It is necessary to identify the professional development needs of agriculture teacher to meet their specific needs, based on their career stages (Sorensen et al., 2014).

Purpose and Objectives

The purpose of this study was to identify the self-perceived teacher development needs of agriculture teachers in Florida depending on their career stages. The objectives of the study were to:

1. Identify the selected competencies development needs of overall agriculture teachers.
2. Identify the selected competencies development needs of beginning agriculture teachers.
3. Identify the selected competencies development needs of experienced agriculture teachers.
4. Identify similarities and differences in selected competencies development needs between beginning and experienced agriculture teachers.

Methodology

The target population for this study was Florida agriculture teachers ($n \approx 450$). The accessible population ($n = 366$) was teachers who attended the Chapter Officer Leadership Training (COLT) Conferences with their students in 2018. Hardcopy questionnaires were administered during the teacher professional development session at COLT conferences. A total of 269 teachers completed questionnaires for a 73% response rate.

Regarding the demographic information of participants, 34.2% ($n = 92$) of agriculture teachers were male, and 65.8% ($n = 177$) were female. In terms of teaching assignments, 33.1% ($n = 89$) of the participants taught students in middle school, 54.6% ($n = 147$) taught students in high school, and 12.3% ($n = 33$) taught students in both middle and high school. Beginning teachers who taught less than five years were 47.96% ($n = 129$), and experienced teachers were 52.04% ($n = 140$).

Borich's (1980) needs assessment model was used to identify the discrepancy between their current perceived knowledge and the relevance of each competency to their work. The survey instrument used in this study was modeled after previously developed instruments that measured the agricultural education teachers' professional development needs (Figland et al., 2019; Roberts & Dyer, 2004; Saucier, Tummons, Terry, & Schumacher, 2010). The instrument involved six professional development areas that measured perceived current knowledge and perceived job relevance to identify agriculture teacher needs using two Likert-type scales (1 = Low; 5 = High). The competency area includes (a) instructional practices, (b) industry certifications, (c) technical agriculture, (d) laboratory settings, (e) teacher development, (f) program management along with personal and professional characteristics.

A panel of experts consisting of five agricultural education faculty and six doctoral students in agricultural education evaluated the face and content validity of the instrument. The reliability of the instrument was identified by calculating Cronbach's alpha coefficients of the instrument items. Data indicated that Cronbach's alpha values of perceived current knowledge and the perceived job relevance were .905 and .898, respectively. All of the constructs in the instrument of this study exceeded the Cronbach's alpha coefficients of .800, which indicates a high level of internal consistency for the instrument.

For the purpose of this study, five items in the section of teacher development were analyzed, along with personal and professional characteristics. Descriptive statistics were utilized to address the research objectives. First, mean weighted discrepancy scores (MWDS) were calculated to identify inservice teacher's professional development needs. Second, samples are categorized into two groups, including beginning teachers (less than five years of teaching experience) and experienced teachers (over six years of teaching experience) to identify similarities and differences between two groups based on years of teaching.

Results

Objective 1: Identify the Selected Competencies Development Needs of Total Agriculture Teachers

For the first research objective, we sought to identify five selected competencies areas (personal management competencies area) of overall agriculture teachers in Florida. We calculated a mean weighted discrepancy score (MWDS) for each of the five selected competencies areas and ranked each competency in order according to the Borich (1980) needs assessment model. A higher MWDS indicates a higher need for inservice agriculture teachers. If the MWDS for each competency area is greater than 5.0, this indicates that the respondent perceives the competency area as highly relevant, but have little knowledge in the competencies area.

In the results, among all responding agriculture teachers, the highest-ranked inservice needs were: (a) managing stress (MWDS = 6.84), (b) balancing work and personal life (MWDS = 6.12), (c) managing time (MWDS = 6.11), (d) financial planning (MWDS = 5.83), and (e) managing paperwork (MWDS = 5.73). The MWDS for all five selected competencies areas were greater than 5.0, which indicates that agriculture teachers in Florida perceived all selected competencies areas as highly relevant, but have little knowledge in these competency areas.

Table 1
Teacher Development Needs of Overall Agriculture Teachers (N=269)

Teacher development needs	Knowledge		Relevance			
	Mean	SD	Mean	SD	MWDS	Rank
Managing stress	3.19	1.27	4.66	.73	6.84	1
Balancing work and personal life	3.29	1.26	4.61	.81	6.12	2
Managing time	3.36	1.15	4.67	.69	6.11	3
Financial planning	3.19	1.19	4.49	.92	5.83	4
Managing paperwork	3.35	1.15	4.60	.72	5.73	5

Note. MWDS = Mean Weighted Discrepancy Score

Objective 2: Identify the Selected Competencies Development Needs of Beginning Agriculture Teachers

Among beginning teachers, the highest-ranked inservice needs were: (a) managing stress (MWDS = 8.09), (b) balancing work and personal life (MWDS = 6.97), (c) managing time

(MWDS = 6.84), (d) managing paperwork (MWDS = 6.63), and (e) financial planning (MWDS = 6.23).

Table 2
Teacher Development Needs of Beginning Agriculture Teachers (N=129)

Teacher development needs	Knowledge		Relevance			
	Mean	SD	Mean	SD	MWDS	Rank
Managing stress	2.99	1.27	4.73	0.65	8.09	1
Balancing work and personal life	3.11	1.25	4.62	0.79	6.97	2
Managing time	3.26	1.13	4.72	0.60	6.84	3
Financial planning	3.08	1.21	4.47	0.93	6.23	5
Managing paperwork	3.21	1.12	4.65	0.65	6.63	4

Note. MWDS = Mean Weighted Discrepancy Score

Objective 3: Identify the Selected Competencies Development Needs of Experienced Agriculture Teachers

Among the experienced teachers, the highest-ranked inservice needs were: (a) managing stress (MWDS = 5.69), (b) financial planning (MWDS = 5.45), (c) managing time (MWDS = 5.44), (d) balancing work and personal life (MWDS = 5.33), and (e) managing paperwork (MWDS = 4.90).

Table 3
Teacher Development Needs of Experienced Agriculture Teachers (N=140)

Teacher development needs	Knowledge		Relevance			
	Mean	SD	Mean	SD	MWDS	Rank
Managing stress	3.38	1.26	4.60	0.80	5.69	1
Balancing work and personal life	3.45	1.25	4.61	0.84	5.33	4
Managing time	3.45	1.16	4.61	0.76	5.44	3
Financial planning	3.29	1.17	4.51	0.91	5.45	2
Managing paperwork	3.49	1.17	4.55	0.78	4.90	5

Note. MWDS = Mean Weighted Discrepancy Score

Objective 4: Identify Differences in Selected Competencies Development Needs Between the Beginning and Experienced Agriculture Teachers

Objective four sought to compare the beginning and experienced teachers by teacher development needs. When comparing beginning teachers and experienced teachers, both beginning teachers and experienced teachers have high professional development needs for all five teacher development competencies areas, which was greater than 5.0 excepting managing paperwork. Florida beginning teachers presented a higher perceived level of needs regarding all five personal management competencies areas than experienced teachers.

Both groups perceived managing stress as the highest professional development need among five teacher development competencies areas. In particular, among beginning teachers, the professional development needs for managing stress were astonishingly high (MWDS = 8.09). This indicates that agricultural education schools and districts and professional development organizations need much care and support to the beginning teachers to help them manage their stress effectively.

The competency with the largest MWDS difference between the beginning and experienced teachers was also managing stress (MWDS = 8.09, MWDS = 5.69, respectively). The competency with the second-largest MWDS difference between the two teacher groups was managing paperwork. The MWDS of managing paperwork for experienced teachers was below 5.0, but the one for beginning teachers was higher than 6.0. The competency with the third-largest MWDS difference between the two teacher groups was balancing work and personal life.

Table 4
Comparison Teacher Development Needs between Beginning and Experienced Agriculture Teachers (n=269)

Teacher development needs	Beginning Teachers		Experienced Teachers		Difference	
	MWDS	Rank	MWDS	Rank	MWDS	Rank
Managing stress	8.09	1	5.69	1	2.40	1
Balancing work and personal life	6.97	2	5.33	4	1.64	3
Managing time	6.84	3	5.44	3	1.40	4
Financial planning	6.23	5	5.45	2	0.78	5
Managing paperwork	6.63	4	4.90	5	1.73	2

Note. MWDS = Mean Weighted Discrepancy Score

Conclusions & Implications

The purpose of this study was to identify the selected competencies development needs of agriculture teachers in Florida. Research has recognized the importance of competency areas in personal management as well as the technical aspects of agricultural education, such as instruction, SAE, and FFA (Roberts & Dyer, 2004; Sorensen et al., 2014). This research focuses on the identification of professional development needs in the area of personal management competency of agriculture teachers in Florida.

Objective one sought to identify the selected competencies development needs of overall agriculture teachers in Florida. The results showed that agriculture teachers' greatest needs in the area of personal management competencies areas were managing stress, balancing work and personal life, managing time which was greater than MWDS 6.0, indicating imperative needs to be supported for agriculture teachers in Florida. This indicates that agriculture teachers have great needs in developing their stress management and proactive coping strategies. Thus, agriculture teacher educators and agricultural education stakeholders should provide inservice

agriculture teachers with professional development to help them manage stress and time effectively (Lawver & Smith, 2014). In addition, financial planning and managing paperwork were greater than MWDS 5.0, indicating high needs for agriculture teachers.

Objective two sought to identify the selected competencies development needs of beginning agriculture teachers. Teachers with less than five years of teaching experience have high professional development needs in managing stress, balancing work and personal life, and managing time. The time a teacher spent at work is highly related to teachers' stress (Torres, Lambert, & Lawver, 2008). In the study of Hainline, Ulmer, Ritz, Burris, and Gibson (2016), agriculture teachers reported they worked an average of 58.65 hours per week for their agricultural education program (classroom instruction, FFA, and SAE), which exceed the average hours per week in the US. The excessive working hours could affect negatively on their personal life and cause the attrition or burnout of teachers (Kelsey, 2006). For agriculture teachers, balancing between work and life is challenging as agriculture teachers spend excessive hours at work with a variety of responsibilities. As a result, agriculture teachers have little time to devote other life roles, and these conditions make it challenging for agriculture teachers to balance work and personal life (Sorensen et al., 2014).

Objective three sought to identify the selected competencies development needs of experienced agriculture teachers. Teachers with over six years of teaching experience have high professional development needs in managing stress, financial planning, and managing time. This findings align with the previous literatures (Smith & Smalley, 2018; Sorensen et al., 2014).
Smith and Smalley (2018) studied mid-career agriculture teachers' perceptions of job stress, burnout, job satisfaction, and professional development needs. They found the mid-career teachers perceived the high level of job stress related to experiential learning and program planning and evaluation. In the study of Sorensen et al. (2014), among experienced teachers who have six or more years of teaching experience, four personal management competency areas placed on top five need areas among all professional development needs of agriculture teachers, which included career and family balance, organization skills, time management, and stress management.

Objective four sought to identify the similarities and differences between the beginning and experienced teachers in terms of professional development needs. The result indicates that most personal management professional development areas shared a high level of perceived needs among beginning and experienced teachers. In detail, the range of MWDS in the personal management competencies area of beginning teachers was from 6.23 to 8.09. On the other hand, the range of MWDS in the personal management competencies area of experienced teachers was from 4.90 to 5.69. The findings indicated the professional development needs of personal management areas are critically important regardless of years of teaching experiences. In particular, both beginning and experienced teachers indicated the greatest professional development need in the area of managing stress. This aligns with the findings of Lawver and Smith (2014), who found that agriculture teachers indicated a higher level of stress than the average American.

Even though both beginning teachers and experienced teachers held a high perceived professional development needs in the area of personal management, the level of professional

development needs for two groups was different depending on years of teaching experiences. In all personal management area, beginning teachers held a higher perceived need compared to the experienced teachers. When comparing MWDS of managing stress between the beginning and experienced teachers, The MWDS of beginning teachers was 2.4 higher than experienced teachers. Especially, the MWDS of managing stress of beginning teachers was 8.09, which indicates a pressing need to supported beginning agriculture teachers in Florida. In terms of managing paperwork professional development need, beginning teachers held a higher need compared to the experienced teachers. In addition, among experienced teachers, financial planning was second-highest needs while among beginning teachers, financial planning was fourth-highest needs.

Agriculture teachers have a variety of job responsibilities, along with typical classroom teachers (Smith & Smalley, 2018). Agriculture teachers at the secondary level often work beyond a typical eight-hour day (Ritz, Burris, Brashears, & Fraze, 2013). Thus, it would be possible that agriculture teachers perceive a high level of stress when they are overwhelmed by the workload. The challenges agriculture teachers experience cause job stress, and this can lead to decreased career satisfaction and, eventually, will likely make them leave the agriculture teacher profession (Chenevey, Ewing, & Whittington, 2008). Therefore, it is necessary to make scholarly efforts to understand a variety of sources of stress agriculture teachers better face to enhance career satisfaction and reduce attrition of agriculture teachers. In the study of Torres, Ulmer, and Aschenbrener (2008), they identified the allocation of time spent on tasks, roles, and responsibilities of agriculture teachers at different career stages. They discovered the largest portion of time spent was planning and instruction among agriculture teachers. In addition, the teachers perceived the supervision and facilitation of Supervised Agricultural Education (SAE) as a challenging task (Torres et al., 2008). Sorensen, McKim, and Velez (2016) proposed reducing time obligations on the work role of agriculture teachers. In addition to that, they suggested providing agriculture teachers with professional development opportunities on work efficiency strategies in order to better support them to complete their job requirements in a reasonable time frame.

Research indicates non-work domain factors can impact on work domain (Sorensen & McKim, 2014). For example, a teacher's competency in managing stress and balancing work and personal life can influence teachers' job satisfaction and professional commitment (Sorensen & McKim, 2014). According to Crutchfield, Ritz, & Burris (2013), the ability to balance work and personal life was significantly related to job satisfaction and professional commitment. In addition, Sorensen, McKim, and Velez (2016) also found that work-family balance (WFB) ability of agriculture teachers was positively related to their job satisfaction. The increasing demands on agriculture teachers limit their ability to balance work and personal life, which lead to the decrease of agriculture teachers' job satisfaction. This issue may potentially contribute to the continuous attrition of agriculture teachers (Sorensen et al., 2016). Therefore, it is necessary to provide professional development opportunities related to the enhancement of work-life balance for the increase in job satisfaction of agriculture teachers (Sorensen & McKim, 2014).

Recommendations

Practical Recommendations

Agricultural education administrators, state leaders, and teacher educators should be aware of and concerned about job stress, burnout, and job satisfaction among agriculture teachers (Smith & Smalley, 2018). It is necessary to consider the challenges of agriculture teachers depending on their career stages and personal conditions and needs when organizing professional development for agriculture teachers (Sorensen et al., 2014). One size fits all professional development may not be the effective ways to encourage agriculture teachers to attend the professional development workshops because of the different needs depending on years of experience (Figland et al., 2019). The difference in needs of agriculture teachers exists from state to state because of different teacher education programs between states as well as the agricultural companies (Sorensen et al., 2014).

According to Knowles (1980), an adult is more motivated to learn when they see the need to learn. Therefore, identifying agriculture teachers' professional development needs based on their background and circumstances will help engage agriculture teachers in professional development programs. In addition, the needs assessment will provide critical information to develop tailored professional development programs to increase agriculture teacher retention and support agriculture teachers to be more effective teachers. Therefore, a needs assessment should be conducted at a regular span to reflect the changing needs of teachers (Washburn, King, Garton, & Harbstreit, 2001).

It is highly recommended to include and implement professional development opportunities related to personal management areas for both beginning and experienced teachers In particular, the challenges faced by beginning teachers are needed more attentions (Sorensen et al., 2014) as the findings of this study indicate that beginning teachers held a higher professional development needs in the areas of personal management compared to the experienced teachers. This study identified managing stress is the greatest need of all career stages of agriculture teachers. It is necessary to make scholarly efforts to better understand a variety of stress agriculture teachers face to enhance career satisfaction and reduce attrition of agriculture teachers. Therefore, future research should investigate stress levels, sources of stress agriculture teachers encounter as well as effective stress management means to solve this issue.

For beginning teachers, timely and appropriate professional development programs are important for the initial success, effectiveness, and retention of those teachers (Joerger, 2002) utilizing induction or mentoring programs designed to support new and beginning teachers. Through developing mid-career agriculture teachers as a mentor for beginning teachers, teacher retention, job satisfaction, and teacher effectiveness can be enhanced (Figland et al., 2019). While meeting the needs of beginning agriculture teachers is critical to solving the issue of teacher shortage, it is also important not to overlook teachers in other career stages and support these individuals as well (Smith & Smalley, 2018). Agriculture teachers in any career stage have professional challenge and unique professional development needs, which need for the retention of agriculture teachers (Smalley & Smith, 2017). The role responsibilities may be different between beginning and experienced teachers. For example, experienced teachers may involve more leadership roles in school, community, and professional organizations compared to beginning teachers. Thus, it is critical to identify the professional development needs of mid-career agriculture teachers as well and design professional development for targeting mid-career or late-

career agriculture teachers to increase their resiliency and reduce burnout (Smith & Smalley, 2018).

Research Recommendations

In this study, we used Fessler and Christensen's (1992) teacher cycle model to compare the professional development needs of the beginning and experienced teachers. Due to the absence of items relevant to teacher career stages, researchers categorized agriculture teacher participants into two groups of the beginning and the experienced teachers based on their years of teaching experience. It is recommended for future research to include items that reflect teachers' career stages based on Fessler and Christensen's (1992) teacher cycle model to better understand teachers' needs at different career stages. We recommend investigating professional development needs by teachers' career stage continually as well as considering other factors such as types of teacher certifications and gender to provide more effective and tailored professional development to specific needs of teachers as previous research indicated (Roberts & Dyer, 2004).

The agricultural education profession must continue to identify the challenges or obstacles agriculture teachers face to reduce agriculture teacher attrition. It is essential for agricultural educators and leaders to acknowledge the various needs of agriculture teachers based on their career phases and offer targeted professional development for agriculture teachers at all career stages to meet their specific needs (Smalley & Smith, 2017; Sorensen et al., 2014). This continued effort will help optimize agriculture teacher professional development programs and better support teachers in all career stages, in return, strengthen the agriculture education profession sustainably.

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Challenges of Early Career Extension Agents in Florida

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Abstract

Extension agents serve a critical role in the land-grant mission as they disseminate research to local clientele in the form of educational programs. However, Extension agents face a myriad of challenges, such as the changing scope of clientele and programming, nature of the job, and burnout. Much research focuses specifically on new agent challenges within the first year, however, little to no research has focused on early career Extension agents after the initial onboarding process is complete. The researchers used grounded theory to explore the challenges of early career Extension agents, which yielded eleven major themes, such as a lack of understanding Extension, nature of the job and understanding their role, and personal pressure. Another major theme was the lack of Extension knowledge of early career Extension agents which could stem from the lack of formalized Extension education programs and professional development programs targeted to early career agents. Social capital theory could be used to better understand the social networks of early career Extension agents, how these networks form over time, and what type of impact social networks have on new Extension agents.

Introduction

Cooperative Extension is an agency of change, providing non-formal education through educational programs targeted toward community citizens. Since its inception in 1914, Extension has served both rural an urban dwellers alike, helping to transform communities through education and empowering citizens to make behavior changes that positively affect themselves, their families, communities, agriculture, and the environment (United States Department of Agriculture, 2019). In Florida, Extension is the local presence in each county of the land-grant university through the county Extension office (Benge & Harder, 2017), comprised of a County Extension Director (CED), Extension agents, and Extension paraprofessionals.

Extension agents carry out the mission of the UF/IFAS Cooperative Extension Service at the county level, providing valuable knowledge and skills to clientele. UF/IFAS Extension has approximately 360 Extension agents who take the research conducted at a land-grant university and create educational programs in focus areas such as 4-H youth development, agriculture, horticulture, natural resources, families and communities (Tom Obreza, personal communication, August 2, 2019). The CED provides leadership of the county Extension office and has both programmatic and administrative responsibilities such as communicating and maintaining relationships with local stakeholders and providing mentorship and coaching to Extension agents within their offices (Elizer, 2011; Radhakrishna, Yoder, & Baggett, 1994).

Extension agents serve a critical role within their local communities, but are faced with many challenges such as burnout, stress, and many weeknight and weekend activities just to name a few (Kutilek, 2000). Challenges and difficulties of the job often lead to increased turnover of

new employees, and employers often do not seek out why their employees leave to help decrease challenges of future employees (Cloutier, Felusiak, Hill, & Pemberton-Jones, 2015). Martin (2011) suggested the most critical time for new Extension agents is within the first two years of employment, the period in which employees indicated the greatest intention to leave, as well as the period where organizational efforts like mentoring and orientation can be targeted to decrease employees' intention to leave the organization. Though some current literature exists within Extension and traditional agricultural education fields on the challenges faced by Extension agents, an understanding of the challenges faced specifically by early career Extension agents (1-3 years on the job) does not exist and is essential to providing quality support for hires past the first year of employment.

Literature Review

The challenges Extension agents face have changed over time due to a myriad of reasons. In its prime, Cooperative Extension's outreach focused largely on agriculture and home economics (Gonzalez, 1982). Beginning in the late 1940s and continuing to this day, changes in technology, reductions in the size of farms and rural populations, and the scope of Extension's clientele base all contribute to an ever-changing landscape of Extension agent challenges and the need for development and training (Warner & Christenson, 1984). With declining budgets and inadequate networks and partnerships (Borich, 2001), Cooperative Extension is trying to serve more urban audiences by adapting its programming and methodologies (Harder, Narine, & Wells, 2019; Henning, Buchholz, Steele, & Ramaswamy, 2014).

The nature of the Extension job also poses many challenges to Extension professionals. Understanding agent roles and responsibilities is a major challenge for new Extension professionals (Ensle, 2005; Myers, 2011). Other challenges faced by Extension professionals include, but are not limited to, time management, balancing work and family, working with volunteers, insufficient staff, lack of training, and program evaluation and reporting (Diaz, Chaudhary, Jayaratne, & Warner, 2019; Ensle, 2005; Myers, 2011). More recently, Harder, Gouldthorpe, & Goodwin (2015) identified that transactional factors increase the burnout of agents more than transformational factors. Challenges such as these affect the turnover rate of Extension professionals, which is approximately 7-9% annually (Benge & Harder, 2018; Kutilek, 2000), making it difficult for state Extension systems and program and staff development professionals to keep up with the demand of hiring and training new employees.

Among land-grant universities across the nation, a total of only eighteen offer an academic program for Extension agents (Harder, Narine, Benge, & Albert, 2018). This lack of formal Extension education programs provided by land-grant universities contributes pressure to state Extension systems to train and develop new hires as they are not competent-ready when first hired. In 2001, Cooper and Graham identified twelve competencies that county Extension educators needed to be successful, and most recently, Harder, Place, and Scheer (2010) used the Delphi approach and identified nineteen competencies entry-level Extension professionals should possess. Though competency frameworks and professional development programs exist, many Extension agents still lack competence in various areas, such as evaluation (Diaz et al., 2019; Franz & McCann, 2007; Lamm, 2011), reporting (Diaz et al., 2019; Franz & McCann, =2007), and volunteer management (Seevers et al., 2005).

Purpose and Research Question

The purpose of the study was to explore challenges of early career Extension agents in Florida, and it is part of a larger investigation of the UF/IFAS Extension new agent onboarding process. The research question of the study was: What are the challenges of early career Extension agents in Florida. This study aligns with priority three of the 2016-2020 National Research Agenda – Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Roberts, Harder, & Brashears, 2016).

Methods

This research study used a qualitative methodology design through a phenomenological lens, where CED coaching and mentoring on Florida early career Extension agents were the phenomenon being addressed. Phenomenology was the appropriate approach for this study as the researchers sought to capture the "meaning for several individuals of their lived experiences of a concept of phenomenon" (Creswell, 2007, p. 56). The goal of phenomenology seeks to move beyond description of a shared experience (i.e., CED coaching and mentoring of early career Extension agents) to what it means reflectively for individuals to "a description of universal essence" (Creswell, 2007, p. 57, Moustakas, 1994). IRB approval was obtained from the University of Florida IRB Office prior to contacting potential participants.

Merriam (1988) explained it is important to address potential bias within qualitative research by writing a positionality statement to address past and current experiences. As the lead researcher, I have worked within Cooperative Extension for eleven years, the first seven years as an Extension agent and the past four years as a state Extension specialist, all within Florida where this study has been conducted. I have firsthand knowledge of and experience being an early career Extension agent and have been through similar challenges other early career Extension agents experience, including the permanent status and promotion process in Florida that all Extension agents undergo. I currently coordinate professional development for new Extension agents and CEDs. There is no existing intentional development for Florida Extension agents beyond the first year on the job, and I believe this study can provide a detailed account of current challenges to help enhance professional development efforts for Extension agents.

The total population of UF/IFAS Extension faculty was 367, of which 62 were CEDs, according to the UF/IFAS Extension Business Services office at the time the data was collected for this study (Tom Obreza, personal communication, 2019). The target population for the study consisted of: (a) 89 Extension agents whom have been on the job for 1-3 years, and (b) 48 CEDs who currently have an Extension agent in their office with 1-3 years of experience. Sixteen participants were purposively selected to participate in the study from the target population with regards to the representative characteristics of Extension district, program area, and county type. One agent passed away during the interview process and was not replaced for the study. A total of eight CEDs and seven Extension agents participated in the study, for a total of 15 participants. IRB approval was obtained from the University of Florida IRB Office prior to contacting potential participants.

The researchers created two semi-structured interview guides, one for Extension agent participants and another for CED participants. Both interview guides were reviewed by a six-member expert panel for face and content validity. The expert panel consisted of one Extension agent, one County Extension Director, two program and staff development professionals, and two state Extension faculty. Five of the six-member panel either currently works or has worked for Extension as an Extension agent or CED. Both interview guides consisted of 20 questions, with the difference being Extension agent participants were asked about their own experience and CED participants were asked their perceptions of their new Extension agent(s) experiences in their office. The following three questions were asked of participants: (a) describe your experience so far as being an Extension agent; (b) describe any challenges you have encountered while working in Extension; and (c) what's been most difficult?

Each interview was audio recorded and transcribed verbatim. The interviews were conducted over two months, ranging from 28 to 63 minutes in length, with the average interview length being 40 minutes. The researchers utilized NVivo 12 qualitative software to organize, code, and analyze the data collected. Data was reduced using the *phenomenological reduction* method by Stevick-Colaizzi-Keen as modified by Moustakas (1994). After transcriptions were downloaded to NVivo, each researcher completed the first seven steps separately, including horizontalization, descriptions of textures and structures of the experience, and construction of a textural-structural description of the meanings of the horizons. From the individual descriptions, a composite textural-structural description was created into a universal description of the CED coaching and mentoring experiences on early career Extension agents (Moustakas, 1994).

The researchers used five strategies to maintain credibility of study, as Eisner (1991) stated that establishing credibility within qualitative research "allows us to feel confident about our observations, interpretations, and conclusions" (p. 110). There are five strategies to maintain the credibility of the study: triangulation, peer debriefing, member checking, thick, rich descriptions, and clarifying researcher bias. Triangulation was attained by interviewing both the new Extension agents and the County Extension Directors. The evidence by these different data sources provided greater evidence into the experiences of new Extension agents in Florida (Creswell, 2007). Peer debriefing was conducted with the expert panel that reviewed the interview guides and between researchers. The researchers analyzed the data individually and then met to discuss emergent themes together, which is important in this study as one researcher does not have an Extension background and acted as an external check to the other researchers with an Extension background. Participants were solicited for feedback on their interview transcriptions as a member check to safeguard the credibility of the data. Thick and rich descriptions were used to ensure transferability of the findings (Creswell, 2007).

Findings

Eleven themes emerged during analysis of the interview transcripts: (a) building relationships; (b) official mentor; (c) lack knowledge and understanding of Extension; (d) nature of the job and understanding their role; (e) CED turnover; (f) leadership and supervision; (g) personal pressure; (h) ROA/POW and reporting; (i) competence; (j) volunteer management; and (k) following the previous agent.

Building Relationships

An early career Extension agent shared challenges she experienced with navigating political relationships during her first three years on the job (Abigail). Abigail expressed her experience with feeling misplaced among colleagues given her job title: "I got a sense from some of my colleagues that they thought I didn't really belong where I was. And there was this sense that is inaccurate, but it still exists, that RSAs are somehow better or higher or above county agents." Carl, a CED, urged his early career agent to build relationships with a few people in the county because of their visiblity of being an opinion leader within the county:

> 'I don't know these 10 people very well, but I get the feeling that they have a huge influence on this group'. You need to get to know those people and decide if that's true or not. If it's not, we need to find out who does and figure out how to build those relationships. Build their trust, and overall you'll have a bigger impact with that group.

Official Mentors

Both the early career Extension agents and the CEDs explained there were inconsistencies regarding assigned peer mentors, such as not having an assigned mentor, having a mentor who doesn't keep consistent contact, and a number of mentors (both official and unofficial). Early career agent Anna expressed, "it's been, kind of, very short-lipped" when sharing experiences with her assigned mentor. Additionally, Abigail indicated, "I actually have two [mentors], because they weren't sure who to assign me, based on me being an RSA and [program]." The CEDs reported seeing their agents utilize informal mentors more than their assigned mentors. The CEDs wished their agents' assigned mentors would have been more present or provided more guidance in the agents' first years on the job, and they have witnessed a variation in mentor and mentee relationships in terms of time invested and experiences. Camile, a CED, expressed, "I feel like he has these other kind of more informal networks that he uses more than maybe [mentor]." CED Caleb shared, "I would like to see a little more guidance from their mentors." Regarding variation in mentor and mentee relationships, one CED, Carly, indicated, "I think it takes a special person to understand the importance of the mentorship when you're dealing with such a young faculty member."

Lack of Knowledge and Understanding of Extension

The early career Extension agents did not discuss their lack of knowledge of Extension as much as the CEDs discussed the Extensions agents' lack of knowledge of Extension being a challenge. There was only one early career Extension agent, Abigail, who expressed her lack of knowledge of Extension and stated: "I didn't really know what extension was…I was in [Extension System] for 6 years doing my graduate work, and I didn't really know about land grants." The CEDs expressed having to invest more time with agents who lack knowledge of Extension when coming into the job as compared to agents with previous knowledge of Extension when starting the job. Caleb shared, "[Agent] has been the one I've spent the most time with because of him being so new to Extension and help [I] him get on track with the things he is supposed to do." Similarly, Carol explained, "[Agent]… came in as an agent, but did not have an extension background. So, she has been undoubtedly the agent that I've done the most hand-holding with,

ever, in my CED time." Caleb explained that a lack of Extension knowledge coming into the job causes agents to "have a hard time figuring about what they're supposed to do regarding programming."

Nature of the Job and Understanding Their Role

The early career Extension agents expressed many challenges they had experienced with the nature of being an Extension agent. Many of the agents shared their high level of uncertainty of what they were supposed to be accomplishing when starting their job (Anna, Alexis, Adam, Alyssa, Amy). Anna stated, "there have been parts of it that have been frustrating, not knowing, you know, the exact direction to take." Alyssa shared, "navigating and figuring out what my program area is, is a journey." Amy explained the amount of time to learn the job was a challenge, and she communicated, "The thing that you kind of hear a lot is oh, it takes you 6 or more years to really understand your job, and you know, you hear those comments… It shouldn't take me 6 years to understand my job!" Adam also discussed:

> [Finding] your role within the county and how you fit… a lot of times they [the county] are already doing a lot of the same programs, so they have departments doing some of the programs, and you have to find a place to fit that makes sense. This is a challenge to make everyone happy and creating the right programs that people want.

The discussion with the CEDs was very similar to the discussion with the early career agents regarding agents being uncertain what exactly they should be accomplishing in the first years on the job (Camile, Cade, Caleb, Cameron, and Carol). Carol shared, "I think that she [agent] really had trouble understanding what she was supposed to be doing, for almost the first year, and it took her months just to start teaching." Cameron discussed, "as an agent, you have to come up with your own programming, what you think is important, and being a new agent… that can be a challenge, you know? What do I do, when do I do it, what's enough, what's not enough?" Caleb stated, "knowing what to do. Having a clear job description: 'this is what I need to do'. Too many times [new agents] are left in the office and we say 'okay, go out into the world and figure it out'. They need a clearer direction." Some CEDs had experienced their agents being challenged by learning the community and the people in the community (Camile and Cade). Camile stated, "I think that's always a challenge, because we are in the office a lot. So how do you get them out into the community with those other people meeting them, brainstorming, collaborating, that kind of thing?"

Turnover of County Extension Directors

Two early career Extension agents from two different counties shared their experiences with having multiple CEDs in their first three years on the job (Adam and Amy). The multiple turnovers in leadership left the agents confused, as each CED came with different expectations. Adam shared, "we've had multiple CEDs, three in three years. They've all had a different way of doing things, which can be tough trying to navigate. The CED turnover has been a challenge for I think everyone here." Adam, Alyssa, and Amy discussed the challenges they experienced with CED turnover in their short, three years on the job. Amy shared, "she's been our interim CED, I want to say for about six months now, so I'm still trying to learn her… leadership style." Amy

also expressed, "just trying to understand the different leadership styles and the points of view of the different CEDs can be a little challenging." Amy further explained:

> Each person has their own unique leadership style, and so trying to conform or understand those different leadership styles can… Not that it was hard, but it is a little, you know, it can be a little challenging, especially when, you know, some of them are interim.

Alyssa discussed having a newer CED, stating "my Extension director is new, so you know, fairly new as well. So, I think there's still some, it's not like she knows." Adam stated his experience:

> We've had three different CEDs, all having difference management styles which made it difficult and you didn't know what was expected. With our CED now, we know what to expect which is definitely different than before. She seems to have more of a balanced plan. I feel now more micromanaged now than I did before, which is something I have to get used to.

CED Leadership and Supervision

Frustrations were expressed by early career Extension agents relating to the level of guidance they received from their CEDs (Abigail, Anna, Adam, Alyssa, and Amy). Anna was confused on expectations with her CED, expressing "how much communication is necessary, required, expected, what she needs to know, what she doesn't need to know – is not clear." Anna also indicated a lack of coaching received from her CED and stated, "I'm not sure I've had what I would call 'coaching'. I mean, I've had reviews of my packet… But I don't think I've had… I'm not sure what you would call 'coaching'." Anna shared more in depth, "I mean I get email communications on, you know, dates things are due, that kind of thing. But as far as coaching specific things, I mean, I don't think that has, you know, that hasn't really happened." Alyssa shared her lack of confidence in her CED to coach her and stated, "some of the things that I'm working on, I know that she may not be able to necessarily give me good direction on, so that's why I've kind of moved to other parts of our Extension community to find some of those answers." Abigail discussed frustrations with CEDs from other counties:

> They just assumed that I needed any guidance they had to give me, and without trying to meet me at my level, you know? I'm sure that CED would have had plenty of great things to tell me as someone who's only been in Extension 3 years, but I don't really need someone to tell me how to network at this point.

Agents expressed their enjoyment with CEDs who have experience in their program area or have experience being an agent prior to becoming a CED (Adam and Anna). Adam stated, "I always like the CEDs that are veteran agents. Those CEDs with that longer experience that worked their way through the system, they tend to have a really good perspective." Anna, a RSA, struggled with CEDs from a different program areas, stating "with the counties that their CED is an ag agent, again, it's kind of easy because they know what I'm doing, and they know what I'm involved in and what's going on."

Personal Pressure

A challenge many agents discussed was personal pressure they, often times, put on themselves (Abigail, Alexis, Adam, Amelia, Alyssa, and Amy). One of these pressures was time management, often related to not being able to say *no* or overcommitting to too many tasks (Abigail, Alexis, Adam, and Amelia). Abigail shared, "the obvious challenge of time management and figuring out your limits… you have enough freedom to get yourself in trouble with your time." Abigail also shared her personal pressure to succeed and stated, "it's just fighting my human nature or my personal nature to work a lot and prove myself and be an overachiever… So, trying to learn not to do that, and learn how to say 'no' the right way." Abigail continued to share her experience with personal pressure, stating:

> I don't really like the term 'time management' because it's more overcommitting, because I'm extremely efficient. I don't waste time at work – I just work a lot. So, I find it really hard to say 'no' because I think in my head, something's not going to take me that long because I do work efficiently, but of course, there's always things that you don't plan for. So just learning my limits, I guess, has been the most difficult. And sticking to those [limits].

Alexis shared her experience with getting distracted by all the things happening in other counties and communicated, "it's hard to, you know, not get distracted by all the things that I'm not doing, so I try to focus on the things I am doing, and just, you know, reassure myself that I can't do everything." Amelia shared her experience with spending time on programs which make up little of her full-time equivalent (FTE): "Sometimes I'll go off on a tangent in one area I shouldn't be. Last year I made the mistake of investing too much time on the youth component which is only 10% [of her FTE]."

Much like the agents reported, the CEDs noticed the agents' lack of ability to manage their time causing stress for the agents and their lack of ability to say 'no' (Candice, Cade, and Carol). Cade shared an experience with an agent, stating:

> [Agent] also gets dragged into things too. He got a call asking to help pull weeds at a community garden. I said, '[Agent], you're not a weed puller. You're a horticultural agent and you're responsible for programming. You can't use valuable time and resources to drive across town and help someone pull weeds. That is not going to work.' Helping them, sometimes, as these things can be difficult because they are afraid to say no. Help them figure out how to draw that line and say 'no, I can't do that'. That can be difficult for all new agents, even seasoned agents sometimes.

ROA/POW and Reporting

Reporting and developing records of accomplishment (ROAs) and plans of work (POWs) have shown to be a challenge for early career Extension agents, specifically the challenges of time needed to dedicate to reporting, ROAs, and POWs, and how to calculate numbers and percentages to show impact of their programs (Anna, Adam, Amelia, and Amy). Anna explained

that because of the nature of her programs, she struggled with how to report their impact, stating "I can't say because of this program, 10 less cattle were lame on this farm, because there's a million things that go into that, and there's no way to measure the instance, the direct impact of that." Amelia shared her challenges with ROAs by explaining, "I have to admit, the one area I struggle with is figuring out the percentages in the ROA, how much behavior change you are making."

The CEDs' perspectives align with the early career Extension agents in regards to challenges of reporting, ROAs, and POWs (Cade, Caleb, Cameron, and Carly). The CEDs shared that understanding these types of reporting is time consuming and especially difficult for early career agents who are not familiar with the system. For example, Cameron shared:

> As an agent, I think it's always good to have a lot of guidance for putting together your [ROA/POW]. It's a very stressful thing because you never know if enough is enough. You never know if you've got enough programs, or trainings, or what have you, and there's no formula to tell you that there's enough, which I've always found very difficult to swallow.

The CEDs also recognized the importance of their role in helping early career Extension agents understand the reporting processes and what is expected of them (Caleb, Cameron, and Carly). Carly explained:

> I didn't do the greatest service to her in the very beginning about reporting. And reporting can make or break an agent. I know it's just a little bit in the onboarding sessions, and it kind of depends on when they start, whether it's spring or fall, but I just think we are doing them a disservice if we don't do more in that arena. Learn how to write that success story. Learn how to write that objective. Maybe it's a workshop so they can develop their first set of objectives.

Competence

Early career agents expressed they received a number of professional development trainings but do not feel as competent in some areas significant to succeeding in their jobs. The Extension agents reported desire to receive more in-depth training related to social science research (Abigail), evaluation and evaluation methods (Abigail and Alyssa), development of logic models (Alyssa), and strategies for marketing (Amy). Abigail shared her challenging experiences with evaluation:

> I definitely played a lot of catch-up in terms of my reporting and getting a good start on evaluation… a lot of people just sort of jump in head first and focus on developing presentation materials, and the evaluation is sort of an afterthought, and that was mostly because I didn't really understand the sort of short, medium, long-term impacts.

The CEDs and the early career Extension agents only indicated one competence area in common as a challenge for early career agents. The only similarity reported was agents' need additional assistance with evaluation. Aside from evaluation, the CEDs expressed a number of different

competence areas the early career agents could use supplemental professional develop on. The areas the CEDs thought the agents needed more assistance with was social media (Camile), communication and dealing with conflict (Camile and Carol), program development and teaching (Caleb, Carly, and Carol), and developing relationships with clientele (Carol and Carl). Carly shared an experience she encountered with an early career agent, stating, "[Agent] didn't have a lot of teaching skills when she came to us. I think sometimes that makes her nervous because [she] doesn't quite feel like the expert I know she is." Additionally, Carly shared, "[producers are] busy, [producers] have a lot going on, lives have changed, men and women have to work, raising children, and they just don't attend meetings in a room with PowerPoint like they used to." Camile explained that agents need training "dealing with conflict and how to help soften some of those things to lessen responses." Similarly, Carol expressed the need for "the communication piece and being able to work through challenges in the workplace as well as with the clientele that we're serving." Carl expressed "they [early career agents] need to understand how to develop relationships with clientele, and it needs to be genuine relationships."

Volunteer Management

Both early career Extension agents and CEDs expressed challenges with volunteer management, though CEDs perceived volunteer management as a bigger challenge than the agents. Alexis explained, "I really hadn't put a lot of emphasis on the volunteer recruitment and retention. And I feel like that's the hardest, most challenging thing – is something to do with, you know, some kind of training on volunteers." Most of the experiences shared by the CEDs were with agents who had responsibilities with the Master Gardeners (MGs) and 4-H programs (Cade, Caleb, Cameron, and Carol). The challenges witnessed by the CEDs regarding the agents' volunteer management had to do with volunteer conflicts. Carole explained her early career agent dealt with backlash from volunteers through the enforcement of rules. Additionally, Cade expressed that running a volunteer program can be challenge for an early career agent:

> It's a big challenge, especially here because we have a lot of them, over 100 MGs, that come on a regular basis. One of the key things with those volunteers is they come from a job where they were director, they were in charge, and now they are part of a program where they are asked to pull weeds or do something that they might not necessarily want to do.

Cameron also expressed sentiments for dealing with a group of volunteers, acknowledging:

> They were a tough group of ladies. All I can say is that she [agent] was dealing with a tough group of ladies. I know that because I was a 4-H agent, and I had to deal with them for a while, and it was a challenge at times.

Following the Previous Agent

CEDs discussed following the previous agent as a challenge for early career Extension agents. Candice discussed how the previous agent's lack of following policies and procedures caused hardship for the current agent in their beginning years on the job:

> Some of the challenges she's been having, and it's getting all these MGs that have existed with all these loosy-goosy rules back in the fold into the new rules. For them to understand she is doing it for a reason. There was quite a bit of folks, the MGs that have been here for a long time really like her, they love her teaching style, they don't like the rules so much, but they are getting to understand why.

Different than the previous example, Caleb witnessed his early career agent having to follow an agent who was a respected agent. Caleb mentioned the early career agent was adjusting to the job, but following a well-respected agent is difficult, stating "I don't care what Master Gardener agent comes in, it's always hard following someone who did well. So you have a year for the agent to get used to the volunteers and vice versa."

Discussion

The CEDs in this study indicated that early career agents had an overall lack of knowledge and understanding of Extension, subsequently creating hardships for both the CED and the early career agent, which has required more undivided attention from the CEDs. Early career agents' insufficient knowledge regarding Extension has caused a lag in productivity, such as the agents not being able to conduct programs because they are still trying to understand the Extension environment. The lack of Extension knowledge stems from the lack of formalized Extension education programs at land-grant universities (Harder et al., 2018), pressuring state Extension systems to not only onboard new Extension hires but to also train them in the foundations of Extension science.

Early career Extension agents' challenges with understanding what their job responsibilities and roles are is a pressing concern for UF/IFAS Extension, especially considering some of the study participants have been on the job for three years. The CED participants stated this was for agents as well as for themselves as a coach and mentor. The challenging areas shared most often by participants were the inability to find direction, not knowing which way to steer their programmatic efforts, and confusion over how to get started in their job. These results mirror similar findings from Vines' et al. (2018) in which the authors stated that organizational changes need to take place to decrease these challenges, otherwise early career Extension agents will continue to leave the organization prematurely.

A major challenge for early career Extension agents is the amount of pressure they place on themselves to be successful. Pressure stemmed from their inability to say 'no' to tasks, overcommitting themselves to too many tasks simultaneously, trouble managing their time, and the social pressure of what is going on in other counties around them. Baker and Hadley (2014) found the aspect of time management to be a professional development need of new agents, and Cooper and Graham (2001) found time management to be a competency agents should be sufficient at to achieve success. The pressure agents feel to succeed in their jobs has been recognized by other state Extension systems as well. Contrary to the findings of this this study and the aforementioned previous studies, Harder, Gouldthorpe, and Goodwin (2015) found Colorado Extension Agents tend to not exceed their workload limits and are able to manage a work-life balance.

Reporting and the development of ROAs and POWs were reported as a challenge to early career Extension agents by both agents and CEDs. Program planning (Harder, Place, & Sheer, 2010) and evaluation (Diaz et al., 2019; Franz & McCann, 2007; Lamm, 2011) are vital Extension agent competencies for both new and experienced agents. CEDs also explained volunteer management was another challenge of early career agents that is recognized as a lack of competency within Extension (Seevers et al., 2005). UF/IFAS Extension agents may not be receiving enough professional development in these areas of need.

The turnover of CEDs was another challenge expressed by early career agents, as the turnover left some early career agents without leadership when CEDs departed. In addition, newly-hired CEDs had different leadership styles which left the agents feeling confused as to how to ask for help. The early career Extension agents also conveyed an overall lack of leadership and management from their respective CEDs. Though there is no previous literature citing CED turnover, CEDs play an important role in an Extension agent's success in early stages of their career and can influence Extension agent job satisfaction (Benge & Harder, 2018). The relationship between a CED and an Extension agent builds over time (Benge & Harder, 2017), which may be cause for the agent perception of a lack of leadership. This is a critical role of the Florida CED, and this may be the beginning of a domino effect which leads to other challenges expressed in this study.

Recommendations

The findings from this study revealed early career Extension agents do not feel their respective CED is providing enough leadership and supervision. UF/IFAS Extension should invest more resources and training to help CEDs development a stronger skillset when leading and supervising Extension agents. Specific topics should include managing new agents, systematic updates and how-to guides, and helping early career agents navigate challenges as evidenced by this study. In addition, program and staff development professionals should review any in-service training and evaluation data to ensure effectiveness and accuracy with up-to-date content. This focus on CED development might also aid in the turnover of CEDs if they are departing due to a lack of training and development.

The lack of knowledge early career Extension agents possess upon entering the organization is a major challenge and delays the ability for agents to understand their roles and responsibilities. This content should be covered in the training and development new Extension agents receive during the onboarding process. In addition, specific competency training focused on program planning, evaluation, reporting, and volunteer management should be increased, as they are all major challenges of early career Extension agents. Due to the many competencies, skills, and knowledge areas Extension agents need to be trained in, Florida program and staff development professionals could increase either the amount of trainings provided or provide different modes of development, such as online modules or flipped-classroom environments.

Addressing personal pressures early career agents burden themselves with can take shape in different ways. Successful programs previously implemented in other states, such as the in-service training offered by the University of Kansas Extension (Fetsch et al., 1984), can be explored and modeled to be state-specific. Since agents in Colorado reported not exceeding their

workload and being able to manage a work-life balance, Colorado State University's Extension system could be observed to determine how they provide support to their agents related to these personal pressures (Harder et al., 2015) and apply similar strategies in Florida.

UF/IFAS Extension should conduct quantitative assessments related to the specific areas of program planning, program evaluation, reporting, and volunteer management of early career agents beyond the first year to determine what professional development is specifically needed for this target audience. The impact of CEDs on Extension agents has only been recently researched. More research and assessment of the relationship between CEDs and early career Extension agents is needed to better understand how relationships form and how to strengthen those relationships that are weak. The cause of CED turnover requires an investigation to determine potential factors that could lead other CEDs to premature turnover. As CEDs serve a critical role with the UF/IFAS Extension system, premature loss could be contributing larger effects than Extension agent challenges. Social capital theory could be used to better understand the social networks of early career Extension agents, how these networks form over time, and what type of impact social networks have on new Extension agents.

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Elements of Burnout Experienced by Extension Professionals in Georgia

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Introduction

Balancing the elaborate and complex work roles and responsibilities is a significant challenge for Extension professionals. Conflicting demands upon an Extension agent's time and expertise, are chipping away at the emotional, physical, and intellectual resources they find necessary for job satisfaction and productivity. Extension professionals regularly work extended hours to complete tasks and manage events. Balancing the competing demands of work responsibilities and personal commitments is a constant struggle for them (Place & Jacob, 2001). The struggle for Extension professionals comes when their work expectations are inconsistent with the organizational culture of Extension. When an individual's expectations of the organization is incongruent with the organization's expectations of that individual, the risk of job burnout is likely (Maslach & Leiter, 1997).

Job burnout is the state of emotional exhaustion that leads to reduced productivity and a loss of personal identity in the workplace (Mayo Clinic, 2019). The term burnout is derived from the 1960s counterculture movement describing the cumulative effects of drug abuse on an individual (Golembiewski, 2001). Psychologist Herbert Freudenberger (1980), expanded the definition to describe a condition his patients were experiencing, consisting of a combination of stress, fatigue, and substance abuse. Maslach and Leiter (1997) posited burnout to be the cumulative effect of stress and fatigue on a person's ability to relate to others, cope with stressors, and experience personal accomplishment on the job. To better understand the degree to which an individual experienced burnout, Maslach (1986) developed the Maslach Burnout Inventory with questions associated with three distinct constructs of burnout: Depersonalization, Emotional Exhaustion, and Personal Accomplishment. These three constructs capture the essence of the burnout phenomenon in the associated literature.

A study by the Gallup Organization found that one in four workers experienced varying levels of burnout on the job. These workers reported that unfair work processes, an overload of work, unclear expectations, poor management, and unreasonable demands on their time were the main causes of burnout (Wigert & Agrawal, 2019).

The effects of burnout have far-reaching implications. The World Health Organization (WHO) recognized burnout as a serious impediment to well-being in the workplace, and has included it as an occupational phonomenon in the 11th Revision of the International Classification of Diseases (World Health Organization, 2019). Goh, Pfeffer, and Zenios (2016) reported that more than 120,000 deaths and as much as 8% of the total health care costs in the United States could be attributed to burnout in the workplace. The total annual cost for burnout is estimated to be between $125 billion and $190 billion in health care and lost productivity in the workplace.

In addition to the negative effects on worker health and productivity, there is the turnover rate to consider. Employees experiencing burnout are 2.6 times more likely to leave their jobs (Wigert & Agrawal, 2019). For Extension, this would lead to the loss of accumulated knowledge and experience; loss of valuable relationships in the community; temporary voids in programming and volunteer participation; and additional strain on the remaining staff. The effort required to replace Extension faculty strains financial resources and adds to administrative workloads (Bradley, 2012).

Theoretical/Conceptual Framework

Maslach & Schaufeli (1993) suggested burnout emerged as a social issue rather than a scholarly construct. Schauefeli, Leiter, & Maslach (2009) tries to deepen the understanding of burnout by providing a historical context in Extension that is consistent with the findings of Freudenberger (1974).

> President Lyndon B. Johnson launched the "War on Poverty" causing an influx of idealistically motivated young people into human services professions. However, after struggling to eradicate poverty for a decade or so, they found themselves disillusioned. They came to learn the systemic factors perpetuating poverty nullified their efforts to alleviate poverty's downstream impact on people and frustrated their efforts to open opportunities for children of impoverished families. Frustrated idealism was a defining quality of the burnout experience (Schaufeli et al., 2009, p. 206).

Essentially, if the idealistic approach to one's career does not meet an individual's expectations or provide them fulfillment, it may lead to feelings of burnout.

Method

The purpose of this cross-sectional study was to understand the degree to which Extension professionals experience burnout. This snapshot study design provided the opportunity to compare variables associated with Maslach's constructs of burnout at a single point in time (Sage Publications & Lavrakas, 2008). Our primary research objectives were to determine the degree to which extension professionals experience 1) *personal accomplishment* in their work, 2) *depersonalization* in their relationships with clients, youth, colleagues and others, and 3) *emotional exhaustion* in their work.

We administered the Maslach Burnout Inventory - Human Services Survey [MBI-HSS] via Qualtrics ™. The MBI-HSS consists of 22 statements describing the feelings an individual might experience as a result of being overworked and possibly burned out. Respondents were asked to indicate the frequency at which they experienced these feelings by selecting from seven choices that ranged from 0 (Never) to 6 (Everyday). Reliability statistics yielded a Cronbach's alpha of .82. Reliability statistics for each sub-scale were: Emotional Exhaustion (8 items) α =.91; Personal Accomplishment (9 items) α =.80; and Depersonalization (5 items) α =.81.

In addition to the MBI-HSS, we asked questions concerning the individuals' years of experience with extension, gender, and location. Surveys were distributed via an extension listserv in the

summer of 2019. A total of 148 surveys were returned, with 129 being complete. Responses were scored based on the summative method recommended by the instrument. Table 1 describes how summative scores for the three subscales were analyzed based on a low, moderate, and high scoring method developed by Maslach and Leiter (1997).

Table 1
Description of the scoring scale for the Maslach Burnout Inventory

Profile Type	Low	Moderate	High
Emotional Exhaustion	14 or lower	14 to 27	28 or higher
Depersonalization	7 or lower	8 to 13	14 or higher
Personal Accomplishment	18 or lower	18 to 36	37 or higher

Once scores were determined, they were analyzed with demographic data provided by the respondent (gender, district, program area, and years of experience) to explore any possible relationships based on similar profiles or scores.

Findings

Summative Scoring of Extension Professionals by Demographic Information

Surveys were analyzed first by demographic data provided. Among the respondents, 62 were agricultural and natural resources professionals, 25 were family and consumer sciences professionals, and 36 were 4-H Youth Development professionals. One respondent did not identify the program area of which they were part. Table 2 highlights respondents based on their years of experience in extension. The majority of respondents had less than 10 years of experience in extension (n=67).

Table 2
Agents by years of experience (n=124)

Years of Experience	Number of Respondents
3 years or less	34
3-10 years	33
10-15 years	19
15-20 years	14
20+ years	24

Lastly, agents were asked to indicate gender. Those results are tabled below in table 3 along with the program area. Female agents outnumbered male agents almost 2 to 1 in this study.

Table 3
Agents by gender and program area (n = 123)

Program area	Male	Female	***Total***
ANR	41	21	62
FACS	0	25	25
4-H	2	34	36
Total	43	81	123

Note. One respondent did not identify their program area.

Scores were first analyzed based on their summative scores in the three subscale areas of emotional exhaustion, depersonalization, and personal accomplishment. Those results are listed below in table 4.

Table 4
Overall scores of respondents based on the three scales (n= 124)

	Emotional Exhaustion	Depersonalization	Personal accomplishment
Low	33 (26.6%)	76 (61.3%)	2 (1.6%)
Medium	48 (38.7%)	30 (24.2%)	58 (46.8%)
High	43 (34.7%)	18 (14.5%)	64 (51.6%)

Of the 124 respondents, 26.6% fell into low levels of emotional exhaustion, 38.7% ranked as moderate levels of exhaustion, and 34.7% scored with high levels of exhaustion. Despite the high percentages in the moderate to high classifications of emotional exhaustion, only 14.5% scored as experiencing high levels of depersonalization, with 21.2% scoring as moderately depersonalized and 61.3% ranking with low levels of depersonalization. Additionally, only 2 respondents (1.6%) scored with low levels of personal accomplishment. Of those two, both experienced moderate levels of emotional exhaustion, one experienced moderate levels of depersonalization, and one experienced low levels of depersonalization. 46.8% scored with moderate levels of personal accomplishment and 51.6% of respondents scored with high levels of personal accomplishment. So, despite over 73% of respondents feeling moderately to highly emotionally exhausted, only 2 of those experienced low levels of personal accomplishment.

A visual interpretation of the data indicates that agent's responses were substantially different when broken down by program area. While ANR agents did make up the majority of the respondent pool, with 62 respondents being ANR agents, only 35.4% of those were scored with high emotional exhaustion. 64.3% of 4-H respondents however, scored in with 64.3% being in the high range of emotional exhaustion. Comparatively, only 12% of FACS agents were considered in the high classification of emotional exhaustion (Table 5). Participant responses on the depersonalization scale suggest low to moderate feelings of detachment from one's self. Agents do not utilize depersonalization as a coping mechanism to diminish the effect of unpleasant work experiences (Table 6).

Respondents in all three program areas scored moderate to high in areas of personal accomplishment, suggesting that the majority of extension agents in Georgia, regardless of program area, are satisfied with the impact that they have in their position and have a high sense of personal accomplishment in their work (Table 7).

Table 5
Responses on the emotional exhaustion scale

Program Area	Emotional Exhaustion		
	Low	Moderate	High
Agriculture and Natural Resources	16	24	22
Family and Consumer Sciences	13	9	3
4-H Youth Development	3	15	18

Table 6
Responses on the depersonalization scale

Program Area	Depersonalization		
	Low	Moderate	High
Agriculture and Natural Resources	37	15	10
Family and Consumer Sciences	22	3	0
4-H Youth Development	14	14	8

Table 7
Responses on the personal accomplishment scale

Program Area	Personal Accomplishment		
	Low	Moderate	High
Agriculture and Natural Resources	1	28	33
Family and Consumer Sciences	0	9	16
4-H Youth Development	1	21	14

The final two demographics reviewed in the summative analysis for agents were gender and years of service. By gender, male agents were more emotionally exhausted with 37.2% having high exhaustion, versus 33.3% of female agents. However, it is still alarming that over 70% of both male and female agents scored in the moderate to high classification of emotional exhaustion.

Table 8
Responses on burnout scales by gender

	Male				Female		
	Low	Mod.	High		Low	Mod.	High
Emotional Exhaustion	16	24	22	Emotional Exhaustion	13	9	3
Depersonalization	37	15	10	Depersonalization	22	3	0
Personal Accomplishment	1	28	33	Personal Accomplishment	0	9	16

It was suspected younger agents would have higher scores in the emotional exhaustion and depersonalization classifications and by observing table 9 below you can see that this was in-fact true.

Table 9
Summative scores on the emotional exhaustion scale by years of experience

Years of Experience	Emotional Exhaustion		
	Low	Moderate	High
3 years or less	11	16	7
3-10 years	7	7	19
10-15 years	6	7	6
15-20 years	4	7	3
20+ years	5	11	8

Table 10
Summative scores on the depersonalization scale by years of experience

Years of Experience	Depersonalization		
	Low	Moderate	High
3 years or less	22	8	4
3-10 years	15	8	10
10-15 years	12	6	1
15-20 years	9	3	2
20+ years	15	8	1

Table 11
Summative scores on the personal accomplishment scale by years of experience

Years of Experience	Personal Accomplishment		
	Low	Moderate	High
3 years or less	2	17	15
3-10 years	0	17	16
10-15 years	0	12	7
15-20 years	0	5	9
20+ years	0	7	17

Agents with 3 to 10 years of service had higher percentages of emotional exhaustion than their counterparts in other service categories. Employees in this category are usually more established in their career, but still trying to establish themselves in their counties. This area of employee is also more likely to be going up for promotions, shifting counties, or even expanding their families. Therefore, their personal workload and career workload is likely to be higher. 57.6% of the employees in this category experienced high levels of emotional exhaustion and 30% scored high on the depersonalization scale. As we found with previous demographics in this survey, the level of personal accomplishment was moderate and high among all groupings. The two agents who scored as "low" in personal accomplishment were in the 0-3 year grouping.

Conclusion and Recommendations

Our research objectives sought to determine the degree to which extension professionals experience 1) personal accomplishment in their work, 2) depersonalization in their relationships with clients, youth, colleagues and others, and 3) emotional exhaustion in their work.

This study provided the opportunity to understand the degree to which extension professionals experience *personal accomplishment* in their work, *depersonalization* in their relationships with clients, youth, colleagues and others, and *emotional exhaustion* in their work. Overall, Extension professionals in Georgia scored highly in emotional exhaustion across demographic areas, but still experienced high levels of personal achievement in their work which may be helping to prevent feelings of burnout (Maslach & Leiter, 2016). The majority of respondents scored low in depersonalization, regardless years of experience, gender, and program area. This indicates that agents are maintaining working relationships that support their sense of the human characteristics of colleagues and clients.

It is important for Extension administration to continue to work with their employees to maintain good working relationships. Since many employees scored in high and moderate levels of emotional exhaustion, the risk for burnout is still a concern. Employee burnout is a costly and detrimental effect for employees and organizations alike. Employees in human services (such as Extension) serve the public with invaluable services. Yet, if the employee is experiencing high levels of exhaustion or depersonalization, their effectiveness will be diminished. Maslach (2016) highlights the dangers of burnout in human service employees in the MBI manual by noting, "The consequences of burnout are potentially very serious for human services workers, their clients, and the larger institutions in which they interact. Our findings suggest burnout can lead to a deterioration in the quality of care or service provided by the staff: it appears to be a factor in job turnover, absenteeism, and low morale. Furthermore, burnout seems to be correlated with various self-reported indicators of personal dysfunction, including physical exhaustion, insomnia, increased use of alcohol and drugs, and marital and family problems."

The results showed that two agents who scored as "low" in personal accomplishment were in the 0-3 year grouping. Much can be attributed to this. New agents have to adjust to working within a county and are faced with a multitude of hurdles, such as transition periods and trainings that can make them feel as if they are not achieving much in their position.

Extension Administrators should be proactive in their approach to preventing burnout, and manage exhaustion and depersonalization levels in employees to prevent turnover and keep cooperative extension in counties to provide valuable services to the public, youth, and communities across the state.

Recommendations for Future Research

Burnout is often treated through intervention programs designed to assist the individual suffering from it, but the problem does not rest entirely with Extension professionals themselves. Perhaps Extension is working from a deficit model that focuses solely on trying to correct the weaknesses of their employees. A review of the literature does not provide an examination of structural deficiencies in Extension that contribute to or exacerbate burnout among agents. The research literature consistently points to burnout as a manifestation of some weakness in an agent that can be alleviated in some manner. This contradicts the research of Maslach and Leiter (1997) who determined that burnout is the result of a mismatch between the expectations of the individual and the expectations of the organization. If we only concentrate our research efforts on remediating the problems of agents, then we may only be addressing half of the problem. Research is needed in order to identify any organizational elements of Extension that contribute to burnout.

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Administrator's Perspectives on Environmental Factors Facing Cooperative Extension

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Extension is a complex organization with a mission to deliver research from the Land-Grant University to all U.S. communities. Extension administrator perspectives of the environmental factor changes that are facing the organization were investigated in this qualitative study to inform the direction for organization adaptation. Extension needs to respond to: shifts in funding and clientele demographics. Organization adaptation can cause long-term stakeholders to fear loss and therefore can act against the organization. Administrators need to be responsive to traditional stakeholder concerns to reduce shifting focus friction and achieve organization adaptation, and further survival.

Keywords: Adaptive Leadership; Cooperative Extension; Organization Change

Abstract

Extension's organizational environment has experienced changes in public financial support, the new information age, and population demographics have affected the organizational environment. These changes pose significant challenges for Extension. The changing nature of public value was discovered as an emergent theme as a part of a more extensive descriptive qualitative study on Extension's organizational environmental factors. The research question of the larger study was: What environmental factors do Extension administrators perceive as being challenges for their Extension organization? This study is grounded in the theory of adaptive leadership, an approach to assist organizations and individuals in dealing with significant changes in uncertain times when no clear answers are forthcoming. It is an approach predominantly concerned with how leaders can encourage people to adapt to changes, problems, and challenges. It was found through this study that administrators are attuned to many environmental factors, both internal and external. Administrators' attention to these factors reflected the literature's emphasis on racial and ethnic diversity changes, urbanization, the change in public's understanding of the public value and the resulting focus on evaluation and, more importantly, impacts, and that technology changes the way the Extension programming is conducted.

Introduction

Environmental factors are those outside influences that impact an organization's ability to operate (Nadler & Tushman, 1977, 1980; Scott, 2003). Environmental factors together create the environment, a contextual matrix comprised of society's political, historical, geographical, and cultural dimensions that influence an organization's relationships and activities (Lewis, 2006; Weick, 1976).

Recognizing these contextual shifts is essential for Extension to meet its mission of providing access to educational programming that translates science for practical application, to allow people to change their practices, attitudes, behaviors, and thus their lives (Bailey, Wallace, Butterfield, Page, Pinchot, Barnett, & Beard, 1909; Bull, Cote, Warner, McKinne, 2004). The academic literature does not include Extension administrators' perspectives on organizational challenges, and therefore it is uncertain whether the trends in the literature are a result of organizational strategy or from local grassroots initiatives.

Literature Review

The environmental factors cited in the literature include the Extension financial crisis (Bull et al., 2004; Graf, 1993; McDowell, 2004; Morse, 2009), changing funding requirements (Franz, 2013, 2015; Kalambokidis, 2004; West, Drake, & Londo, 2009), and significant population demographic shifts (Erbstein, Moncloa, Olagundoye, Diaz-Carrasco, & Hill, 2017; Henning, Buchholz, Steele, & Ramaswamy, 2014; Hoorman, 2002; Krofta & Panshin, 1989). Each of these factors has contributed to organizational change or calls for change in Extension.

The theorizing on Extension adaptation has offered three distinct responses to the aforementioned large-scale shifts in organization orientation (Hoag, 2005): The first is that Extension is no longer relevant and will—should—become extinct (West, Drake, & Londo, 2009); others state that a change in mission is causing organizational shortcomings because Extension has moved away from its roots in agriculture and lost support from historically significant supporters (Bull, Cote, Warner & McKinnie, 2004); and third, that Extension has not moved away from a focus on agriculture and a resulting lament that this programmatic movement has not yet occurred (McDowell, 2004). The direction for Cooperative Extension adaptation remains unclear.

Theoretical Framework

Adaptive leadership is an approach to assist organizations and individuals in dealing with consequential changes in uncertain times when no clear answers are forthcoming. It is an approach predominantly concerned with how leaders can encourage people to adapt to changes, problems, and challenges. According to Heifetz (1994), leaders need to engage in activities that mobilize, motivate, organize, orient, and focus the attention of others. The behaviors of the leader and the actions they take encourage others to address changes that are central to their lives.

Heifetz (1994) identified three different types of situational challenges. Those problems are purely technical, or purely adaptive, or a combination of both technical and adaptive. Technical challenges are defined as those problems in the "workplace or community that are clearly defined with known solutions that can be implemented through existing organizational rules and procedures" (Northouse, 2016, p. 261). Adaptive challenges do not have known solutions (Heifetz, 1994). The majority of problems are a combination of both technical and adaptive challenges (Heifetz, Grashow, & Linsky, 2009). Adaptive leadership is pertinent when adaptive challenges are present in the problem (Yukl & Mahsud, 2010).

The process of adaptive leadership is comprised of four different viewpoints: the systems, biological, service-oriented, and psychotherapy perspectives (Heifetz, 1994). The systems perspective recognizes many problems individuals are confronted with are a part of a complicated interactive system. The biological perspective acknowledges that individuals do respond to both internal and external cues, influences, and environments. There is an assumption that a leader will have a service-oriented perspective and that they will use their expertise and knowledge to diagnose and prescribe solutions to the problem — the psychotherapy perspective. Adaptive leadership is used to explain how and why people accomplish adaptive work. In order to accomplish the objective, people need a supportive, safe, and constructive environment (Northouse, 2016).

Perspective

Adaptive leadership requests that leaders "get on the balcony"—this is the task of reflecting on and observing the entire organization to assess the value and power conflicts that are occurring within the organization. In organizational leadership, the external process of gaining perspective is called *scanning* (Choo, 2001; Daft & Weick, 1984). Heifetz (1994) recognizes that the leader needs to be seeking the challenges to the organization, both internally and externally. The leader's ability to scan the environment and recognize the challenges they face influences their ability to react and how they react when they do recognize those challenges (Yukl & Mahsud, 2010).

Ecology

Adaptive leadership has a unique term, called the *holding environment* (Heifetz, 1994). It is the safe space created by the leader for everyone involved in the adaptation process to be in while they are addressing difficult issues. This environment is an atmosphere of constructive dialogue and feedback. Beyond creating safe spaces for conversations, adaptive leaders look outward from their organization to recognize the environment that they exist within. Leaders need to ask themselves if there are threats, concerns, or opportunities that the organization needs to be responding to (Segil, 2002).

The Nadler-Tushman Congruence Model for Diagnosing Organizational Behavior

This model views an organization as an open system and, therefore, is influenced by inputs, but also that it shapes its environment (Burke, 2014). In this model, the inputs are viewed as relatively fixed (Burke, 2014). The inputs help influence how the people in the organization behave by serving as constraints or opportunities for action (Burke, 2014). The three inputs that Nadler and Tushman (1977, 1980) identified are the environment, resources, history, which lead to strategy.

Environment

The stability of an organization is determined by the extent to which the environment is relatively stable or if it is dynamic (Burns & Stalker, 2006; Lawrence & Lorsch, 1967). The

environment's stability or instability significantly affects the internal operations, structures, and policies of the organization (Burke, 2014).

Resources

Nadler and Tushman (1977, 1980) identify resources as the assets of the organization, such as the capital, people, technology, and raw materials. Other intangibles are also considered resources, including a logo, company name, or brand, because these may bring public regard or value to the organization (Burke, 2014).

History

An organization's history determines patterns of employee behavior, policy, and the types of people that an organization attracts as employees and as clients (Burke, 2014). Most important for this context, history influences how organizations respond to crises (Nadler & Tushman, 1977). Burke (2014) stressed that history is an important variable in understanding an organization.

Strategy

Environment, resources, and history converge to influence the strategy that is implemented by a leader. Strategy is the "process of determining how the organization's resources are best used within the environment for optimal organizational functioning" (Burke, 2014, p. 210). Strategy is the result of identifying and addressing opportunities in the environment and determining how the organization's resources are adequate to capitalize on the opportunities.

Methods

The changing nature of public value was discovered as an emergent theme as a part of a larger descriptive qualitative study on Extension's organizational environmental factors. The research question of the larger study was: What environmental factors do Extension administrators perceive as being challenges for their Extension organization? The objective of this project is to relay State Extension Directors and 4-H Program Leaders perspectives on the environmental factors facing the Cooperative Extension organization.

Participants

Twenty Extension administrators (State Extension Directors (n=7), State 4-H Program Leaders (n=13)) volunteered to be interviewed. Participants represent 15 states and all four APLU administrative regions. The population in this study is small and has a public profile. Therefore data has not been relayed here to ensure anonymity.

Data Collection

Participants completed a Strengths, Weaknesses, Opportunities, and Threat (SWOT) Analysis for both Extension and the 4-H program in their state. A SWOT Analysis is a management

assessment tool (Pickton & Wright, 1998). Participants were asked to complete the analysis as a mental exercise before the interview and then to reflect on what they identified. Data were collected through video-based interviews and ranged from 44-114 minutes long.

Data Analysis

Data were prepared and analyzed by transcribing audio recordings verbatim. During data collection and analysis, memoing occurred (Charmaz, 2014). Open-coding with Atlas.ti was conducted, and then themes were developed. Member checking was conducted to support transparency (Creswell & Poth, 2017). Triangulation was supported by using two separate populations to give perspective on the same phenomena (Corbin & Strauss, 2008).

Results

Administrators recognized key challenges: the nature of financial resources at the federal, state, and local levels; figuring out the appropriate use of technology in conducting Extension work; and the impact that urbanization and then the resulting shrinking rural communities pose for Extension. Additionally, administrators recognize the challenges faced by the increasing diversity in both rural and urban communities. Throughout the discussion of the challenges by administrators, they consistently-to a person saw the importance of remaining focused on delivering agricultural education; however, there was a reframing of agriculture as focusing on not only production but also food, and then in turn health.

Financial Resources

Money is the primary enabling resource for the system. Nancy shared:

> ...People realize that research costs money, you have to have labs, and [you] need to have students, and you know it costs money. People just think that Extension just happens, that people just go out there and do [it]. [University] administrators don't quite know how to fund it because they can't see how you do that. They just think a person goes out and does an educational event.

Recognition of financial reduction as a crisis was relayed at all levels: federal, state, and county. Each level of financial support—federal, state, county—was influenced by different trends, impacts, and responses for administrators.

Federal. Administrators relayed that Smith-Lever funds have been at flat funding levels. It would be a critical moment because Smith-Lever funds, even at flat funding levels, which translates to shrinking levels due to inflation, provides flexible base support that allows for matching funding from the state, county, and grants. Numerous administrators talked about the expanded opportunities to find federal funding partners across the government. Unanimously, Federal funding is important to state funding and of both to the organization as a whole.

State. Administrators' perspective on their respective states was based on the unique state's economy, politics, and culture. Extension "[is] a hundred variations on a theme." At the

state level, the relationships of administrators to their state legislature are incredibly important because of the significant financial contributions of the state legislature. “We engage [with] our legislature a lot because 42 percent of our funding comes from the legislature; [it’s] the way we fund our program,” stated Nancy. The legislature is also invested in Extension's programming efforts, and therefore the relationships are important to communicate what the Extension program is doing. The conversation goes in both directions. It is important to communicate outcomes but also to learn what the state legislature is interested in. Regular contact with the legislature was viewed as a way to help monitor concerns and to attempt to grow financial support.

County. Administrators recognized the constant shifting status of financial support from counties. As with states, each county has its own economy, culture, and politics—multiply that by the number of counties in each state, and therefore, relationships with county officials were noted as important. Administrators emphasized that retaining funding at the county level was a constant battle. Joseph shared:

> I see an opportunity to get more funds from the counties. Right now, the counties put in about $6 to $7 million a year. I truly believe that number could get to $15 to $20 million a year if we do it right because they'll see a need to . . . be more invested in what we do.

Extension is a significant portion of some county government budgets in rural counties. Others see successes that have occurred in receiving funding from urban communities because Extension is a small expenditure. Carolyn relayed both thoughts when she said, “In a small, rural county, Extension might be 15 percent of their budget. Whereas if you look at [an] urban county, it’s not even 1 percent.” The difference in capacity contributes to the constantly shifting financial status of each county and the challenge that county funding provides for the system.

Change in public value. Administrators recognized a societal shift in how the public values Extension through the downward pressure on public funding. Joseph recognized the shift as “the shaking [up] of state budgets, the public’s questioning of the value of higher education in many sectors of the country, has put pressure on the way we do things.” Even organizational strategy may not be enough to respond to that trend.

Importance of evidence of Extension benefit. The need for evaluation is emphasized due to its connection to financial strings. In recognition of the changing contract between legislatures and public service organizations through the shrinking number of public dollars available, it has always been thought that there is a need to communicate research impacts better. Nancy recognized the need for evaluation and for putting resources behind that initiative:

> We invested a number of years ago in program evaluators to really evaluate the work that we’re doing and so that we can talk about . . . [how] our work makes a difference… what were the outcomes…

Nancy elaborates that when they were able to communicate specific impacts and outcomes, then the legislature can be responsive. Outcomes need to be communicated widely to stakeholders so that those messages are shared from multiple directions.

Greater emphasis on grants and contracts. Administrators recognized the use of soft dollars as the new normal and as necessary. The use of grants is recognized as a challenge to remain focused on the organization's mission. Grants are term-limited, which can create a discontinuity of service in communities.

Fees for service. Fees are a strategy to generate financial support for program implementation. Fees do have practical limitations. Susan explained that "the [administration] is trying to pull the program staff off the state lines and move them all onto program fees. But I'm telling [the state director's team] that the budget can't sustain and support that." The ability to generate resources ensured resources for the program. The increase in fees can serve as a barrier to participation by low-income clientele.

Technology

Administrators do embrace the use of technology to do Extension work and have been investing in the use of technology. The two concerns that administrators consistently reported were, first, a concern that with reduced budgets that there would be growing pressure to deliver educational materials online. And second, there was a fear that Extension would be forced to deliver more and more content electronically or digitally and that they are not doing enough to be responsive in the "technology space." While technology is present in work, technology does not have the same effect as personal education, but it is a delivery mode that should be explored.

High tech and high touch. Administrators are seeking a path forward with a model that was "high tech and high touch." Sam emphasized that:

> I still think for Extension to work, it's based on relationships, and I still think we need to be sure that we value those one-on-one types of relationships that are built through Cooperative Extension Service, particularly for a youth education program. So, I think there's going to need to be a balance there.

Relationship-based means are having an in-person relationship or connection between the Extension staff and the learner. Sam reiterates what Elizabeth and Joseph were conveying that in-person relationships are imperative to Extension work because virtual education is not the same.

The strongest case for the need for relationships in the local community and with local citizens is the ability to deliver content in the mode that citizens will be able to access it. Recognition that clients may have limited access is not a call to avoid the use of technology. It emphasizes the need to utilize staff who can have both an understanding of the local context on the ground and technology for others.

Urbanization

Rural communities are shrinking, and urban populations continue to increase and concentrate. Carolyn added more context about the urbanization that her state is experiencing, explaining that:

> [We have] 80-something counties that are losing population, [and] we have about eight counties that [have] population growth…so that's where the population is. So that's also a threat because as you pack more and more people in there, how do we serve more and more people in those areas?

Urbanization is a recognized threat for Extension administrators across the country from the most rural Western states to the most urbanized East Coast states. Urbanization challenges Extension on many different levels: First, the citizens living in urban areas are disconnected from production agriculture; second, cities are so large that it is hard to make an impact with the level of staffing, and at the same time, there is greater service provider competition. If these challenges weren't enough, the current Extension and employee pipeline might not be prepared to serve these audiences. All of this contributes to a changing political landscape.

Scale. Urban populations are large and hard to penetrate. Carolyn recognized the significant scale of serving entire populations within the county boundaries, which is the current organizational structure of Extension. Carolyn explained the staffing challenge like this:

> I think our number of employees in urban areas is really a challenge because, you know, if you have one 4-H agent in a county that has 10,000 people versus one 4-H agent in a county that has 100,000 people, that's a really different scenario.

It is no shock that this level of staffing is inadequate to make significant public contributions, and this ineffectiveness was readily viewed as a significant challenge.

Urban centers have more service provider competition. The level of competition from organizations providing a wide range of specialized educational information was characterized by administrators as a potential threat and also as a potential opportunity. However, it was recognized that in urban communities, there was significant competition likely because of their population and geographic scale. Not only is the program competing with other organizations, but they are also targeting an already diminished pool of money. When Curt said, "there are a lot of dollars that we are competing for," it referred to the level of competition, rather than the volume of dollars available. It is also important to acknowledge that the legislature is supplying funding to other organizations while their own state Extension program provides the same or a similar program.

Power shifts. Shifts in population and population needs will inevitably result in changing political alliances and power. With the population shifts, administrators recognized that potential funding and support changes would result from an increase in the number of urban legislators. As potential funding and programming shifts to serve a growing urban population, stress will be placed on the historical relationships with organizations who work to secure support for Extension as well as with the program's historical clients. The state legislature is a significant source of financial support for Extension. There is a need to have an educational strategy for legislators who may not have experiential knowledge of the Extension program, either as a client or 4-H member. Additionally, it is a call for administrators to be in dialogue with the legislature to be responsive to the needs that the legislators are identifying in their communities.

Long-standing organizational relationships. Extension has long-standing relationships with agriculture and rural organizations. These relationships are important for political reasons but also as working educational partnerships, with commodity groups relaying feedback about programming. In the context of urbanization, these strong relationships may not consider the need for changing programming into urban settings. Even if they do consider the need for Extension to expand, they do not want their clientele to lose services. The organizations still have political power and can mobilize their clientele for or against Extension.

Stakeholders are fearful of loss. Stakeholders are fearful of losing opportunities and resources. As David said, "Sometimes when you try to move in new directions, you find opposition from current audiences. The current audiences of rural and agricultural organizations are concerned about their status. Sarah captured that Extension's clients are:

> . . . really passionate folks, that really come to the table to rally; they really value Extension and want to make sure that the things they know and love about Extension [continue]; and again, some of this goes back to 4-H, so they are pretty loud, loud and clear.

These historic audiences are not just agriculture commodity groups, but also 4-H parents, volunteers, and Master Gardeners, and the list of stakeholders goes on. The stakeholders' passion for the organization is rooted in what the organization provides them, and they care deeply about the positive benefits that they have experienced or see others receiving. Thus, from that passion, those same stakeholders who will "rally for a budget cut at the state legislature" can be loud when they perceive that the organization is shifting away from their "special interests."

Opportunities in the urban landscape. While urbanization is a significant threat to many factors, urban populations are always viewed as "opportunities." Robert shared this:

> Saying that we need to increase that urban presence and look at how we approach those audiences differently is not saying that we're doing things wrong in other aspects. [Urban communities] are really where [the] opportunities are.

Additionally, Curt saw the opportunity to bring the historic strength of agricultural education to the urban context. He emphasized that when he said, "I think there's phenomenal opportunity in this urban interface of folks who are concerned about where their food comes from." He showcased the need for continued agricultural and environmental literacy, which emphasized Extension's historic strength and matched it with citizens' interest in "food." In order to serve urban populations, administrators have turned to municipalities to provide funding for staff. Administrators relayed success with having county administrators fund more paraprofessionals to deliver the content in more communities. This was highlighted as a fairly "easy" sell because an Extension budget request is tiny compared to the entirety of a large urban county budget.

Shrinking Rural Communities

Since Extension was founded as an agricultural improvement organization that has focused on rural community and human capacity development, it is understandable that rural people, spaces,

and economies have been its strength. Urbanization has resulted in shrinking rural communities, with a reduction in economic vibrancy and viability, as young people have moved away. While at first glance, these certainly are opportunities for Extension, they have also become threats. As the need for Extension's programming is increasing in rural communities, the ability for rural counties to fund Extension is decreasing.

With brain drain (Carr & Kefalas, 2009), a challenge has emerged for Extension: how to replace retiring county-based staff in rural communities. Carolyn shared that it has been challenging to find qualified extension professional candidates in rural communities. She said, "we really struggle to find strong applicant pools for agents in… rural areas." The barrier to recruitment was not salary but the availability of qualified individuals who would be willing to stay and work in those communities.

As land-grant universities seek higher rankings, they have sought more competitive applicant pools, and therefore it has become increasingly challenging for rural youth to gain entry to land-grant universities. Because it is harder to get into the state's land-grant university, administrators cited there were fewer qualified individuals who want to "return home" to their rural communities.

Diversity in Our Communities

Each administrator expressed the need for Extension to serve the entire public. Administrators expressed specific considerations on inclusion efforts for Hispanic/Latino populations, ESL individuals, African Americans, Asian Americans, Native Americans, refugee populations, and LGBTQ+ individuals.

All twenty of the study participants expressed a need to continue work toward representative parity between state demographics and clientele. Sam candidly shared this about his state:

> When I run the demographics for [my state], we still disproportionately have more Caucasian white, you know, white folks, and… if you compare that to our state demographics and we do very well on the Hispanic, but [this state] is primarily a majority Hispanic population… We are still falling short on [serving] our tribal native American [youth]

Each state is at different levels of response to changing ethnic and racial demographics; however, the consistent response indicated a need to systematize their response and to be intentional. One regularly suggested institutional response was for there to be more diversity in staff.

Need for a diverse staff pipeline. The need for racial and ethnic diversity in staffing was recognized as a barrier to participation. Benefits associated with diversifying the workforce ranged from improving gatekeeper status, bilingual skills, and cultural competency to creating the potential for individuals to associate and bond with similar others, also known as *homophily* (McPherson, Smith-Lovin, Cook, 2001).

Administrators recognized their staff populations as being primarily white. Ryan succinctly stated: “We do not have a diverse staff at all. We only have two people of color . . . out of all of our 80 plus educators.” Additionally, some—not all—agents do not have the cultural knowledge to access diverse populations, but they also do not want to. Some current staff fear a *shifting focus.* Administrators recognized that there were intentional forces against inclusion within their organizations, which lead to slow progress when there is a lack of intentionality, which most administrators identified.

At the same time, all the administrators saw glimpses of effort toward demographically representative service. The intentionality of effort was recognized as being essential for forward progress. Using in-organization individuals/families of underserved populations to speak about their experiences allows for a little bit of that support to be done by people who allow the target population to say, “Those individuals look like me, talk like me, and are in my communities.” It is powerful to note that Rhonda recognizes this approach has been done historically to serve white rural youth and now needs to be done for all other youth. It is important to engage families in a dialogue to understand how they want to experience Extension.

The Mission Remains Agriculture

Extension administrators are committed to continuing agricultural educational programming for adult agriculture producers, youth through 4-H, and community members through Master Gardeners. Callie framed the task for Extension to remain committed to agriculture programming:

> I think it's very important to provide agricultural programming, from the standpoint of healthy living and nutrition, from the standpoint of a community food security, [; [and] from the standpoint of agriculture production here in the U. S., I think it really is. It's important that we grow our food locally. So, yeah, I think it's very important because . . . it's also our roots . . . If we deviate from what we are because we're trying to stay relevant and cool and hip, [we may experience mission creep]. Thankfully there's a lot of ways to make agriculture cool and hip nowadays, which is also who we are . . . what we're founded [on], but it can't be the only thing we do.

This commitment is predicated on the idea that agriculture is a primary industry for the states because it's the organization's historic work in this area, as well as because of an inborn commitment that leaders have to the agriculture industry. Administrators see opportunities to expand agricultural literacy through programs that are framed around food, nutrition, and health, and they see an opportunity to make significant impacts on communities and to make Extension more relevant to the broader society by framing their work as "health" rather than simply agricultural production.

Shifting Focus Friction: Barrier to Adaptation

Discussed above are a wide range of environmental factors that administrators recognized for the Extension system as a whole. There are many, and they are complex. Administrators raised the idea of *shifting focus friction.* Shifting focus friction is the backlash from important stakeholders

to organizational changes when there is either an actual loss or a perceived loss of resources to another focus. The individuals causing this friction are experiencing real stress from the real or perceived loss. Administrators recognized that this shifting focus friction is generated from a deep appreciation for the services that they have experienced from Extension. This appreciation is paired with a lack of understanding about the entire organization's mission, which makes them focused on preserving the services that they utilize and appreciate.

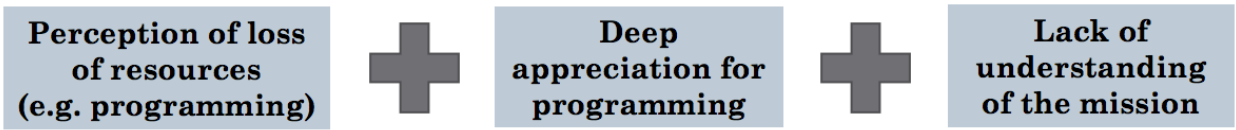

Figure 1. Shifting Focus Friction

Historic stakeholders such as long-term volunteers - or agricultural organizations- will be the ones who will demonstrate behaviors intended to prevent organizational change. Extension audiences with political power will use their relationships and connections to try and ensure that shifts in the organization's mission do not take place unless their special interest is maintained. Examples of responses administrators relayed, included: social media campaigns, personal attacks on administrators, campaigns toward legislators, and communicating with university administrators. Individuals within the organization who are non-adopters of the program because they do not agree with the changes contribute to shifting focus friction.

Discussion and Implications

It was found through this study that administrators are attuned to many environmental factors, both internal and external. Administrators' attention to these factors reflected the literature's emphasis on racial and ethnic diversity changes, urbanization, the change in public's understanding of the public value and the resulting emphasis on evaluation and, more importantly, impacts; and, that technology changes the way the Extension programming is conducted. In addition to the above environmental factors, they also highlighted other factors, including 1) that the mission should be reframed toward health, 2) that there is still a need for Extension in rural communities, and 3) that the Extension employee pipeline needs attention. Administrators recognized that the organization's response to the above environmental factors had produced shifting focus friction.

Extension is Relevant and will Remain focused on agriculture. Despite the debate in the literature about the future of Extension (Hoag, 2005; West et al., 2009) or the relevance of Extension as an agriculture organization (Bull et al., 2004), administrators resoundingly rebuked Extension's extinction (West et al., 2009) and were committed to Extension as an organization that has and will remain rooted as an agriculture organization.

The change in the public's understanding of public value has to lead to the contract now is: What is the value that is being received for the dollar invested. What is the return on investment? And, should the public dollar be invested in this program compared to any other given program. Evidence will continue to grow in importance.

Extension has an opportunity to reframe as a health organization. Extension must remain committed to agricultural programming. They suggested the need to reframe agriculture programming to be a continuum of agriculture as food, as health, and even as a community. This is not new as Extension has been providing programming on agriculture production and food since it's inception (Rogers, 1988). Administrators specifically focused on how to support healthy production, how to ensure healthy food, and how to ensure healthy people in mind and body—all of which they saw as ways to achieve healthy communities.

Smith-Lever Capacity Grant Funds that are administered through USDA-NIFA's Federal budget are stagnant. Unified efforts to increase Smith-Lever Capacity Grant Funds in order to ensure future organizational stability were strongly recommended by administrators. The effort needs to be a concerted campaign of the land-grant university systems and their partners to communicate the organizational value and their mission to federal, state, and local legislators and government agencies. Additionally, Extension is no longer solely a rural community education program and therefore, should seek partnerships across the federal government.

Developing strong relationships with legislators and being armed with relevant outcome data were recognized as the two aspects that could help stabilize state and county budgets. It is interesting to note that the administrators' ability to have two-way conversations with legislators and county-commissioners was considered important so that programming could be responsive to the needs of the representatives and thus could be on the mind of funders when there was a funding initiative.

County-level budgets will continue to become increasingly disparate, with rural communities experiencing downward pressures on both legislatively appropriated or direct tax-levied budgets as rural communities shrink. In order to continue to be relevant in Extension's historically strong programming communities and areas, there will need to be pressure to increase urban funding to allow for other state or federal funds to be used in shrinking communities.

Rural communities are having a growing need for Extension services. Administrators recognized the flip side of urbanization was the shrinking and aging rural communities that are left behind (Carr & Kefalas, 2009; Henderson & Akers, 2009). As the needs increase in rural communities, the local capacity to fund the organization shrinks. This creates a unique pressure on Extension to urbanize. However, Extension has a long-term relationship and a commitment to rural communities (Rogers, 1988; Wessel &Wessel, 1982); therefore, it's imperative to sustain service in rural communities and increase funding in urban communities in order to continue to serve both traditional and expand new audiences.

Urbanization is recognized by administrators as *the* challenge for Extension: the tension between shrinking rural communities where they have a strong base of support and large-population communities that are unknown territory (Fehlis, 1992). In urban communities Extension administrators recognized a high concentration of competition not only for financial resources but also for clientele. Additionally, administrators consistently recognized that the county unit scale is daunting for servicing urban communities.

Shrinking rural communities will erode political support for rural-only organizations, and serving all people is part of their public service mission. Urban counties and municipalities have stronger tax bases. The implications for Extension working in urban environments is that Extension will need to market themselves in order to gain market traction at the same level that Extension has earned over a century of providing services in rural communities. The staffing scale needs to reflect the community integration levels that can be achieved in rural communities.

Technology is not a panacea as there are significant barriers for clients to be able to use and access the tools (Seger, 2011). Administrators experienced the tension between using technology, which could result in devaluing the effectiveness of programming and using technology to enhance programming reach. Additionally, there was a strong commitment to the idea that Extension's value is the closeness to communities and the deep knowledge of the community that only that face-to-face connections can produce. Joseph used the terms "high tech and high touch" to capture an Extension strategy that uses technology. Technology costs money and takes investments to maintain the technology infrastructure. In tight budgets, administrators are faced with spending money on technology or people. The decisions do not have to be either-or; rather it needs to be a mix of both approaches.

Administrators recognized their mission mandate to serve the representative populations in their state. There was still significant work to be done to serve diverse audiences in both urban and rural communities. There needs to be an intentional effort to develop programs that target under-served populations. Efforts to modify existing curriculum for diverse communities were acknowledged (e.g., translating curriculum).

The importance of staff was emphasized by administrators. Staffing levels need to be increased. Logically, the downward trend in staffing levels (Astroth, 2007) is linked to the downward pressure of funding because the majority of the Extension budget is in human resources. A strategy needs to be developed to increase both numbers of community-based agents. The other challenge of staffing was that the current employees were predominantly white and did not have insider knowledge of the growing number of ethnic populations: their cultural norms, language, religion, or networks (Vega et al., 2016). The low-level of system-wide employee diversity is a limitation for serving all populations.

Organization Environmental Change

The Nadler-Tushman Congruence Model for diagnosing organizational behavior. This model views an organization as an open system and, therefore, is influenced by inputs, but also that it shapes its environment (Burke, 2014). In this model, the inputs are viewed as relatively fixed (Burke, 2014). The inputs help influence how the people in the organization behave by serving as constraints or opportunities for action (Burke, 2014). The three inputs that Nadler and Tushman (1977, 1980) identified are the environment, resources, history, which lead to strategy.

Environment. Extension's environment has continued to become more complex, with changing funding streams, bigger communities, more diverse target populations, and more breadth in programming. As Burns and Stalker (2006) discuss, the organizational environment's

stability or instability significantly affects the internal operations, structures, and policies of the organization For extension the complexity and the greater amount of environmental instability and complexity has threatened the Extension system, yet, administrators are identifying the issues and trying to create change.

Extension has a deep-history that has determined patterns of employee behavior, policy, and the types of people that an organization attracts as clients. The organizational environment, the resources available, and history converge to influence the strategy that is implemented by a leader (Burke, 2014). It is imperative Extension administrators recognize the need to be responsive to historic stakeholders and prepare them for significant organization adaptation needs to maintain and grow available resources.

Leadership implications. *Shifting focus friction* is a result of a failure of Extension leadership to prepare their clientele for organizational change. To prepare clientele for change, administrators emphasized the need for relationship building. Constant communication and relationship-building help advance efforts to bring clientele into the bigger mission of the organization -create a *shared* vision (Heifetz, 1999)- and when there is constant communication, the administrator creates a *holding environment* (Heifetz, 1999)- which can lead to successful organizational adaptation. If a state's Extension program is experiencing shifting focus friction, administrators are not creating a shared vision or ensured a shared commitment to the future of the organization, thus reducing fear of loss of programming. Adaptive leadership (Heifetz, 1999) gives a prescriptive approach to build consensus to allow for the organization to make the adaptation.

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Coaching and Mentoring Experiences of Early Career Extension Agents in Florida Received from County Extension Directors

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Abstract

County Extension directors (CEDs) are Extension agents who have both programmatic and administrative responsibilities. A critical role of Florida CEDs is to coach and mentor new Extension agents in their county office. Most literature surrounding the onboarding process of new Extension hires focuses attention on Extension agents within their first year on the job, with little attention focusing on their subsequent years on the job. This study sought to understand the coaching and mentoring experiences of early career Extension agents (one to three years on the job) received from CEDs. Findings revealed eight major themes, including CED years of experience as an agent, lack of CED onboarding, and intentionality of meeting regularly. Overall, CEDs were substantially more optimistic about their early career agents' coaching and mentoring experiences than the agents themselves were, revealing a major difference in perception regarding the impact of this critical CED role. UF/IFAS Extension should provide more resources to create needed onboarding training for new CEDs, as well as tools to help CEDs be more effective coaches and mentors for new and early career Extension agents.

Introduction

Cooperative Extension is a nationwide, nonformal educational system which seeks to help citizens and interest groups at the local level to solve problems in the areas of 4-H youth development, agriculture, horticulture, natural resources, families, and communities (Benge & Harder, 2017; National Institute of Food and Agriculture, 2019). Extension agents carry out this mission by creating and implementing educational programs that are research-based, teaching people to identify problems, analyze information, decide among alternative courses of action for dealing with identified problems, and locate resources to accomplish the preferred course of action (Rasmussen, 1989; Seevers, Graham, Gamon, & Conklin, 1997). In Florida, Cooperative Extension has a local presence by having an Extension office in all 67 counties (UF/IFAS Extension, 2019), with each office being managed by a county Extension director (CED) who has a split appointment between their Extension program and their administrative and supervisory roles (Benge & Harder, 2017; Radhakrishna, Yoder, & Baggett, 1994).

Florida CEDs have three primary responsibilities: (a) individual Extension programming; (b) leadership of the total county Extension program, and; (c) administrative and management responsibilities (UF/IFAS Extension, 2019). CEDs play an integral role in the onboarding and development of new Extension agents, serving as both a coach and mentor; however, many CEDs do not have these necessary skills to be effective in their positions (Sanders, 2014). CEDs have historically been promoted from county agent positions with no guarantee the agent is ready or prepared to undertake the responsibilities CEDs are tasked with (Elizer, 2011; Rudd, 2000). It is unclear how CEDs are coaching and mentoring early career Extension agents in Florida.

Limited research has examined the experiences of early career Extension agents in regard to the coaching and mentoring they received from their CED which limits Extension's ability to provide a sound and firm onboarding experience for early career Extension agents.

Review of Literature

Mentoring is described as a "dynamic process through which mentors provide advice and support to those who have limited experience or skills" (Balu & James, 2016, p. 2). Hadden (1997) described coaching as "the discussion process between two partners aimed at exerting a positive influence", yet "since coaching is a critical part of mentoring, an effective mentor will have well developed coaching skills" (p. 17). Within Extension, CEDs fill a critical role as they serve as both a mentor and a coach for early career Extension agents (Sanders, 2014). Mentoring by the supervisor is influential regarding job commitment, job satisfaction, and turnover intention (Payne & Huffman, 2005). Mentoring and coaching are vital ways to obtain information, knowledge, support, and advice from supervisors (Brass, 2001) and "have become a part of the everyday workplace contributing to increased job satisfaction, personal productivity, and employment stability within an organization" (Kutilek & Earnest, 2001, para. 2).

Though the literature is bare regarding the experiences of CED coaching and mentoring of early career Extension agents, literature exists surrounding peer coaching and mentoring within Extension. Kutilek and Earnest (2001) provided a mentoring model centered on employee support and the enhancement of organizational effectiveness, where a new Extension professional has a peer mentor, peer coach, and executive coach. Place and Bailey (2010) found peer mentoring provided value to both new and seasoned Extension agents. Byington (2010) provided Extension professionals with four keys to establishing successful mentor-mentee relationships, which positively impacted new agents by experimenting with creative solutions and stronger teaching skills.

Extension researchers and practitioners have shown considerable attention to the leadership competencies of CEDs, and the roles of coaching and mentoring are prevalent with the current frameworks surrounding CED competency research and development. Rogers (1977) found four administrative functions were critical for the CED administrative role: personnel management, program management, financial management, and office management. In 1987, Whiteside and Bachtel explored the essential skills needed by Georgia county directors, with the ten most important skills needed for success being communication, public relations, leading, planning, establishing and maintaining a good office image, budget accountability, decision making, evaluating, staff support, and motivating others. Owen (2004) explored CED skills in in North Carolina and found 38 competencies were important for CEDs to possess, with coaching being rated as an important competency to possess. A year later, Moore and Rudd (2005) explored the leadership skills needed for senior Extension leaders, resulting in six leadership skillsets: human, conceptual, technical, communication, emotional intelligence, and industry knowledge.

Most recently, Sanders (2014) examined the leadership competencies needed of Florida CEDs to be successful and distinguished human skills from conceptual skills. Utilizing a mixed methods study, Sanders (2014) included both CEDs and county administrators to identify and assess CED leadership competencies. A total of 40 leadership competencies were identified, including

mentoring and coaching which was identified as a human skill. In addition to identifying 40 leadership competencies which included mentoring and coaching, Sanders (2014) used the Borich model to create a mean weighted discrepancy score (MWDS) between perceived level of importance and level of proficiency, where mentoring and coaching had a moderately high MWDS.

Conceptual Framework

While this study is qualitative in nature and is therefore not based on a true theoretical framework, theory related to Extension agent professional development informed this study and guided the development of interview questions. Kutilek, Gunderson, and Conklin (2002) provided a framework for providing professional development through a systems approach. The framework provided both motivators and organizational strategies throughout the three stages of an Extension professional's career: entry, colleague, and counselor. Benge, Harder, and Carter later expanded the framework to include a pre-entry stage for Extension professionals prior to officially starting their role. In this framework, agents in the entry stage should be receiving leadership coaching from CEDs, and agents in the experienced counselor stage should be providing mentoring to other agents (Kutilek et al., 2002). County Extension directors play an integral role in the career of early career Extension agents. From building social networks and serving in mentor and coach capacities, CEDs are crucial for the success of Extension agents. Although research has focused on the identification and understanding of CED coaching and mentoring, the experiences of early career Extension agents receiving CED coaching and mentoring is not well understood.

Purpose and Research Question

The purpose of the study was to understand the CED coaching and mentoring experiences on early career Extension agents, and is part of a larger investigation of the UF/IFAS Extension new agent onboarding process. The research question of the study was: What are the experiences of CED coaching and mentoring on early career Extension agents in Florida? This study aligns with priority three of the 2016-2020 National Research Agenda – Sufficient Scientific and Professional Workforce which Addresses the Challenges of the 21st Century (Roberts, Harder, & Brashears, 2016).

Methods

This research study used a qualitative methodology design through a phenomenological lens, where CED coaching and mentoring on Florida early career Extension agents were the phenomenon being addressed. Phenomenology was the appropriate approach for this study as the researchers sought to capture the "meaning for several individuals of their lived experiences of a concept of phenomenon" (Creswell, 2007, p. 56). The goal of phenomenology seeks to move beyond description of a shared experience (i.e., CED coaching and mentoring of early career Extension agents) to what it means reflectively for individuals to "a description of universal essence" (Creswell, 2007, p. 57, Moustakas, 1994). IRB approval was obtained from the University of Florida IRB Office prior to contacting potential participants.

The total population of UF/IFAS Extension faculty was 367, of which 62 were CEDs, according to the UF/IFAS Extension Business Services office at the time the data was collected for this study (Tom Obreza, personal communication, 2019). The target population for the study consisted of: (a) 89 Extension agents whom have been on the job for 1-3 years, and (b) 48 CEDs who currently have an Extension agent in their office with 1-3 years of experience. Sixteen participants were purposively selected to participate in the study from the target population with regards to the representative characteristics of Extension district, program area, and county type (see Table 1). One agent passed away during the interview process and was not replaced for the study. A total of eight CEDs and seven Extension agents participated in the study, for a total of 15 participants.

Table 1
Characteristics of Interview Participants

Participant	Agent Type	District	Program Area	County Type
Gabriella	CED	District 2	Family & Consumer Sciences	Rural
Ryann	CED	District 5	Family & Consumer Sciences	Rural
Kyle	CED	District 1	4-H Youth Development	Urban
Grayson	CED	District 3	Agriculture/Horticulture	Rural
Aaron	CED	District 4	Agriculture/Horticulture	Urban
Fatima	CED	District 5	Agriculture/Horticulture	Rural
Chelsea	CED	District 4	4-H Youth Development	Rural
Leo	CED	District 3	Agriculture/Horticulture	Mix
Alexa	Agent	District 2	Natural Resources	Mix
Olivia	Agent	District 5	Agriculture/Horticulture	Rural
Lilly	Agent	District 1	4-H Youth Development	Urban
Andrew	Agent	District 4	Natural Resources	Urban
Evelynn	Agent	District 3	Family & Consumer Sciences	Urban
Chrys	Agent	District 4	Agriculture/Horticulture	Mix
Isabella	Agent	District 3	Family & Consumer Sciences	Mix

Note. Each district was masked with a random number between 1 and 5 to keep the anonymity of each participant, as the characteristics provided would decrease anonymity of the participants.
Note. Participant 9 is a Regional Specialized Agent (RSA).
Note. Participant 10 is a Multi-County Extension Agent.

The primary form of data collection for phenomenological research involves in-depth interviews (Creswell, 2007). The researchers created two semi-structured interview guides, one for Extension agent participants and another for CED participants. Both interview guides were reviewed by a six-member expert panel for face and content validity, consisting of one Extension agent, one County Extension Director, two program and staff development professionals, and two state Extension faculty. Five of the six-member panel either currently works or has worked for Extension as either an Extension agent or CED. Both interview guides consisted of 20 questions, with the difference being Extension agent participants were asked about their own experience and CED participants were asked their perceptions of their new Extension agent(s) experiences in their office. The following three questions were asked of the participants: (a)

describe your mentor experience; (b) describe your working relationship with your CED; and (c) how does your CED coach you?

Each interview was audio recorded and transcribed verbatim. The interviews were conducted over two months, ranging from 28 to 63 minutes in length, with the average interview length being 40 minutes. The researchers utilized NVivo 12 qualitative software to organize, code, and analyze the data collected. Data was reduced using the *phenomenological reduction* method by Stevick-Colaizzi-Keen as modified by Moustakas (1994). After transcriptions were downloaded to NVivo, each researcher completed the first seven steps separately, including horizontalization, descriptions of textures and structures of the experience, and construction of a textural-structural description of the meanings of the horizons. From the individual descriptions, a composite textural-structural description was created into a universal description of the CED coaching and mentoring experiences on early career Extension agents (Moustakas, 1994).

The researchers used five strategies to maintain credibility of the study, as Eisner (1991) state the importance of establishing credibility within qualitative research "allows us to feel confident about our observations, interpretations, and conclusions" (p. 110). The five strategies to maintain the credibility of the study: triangulation, peer debriefing, member checking, thick, rich descriptions, and clarifying researcher bias. Triangulation was attained by interviewing both the new Extension agents and the County Extension Directors. The evidence by these different data sources provided greater evidence into the experiences of new Extension agents in Florida (Creswell, 2007). Peer debriefing was conducted with the expert panel that reviewed the interview guides and between researchers. The researchers analyzed the data individually and then met to discuss emergent themes together, which is important in this study as the one researcher does not have an Extension background and acted as an external check to the other researchers with an Extension background. Participants were solicited for feedback on their interview transcriptions as a member check to safeguard the credibility of the data, and thick and rich descriptions were used to ensure transferability of the findings (Creswell, 2007).

Lastly, Merriam (1988) explained it is important to address potential bias within qualitative research by writing a positionality statement to address past and current experiences relating to new Extension agents. As the lead researcher, I have worked within Cooperative Extension for eleven years, the first seven years as an Extension agent and the past four years as a state Extension specialist, all within Florida where this study has been conducted. I have firsthand knowledge of and experience being a new Extension agent and have been through the challenges other new Extension agents face. My current role as a state Extension specialist is to coordinate professional development, and one of my primary responsibilities is coordinating the training for new Extension agents. There is currently no intentional development or attention on Florida Extension agents past their first year on the job, and I believe there are gaps which need to be identified and programs created to help better prepare our Extension agents for success.

Findings/Results

Eight primary themes emerged from interviews with seven early career agents (early career agents) and eight County Extension Directors (CEDs) involved in this study. The themes discussed in this section include: (a) years of experience; (b) CED turnover; (c) lack of CED

onboarding; (d) intentional meetings; (e) open-door policy; (f) CED knowledge of agents' programmatic fields; (g) emotional intelligence support for early career agents; and (h) CED understanding of early career agents' experiences.

Years of Experience

A CED's level of experience as an agent prior to beginning their CED appointment was a critical aspect of providing valuable tips, feedback, and support for early career agents (Olivia, Andrew, Chrys). Agents expressed concern with seeking coaching and mentorship from CEDs with little Extension experience prior to becoming a CED (Olivia, Andrew, Chrys). Andrew explained the benefit of being coached and mentored by a CED with Extension experience:

> I always like CEDs that are veteran agents. Those CEDs with that longer experience that worked their way through the system, they tend to have really good perspective...I always liked the persons who have done the job [themselves], I think that would help.

In addition, years of experience being a CED was expressed by agents as a concern for receiving coaching and mentorship from CEDs with limited supervisory experience (Olivia, Andrew, Chrys). Early career agent Olivia reported, "I feel like [my CED] and I have coached each other because of her...lack of experience when she came into the CED position". Similarly, Chrys explained her feelings as an early career agent with a new CED: "I think some of the challenge, too, is my [CED] is new...So I think we're both kind of learning it," and "Some of the things I'm working on, I know she may not be able to necessarily give me good direction on."

Providing a supervisory perspective, CEDs Aaron and Kyle mentioned the vital role their years as Extension agents have played in their ability to coach and mentor early career agents. Aaron explained his ability to utilize his personal experience of being new to Extension at one point to better coach and mentor his early career agents: "[I feel prepared to supervise a new agent because] I've got a lot of experience with, you know, just being an agent. Being in the system for a very long time, and understanding what new agents go through."

County Extension Director Turnover

High CED turnover accounted for increased stress and challenges in adapting to multiple management styles. Andrew lamented, "We've had three different CEDs, all having different management styles which made it difficult and you didn't know what was expected." Isabella explained having multiple CEDs within a short timeframe caused challenges in understanding how a CED leads and manages: "[W]ithin [my] county thus far, I've had 3 CEDs, and so just the changing of leadership has been a little bit challenging, because each person has their own unique leadership style."

Lack of County Extension Director Onboarding

Many CEDs expressed a challenge in effectively mentoring early career agents when they themselves were never mentored during their transition from county agent to CED (Ryann, Kyle, Grayson, Aaron, Fatima, Chelsea). Some CEDs explained how their DED did not provide

mentorship support to them when they became CED (Kyle, Fatima). Kyle, a CED, mentioned his DED provided him "very little" support, "other than email, and during evaluations, asking 'how's it going?'" Fatima explained her perception on mentorship and effective CED onboarding:

> I think it takes a special person to understand the importance of the mentorship when you're dealing with such a young faculty member [early career agents]...I think the mentorship curriculum is excellent but I've heard some DEDs say 'oh, if you don't want to complete it, that's fine'...I got zero encouragement in this system even though I had been in this system [for a long time]...But I really try to go to [my early career agent] and I don't make her feel like she always has to come to me.

Having learned many supervisory skills on his own without CED onboarding, Grayson described his challenge as a new CED: "No one showed me anything coming in as a new CED. No one showed me what I needed to do. You kind of figure it out on your own." With respect to assisting the CED onboarding and training process, over half of the CED participants explained the need for greater quantity and availability of resources on how to train, mentor, and coach early career agents (Ryann, Kyle, Grayson, Aaron, Fatima, Chelsea). CED Grayson described turning to an open-door coaching policy in lieu of more hands-on and involved coaching/mentoring due to a lack of available resources for CEDs to engage in developing early career agents. Andrew expressed his concerns as an early career agent:

> [My CED and I] have a relationship where we have a one-on-one meeting monthly, and that's kind of it. There's not much sit down time beyond that. We go through the list of tasks, and sometimes I dread these meetings…[Y]ou never know what to expect, because sometimes I'm walking out of there with more work. That's my biggest fear and why I hold back.

Six of the eight CEDs requested the creation of an online archive of CED training basics to support CEDs in mentoring/coaching their early career agents (Ryann, Kyle, Grayson, Aaron, Fatima, Chelsea). Ryann described her interest in using online tools while coaching her early career agents: "I think [it would be helpful] having an online directory for things they [early career agents] are going to need to know." Fatima also stated she would benefit immensely as a CED by coaching her early career agents with online tools:

> Something [online] would be tremendous where I could just go and pick and grab tools I could use. Something I try to do with my folks [early career agents] is I try to do some professional development stuff that needs to be in those short bites. Dealing with difficult people. Seven habits. [I would love] someplace where we could get some Extension activity to go along with that so we are not having to work for three days to get a 20-minute presentation together.

Intentional Meetings

Scheduling weekly face-to-face meetings between CEDs and early career agents was explained as critical within the first three months an agent is on the job (Ryann, Kyle, Grayson, Aaron).

Aaron stated the vitality of his coaching methods during early career agents' first 90 days on the job:

> I think that working with early career agents is really important because it's their opportunity to get [ahead]. They're very malleable in the first 90 days, especially, and that's the time you can get them trained to understand the culture, proper behavior, and a lot of different things. Because after 90 days, it's a lot more difficult after that point in time to correct.

Concerning weekly in-person meetings, Chelsea, a CED with multiple early career agents in her office, similarly described the benefits she has seen from scheduling intentional meetings with her early career agents: "I'm here to help them succeed. We spend a lot of face-time. I meet with them every week. I think that has helped agents feel secure in that they're going to be supported in the growth of their career." Grayson stated, "I always meet with [early career agents] once or twice a week, see what's going on, ask them if there is anything they need." Kyle explained the value of consistent communication when he coaches early career agents:

> I think [we] have a really good relationship. We meet regularly. I schedule a time to meet with [early career agents]. And then I follow up just by going and having a conversation to see if there is anything I can do and involve them in programs and activities. Just to help bring them along. Regular communication, face-to-face that is, not necessarily just email.

Open-Door Policy

Open-door supervisory policies have impacted CEDs' interactions and relationships with their early career agents (Isabella, Olivia, Grayson). Early career agent Isabella, who had three different CEDs over three years, shared "[My CEDs] have kind of like that 'open-door' policy…'if you need any help, I'm here to help you'." Similarly, Olivia summarized her experience of an open-door policy by stating, "I'm not sure I've had what I would call 'coaching'." Grayson, an experienced agent but new to being a CED, talked about how although he understands better coaching and mentoring strategies exist in comparison to having an open-door policy, he was not trained on ways to better help his early career agents, and he therefore defaulted to using an open-door policy.

CED Knowledge of Agents' Fields

The amount of knowledge CEDs have within early career agents' content area impacted the level of coaching and mentoring provided. Andrew explained, "I view the role of a CED as someone who can provide support and guidance with programs. I'm hoping to see more of this from my current CED." CED Gabriella provided a supervisory perspective, explaining how having field-specific knowledge impacts her coaching: "I went to a lot of meetings that weren't in my subject matter area so that I can understand...what's going on in those other topic areas", and "I also want to kind of understand and help and still be involved in at least a basic understanding of what's going on and how I can help."

Reliance on early career agents' formally assigned peer mentor was often seen as a result of CEDs' lack of subject area expertise, in which they would easily defer early career agents to someone else for help. For example, when CED Kyle coached and mentored agents in 4-H, which was his subject area of expertise, he was able "to train and teach them all about 4-H". However, Kyle's ability to coach an agent in a different subject area differed:

> The one thing that I try to focus on when [early career agents] come in is 'this is what you need, work with your [peer] mentors with outcomes and impacts,' because with [my early career agents], that is not in my field, so I really don't know. These are the things you need to do for your packet.

Emotional Intelligence Support for Early Career Agents

Support manifested itself through openness, honesty, and respect for early career agents (Alexa, Lilly, Evelynn). Supportive and encouraging relationships between early career agents and CEDs were inspiring to early career agents and promoted professional growth (Alexa, Lilly, Evelynn, Isabella). Evelynn explained her CED encouraged her to pursue Extension and gave her books to read, walked her through the process, and shared strategies to help her be effective. CED Ryann provided another example of effective coaching and mentorship stating, "I have very much a team mentality, so we quite often have a lot of meetings and communication...[W]e are all...in the same boat as far as ownership of our own careers and utilization of the resources we can garner."

Early career agent Alexa explained the impact of receiving open, honest, and supportive feedback from her supervisor has had on her career, stating "[My supervisor] has a lot of respect for me, and I think it's great. He does a lot of positive reinforcement. He is not the kind of supervisor that withholds praise", and "I know that he's doing it to help me, that he wants me to succeed, and that he wants to keep me as an agent, because he praises me, and I know I am valued by him. He is very open and honest where you stand with him."

However, CEDs defer to different coaching and mentoring styles than emotional intelligence coaching. For instance, a contrasting response was provided by CED Leo regarding his opinion of early career agents' personal responsibility in ensuring their own success. Leo explained how early career agents' professional well-being is determined primarily by how much and how well they network with others around them, stating, "They [early career agents] need to understand how to develop relationships with clientele, and it needs to be genuine relationships." Leo further elaborated:

> [A]t work, you've got to be an extrovert. If you just sit in your office and shut your door and don't want to talk to anybody, then when you don't have success, that's your fault. If an agent [says] 'I didn't survive because nobody worked with me,' it's their own fault because there are plenty of opportunities to team up with other agents...I need my new agents to hit the ground running when they get here.

CED Understanding of Early Career Agents' Experiences

An understanding of the feelings and experiences of early career agents manifested in the form of breaking down information into manageable pieces, going step-by-step, providing concise guidelines for early career agents, and providing emotional support during times of need. Early career agent Lilly mentioned "[My CED] has done a really good job of not making me feel overwhelmed...I'm really lucky to have him in our office." From the supervisory perspective, CED Chelsea explained the process of meeting her early career agents where they are at, stating "I work to be very deliberate to coach each person as is appropriate for where they are professionally, mentally, emotionally, just trying to take all of that into consideration."

Similarly, a new CED and experienced Extension agent, Kyle, described his process of utilizing his personal experience as an early career agent to better understand what his early career agents are experiencing:

> I'm not so far removed from what it feels like to be new, even though I've been here for a while; I still remember what it's like. It's a horrible feeling when you're in a job and you don't know what you're doing or what you're supposed to do. I know what is important [to teach early career agents] early on before [they] start going off track. Also, CEDs have to be careful how they interact with agents. Making sure you don't say things that might make someone uncomfortable.

Providing an agent's perspective, Olivia expressed frustration with managing the demands of her job. Since she has been coached and mentored by a new CED, Olivia explained her supervisor has not been able to provide effective guidance or direction on what steps she should take. Alexa also summarized her conflicting feelings of being overwhelmed as an early career agent during her first six months on the job, stating "In the first months, I would seriously just hold it together all day and then I would get into the car and I would just break down, and it was crazy."

Discussion

Participants provided substantial feedback regarding the onboarding experiences of early career agents. Four out of the seven early career agents interviewed reported a predominantly positive, supportive, and growth-enabling coaching and mentoring relationship with their CEDs. These same agents felt supported through positive coaching relationships with their CEDs, felt satisfied with their job when discussing their experiences as an early career agent, and reported a positive attitude when discussing their feelings about their job. These findings support work of Elizer (2011) which explained CEDs who engage and motivate agents have more highly satisfied agents than CEDs who employ a primarily hands-off coaching and mentoring style. Benge & Harder (2017) explained positive working relationships between CEDs and agents increase agent performance, job satisfaction, and retention, whereas negative relationships can contribute to agent turnover and burnout. The same cannot be said of the three early career agents that did not report feeling adequately supported by their CED, reporting they felt overwhelmed, disorganized, and simultaneously pulled in multiple directions when discussing their experiences. These same agents were either in a county with high CED turnover or were being coached by a new CED who did not have years of experience on the job yet. Extension agents face various challenges which lead to decreased productivity and low levels of job satisfaction, with ineffective and unreliable CED supervision being a major contributor.

Overall, CEDs were substantially more optimistic about their early career agents' coaching and mentoring experiences than the agents were. Seven out of the eight interviewed CEDs reported high levels of coaching and involvement with their early career agents, whereas only four of the seven interviewed early career agents reported high levels of CED coaching and mentoring. The CEDs' optimism could be accurate, or it could be inflated as they may not actually understand how their early career agents are doing on the job. CEDs should have an accurate perception of their early career agents as they are responsible for coaching and mentoring them during their entry stage on the job (Benge, Harder, & Carter, 2011).

Most CEDs indicated taking an active approach to connect with early career Extension agents, including scheduling weekly meetings and engaging in face-to-face dialogue. Some early career agents and CEDs mentioned the use of an "open-door" policy, where CEDs invited agents to approach them whenever help was needed. Open-door leadership involves indirect and hands-off management of employees, and Extension agents with CEDs who employ a strictly hands-off coaching and mentoring style are more likely to have low job satisfaction (Elizer, 2011). Additionally, open-door, or "laissez-faire", coaching and mentoring may contribute to agents' perception of a lack of CED support, involvement, and investment in their professional wellbeing (Elizer, 2011).

Sanders (2014) explained both human and conceptual skills are needed by CEDs to be effective in their job. Some of the CEDs did not possess these human and conceptual skills. Some newly hired CEDs were new to UF/IFAS Extension and did not possess the organizational knowledge to coach and mentor early career agents. Other CEDs had agent experience and knowledge of the organization but not sufficient human skills to be an effective leader and coach. This was seen in counties where CED turnover was high, leading early career agents to feel less supported by their CEDs. CEDs that are not in the counselor stage of their Extension career may not be fully able to coach and mentor entry stage Extension agents, which seems to be contributing to the negative experiences of early career agents. Effective leadership, coaching, and professional support is crucial for the new Extension agent (Kutilek, Gunderson, & Conklin, 2002), and it is evident some early career agents beyond the first year, or even three years, are still not receiving the appropriate coaching and mentoring form their CED.

Recommendations

The findings of this study revealed some early career agents are properly being coached and mentored, but others agents are not. The UF/IFAS Extension system lacks uniformity in terms of how Florida CEDs are to coach and mentor Extension agents. As it is unlikely all hired CEDs possess all forty leadership competencies identified by Sanders (2014), UF/IFAS Extension should invest resources and training to enhance its onboarding practices for its county Extension leaders. A training program for both new and seasoned CEDs focusing on active strategies for coaching and mentoring should be created to ensure all CEDs are coaching and mentoring similarly with common expectations. An online repository, or coaching toolbox, should be created for CEDs on topics related to coaching, mentoring, and the other leadership competencies identified by Sanders (2014).

Just as mentoring is important for early career Extension agents, it is just as important for CEDs to receive coaching and mentoring themselves. All new CEDs under five years of being a CED could have a formalized mentor to be coached and receive support, especially for those CEDs who are hired with no Extension background. UF/IFAS Extension could also restructure some CED appointments to be completely administrative which could encourage: (a) job descriptions to be more specified to the skills and responsibilities of a CED; (b) a different pool of applicants who have more extensive leadership and supervisory backgrounds; and (c) more specified and intentional training opportunities for CEDs with high administrative appointments.

The quality of relationships between CEDs and early career agents needs improvement, as CEDs and agents have misconceptions in understanding their experiences of being coached and mentored. Relying on an open-door policy has caused CEDs to not be involved in their early career agents' success and challenges, whereby putting the CED in a position where they are unable to properly coach and mentor. CEDs are encouraged to discontinue the use of an open-door policy unless it is used in conjunction with, and not as a replacement of, a hands-on coaching and mentoring approach involving regularly scheduled meetings and check-ins with early career agents. The researchers recommend the impacts of CED coaching and mentoring on Extension agents beyond their first year be further explored since there is limited research examining this phenomena. An in-depth needs assessment of current CEDs' coaching and mentoring competencies would highlight what resources are needed to enhance CED coaching and mentoring strategies. A similar assessment could be created and administered to early career agents to better understand professional, developmental, and training needs of this group.

The current study would be complimented by exploring the impact of formally assigned peer mentors on the job satisfaction and professional development of early career agents in Florida. Understanding peer-to-peer mentor relationships may provide additional insight into how CED coaching and mentoring relationships impact early career agents. Aditionally, CED onboarding and mentoring needs to be better understood. Another qualitative study could focus on how CEDs themselves are coached and mentored, which would aid in the development of more training and "toolbox" materials available for CEDs. An examination of human, communication, and emotional intelligence competencies (Moore & Rudd, 2005), which may be more easily forgotten when considering valuable supervisory skills. A study comparing the emotional intelligence scores of CEDs in correlation to the coaching and mentoring styles they use with early career agents could provide details about how emotional intelligence variance influences CED leadership outcomes. This could be compared to the current study on early career agents' feelings of support, coaching, and mentorship from their CED to assess whether CEDs' emotional intelligence influences the support they provide to early career agents.

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Professional Life Phases: Identifying Professional Development Needs Relating to Instructional Practices and Teacher Development for Florida Agriscience Teachers

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Abstract

For learners to be better prepared to solve current and future complex problems, teachers must continue to strengthen and refine their teaching and learning practices throughout their career. One known modality to assist teachers in refining their pedagogical skills is teacher participation in professional development opportunities. The purpose of this study was to identify the self-perceived professional development needs of agriscience teachers in Florida based on their professional life phase. All three career phases shared modifying instruction for students with special needs as one of their top four identified ranked instructional practice needs. Regarding teacher development, all three career phases shared managing stress as one of their top two identified ranked teacher development needs. It is recommended that agricultural education professional development organizers consider years of experience when planning workshops and opportunities. The "cookie cutter" method or "one size fits all" themes for professional development may not be the most effective way to continue offering these workshops since the findings of this study and others indicate differing needs of agriscience teachers based on professional life phase and years of experience.

Introduction

For learners to be better prepared to solve current and future complex problems, teachers must continue to strengthen and refine their teaching and learning practices throughout their career (Darling-Hammond & Bransford, 2005; Darling-Hammond, Hyler, & Gardner, 2017; Mizell, 2010; Wash, Lovedahl, & Page, 2000). One known modality to assist teachers in refining their pedagogical skills is teacher participation in professional development opportunities. Quality professional development focused on educational programming allows educators to build on their knowledge and skills to apply the best educational practices to impact learners' knowledge and skill acquisition (Darling-Hammond & Richardson, 2009; Mizell, 2010; Wenglinsky & Silverstein, 2006). However, identifying which professional development opportunities to offer teachers can often be difficult (Washburn, King, Garton, & Harbstreit, 2001). Teachers from every career phase, beginning to end, are met by professional challenges that can influence their retainment in the profession (Sutcher, Darling-Hammond, & Carver-Thomas, 2016). Cannon, Kitchel, and Duncan (2012) found teachers' needs can change over time due to their diverse backgrounds and experiences. Thus, conducting periodic teacher needs assessments can be beneficial to identifying teacher needs (Borich, 1980; Darling-Hammond et al., 2017).

Literature Review/Conceptual Framework

Day and Gu (2014) outlined six professional life phases centered around years of experience in teaching: zero to three, four to seven, eight to 15, 16 to 23, 24 to 30, and 31 years or more. During the professional life phase one (zero to three years), teachers are said to have a high level of commitment. Within this phase two subgroups of teachers exist, those with a developing sense of efficacy and those with a reduced sense of efficacy. The level of support, recognition of their work, and school culture are key factors that play a role in the professional life trajectories for teachers during this phase (Day & Gu, 2014).

For the second professional life phase (four to seven years), promotion and additional responsibilities begun to play a significant role in the identities, motivation and sense of effectiveness for teachers. Day and Gu (2014) indicated the second phase has three sub-groups. The first sub-group of teachers maintain a strong sense of identity, the second sub-group is observed as merely coping and managing their identity, efficacy and effectiveness, and the third sub-group is shown to be declining or vulnerable with their identity, efficacy, and effectiveness as teachers are at risk of leaving the profession.

The third professional life phase (eight to 15 years) focuses on managing changes in role and identity including tensions and transitions in the workplace. Two sub-groups were observed in this phase, teachers whom sustained engagement and those who were affected by detachment or a loss of motivation. Day and Gu (2014) also said that this professional life phase is described by some (Hargreaves & Fullan, 2012) as being the most overlooked group in the entire teaching profession. Even though the teachers in this professional phase are most likely to be confident and well established, they are starting to face difficulties managing both their professional and personal lives.

Day and Gu (2014) define the professional life phase (16 to 23 years) as work-life tensions, challenges to motivation and commitment. Teachers were observed and categorized into three sub-groups based on their level of work challenge management and life/home experiences. Teachers are reported to have seen their motivation and commitment increase as a result of career advancement and/or good pupil relationships in sub-group one. Sub-group two teachers simply maintained their motivation, commitment, and effectiveness and would likely continue to cope with work life tensions in their next professional phase. Teachers included in the third sub-group were observed having their workload, management of competing tensions and career stagnation lead to a decrease in career motivation and commitment.

Based on challenges to sustaining motivation, two sub-groups were also identified for the fifth professional life phase (24 to 30 years of teaching experience). They were made up of those who had continued to maintain a strong sense of motivation and commitment and those who were losing motivation which likely leads to an early retirement. Classroom knowledge updates and more general professional/personal development needs were observed to be important to teachers in this professional life phase (Day & Gu, 2014).

The sixth and final professional life phase includes teachers with 31 or more years of teaching experience and described by Day and Gu (2014) as having sustaining/declining motivation, the ability to cope with change, or looking to retire. Teachers in this phase were categorized either as teachers whose motivation and commitment remained high despite of or because of changing

personal, professional, and organization contexts and teachers whose motivation had declined and whose expected trajectories were increased fatigue, disillusionment, and exit. Supportive school cultures not only played a crucial role in teachers' continued engagement in the profession during this professional life phase, but in the teachers' sense of effectives across all six professional life phases (Day & Gu, 2014).

Figland, Blackburn, Smith, and Stair (2017) reported findings for classroom-based professional development needs of agriculture teachers based on years of teaching experience. According to the responses for perceived instructional needs, teachers with one to five years of experience identified need in teaching in a laboratory and managing instruction facilities. Teachers with six to 10 years of experience reported perceived instructional need in motivating student learning and developing online teacher resources. Those with 11 to 15 years of teaching experience had identified need in developing online teaching resources and using instructional technologies. Teachers with 21 or more years of teaching experience identified their highest need as using instructional technologies.

Sorensen, Lambert, and McKim (2014) examined agriscience teachers' professional development needs by career phase and identified the top five-ranked in-service needs among teachers in the induction phase (one to five years), as being (a) writing grant proposals for external funding, (b) utilizing a local advisory committee, (c) utilizing the AET record book system, (d) training CDE teams, and (e) balancing priorities to make time for career and family/personal life. In a qualitative study conducted by Smalley and Smith (2017), 35 participants, representing all regions of the National Association of Agricultural Educators (NAAE), responded to the question, "What are the biggest obstacles that prevent mid-career agriculture educators from becoming the teachers they wish to be?" Nineteen participants identified time management as their biggest obstacle. Another five participants acknowledged work/life balance concerns, which the researchers related back to the issue of time management. The second most identified theme was course planning, particularly regarding (a) content knowledge, (b) locating curriculum, (c) classroom resources, and (d) developing lesson plans (Smalley & Smith, 2017).

This particular study sought to identify the needs of Florida agriscience teachers based on professional life phase. The professional life phases used in this study were (a) early-career (zero to seven years), (b) mid-career (eight to twenty-three years), and (c) late-career (twenty-four years and up). There is a considerable need for new data that can assist in guiding the professional development of Florida agriscience teachers since the last assessment was administered over ten years ago (Blinded authors, Date). Additionally, identifying the professional development needs of agricultural educators directly aligns with Research Priority 5: Efficient and Effective Agricultural Education Programs of the *American Association for Agricultural Education National Research Agenda* (Thoron, Myers, & Barrick, 2016).

Purpose and Objectives

The purpose of this study was to identify the self-perceived professional development needs of agriscience teachers in Florida based on their professional life phase. For this purpose, instructional practices are competencies related to teaching methodologies, planning lessons and

units, and student assessment. Teacher development includes competencies related to balancing work and personal life, managing time and stress, and financial planning. Four objectives guided this study.

1. Identify the self-perceived instructional practice and teacher development needs for agriscience teachers in the *early-career* phase.
2. Identify the self-perceived instructional practice and teacher development needs for agriscience teachers in the *mid-career* phase.
3. Identify the self-perceived instructional practice and teacher development needs for agriscience teachers in the *late-career* phase.
4. Determine the similarities in the self-perceived instructional practice and teacher development needs between the three professional life phases of agriscience teachers based on ranked mean weighted discrepancy scores (MWDS).

Methods

Population and Sampling

The target population for this study was all Florida agriscience teachers who registered for FFA Chapter Officer Leadership Training (COLT) Conferences ($N = 366$). Each of the six areas in Florida hosted a COLT conference and data were collected at each location and point in time through a hardcopy questionnaire administered during the teacher professional development sessions. Ultimately, 269 teachers completed and submitted the instrument for a 73% response rate. Collection of data from non-respondents or agriscience teachers who did not attend the conference was not attempted by the researchers. Non-response data was not collected because 64% of the total Florida teacher agriscience population ($N = 465$) completed the instrument and the researchers considered the sample representative of the population. For the purposes of this study, the professional life phase timeline purposed by Day and Gu (2014) was combined with the teacher life cycle model created by NAAE (2015) to describe professional life phases of Florida agriscience teachers. Early-career teachers were those who have taught zero to seven years in the classroom. Mid-career teachers have been teaching for eight to twenty-three years. The late-career life phase includes those who have been teaching for twenty-four years or more. The teacher respondents in this study were majority female ($f = 177$; 65.8%), white ($f = 243$; 90.3%), and held a bachelor's degree ($f = 198$; 73.6%). A slight majority indicated that they were traditionally certified in agriculture ($f = 102$; 37.9%), taught in a single teacher program ($f = 149$; 55.4%) and at the high school level ($f = 147$; 54.6%). Regarding teacher professional life phases, 163 (60.6%) were early-career, 82 (30.5%) were mid-career, and 24 (8.9%) were late-career, with the majority of participants having taught an average of 8.8 years ($SD = 9.0$; Min. = 1.0; Max. 42.0).

Instrumentation

The study utilized an instrument that was originally created by Roberts and Dyer (2004) and later revised by Saucier, Tummons, Terry, and Schumacher (2010), and Figland, Blackburn, Smith, and Stair (2017). It was modified further in order to fit the needs of this study. The questionnaire instrument aimed to identify the professional development needs of agriscience teachers in their

corresponding states. A panel of experts comprising of five agricultural education faculty members and six doctoral students, five of which were former agriscience teachers, established face and content validity. Three items were deleted, and numerous items were rephrased to make items relevant for Florida agriscience teachers as a result of the instrument review. Seven sections comprised the instrument that measured agriscience teacher needs. For the purpose of this study, sections (a) instructional practices, (e) teacher development, and (g) teacher demographics, were analyzed. Two Likert-type scales (1 = *Low*; 5 = *High*) intended to measure teacher perceived current knowledge and perceived job relevance were used in sections (a) and (e).

Data Analysis

The data were examined for the distribution of missingness (Schafer & Graham, 2002) in order to address missing data. It was determined that data were missing at random, and single imputation was used (Schafer & Graham, 2002). The data were analyzed using SPSS version 26 for PC. Descriptive statistics, including means, standard deviations, frequencies, and percentages were used to describe the population of agriscience teachers who attended the COLT conferences. For the purpose of objectives one through four, mean weighted discrepancy scores (MWDS) were used. Discrepancy scores are well-suited for ranking prioritizing competencies of needs assessments (Borich, 1980). In accordance with Borich's (1980) model. The MWDS was determined by subtracting the perceived content knowledge score from the perceived job relevance score to find the difference. That difference was then multiplied by the mean job relevance score which equaled the individual discrepancy score. Individual discrepancy score means were then calculated to obtain the MWDS for each competency. These calculations were conducted using a Microsoft Excel template.

Study Limitations

Data was collected only from the agriscience teachers that were able to attend the COLT conference. A non-response follow-up was not conducted since a majority (64%) off all agriscience teachers in Florida were in attendance and responded to the questionnaire. An argument could be made that the professional development needs of those teachers who did not attend the conference could differ from those who did.

Findings

Objective 1: Identify the instructional practice and teacher development needs for Florida agriscience teachers in the *early-career* phase.

Based on MWDS, the five competencies identified in the area of instructional practice with the greatest need by teachers in the early-career phase included *determining content to be taught in specific courses* (MWDS = 4.68), *sequencing lessons and units of instruction* (MWDS = 4.37), *assessing student learning in the classroom and lab* (MWDS = 4.12), *modifying instruction for students with special needs* (MWDS = 4.09), and *identifying resources for curricula* (MWDS = 3.88). The three competencies identified with the least need in the area of instructional practice were *using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.)*

(MWDS = 1.46), *highlighting science in agriculture courses* (MWDS = 1.40), and *planning for teaching in a block schedule* (MWDS = -0.61).

Table 1
Instructional Practice Needs of Florida Early-Career Phase Agriscience Teachers (n = 163)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*
1	Determining content to be taught in specific courses	4.68	3.61	1.03	4.63	0.70
2	Sequencing lessons and units of instruction	4.37	3.50	0.98	4.48	0.74
3	Assessing student learning in the classroom and lab	4.12	3.63	0.85	4.54	0.68
4	Modifying instruction for students with special needs	4.09	3.25	1.07	4.22	0.96
5	Identifying resources for curricula	3.88	3.30	0.98	4.22	0.90
6	Developing lesson plans	3.79	3.58	1.01	4.44	0.92
7	Using experiments in teaching	3.64	3.34	0.99	4.21	0.84
8	Managing student behavior	3.54	3.93	0.85	4.69	0.64
9	Teaching for different learning styles	3.50	3.56	0.88	4.36	0.77
10	Motivating students	3.25	3.90	0.83	4.60	0.65
11	Teaching problem solving skills	3.12	3.34	0.99	4.21	0.84
12	Evaluating teaching resources	3.02	3.33	1.03	4.07	1.01
13	Teaching critical thinking skills	2.98	3.56	0.89	4.26	0.90
14	Teaching decision making skills	2.54	3.72	0.86	4.31	0.84
15	Highlighting reading strategies in agriculture courses	2.25	3.52	0.93	4.07	0.82
16	Highlighting math in agriculture courses	2.23	3.15	1.00	3.75	1.03
17	Using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.)	1.46	3.73	1.02	4.09	1.11
18	Highlighting science in agriculture courses	1.40	4.17	0.84	4.48	0.68
19	Planning for teaching in a block schedule	-0.61	2.75	1.37	2.50	1.61

In the area of teacher development, the three competencies identified with the greatest need included *managing stress* (MWDS = 8.12), *balancing work and personal life* (MWDS = 7.26) and *managing time* (MWDS = 7.04). The two competencies identified with the least need were *managing paperwork* (MWDS = 6.38) and *financial planning (investing, retirement planning)* (MWDS = 6.33).

Table 2
Teacher Development Needs of Florida Early-Career Phase Agriscience Teachers (n = 163)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*

1	Managing stress	8.12	2.98	1.28	4.71	0.66
2	Balancing work and personal life	7.26	3.07	1.26	4.64	0.76
3	Managing time	7.04	3.20	1.16	4.70	0.62
4	Managing paperwork	6.38	3.24	1.15	4.62	0.67
5	Financial planning (investing, retirement planning)	6.33	3.06	1.22	4.47	0.89

Objective 2: Identify the instructional practice and teacher development needs for Florida agriscience teachers in the *mid-career* phase.

Based on MWDS, the five competencies identified in the area of instructional practice with the greatest need by teachers in the mid-career phase included *modifying instruction for students with special needs* (MWDS = 3.82), *using experiments in teaching* (MWDS = 3.16), *assessing student learning in the classroom and lab* (MWDS = 3.15), *identifying resources for curricula* (MWDS 2.83), and *motivating students* (MWDS = 2.77). The three competencies identified with the least need in the area of instructional practice were *highlighting science in agriculture courses* (MWDS = 1.70), *developing lesson plans* (MWDS = 1.44) and *planning for teaching in a block schedule* (MWDS = -1.56).

Table 3
Instructional Practice Needs of Florida Mid-Career Phase Agriscience Teachers (n = 82)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*
1	Modifying instruction for students with special needs	3.82	3.48	1.00	4.35	0.79
2	Using experiments in teaching	3.16	3.43	0.92	4.18	0.80
3	Assessing student learning in the classroom and lab	3.15	3.93	0.89	4.61	0.64
4	Identifying resources for curricula	2.83	3.63	0.95	4.29	0.82
5	Motivating students	2.77	3.93	0.90	4.54	0.72
6	Teaching critical thinking skills	2.75	3.71	0.91	4.34	0.71
7	Teaching for different learning styles	2.75	3.71	0.90	4.34	0.77
8	Determining content to be taught in specific courses	2.72	4.06	0.84	4.65	0.57
9	Teaching problem solving skills	2.72	3.85	0.86	4.46	0.65
10	Using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.)	2.41	3.73	1.13	4.29	0.82
11	Teaching decision making skills	2.34	3.94	0.91	4.46	0.60
12	Evaluating teaching resources	2.01	3.65	0.91	4.13	0.87
13	Highlighting math in agriculture courses	1.94	3.60	0.91	4.07	0.80
14	Managing student behavior	1.93	4.24	0.87	4.66	0.63
15	Sequencing lessons and units of instruction	1.88	3.98	0.94	4.40	0.83
16	Highlighting reading strategies in agriculture courses	1.79	3.63	1.00	4.07	0.91

17	Highlighting science in agriculture courses	1.70	4.12	0.87	4.50	0.71
18	Developing lesson plans	1.44	3.88	0.93	4.22	1.11
19	Planning for teaching in a block schedule	-1.56	3.29	1.47	2.72	1.74

In the area of teacher development, the three competencies identified with the greatest need included *financial planning (investing, retirement planning)* (MWDS = 5.54), *managing stress* (MWDS = 5.44) and *managing time* (MWDS = 5.23). The two competencies identified with the least need were balancing work and personal life (MWDS = 5.16) and managing paperwork (MWDS = 4.99)

Table 4
Teacher Development Needs of Florida Mid-Career Phase Agriscience Teachers (n = 82)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*
1	Financial planning (investing, retirement planning)	5.54	3.21	1.13	4.45	1.03
2	Managing stress	5.44	3.41	1.22	4.60	0.89
3	Managing time	5.23	3.48	1.10	4.61	0.81
4	Balancing work and personal life	5.16	3.41	1.20	4.55	0.96
5	Managing paperwork	4.99	3.45	1.09	4.55	0.83

Objective 3: Identify the instructional practice and teacher development needs for Florida agriscience teachers in the *late-career* phase.

Based on MWDS, the five competencies identified in the area of instructional practice with the greatest need by teachers in the mid-career phase included *modifying instruction for students with special needs* (MWDS = 2.71), *using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.)* (MWDS = 2.30), *motivating students* (MWDS = 2.08), *highlighting reading strategies in agriculture courses* (MWDS = 1.93), *teaching for different learning styles* (MWDS = 1.75). The three competencies identified with the least need in the area of instructional practice were *assessing student learning in the classroom and lab* (MWDS = -0.18), *identifying resources for curricula* (MWDS = -1.03), and *planning for teaching in a block schedule* (MWDS = -2.36).

Table 5
Instructional Practice Needs of Florida Late-Career Phase Agriscience Teachers (n = 24)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*
1	Modifying instruction for students with special needs	2.71	3.71	0.78	4.67	0.64
2	Using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.)	2.30	3.71	1.00	4.25	1.07

3	Motivating students	2.08	4.08	0.88	4.54	0.72
4	Highlighting reading strategies in agriculture courses	1.93	3.75	1.22	4.21	0.83
5	Teaching for different learning styles	1.75	3.79	0.83	4.21	0.93
6	Teaching decision making skills	1.12	4.21	0.78	4.46	0.66
7	Determining content to be taught in specific courses	1.01	4.63	0.65	4.83	0.38
8	Using experiments in teaching	0.97	3.63	0.97	3.88	1.03
9	Teaching problem solving skills	0.94	4.29	0.75	4.50	0.66
10	Managing student behavior	0.78	4.50	0.78	4.67	0.64
11	Highlighting science in agriculture courses	0.74	4.29	0.86	4.46	0.66
12	Teaching critical thinking skills	0.70	4.04	0.62	4.21	0.88
13	Highlighting math in agriculture courses	0.65	3.75	1.03	3.92	0.93
14	Evaluating teaching resources	0.18	4.17	0.82	4.21	0.83
15	Sequencing lessons and units of instruction	0.00	4.42	0.83	4.42	0.72
16	Developing lesson plans	-0.17	4.21	1.02	4.17	0.96
17	Assessing student learning in the classroom and lab	-0.18	4.46	0.66	4.42	0.72
18	Identifying resources for curricula	-1.03	4.38	0.65	4.13	0.95
19	Planning for teaching in a block schedule	-2.36	4.21	1.28	3.54	1.53

In the area of teacher development, the three competencies identified with the greatest need included *managing paperwork* (MWDS = 3.86), *managing stress* (MWDS = 3.24), and *financial planning (investing, retirement planning)* (MWDS = 3.14). The two competencies identified with the least need were *managing time* (MWDS = 2.89) and *balancing work and personal life* (MWDS = 1.75).

Table 6
Teacher Development Needs of Florida Late-Career Phase Agriscience Teachers (n = 24)

Rank	Competency	MWDS	Mean Knowledge Level	*SD*	Mean Relevance Level	*SD*
1	Managing paperwork	3.86	3.79	1.25	4.63	0.65
2	Managing stress	3.24	3.88	1.03	4.58	0.65
3	Financial planning (investing, retirement planning)	3.14	4.04	0.81	4.71	0.62
4	Managing time	2.89	4.00	0.93	4.63	0.65
5	Balancing work and personal life	1.75	4.29	0.86	4.67	0.64

Objective 4: Determine the similarities in the self-perceived instructional practice and teacher development needs between the three professional life phases of agriscience teachers based on ranked mean weighted discrepancy scores (MWDS).

When comparing the ranked needs of the three groups of agriscience teachers, they collectively shared one of their highest five self-perceived instructional practice needs (see Figure 1). Early-career phase agriscience teachers and mid-career phase agriscience teachers shared an additional two of their highest five self-perceived instructional practice needs (see Figure 1). Mid-career phase agriscience teachers and late-career agriscience teachers shared an additional self-perceived instructional practice need (see Figure 1). When comparing the three groups self-perceived teacher development needs, they collectively shared one of their highest three needs (see Figure 2). Early-career phase teachers and mid-career phase teachers share an additional top three teacher development need, as well as mid-career and late-career teachers (see Figure 2).

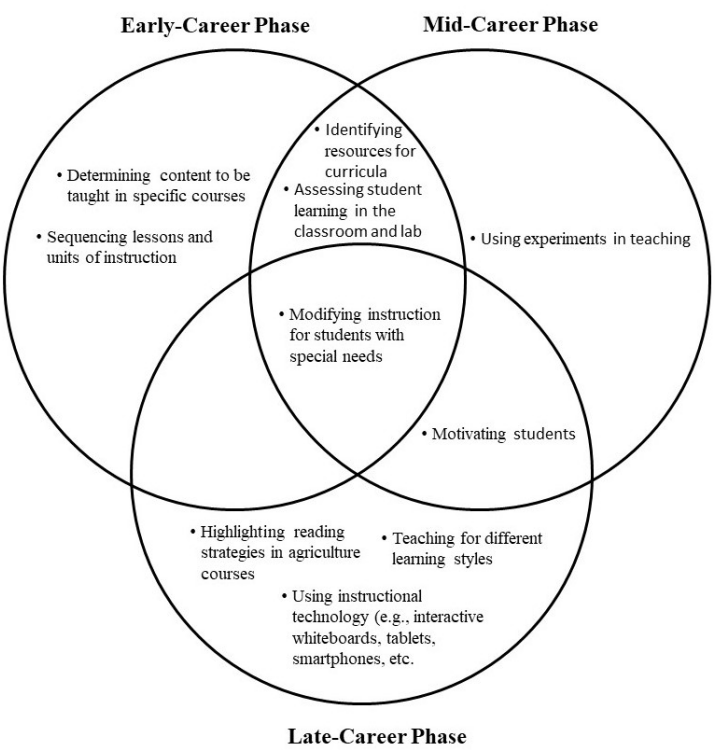

Figure 1. Comparison of the top five instructional practice needs by career phase

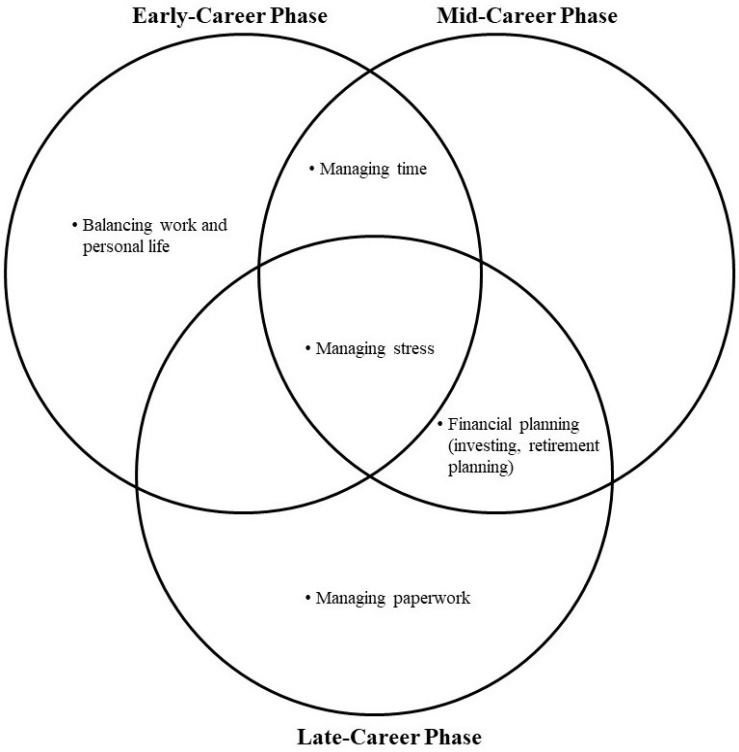

Figure 2. Comparison of the top three teacher development needs by career phase

Conclusions

The purpose of this study was to identify the instructional practices and teacher development need of Florida agriscience teachers. After examination of the data, 60.6% of the respondents were classified as early-career phase teachers with zero to seven years of teaching experience in agriculture. Early-career phase teachers reported their top five self-perceived needs as being *determining content to be taught in specific courses, sequencing lessons and units of instruction, assessing student learning in the classroom and lab, modifying instruction for students with special needs,* and *identifying resources for curricula*. In the area of teacher development, the top three self-perceived needs were reported as being *managing stress*, *balancing work and personal life,* and *managing time*. This conclusion is consistent with Sorensen, Lambert, and McKim (2014) who reported that balancing priorities to make time for career and family/personal life as

ranking among the top in-service needs of teachers in the induction phase of their study (one to five years of teaching). This conclusion also supports Day and Gu's (2014) inference that teachers in this stage are beginning to struggle with additional responsibilities and this will begin to affect their identities.

The mid-career phase teachers represented 30.5% of the respondents. Teachers ranked *financial planning (investing, retirement, planning), managing stress,* and *managing time* as their top three self-perceived teacher development needs. Day and Gu (2014) categorized the teacher in this career-phase based on their level of management of work challenges and life and home experiences. The sub-groups are the outcome of teachers that are facing needs of managing stress and managing time as presented above. This conclusion also aligns with Smalley and Smith's (2017) who reported that time management followed by work/life balance concerns as being major concerns for mid-career agriculture educators. Additionally, Florida mid-career agriscience teachers ranked *modifying instruction for students with special needs, using experiments in teachings, assessing student learning in the classroom and lab, identifying resources for curricula,* and *motivating students* among their top five self-perceived instructional practice needs. Three out of five of these needs can be categorized in the course planning theme reported by Smalley and Smith (2017).

Only 8.9% of the study's Florida agriscience teacher respondents represented the late-career phase. *Modifying instruction for students with special needs, using instructional technology (e.g., interactive whiteboards, tablets, smartphones, etc.), motivating students, highlighting reading strategies in agriculture courses,* and *teaching for different learning styles* were the top five reported self-perceived instructional practice needs. Late-career phase teachers reported much need for *managing paperwork, managing stress,* and *financial planning (investing, retirement planning)* in the area of teacher development. Day and Gu (2014) purported classroom knowledge updates and struggling motivation as needs among the teachers in the late-career phase as well. This conclusion also aligns with Figland, Blackburn, Smith, and Stair (2017) who stated that using instructional technologies was the highest need among agriculture teachers with 21 years or more of teaching experience.

All three career phases shared *modifying instruction for students with special needs* as their number one identified ranked instructional practice need. Early and mid-career phase teachers shared *identifying resources for curricula* and *assessing student learning in the classroom and lab,* while the mid and late-career phase teachers had *motivating students* as a shared ranked need regarding instructional practice. Regarding the area of teacher development, all three career phases shared *managing stress* as their number one identified ranked teacher development need. Early and mid-career phase teachers shared *managing time*, while the mid and late-career phase teachers shared *financial planning (investing, retirement planning)* as a common ranked need regarding teacher development.

Recommendations

Recommendations for Practice

The results of this study should be shared with state agricultural education staff, university faculty, the Florida Association of Agricultural Educators, and anyone else who provides professional development experiences for agriscience teachers. These groups should work together in the vested interest of agriscience teachers to offer relevant professional development based on professional life phase. It is recommended that agricultural education professional development organizers consider years of experience when planning workshops and opportunities. The "cookie cutter" method or "one size fits all" themes for professional development may not be the most effective way to continue offering these workshops since the findings of this study and others indicate differing needs of agriscience teachers based on professional life phase and years of experience. Specifically, for teachers in the early-career phase (zero to seven years), professional development opportunities could be offered on determining content to be taught in specific courses and balancing work and personal life. For mid-career phase teachers (eight to twenty-three years), the areas of using experiments in teachings or financial planning (investing, retirement planning) would make beneficial professional development topics. Additionally, late-career phase teachers (twenty-four or more years) should receive professional development opportunities related to using instructional-technology or managing paperwork. However, when it is not possible to offer a workshop geared toward teachers in a specific professional life phase, it is recommended that an audience consisting of members from each career-phase be offered professional development in the area of modifying instruction for students with special needs or managing stress since all three phases identified these areas as a shared ranked need to be addressed.

Recommendations for Future Research

This study only identified the instructional practice and teacher development needs of the agriscience teachers based on professional life phases. Further research should look at the self-perceived needs included in the additional areas of the questionnaire. There is much knowledge to be gained about future professional opportunities from these areas that include data on agriscience teacher needs concerning (a) industry certifications, (b) technical agriculture, (c) laboratory settings, and (d) program management.

An additional question emerged from the findings of this study. Why is modifying instruction for students with special needs a priority area of need among agriscience teachers in every career phase? A study which explores the curricula currently being taught in teacher preparation programs to identify if the content in the courses are effectively preparing teachers to work with students with special needs would be informative. Future needs assessments should be administered periodically to collect the most current agriscience teacher's needs data. Finally, analysis of need changes overtime should be conducted to monitor professional development progress in the top priority areas.

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The Dimensions of Professional Development Needs for Secondary Agricultural Education Teachers Across Career Stages: A Multiple Case Study Comparison

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Abstract

This study sought to understand the professional development needs articulated by secondary agricultural education teachers across three career stages. To accomplish this, we collected data from secondary agricultural educators (N = 66) in Louisiana. Then, we performed a cross-case analysis to compare and contrast themes and axial codes. Through our analysis, three themes emerged in each case: (1) presage variables, (2) context variables, and (3) process variables. The themes represented the various dimensions of professional development that teachers expressed they desired to facilitate student success better. In particular, the Early Career Teachers' non-traditional backgrounds often limited their exposure to opportunities; therefore, they desired more knowledge and skills in technical agricultural concepts. Meanwhile, Mid-Career Teachers were more stable and confident in their roles as secondary agricultural education teachers; nevertheless, they were frustrated because of various contextual forces that complicated their job duties. Finally, Career Teachers were experiencing career wind-down and had unique professional development requests to help them cope better with contextual changes influencing their responsibilities. Findings from this study, therefore, suggested that although areas of commonality exist across career stages, it is critical to differentiate professional development across programmatic dimensions of agricultural education.

Introduction

Education has evolved dramatically throughout history due to an array of social, cultural, and policy-based forces that have driven or restrained the beliefs and practices of key decision-makers (Fraser, 2014; Urban & Wagoner, 2014). Despite such changes, however, the variable that has been most consistently reported to moderate student achievement is teacher effectiveness (Marzano, 2012; Stronge, Ward, & Grant, 2011). However, teachers' success in delivering quality instruction is affected by a number of presage, context, and process variables (Dunkin & Biddle, 1974). As a consequence, a plethora of research has been dedicated to distinguishing the key characteristics of effective teachers. However, defining such factors has proven to be complicated since the construct is primarily *context* and *academic discipline* specific (Fessler & Christensen, 1992; Larsen, 1992; Luft & Thompson, 1995; Miller, Kahler, & Rheault, 1989;). In response, Roberts and Dyer (2004) advanced 40 characteristics of effective agricultural educators that gained consensus through the use of a panel of experts. Of these characteristics, seven emerged with the highest level of agreement: (1) cares for students, (2) effectively plans for instruction, (3) effectively evaluates student achievement, (4) is honest, moral, and ethical, (5) has sound knowledge of FFA, (6) communicates well with others, and (7) effectively manages, maintains, and improves laboratories (Roberts & Dyer, 2004). The identification of such features

provided a basis for the design and delivery of quality professional development for secondary agricultural educators across several states (DiBenedetto, Willis, & Barrick, 2018; Figland, Blackburn, Stair, & Smith, 2019; Smalley, Hainline, and Sands, 2019)

Professional development has been defined as the learning activities and experiences that educators engage in, from preservice education to retirement, to increase their career-related performance (Fullan & Steigelbauer, 1991; Rhodes, Stokes, & Hampton, 2004; Ruhland & Bremer, 2002). Researchers have argued that professional development is a critical element of educational reform (Borko & Putnam, 1995; Desimone, 2009; Gusky, 2000). However, the literature has demonstrated that all professional development efforts are not created equal. For example, the preparation and experiences of secondary agricultural educators can vary greatly (Torres, Kitchel, & Ball, 2010). As a result, understanding the diverse needs of teachers has been a dominant theme in the literature.

For example, almost one-fourth of teachers in the U.S. reported their primary motivation to engage in professional development was to improve their content knowledge (Darling-Hammond, Chung, Andree, Richardson, & Orphanos, 2009). However, secondary agricultural educators' duties extend beyond traditional classroom teaching as they are also responsible for facilitating students' Supervised Agricultural Experiences (SAE) and leadership development through the National FFA Organization (Croom, 2008; Phipps, Osborne, Dyer, & Ball, 2008). Further, they are also responsible for navigating complex local, state, and federal policy as well as diverse community norms and traditions (Phipps et al., 2008). Because of such complexities, Easterly and Myers (2018) called for the discipline to examine ways to help secondary agricultural educators to mature in critical dimensions of personal resilience as a way to improve their engagement in professional development and ultimately enhance their students' learning. As such, professional development needs in agricultural education continue to diversify and become more complex. To this point, Grieman (2010) called for additional research to better assess the quality and impact of professional development in agricultural education as teacher needs continue to grow and evolve. So far, the literature on professional development has illuminated several critical areas of need for secondary agricultural educators across multiple states. In particular, Smith and Smalley (2018) reported secondary agricultural educators who participated in the National Association for Agricultural Education's eXcellence in Leadership for Retention (XLR8) conference ranked *program planning and evaluation* as well as knowledge about facilitating *experiential learning* as their primary need areas for professional development. Meanwhile, Smalley et al. (2019) found that secondary agricultural educators in Iowa expressed a variety of needs in regard to teaching, classroom management, and technical skills.

It is important to note that multiple investigations have also examined the needs of secondary agricultural educators from the perspective of their years of teaching experience (DiBenedetto et al., 2018; Figland et al., 2019; Layfield & Dobbins, 2002; Washburn, King, Garton, & Harbstreit, 2001). As a result of such work, we now understand that early career teachers warrant additional support because of crucial personal and educational differences, and as a result, their needs span areas such as: (a) behavior management, (b) content knowledge, (c) lesson planning, (d) FFA programming, and (e) SAE management (Layfield & Dobbins, 2002; Mundt, 1991; Shippy, 1981; Talbert, Camp, & Heath- Camp, 1994). Meanwhile, secondary agricultural educators with 10 or more years of experience perceive their needs are more programmatic and

technology-based (Layfield & Dobbins, 2002; Washburn et al., 2001). For instance, career teachers reported that they would prefer professional development on topics that included: (a) computer-based programming assistance, (b) FFA award and degree applications, and (c) recording keeping (Layfield & Dobbins, 2002; Washburn et al., 2001). As such, secondary agricultural educators' conceptualizations of their needs remain varied, complex, and evolving until they establish a stable professional identity (Shoulders & Myers, 2011). However, Easterly and Myers (2019) and Figland et al. (2019) cautioned that many professional development efforts have failed to differentiate activities based on the needs and experiences of teachers across career stages. Therefore, a need existed to understand better how secondary agricultural educators' discourse about their needs regarding teaching and learning converged and diverged across career stages.

Conceptual and Theoretical Framework

Fessler's and Christensen's (1992) teacher career cycle model served as our conceptual lens in the development of this investigation. The model suggested that professional development needs must be understood as an interdependent system that involves a complex interaction between teachers' career stages, personal attributes, and the institutional context (Fessler and Christensen, 1992). In particular, Fessler and Christensen (1992) argued that teachers advance through a series of eight non-linear stages throughout their career: (1) preservice, (2) induction, (3) competency building, (4) enthusiastic and growing, (5) career frustration, (6) career stability, (7) career wind-down, and (8) career exit. Meanwhile, personal dimensions that influence teachers' career stages include variables such as: (a) family support, (b) critical incidents such as marriage, birth of children, or religious experiences, (c) life crises such as illness, death, financial loss, or legal problems (d) teachers' unique traits, aspirations, and values, (e) avocational outlets including hobbies and travel, and (f) life stages (Greiman, Walker, & Birkenholz, 2005). In addition to myriad personal variables, teachers must also navigate distinct institutional contexts (Fessler & Christensen, 1992) in the form of school regulations, administrative management styles, public trust, and societal expectations. In this study, therefore, we used Fessler and Christensen's (1992) model to conceptualize how secondary agricultural educators in Louisiana's needs may be similar as well as distinct across career stages.

In our analysis of such factors, we then employed Dunkin' and Biddle's (1974) model of teaching and learning (see Figure 1) as an a posteriori lens to interpret our emergent findings. The model refined constructs first proposed by Mitzel (1960) to offer four variables that influence teaching and learning: (a) presage, (b) context, (c) process, and (d) product. The first variable, presage, refers to the personal characteristics that influence the teaching and learning process such as certification type, teacher preparation, and other unique individual needs and experiences. Context variables reflect the unique factors and conditions that influence the teaching and learning environment such as educational policy, school climate, and any specialized expectations that affect how teachers approach their career. The third variable, process, is defined as the specific activities that affect achievement such as methods of instruction, classroom management, and student motivation strategies. Dunkin and Biddle (1974) theorized the combination of the aforementioned variables influence the final *product, i.e., student success*. Our lenses, therefore, helped interpret the dimensions of professional development needs for teachers, across career stages, in regard to the factors – presage, context,

and process – that most profoundly influence student success in secondary agricultural education.

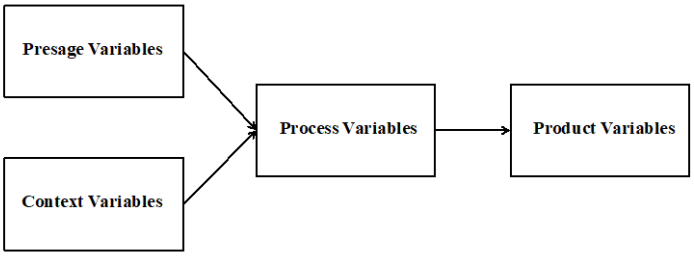

Figure 1. Adapted from Dunkin's and Biddle's (1974) model of teaching and learning.

Statement of Purpose and Research Question

The purpose of this study was to compare and contrast the professional development needs articulated by Louisiana secondary agricultural education teachers across three career stages: (1) early career, (2) mid-career, and (3) career teachers. Because this study was positioned to build the capacity of the agricultural education profession, it addressed the American Association for Agricultural Education's Research Priority Area 3: *Sufficient Scientific and Professional Workforce that Address the Challenges of the 21st Century* (Stripling & Ricketts, 2016). One research question framed the investigation: In what ways did secondary agricultural education teachers experience similar, but diverse professional development needs across career stages?

Reflexivity

In addressing this study's purpose, it is important to reveal how our experiences and biases influenced this investigation. First, we want to acknowledge that each investigator is a former secondary agricultural education teacher. Therefore, our beliefs about teaching and learning and priorities regarding professional development for inservice teachers were distinct biases that although we attempted to minimize, could have impacted the design and interpretation of data. We also believe it is essential to recognize that we have strong professional relationships with many secondary agricultural educators in Louisiana. For example, several of the participants in this study were our former students. We also have close professional bonds with many of the other participants through our previous service and outreach efforts. Although such relationships provided some advantages, such as participant recruitment, they also introduced susceptibilities. In our methodology section, therefore, we explain how we imbued rigor and trustworthiness throughout this investigation to provide quality conclusions.

Methodology

In framing this study, we situated our assumptions and investments through the epistemological position of constructionism (Crotty, 1998). Using this worldview, we pursued our *quintain* (Stake, 2006), or central issue, in regard to how professional development needs could foment, interact, or clash when examined as a social construct. It was through this lens that we also grounded the study, methodologically, in Stake's (2006) multiple case study design. Such an approach is appropriate when attempting to construct an understanding of a phenomenon from

diverse perspectives to obtain a more complete understanding (Stake, 2006). To accomplish this, we collected data from secondary agricultural educators ($N = 66$) in Louisiana to develop a profile of each case. Then, we performed a cross-case analysis to compare and contrast themes and axial codes across cases to better understand their collective dimensions (Stake, 2006).

Description of Cases, Participant Recruitment, and Data Collection

To study teacher professional development needs across career stages, we bounded cases by location and years of teaching experience. For example, all participants were secondary agricultural educators in Louisiana. We also categorized participants into distinct cases based on their years of experience: Case #1 – *Early Career Teachers* – zero to five years of teaching experience; Case #2 – *Mid-Career Teachers* – six to 15 years of teaching experience; and Case #3 – *Career Teachers* –16 or more years of teaching experience. We then purposefully recruited participants who (a) met the bounds of each case, and (b) were attending one of three Louisiana FFA Leadership Camp sessions. Based on Louisiana's Agricultural Education Bulletin all agricultural educators in Louisiana are required to attend one camp session and engage in professional development facilitated by the Louisiana Agricultural Teachers' Association. Therefore, the camp served as an optimal site to facilitate data collection. After Internal Review Board (IRB) approval, we then conducted focus groups, ranging from 65 to 85 minutes in length, for cases at each session of camp, i.e., a total of nine interviews. Of note, three research team members facilitated each of the nine focus group interviews using the same semi-structured interview protocol. We also collected the following forms of data from participants to triangulate findings: (a) demographic questionnaires, (b) quantitative instruments assessing participants' professional development needs on Likert-type scales, and (c) other supporting documents. In total, 11 females and 12 males ($n = 23$) represented the *Early Career Teachers* and had an average of 2.5 years of teaching experience. The *Mid-Career Teachers* were comprised of 26 participants (11 female; 15 male) who reported a mean of 12.3 years of teaching experience. Finally, six females and 11 males ($n = 17$), who had 22.7 years of average teaching experience, represented the *Career Teachers*. We next provide our techniques to analyze data (Stake, 2006).

Data Analysis

After data collection, we transcribed interviews verbatim. Then, data were uploaded to NVivo® qualitative analysis software to facilitate analysis and understand the data's complexities. In particular, our analysis procedures were facilitated using Corbin's and Strauss' (2015) constant comparative method through three phases of coding: (1) open, (2) axial, and (3) selective. For example, in the open coding phase, we labeled data into distinct units using participants' words (Corbin & Strauss, 2015). During this process, we also created memos to capture our thoughts and assertions (Corbin & Strauss, 2015). Thereafter, we engaged in axial coding in which we scrutinized relationships of our open codes through concept mapping, code weaving, and data displays to reduce the data into categories and create evidentiary warrants for each case (Corbin & Strauss, 2015; Saldaña, 2012). Example axial codes from our analysis included: (a) advocating for agricultural education, (b) building a culture for agricultural education, (c) facility restoration and management, (d) industry-based credentials, and (e) teaching diverse students. During this phase, we were also able to explore discrepancies in our data and consider rival explanations. The evidentiary warrants were then mobilized using horizontal analysis techniques to construct

an analytic storyline for each case, i.e., our *case reports* (Stake, 2006). In the third phase of analysis, we employed selective coding to our case reports and axial codes to *think with theory* (Corbin & Strauss, 2015). Through this inductive process, three themes emerged in each case by interpreting our preliminary findings a posteriori through Dunkin's and Biddle's (1974) model of teaching and learning. Then, to describe the dimensions of the professional development needs across career stages, we performed a cross-case analysis of the study's themes and axial codes. Before offering our interpretation of this investigation's findings, however, it is critical to examine how quality was built into each phase of this investigation.

Building Quality into the Study

In this investigation, we used Lincoln and Guba (1985) four standards of trustworthiness to build quality in our design and procedures: (1) credibility, (2) transferability, (3) dependability, and (4) confirmability. The first standard, credibility, refers to whether findings and conclusions ring true within the context in which data were collected and when compared against existing evidence and theory (Lincoln & Guba, 1985). To achieve credibility, we explored uncertainties, provided context-rich descriptions, triangulated findings across sources, and compared our conclusions to relevant research. Transferability, the second standard, indicates the utility of the investigation's findings for other contexts (Lincoln & Guba, 1985). To ensure that our findings were transferable we: (a) accurately described our participants and setting, (b) provided diverse perspectives on the phenomenon, and (c) explained how participants were selected and recruited. The third standard, dependability, refers to whether the investigation was conducted in a consistent way over time (Lincoln & Guba, 1985). As such, we developed a clear statement of purpose, illuminated our role in the study, and maintained a thorough audit trail. The final standard, confirmability, reflects researchers' explicitness about their decisions, biases, and other influences that could have affected the investigation (Lincoln & Guba, 1985). We upheld confirmability by: (a) offering a researcher reflexivity, (b) provided a full description of our procedures, and (c) only provided conclusions that were clearly linked to data (Lincoln & Guba, 1985). Next, we provide a discussion of our emergent themes.

Findings

Through our analysis, three themes emerged in each case: (1) presage variables, (2) context variables, and (3) process variables (Dunkin & Biddle, 1974). The themes represented the various dimensions of professional development that secondary agricultural education teachers expressed they desired to better facilitate student success, i.e., *product variables* (Dunkin & Biddle, 1974). Through case comparison and contrasts, we weaved salient axial codes and the voices of within case participants into a rich description of each theme. At the conclusion of the report, we then provided meta-inferences using cross-case analysis procedures (Stake, 2006).

Case #1: Early Career Teachers

The *Early Careers Teachers* were largely focused on building their competencies (Dunkin & Biddle, 1974) to better prepare them for a career as a secondary agricultural education teacher. For example, because many of the teachers in this career phase came from non-traditional backgrounds, they desired more training in content agriculture and knowledge of pedagogical

strategies to enhance student learning. Next, we offer the dimensions of the *Early Career Teachers'* needs as interpreted through the lens of Dunkin's and Biddle's (1974) model of teaching and learning: (1) presage variables, (2) context variables, and (3) process variables.

Theme #1: Presage Variables

During focus group interviews, the *Early Career Teachers* articulated how their unique backgrounds, i.e., *presage variables*, influenced their professional development needs. For example, ten of the 23 participants interviewed in this case revealed they were alternatively certified. To this point, Participant #1 added, "I'm guessing some of you went through teacher education programs where they taught you how to utilize your student leadership. But I came to teaching ag straight from 20 something years in the air force. So it's been a challenge." Participant #8 also explained that her non-traditional background limited her ability to keep students engaged, "I graduated in animal science. I've relied on PowerPoints and things like that. And kids don't respond as well." Another pattern that emerged from our analysis of *Early Career Teachers'* interviews was that a majority expressed a need for additional content knowledge. Participant #16 explained, "I was raised on a dairy so I had a lot of the animals, had some plants, but the problem [is] like with food safety and agricultural mechanics…I don't have that background." Participant #14 added, "Like for me, I came from a different state. I didn't have my education necessarily from here. I'm learning something completely different and all my kids complain because they hated [my class] because it was so much bookwork." The *Early Career Teachers* also articulated that their backgrounds and training complicated their ability to navigate work-life balance. Participant #2 explained, "my husband and I have just had to stop talking about work. I guess I just don't know what's best." Participant #9 added, "in my education classes, we just never really talked about how to turn it off [being a teacher] after the bell rings."

Theme #2: Contextual Variables

The *Early Career Teachers* also described how unique *contextual influences* affected their ability to fulfill aspects of their career. A salient axial code from our analysis, for example, were needs regarding how-to fulfill community and administration expectations while also building a culture supportive of agricultural education. Participant #15 explained, "I need help communicating with my community and administration, I can't get [everyone] on the same page." As a result of such challenges, 16 *Early Career Teachers* voiced the need for additional "networking" or "mentorship" opportunities in the future. The early career teachers also spoke to how their school districts served students with diverse needs. Therefore, they needed more guidance on how to support such students. Participant #19 explained, "I have lots of kids with different needs." And, Participant #23 added, "I had one kid that could not talk. I wanted to help him all I could, but it just made things so difficult. That's the hardest thing." Another contextual factor that affected the *Early Career Teachers* interviewed was the importance placed on Industry-based Credentials (IBCs) in their school districts. Participant #19 explained, "I did not realize how big of a deal IBCs were, so, I really need some help understanding how to certify my students in different areas." Finally, several of the Early Career Teachers also described the need to learn how to "restore" (Participant's #2, #9, #13, #16, & #20) and "manage" (Participant's #4, #6, #7, #13, & #21) their facilities and laboratories because of a lack of resources in their school systems.

Theme #3: Process Variables

The final theme, *process variables*, that emerged for the *Early Career Teachers* case reflected their need for professional development to ensure student success (Dunkin & Biddle, 1974). For example, participants, in this case, expressed an interest in learning more pedagogical skills that would allow them to "keep students engaged" (Participant #8). To accomplish this, they also emphasized the need for more "behavior management techniques" (Participant #2, #6, #7, #9, #10, #11, #17, & #22), strategies for "motivating students" (Participant #1, #3, #5, #7, #15, #16, & #20), and facilitating "Supervised Agricultural Experiences (SAEs)" (Participant #1, #2, #4, #7, #13, #15, #16, & #20). Further, 14 of the participants expressed the desire for more professional development in regard to FFA competitions and award applications.

Case #2: Mid-Career Teachers

The *Mid-Career Teachers* appeared more confident in their abilities (Fessler & Christensen, 1992). However, they also expressed frustrations in the career. Therefore, they desired professional development to gain more stability and proficiency in performing their job duties. We next offer an interpretation of the *Mid-Career Teachers'* professional development needs through the lens of Dunkin's and Biddle's (1974) model of teaching and learning.

Theme 1: Presage Variables

The Mid-Career Teachers expressed more stability and were eager to acquire knowledge to support their students. However, their life situations, i.e., *presage variables*, appeared to influence particular aspects of their work. For example, 18 of the *Mid-Career Teachers* spoke about their struggle to maintain "work-life balance." As an illustration, Participant #27 explained: "I get frustrated because I'm in a one teacher department and it's a large school. How am I supposed to take care of everything and still have time for family?" This issue of work-life balance also appeared to influence other aspects of *Mid-Career Teachers'* family life negatively. According to Participant #40: "You start looking at ag teachers as a whole and I'm willing to bet in most schools you start seeing a lot of teachers that are becoming single. Apparently, it's a trend." As a result, the *Mid-Career Teachers* desired more professional development in this area. However, they also voiced a need to learn more strategies to overcome personal struggles such as coping with "stress" (Participant's #26, #27, #32, #36, #39, #41, & #49).

Theme 2: Context Variables

The second theme, *context variables*, illuminated the situational elements in which *Mid-Career Teachers* desired to develop more professionally. For example, a hurdle faced by nearly all of *Mid-Career Teachers* was their school district's emphasis on IBCs. As Participant #49 claimed: "The problem [at my school] is all they care about is that students get a credential at the end. Our guidance counselors, they just want to find the quickest way to get a kid graduated and out of here." Because of increasingly complex contextual factors, the *Mid-Career Teachers* also saw value in professional development that focused on "teaching diverse students" (Participant #24, #27, #31, #34, #37, & #46), "advocating for agricultural education" (Participant #32, #35, & #38), securing additional "funding support" (Participant's #33, #39, #42, & #47) and "grant

writing" (Participant #24, #26, & #29). Also, because of the lack of resources in most school districts, the *Mid-Career Teachers* desired more professional development about facility restoration and management. For example, Participant #50 revealed, "We just do not have a lot of money in my [school], our facilities are run down and getting old. So, maybe just some ideas and strategies to help keep them up would help me."

Theme 3: Process Variables

The final theme for the *Mid-Career Teachers*, process variables, represented their professional development needs concerning facilitating student success. For example, the *Mid-Career Teachers* voiced a need for more opportunities to acquire knowledge and skills in regard to using "educational technology" (Participant's #29, #37, #38, #40, & #44) and improving "student motivation" (Participant's #25, #29, #28, #37, & #41). As Participant #29 explained, "we have access to a lot of technology. I just do not know how to use it." In addition to technology, 16 of the participants spoke about the need for advanced training to facilitate "SAE projects" as well and "FFA competitions and applications."

Case #3: Career Teachers

Overall, the *Career Teachers* articulated they were *winding down* in their career and beginning to make plans for retirement (Fessler & Christensen, 1992). Throughout their career, they explained how they had witnessed an evolution concerning the priorities of education as well as the types of students in their programs. They also voiced a desire for more opportunities to promote camaraderie, networking, and fellowship to improve the culture of secondary agricultural education. As a result, their professional development needs were unique when interpreted through Dunkin's and Biddle's (1974) model of teaching and learning.

Theme 1: Presage Variables

During interviews, the *Career Teachers'* provided anecdotes of how they overcame many challenges throughout their work lives. However, they were also experiencing new personal challenges, i.e., *presage variables*, that affected how they approached work. For example, several of the *Career Teachers* mentioned how their health and other *personal struggles* affected the way they approached their career. As a consequence, Participant #65 suggested the need for professional development on maintaining a "healthy lifestyle." However, the *Career Teachers* also spoke about more support on how-to balance "family and relationships" (Participant #46, #48, #51, #54, #55, #61, #64, & #65) while maintaining a successful program.

Theme 2: Contextual Variables

A prominent concept that emerged in our analysis of *Career Teachers* was their struggle to cope with shifting *contextual* forces that influenced their work. In response, nearly all of the *Career Teachers* called for more professional developments opportunities to build relationships and network so that secondary agriculture teachers in Louisiana could traverse such issues as a united front. The *Career Teachers* also articulated problems facilitating quality instruction for the diverse needs of their students. Participant #62 explained, "there have been a lot of societal

changes, which means there is a big difference in the kids that we're getting in today. It's been a struggle. They need this and that, I just have trouble keeping up." Another contextual shift the *Career Teachers* mentioned they had witnessed was the emphasis on "industry-based credentials." As a result, 16 of the *Career Teachers* wanted more programming on strategies to certify students in various IBCs in the future. After witnessing multiple economic downturns and budget cuts during their tenure, the *Career Teachers* also noted they required more training on how to effectively "advocate for agricultural education" to decision-makers (Participant's #45, #46, #59, #60, & #61). They also saw value in learning more ways to acquire "grants" and other "financial support" (Participant #41, #49, #52, & #58).

Theme 3: Process Variables

The last theme, *process variables*, reflected the procedural aspects that *Career Teachers* perceived restricted them in achieving student success. As an illustration, one of the greatest frustrations expressed by *Career Teachers* was their lack of knowledge concerning technology. Participant #59 explained, "I think we need to have [professional development] on the electronics and how to use them. The SmartBoards and online learning… it is intimidating, especially for someone who's been around before computers were in the classroom." In addition, the Career Teachers also noted they struggled with how to motivate today's students. Participant #65 revealed, "for me the last 15 years, student motivation has been on the decline as far as students wanting to do things, and be involved. I need some help on understanding what makes them tick." Finally, nearly all *Career Teachers* interviewed maintained they needed more assistance learning how to "engage students" and facilitate "SAEs."

Conclusions

The purpose of this study was to compare and contrast the professional development needs voiced by Louisiana secondary agricultural education teachers across three career stages: (1) early career, (2) mid-career, and (3) career teachers. As a result, findings from this investigation suggested that secondary agricultural education teachers' professional development needs in Louisiana were *nuanced* and *varied*. For example, when interpreted through Dunkin's and Biddle's (1974) model of teaching and learning, presage, context, and process variables emerged in each career stage. However, the dimensions of each variable were diverse.

In particular, the *Early Career Teachers*' non-traditional background often limited their exposure to opportunities available through agricultural education; therefore, they desired more knowledge and skills in technical agricultural concepts. Meanwhile, *Mid-Career Teachers* were more stable and confident in their roles as secondary agricultural education teachers; nevertheless, they were frustrated because of various contextual forces that complicated their job duties. The final case, *Career Teachers*, were experiencing career wind-down and, therefore, reflected on the many changes they had witnessed to agricultural education. As a consequence, they had unique professional development needs to help them cope better with personal, contextual, and process changes that were affecting their career. As a consequence, findings from this investigation not only align with the literature on professional development, but also add new developments regarding the relevance of understanding teachers' needs across career stages to ensure student success in agricultural education (Dunkin & Biddle, 1974; Fessler & Christensen, 1992).

For example, our cross-case analysis (Stake, 2006) of this investigation's themes and axial codes revealed key converges and divergences. Such differences helped define and describe the professional development needs through and between cases. However, it is essential to recognize that across cases, four axial codes regarding professional development needs were constant: (1) industry-based credentials, (2) teaching diverse students, (3) SAEs, and (4) student motivation strategies. Such factors have been previously identified by research in the agricultural education literature (Figland et al., 2019; Layfield & Dobbins, 2002; Washburn et al., 2001).

However, data from this study provided new insights into ways that work-life balance and personal struggles may manifest in the various career stages of secondary agricultural educators. Further, our findings also illuminated how career experience may uniquely frame the ways in which secondary agricultural education teachers interpret and react to various contextual forces – such as resources, support, expectations, and changing student profiles – and as a result require additional support in understanding how to navigate such changes. Finally, key differences regarding process needs (Dunkin & Biddle, 1974) speak to the need for differentiated professional development in each programmatic dimension of agricultural education's comprehensive three-circle model: (a) classroom and laboratory, (b) FFA, and (c) SAE, a finding supported by previous literature (Easterly & Myers, 2019; Figland et al., 2019). Table 1 provides an overview of the cross-case comparison of the study's themes and axial codes.

Table 1
Cross-Case Comparison of Professional Development Needs by Themes and Axial Codes

Themes and Axial Codes	Early Career Teachers	Mid-Career Teachers	Career Teachers
Presage Variables			
Content knowledge	✔	✖	✖
Expectations for alternatively certified teachers	✔	✖	✖
Personal struggles	✖	✔.	✔.
Work-life balance	✔	✔.	✖
Contextual Variables			
Advocating for agricultural education	✖	✔	✔
Building a culture for agricultural education	✔	✖	✖
Community and administration expectations	✔	✖	✖
Facility restoration and management	✔	✔	✖

Themes and Axial Codes	Early Career Teachers	Mid-Career Teachers	Career Teachers
Grants and financial support	✖	✔	✔
Industry-based Credentials	✔	✔	✔
Networking	✔	✖	✔
Teaching diverse students	✔	✔	✔
Process Variables			
Behavior management	✔	✖	✖
Facilitating SAEs	✔	✔	✔
FFA competitions and applications	✔	✔	✖
Pedagogy	✔	✔	✖
Student motivation	✔	✔	✔
Technology	✖	✔	✔

Note. Not present = ✖; Present = ✔.

Recommendations, Implications, and Discussion

In this investigation, we provided an amplified view of the professional development needs of secondary agricultural education teachers in Louisiana across career stages. As a consequence, our findings appear to illuminate new implications for future research, theory, and practice. We recommend, therefore, that the results from this study be shared with Louisiana Agriculture Teachers' Association. By providing insight into teachers' discourse, perhaps professional development opportunities can be tailored to target their needs better as they transition into various phases of their career (Easterly & Myers, 2019; Figland et al., 2019). And, because teachers were provided opportunities to voice their concerns if state leaders respond by delivering their desired programming needs, perhaps greater teacher buy-in can be achieved (Fessler & Christensen, 1992; Knowles, 1980). In agricultural education, Greiman (2010) described professional development as a *one size fits all* approach. In accord, the findings of this investigation illuminated some areas of commonality in regard to secondary agricultural education teachers' professional development needs. For instance, professional development on industry-based credentials, teaching diverse students, SAEs, and student motivation strategies would be appropriate programming for secondary agriculture education teachers in all career phases in Louisiana. We recommend that such professional development sessions be featured at the annual meeting of the Louisiana Agriculture Teachers' Association in the future.

However, our findings all provided evidence that the *one size fits all* approach (Greiman, 2010) will not work in all areas of professional development. For instance, *Early Career Teachers* warrant additional support in content knowledge, understanding expectations for alternatively certified teachers, building a culture for agricultural education, meeting community and administration expectations, pedagogy, behavior management, among others factors. Therefore, we recommend that an *Early Career Teacher* induction series be created in Louisiana by which

novice teachers engage in regular professional development to better support their growth and development. Meanwhile, *Mid-Career Teachers* and *Career Teachers* voiced they would prefer additional support regarding how-to navigate personal issues and work-life balance as well as contextual influences and technology (Layfield & Dobbins, 2002; Washburn et al., 2001). To accomplish this, perhaps state leaders could embed opportunities to address these topics during statewide events such as Louisiana FFA Convention or FFA Leadership Camp.

Although we recognize that the professional development needs of secondary agricultural education teacher vary from state to state, this study's findings point to additional areas for future research. As an illustration, the emergence of the need for advocacy training, teaching diverse students, and support in grant seeking could serve a basis for professional development exploration for *Mid-Career* and *Career Teachers* in other regions of the United States. Further, although previous research has reported that differences exist between traditional and alternatively certified teachers (Roberts & Dyer, 2004; Swafford & Friedel, 2010), our findings provided voice to how such differences may stimulate unique frustrations and result in alternatively certified teachers leaving the profession more frequently than their traditionally certified peers. And finally, because Dunkin's and Biddle's (1974) model for teaching and learning served as a productive lens in this study, we recommend that future theory-building efforts be dedicated to distilling the dimensions of professional development needs for secondary agricultural education teachers across the U.S. regarding the factors – presage, context, and process – that most profoundly influence student success in secondary agricultural education.

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SBAE Student Teachers' Sense of Importance and Competence per Selected National Quality Program Standard Indicators: A Then-Now Borich Needs Assessment

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Abstract

The student teaching internship is a valuable time of professional growth for school-based agricultural education (SBAE) preservice teachers. Still, new teachers require more professional development than any other career phase. The National Quality Program Standards (NQPS) developed by The National Council for Agricultural Education provides a reliable and valid measuring stick to assess the professional development needs of newly qualified SBAE teachers. This study utilized a modified NQPS Borich needs assessment with a then-now design to analyze professional growth and continuing professional development needs of a student teacher cohort in the Agricultural Education Department at Oklahoma State University. The 13 participants showed positive change in both competency and perceived importance in all selected quality indicators. The ability to utilize equipment, tools, and technology for effective instruction was found to be the most impactful gain in competency and perceived importance. The greatest reported professional development needs included the evaluation and documentation of student Supervised Agricultural Experience (SAE) projects. Recommendations for teacher preparation courses and professional development as well as the greater utilization of NQPS is further discussed.

Introduction and Review of Literature

During the student teaching internship, preservice teachers begin the transition from student to professional teacher (Sorensen, Lawver, Hopkins, Jensen, Dutton, & Warnick, 2018). This internship has the potential to be the most impactful professional development experience for a novice school-based agricultural education (SBAE) teacher (McKim & Velez, 2017). It is a time for great change in teacher self-efficacy (McKim & Velez, 2017). Experience in instructional planning and presentation, teacher self-reflection, classroom management, and a variety of other professional development areas are reported by student teaching cohorts (Bartolome, 2017). This educational practice has the potential to shift instructional approaches and preferred teaching methods of preservice teachers (Smith & Rayfield, 2017).

Despite the immersive nature of student teaching, early career SBAE teachers require additional professional development reflective of the complete agricultural education model (Joerger, 2002; McKim & Velez, 2017). Induction-year teachers "are expected to perform the same jobs at the same level as veteran teachers" (Moore & Swan, 2008, p. 60). Therefore, these neophyte teachers enter the profession with the most pronounced professional development needs of any other teacher career stage (Katz, 1972). Sorensen, Lambert, and McKim (2014) identified professional development needs representing instruction, Supervised Agricultural Experience (SAE), and SBAE program management among the top needs for novice SBAE teachers. Another study of Iowa SBAE teachers found deficiencies in instruction, classroom management,

and content knowledge that required professional development (Smalley, Hainline, & Sands, 2019).

According to Garton and Chung (1996), the needs of the intended audience should guide professional development. The Borich needs assessment model is designed to "(rank) in order of priority so that responses are linked to a practical decision framework for program improvement" (Borich, 1980, p. 39). This method considers discrepancies between perceived importance of and competence in selected criteria to identify needs and inform professional development delivery (Borich, 1980). Studies by Garton and Chung (1996), Hendon, Hainline, Burris, Ulmer, and Ritz (2019), Joerger (2002), Smalley et al. (2019), Sorensen, Tarpley, and Warnick (2010), Saucier, Vincent, and Anderson (2014), and Sorensen et al. (2014) are a few among the *Journal of Agricultural Education* that have utilized the Borich needs assessment to identify professional development needs of SBAE teachers.

Research has identified important competencies for novice SBAE teachers (Hainline & Wells, 2019; Roberts & Dyer, 2004; Rubenstein, Thoron, & Estepp, 2014; Stripling & Barrick, 2013). However, much of this research has been completed with a regional focus (DiBenedetto, Willis, & Barrick, 2018). With the variety of teacher certification standards (Greenblatt, 2016) and diverse SBAE teacher induction program (Moore & Swan, 2008) across state lines, a difficulty lies in designing and implementing an instrument to measure professional development needs of induction year teachers (DiBenedetto et al., 2018).

The National Quality Program Standards (NQPS) is an evaluation tool for SBAE teachers, stakeholders, administrators, and other interested parties to evaluate the complete SBAE program (The National Council for Agricultural Education, 2016). First developed in 2009, NQPS is intended for "local teacher(s) in cooperation with administrators, community partners, advisory committees, FFA support groups, and/or an external assessment team" to "analyze their program and develop clear goals and objectives for program growth" (The National Council for Agricultural Education, 2016, p. 3). The ten standards include (1) curriculum and program design, (2) instruction, (3) facilities and equipment, (4) assessment, (5) SAE, (6) FFA, (7) school and community partnerships, (8) marketing, (9) professional growth, and (10) program planning. Each standard contains a number of quality indicators. The assessor ranks each quality indicator on a scale from one to five. A score of three or above indicates the teacher or program has met the standard while a score of one or two fails to meet the expectation. The document also contains a list of suggested evidence for each quality indicator and suggestions for improving deficit quality indicators (The National Council for Agricultural Education, 2016). Quality standard assessments like the NQPS provide a valuable assessment of professional needs (Smith & Smalley, 2018; Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009).

Problem Statement

This study addresses the American Association for Agricultural Education National Research Agenda's third research priority identified to provide sufficient scientific and professional workforce that addresses the challenges of the 21st century (Roberts, Harder, & Brashears, 2016). In order to provide the most efficient professional development for teachers, their needs and competencies must be assessed (Garton & Chung, 1996). The results of this study will inform

Oklahoma SBAE teacher educators and agricultural education staff to provide impactful professional development and inform teacher preparation practices. Peer institutions may be able to replicate the study methods within their own contexts.

Conceptual Framework

Katz's (1972) developmental stages of preschool teachers served as the conceptual framework for the study. Katz (1972) identifies four stages, (1) survival, (2) consolidation, (3) renewal, and (4) maturity, to roughly represent the first five years of a teacher's career (see Figure 1). The survival stage begins in the last phases of a preservice teacher's preparation, as the reality of their blossoming career takes focus. This phase typically lasts throughout the induction-year. During this phase, the novice teacher is focused on the present day and task at hand (Katz, 1972). Reality versus expectations can be sources of great stress in this stage (Shayshon & Popper-Giveon, 2017). Katz (1972) identified needs for each developmental stage. During the survival stage, novice teachers need "instruction in specific skills and insight" (Katz, 1972, p. 4). This instruction should occur in the local school district as well as with fellow colleagues in the survival phase. Mentoring is also an important support system in this phase (Katz, 1972). The individual needs of teachers in the survival stage should be identified and these individuals offered interventions by mentors, administrators, and teacher educators (Katz, 1972).

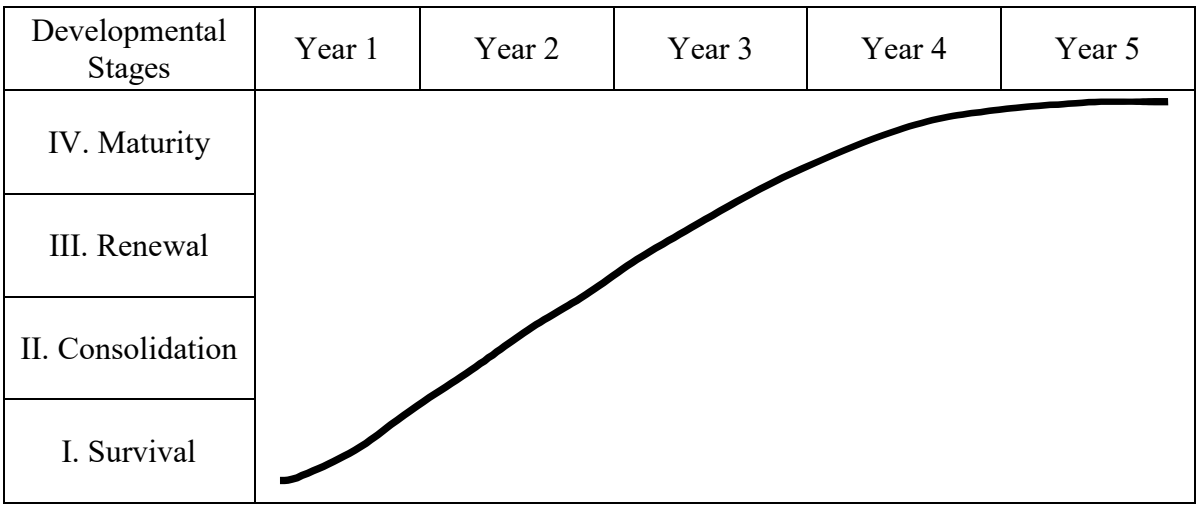

Figure 1. Typical novice teacher trajectory through Katz's (1972) stages of development in novice teachers

Purpose and Objectives

The purpose of this study was to assess Oklahoma State University SBAE preservice teachers' competence in selected NQPS standards as a result of the student teaching experience. The following objectives guided the study.

1. Assess professional development growth of selected NQPS indicators during the student teaching internship.

2. Identify continual professional development needs in selected NQPS indicators.

Methodology

The target population of this study was the 2019 spring SBAE student teaching cohort from Oklahoma State University. These 16 individuals had completed the necessary requirements for the student teaching internship set by the Oklahoma State University College of Education and the Agricultural Education Department. The 12 females and four males spent 15 weeks with their cooperating SBAE teacher. All but one preservice student teacher completed their internship in Oklahoma.

Two common assessment procedures were combined in this study to produce a unique methodology. A Borich needs assessment was presented in a then-now design to assess preservice teachers' sense of importance and competence in selected NQPS quality indicators both before and after the student teaching internship.

A then-now design is intended to measure program impact (Rockwell & Kohn, 1989). Participants are assessed at the completion of the program and asked to reflect on their status before (then) and after (now) (Colosi & Dunifon, 2006). In many programs where participants are largely unfamiliar with the activities of the program, a then-now approach is more informative about program impact than a pre-post design (Rockwell & Kohn, 1989). The additional self-insight that is gained through the experiences of the student teaching internship may produce more reliable self-report data (John & Robins, 1994).

A Borich needs assessment analyzes participant responses in a way that allows researchers and professional development providers to rank instrument items by need, thus providing a priority list for professional development interventions (Borich, 1980). As previously stated, this is a popular method for identifying professional development needs.

The National Council for Agricultural Education's (2016) NQPS was narrowed from ten standards to six. These standards were chosen to represent the three-circle model of agricultural education; that is, classroom and laboratory instruction, experiential learning opportunities through SAE, and participation in student leadership within the National FFA Organization. These six areas represented curriculum and program design, instruction, facilities and equipment, assessment, SAE, and FFA. The reduction and selection of NQPS standards was purposeful to assess the SBAE teacher, not the overall local SBAE program. Quality indicators representing the six standards were chosen by an expert panel of SBAE teachers. Three past SBAE teachers who are currently employed by Oklahoma State University's Agricultural Education Department served on the panel. Combined, these experts boasted 22.5 years of SBAE teaching experience. Experts individually chose the top indicators they believed most important for Oklahoma induction-year SBAE teachers included in the six NQPS standards. Their individual choices were tallied to select included quality indicators. The reduction of quality indicators per standard helped to prevent survey fatigue and focused the study. See Table 1 for a complete list of all NQPS standards and quality indicators included in the instrument.

For each quality indicator, participants were asked to reflect on their perceived importance and competence both before and after their student teaching internship. Each item was ranked on a five-point summated scale with higher numbers indicating a greater sense of importance or

competence (see Figure 2). Four agricultural education faculty members provided content and face validity analysis of the instrument. With 12 demographic items, the instrument contained a total of 25 items. The instrument, along with all study procedures, was approved by the Oklahoma State University Institutional Review Board.

Table 1
NQPS Standards and Quality Indicators Included in This Study

Standard	Quality Indicators
Program Design and Instruction: Curriculum & Program Design	Courses offered reflect needs of the community. Courses offered contain a balance of all three components of the model.
Program Design and Instruction: Instruction	Classroom instruction incorporates SAE and FFA components. Learning environments are supportive and safe for all students.
Program Design and Instruction: Facilities & Equipment	Facilities are in compliance with safety and health standards. Equipment, tools, and technology are effectively used for instruction.
Program Design and Instruction: Assessment	Student growth in SAE project(s) is continually evaluated. Grading incorporates all three components of the model.
Experiential, Project, and Work-Based Learning Through SAE	All students maintain an SAE. Students maintain accurate SAE documentation. Teacher provides supervision and guidance for each SAE.
Leadership and Personal Development Through FFA	All students participant in leadership and personal development. The FFA chapter conducts regularly scheduled meetings.

The instrument was piloted to students in an agricultural education teaching methods course. Nine preservice SBAE teachers who had recently completed a pre-clinical teaching experience were given the instrument in its entirety and allowed to provide feedback as to the readability of the instrument. Minor changes to one demographic question was made after this round.

The instrument was administered during a debriefing session of the 15-week student teaching internship to Oklahoma State University SBAE student teachers. The lead researcher presented the opportunity to participate. Sixteen student teachers were provided a link to the Qualtrics hosted instrument. By the end of the session, 13 usable responses were collected, resulting in a response rate of 81.25%.

Classroom and laboratory instruction integrate SAE and FFA components.

	Low				High
Before my student teaching experience, my perceived importance was...	○	○	○	○	○
Before my student teaching experience, my perceived competency was...	○	○	○	○	○
After my student teaching experience, my perceived importance is...	○	○	○	○	○
After my student teaching experience, my perceived competency is...	○	○	○	○	○

Figure 2. Sample item from study instrument

Descriptive statistics were utilized to analyze the data (Garton & Chung, 1996). The means of before importance (BI), before competency (BC), after importance (AI), and after competency (AC) were calculated and compared. To address objective one, discrepancy scores (DS) for each participant were analyzed by subtracting AC from BC. Then weighted discrepancy scores (WDS) were calculated by multiplying the individual discrepancy score (DS_i) by the average BC score. Importance differences were calculated similarly with AI and BI. Greater mean weighted discrepancy score (MWDS) indicates a larger reported gain in the quality indicator over the student teaching internship. Objective two followed similar computations but replaced BC with AI. A higher positive mean weighted discrepancy score (MWDS) indicates a greater need for professional development in that quality indicator (Borich, 1980). According to Garton and Chung (1996), a MWDS of 2 or greater indicates a need for professional development.

Equations for objective one:

$$DS_i = AC - BC$$
$$WDS_i = DS_i\left(\frac{\sum_i BC}{n}\right)$$

$$\mathrm{DS}_i = AI - BI$$
$$WDS_i = DS_i\left(\frac{\sum_i BI}{n}\right)$$

Equations for objective two:

$$DS_i = AC - AI$$
$$WDS_i = DS_i\left(\frac{\sum_i AI}{n}\right)$$

A Cronbach's *a* for competence mean weighted discrepancy scores (CMWDS), importance mean weighted discrepancy scores (IMWDS), and after student teaching mean weighted discrepancy scores (AMWDS) was calculated using IBM's SPSS Statistics Version 23 software (Warmbrod, 2014). Each summated subscale score reported an acceptable reliability with a Cronbach's *a* score for CMWDS of 0.88, IMWDS of 0.81, and AMWDS of 0.86 (Robinson, Shaver, & Wrightsman, 1991).

Findings

Nine participants (69.23%) were female. On average, participants were 21.77 years old with a reported grade point average of 3.38. All had at least four years of participation in agricultural education as a secondary student with experiences in each component of the three-circle model of agricultural education. Nine participants graduated high school within Oklahoma while four were out of state students. Twelve students were undergraduates with one fulfilling the requirements for master's degree in agricultural education. Eleven participants planned to teach SBAE, six of whom had accepted SBAE teaching positions at the time of data collection. The remaining two participants indicated they had alternative career plans in the agricultural industry.

Findings from this then-now Borich needs assessment both analyzed professional development gains during the student teaching experience and identified continuing professional development needs as these newly certified SBAE teachers enter the profession. Overall, this experience provided meaningful professional development for the cohort of SBAE student teachers. During the student teaching internship, participants reported spending the most time advising FFA chapters, followed closely by instructional activities, with SAE supervision consuming 33.54% of their time. The cohort recorded a total of 239 professional development hours during the student teaching internship with FFA consuming the largest proportion of those hours.

Objective One

Objective one described the change in perceived importance and competency in selected NQPS over the student teaching internship for the Oklahoma State University SBAE Spring 2018 student teaching cohort. Participants reported positive MWDS for perceived importance and competence at the conclusion of their student teaching experience for each of the 13 NQPS indicators, indicating a beneficial professional development experience. Table 2 displays the competency gains by comparing perceived competency before and after the student teaching internship. Ten of the 13 quality indicators received a MWDS score above two, indicating a high rating of professional growth (Garton & Chung, 1996).

Perceived importance also showed gains for each quality indicators. Table 3 shows the MWDS of before and after student teaching perceived importance scores. The top six ranked quality indicators display a MWDS of two or higher.

Table 2
Competency Gains After Student Teaching: Mean Weighted Discrepancy Scores

Rank	Quality Indicator	CMWDS
1	Equipment, tools, and technology are effectively used for instruction.	3.34

2	Courses offered reflect needs of the community.	3.08
3	Classroom instruction incorporates SAE and FFA components.	2.93
4	Learning environments are supportive and safe for all students.	2.90
5	Grading incorporates all three components of the model.	2.77
6	Students maintain accurate SAE documentation.	2.61
7	All students maintain an SAE.	2.42
8	Student growth in SAE project(s) is continually evaluated.	2.19
9	Teacher provides supervision and guidance for each SAE.	2.08
10	All students participant in leadership and personal development.	2.04
11	Facilities are in compliance with safety and health standards.	1.78
12	Courses offered contain a balance of all three components of the model.	1.42
13	The FFA chapter conducts regularly scheduled meetings.	0.84

Table 3
Perceived Importance Gains After Student Teaching: Mean Weighted Discrepancy Scores

Rank	Quality Indicator	IMWDS
1	Equipment, tools, and technology are effectively used for instruction.	3.14
2	Student growth in SAE project(s) is continually evaluated.	2.66
3	Classroom instruction incorporates SAE and FFA components.	2.61
4	Students maintain accurate SAE documentation.	2.55
5	Courses offered reflect needs of the community.	2.51
6	Grading incorporates all three components of the model.	2.18
7	All students maintain an SAE.	1.99
8	Learning environments are supportive and safe for all students.	1.95
9	Courses offered contain a balance of all three components of the model.	1.48
10	The FFA chapter conducts regularly scheduled meetings.	1.48
11	Facilities are in compliance with safety and health standards.	1.33
12	Teacher provides supervision and guidance for each SAE.	1.21
13	All students participant in leadership and personal development.	0.75

Objective Two

Objective two sought to identify the perceived continuing professional development needs of the Spring 2108 cohort of Oklahoma State University SBAE student teachers. *Student growth in SAE project(s) is continually evaluated* and *Students maintain accurate SAE documentation* were ranked as the highest needs after student teaching. Only these quality indicators reported a perceived professional development need greater than 2 AMWDS, as indicated in Table 4. Additional perceived needs for professional development focused on student engagement in SAE, facilities and equipment, and FFA meetings. Other quality indicators reported minimal need for professional development.

Table 4
Continuing Professional Development Needs: Mean Weighted Discrepancy Scores

Rank	Quality Indicator	AMWDS
1	Student growth in SAE project(s) is continually evaluated.	2.60
2	Students maintain accurate SAE documentation.	2.02

3	The FFA chapter conducts regularly scheduled meetings.	1.63
4	Equipment, tools, and technology are effectively used for instruction.	1.49
5	Facilities are in compliance with safety and health standards.	1.42
6	All students maintain an SAE.	1.30
7	Courses offered reflect needs of the community.	0.99
8	Teacher provides supervision and guidance for each SAE.	0.98
9	Grading incorporates all three components of the model.	0.96
10	Learning environments are supportive and safe for all students.	0.72
11	Classroom instruction incorporates SAE and FFA components.	0.67
12	Courses offered contain a balance of all three components of the model.	0.65
13	All students participant in leadership and personal development.	0.39

Conclusions and Recommendations

The 2018 Spring SBAE student teaching cohort from Oklahoma State University appear to be representative of the nationwide license-eligible program completers (Smith, Lawver, & Foster, 2019). A large percentage, 84.62% indicate they planned to teach SBAE. Though a small sample size, this percentage is comparable to the 2018 national conversion rate (76.17%) of newly certified SBAE teachers employed in the profession (Smith et al., 2019). This cohort's 69.23% female composition is also similar to the 65.20% national supply of agricultural education teacher preparation program completers (Smith et al., 2019). The demographics of this population is indicative of typical recent college graduates in Katz's (1972) survival stage.

Objective One

This data sheds light on the perceived professional growth gained during student teaching and the continuing professional development needed for this student teaching cohort. Perhaps not surprising, student teachers reported the greatest gains in competency of quality indicators directly related to instruction. Bartolome (2017), Sorensen et al. (2018), and Smith and Rayfield (2017) also found improvement in instruction abilities over the student teaching experience. SAE documentation, evaluation, and supervision were the next greatest area of perceived growth in competency. These preservice teachers felt they did not gain as much competency in *Facilities are in compliance with safety and health standards* or *Courses offered contain a balance of all three components of the model* (see Table 2). Cooperating teachers may be encouraged to offer explicit instruction and reflection in these areas. Teacher educators could include these topics during weekly student teacher check-ins as well as supervisor visits held throughout the semester.

Perceived importance MWDS showed less gains in comparison to competency MWDS. However, Table 3's top six quality indicators, those scoring two or higher MWDS, reflected instruction, FFA, and SAE. This finding indicates a well-rounded student teaching experience. These six quality indicators also resulted in competency MWDS gains or two or greater. It is important to note Table 3 is not a ranking of the importance of quality indicators, but rather the change in perceived importance over the student teaching internship.

Interestingly, *Equipment, tools, and technology are effectively used for instruction* was the highest ranking MWDS for both competency and importance gains. During the student teaching internship, participants have daily utilized classroom technology in addition to equipment and tools common to agricultural education learning laboratories, such as the agricultural mechanics shop and greenhouse. The immersive experience with peer feedback from cooperating teachers likely increases teacher self-efficacy in using equipment, tools, and technology for instruction (Bandura, 1993). Additional research would be necessary to explain the experiences of student teachers as they build competency in this and other quality indicators.

The FFA quality indicators, *All student participate in leadership and personal development* and *The FFA chapter conducts regularly scheduled meetings*, both sorted to the lower third of Tables 2 and 3. After returning to the data, it was deemed these students held FFA quality indicators as both highly important and felt highly competent in these areas before their student teaching experience, leaving little room for improvement during the student teaching internship. All participants reported at least four years of experience in SBAE and a very active involvement in FFA chapters as a high school student. Additional research would answer why these student teachers chose to rank FFA quality indicators highly in both importance and personal competency. Does this sense of competency and importance stem from their personal experiences?

Objective Two

These neophyte teachers require additional professional development (see Table 4). The greatest perceived needs are related to student SAE assessment and documentation. The total of 82 hours dedicated to SAE related professional development reported by the SBAE student teaching cohort was not sufficient to meet their needs. SAEs seem to be a common topic of professional development needs (Garton & Chung, 1996; Hendon et al., 2019; Joerger, 2002; Rubenstein et al., 2014; Sorensen et al., 2010; & Sorensen et al., 2014).

The SAE experiences during their student teaching experience may have highlighted perceived deficiencies in these quality indicators. By observing others who are proficient in these arenas, such as their cooperating teacher and other inservice SBAE instructors, preservice teachers may have developed a lack of self-efficacy regarding SAE supervision activities including evaluation and documentation (Bandura, 1977). From the immersive experience of the student teaching internship (McKim & Velez, 2017), participants have developed a felt need towards the proper supervision of student SAE projects. These felt needs are likely to translate to help seeking behaviors such as professional development and mentoring participation (Wade, 1989).

It is recommended Oklahoma induction-year SBAE teachers be offered professional development in these SAE assessment and documentation. Perhaps a standardized grading rubric would assist novice teachers in grading student SAEs. The SAE for All curriculum may provide helpful tools for induction year teachers to assess and document student SAEs. Trainings from the state SBAE staff in the Agricultural Education Tracker (AET) system, Oklahoma's SAE recordkeeping platform, appear to be necessary for beginning teachers. In addition, the Oklahoma State University SBAE teacher preparation program should incorporate more SAE instruction into preservice teacher coursework by utilizing inservice SBAE teachers who are

proficient in SAE assessment and documentation as guest speakers on these topics. Providing this necessary support for novice SBAE teachers will assist early professionals through developmental phases (Katz, 1972).

No identifiable pattern emerged from the rankings of individual NQPS quality indicators nor their MWDS across gains in competency, perceived importance, or professional development needs. A high rate of variance occurred across Tables 2, 3, and 4 in the rankings of quality indicators by MWDS. The redundancy in some quality indicators, such as *Classroom instruction incorporates SAE and FFA components* and *Courses offered contain a balance of all three components of the model*, may attest to this fluency of quality indicator rankings. The instrument may be further developed by reducing the amount of overlap in quality indicators.

Additionally, the instrument created for this study should be re-administered to the participants who have entered the SBAE teaching profession to again track growth and further professional development needs in the selected quality indicators. This population could serve as a comparison group for future student teaching cohorts.

Discussion

The SBAE spring student teaching internship at Oklahoma State University is unique in many ways to the fall semester. The spring months contain more frequent FFA activities such as Career and Leadership Development Events while fall student teaching internships contain two major state livestock shows as well as many local and county fairs. This disparity of FFA and SAE calendar events across semesters will impact the time and professional development focused on separate components of the three-circle model. Therefore, competency and importance gains as well as continuing professional development needs will show differences over fall and spring student teaching cohorts.

The National Quality Program Standards offer a bountiful area of assessment and research for agricultural education. However, this instrument appears to be an underutilized resource. After a thorough search of the *Journal of Agricultural Education*, only Smith and Smalley's (2018) study was found utilizing the NQPS instrument. To capitalize on this valuable document, teacher educators, state agricultural education staff, and professional development providers should adapt the NQPS to meet their unique contexts in assessing professional development needs. There is potential for the NQPS to fulfill the recommendation from DiBenedetto et al. (2018) to develop "a consistent instrument to assist teacher educators and national organizations with designing professional development opportunities to meet the current needs of agricultural education teachers" (p. 52).

NQPS also holds potential to inform SBAE teacher education curriculum. All ten standards of the NQPS should be incorporated in a preservice teacher's plan of study. To best prepare future SBAE teachers, teacher educators need to set high quality standards for their students. The National Council for Agricultural Education's NQPS may serve as the framework to set high expectations for SBAE teacher and program standards.

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Examining the Effects of Reflection Type and Abstraction Order on Content Knowledge and Content Knowledge Retention During Experiential Learning

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Abstract

Experiential learning is fundamental to agricultural education. Current literature indicates some methods of pedagogically implementing experiential learning are more effective than others. The purpose of this study was to examine the effects of reflection type and abstraction order on content knowledge and content knowledge retention when teaching experientially. This research experiment was conducted with secondary school students enrolled in agriscience courses. The findings of this study indicated neither the method in which students reflected nor the order in which they received abstraction affected students' ability to attain content knowledge. However, when analyzing student content knowledge retention, a statistically significant interaction effect indicated reflection type and abstraction order were dependent upon one another. It is recommended those who are interested in knowledge retention outcomes should implement purposeful reflection-on-action techniques when delivering abstract conceptualization prior to an experience.

Introduction/Literature Review

Experiential learning is fundamental to agricultural education curricula (Baker et al., 2012; National Association of Agricultural Educators [NAAE], 2019; Phipps et al., 2008; Roberts, 2006; Roberts & Ball, 2009; Shoulders & Myers, 2013). NAAE (2019) explained experiential learning accounts for a minimum of one-third of the integrated agricultural education model and is an essential part of instruction. Baker et al. (2012) stated that experiential learning is embedded into the entire three-circle model of agricultural education. Within agricultural classroom and laboratory settings, students should reflect on the instructor-provided content, relate their reflection to abstract educational concepts, and then experiment with their newfound knowledge in other contexts (Baker et al., 2012). Phipps et al. (2008) described experiential learning as foundational to effective teaching in agricultural education. Agricultural instruction often centers around problem-solving and skill-building, and classrooms serve as agriscience laboratories for students to perform experiments. Students are expected to learn knowledge and skills and apply them to real-life situations (Phipps et al., 2008). Roberts and Ball (2009) contended the two main purposes of agricultural education are to (a) prepare a skilled workforce and (b) develop lifelong learners who are agriculturally literate. To accomplish this, agricultural education welcomes experiential learning. The authors emphasized the facilitation of learning in which learners construct knowledge through experiences, "in complex social environments with teacher-to-learner and learner-to-learner interactions" (p. 87).

For experiential learning to be effective, instructors should play an active role in delivering each of the four components. Instructors are crucial to the experiential learning process because they

facilitate learning through reflection, serves as content experts, and evaluate and coach students (Baker et al., 2012). While the practice of experiential learning is an integral component of agricultural education, more consideration should be given to experiential learning theory (ELT) (Roberts, 2006). Because ELT is widely used in agricultural education, are agriculture instructors successfully utilizing Kolb's (1984) model of experiential learning when providing concrete, educational experiences to students? Shoulders and Myers (2013) found teachers frequently utilized less than all four components (concrete experience, reflective observation, abstract conceptualization, and active experimentation) of experiential learning. Knobloch (2003) stated this could be because a major challenge of agricultural educators is connecting concrete experiences to thinking, knowledge, and ultimately re-application. This leads to the question: Are some methods of pedagogically implementing the components of ELT more effective than others in developing students' content knowledge from a learning experience? Baker et al. (2012) suggested agricultural educators use careful planning and execution when utilizing experiential learning as a pedagogical approach.

Reflection is a key component of ELT; however, are some reflection techniques more effective than others? In a study conducted by Baker et al. (2014), it was found reflection-in-action was a more effective strategy than reflection-on-action for acquiring content knowledge when used in a post-secondary school setting. The authors also found the order in which abstract conceptualization (abstraction) occurred did not affect students' content knowledge. The third finding by Baker et al. (2014) was the order of abstraction and type of reflection were independent of one another regarding the acquisition of content knowledge. In a similar study, with secondary school students the findings indicated that the mode of reflection and order of abstraction were important factors for discussion abilities for students, but the results did not find that the type of reflection significantly impacted content knowledge gains. Further, the authors reported that the order of abstraction and type of reflection were independent of one another (DiBenedetto et al., 2017). In a study of preservice agriculture teachers at Oklahoma State University, Blackburn et al. (2015) found the type of reflection-in-action, verbal or written, did not have a significant effect on test scores, but options should be provided for students to reflect during their experiences.

Initial significant findings beget researchers to replicate studies (Dooley, 2001). Baker et al. (2014) recommended a rigorous follow-up study which would expand upon their findings. The first recommendation for research was to conduct the experiment with 76 participants which would ensure a power base of .80 (Baker et al., 2014). A second recommendation of Baker et al. (2014) was to conduct this study with secondary school students. Baker et al. (2014) measured the content knowledge gained by student, but recommended a future study should also measure other dependent variables. Specifically, administering a deferred post-test would measure students' content knowledge retention (Baker et al., 2014). DiBenedetto et al. (2017) recommended a follow-up study in a block-style class period where reflection time could be lengthened. This study sought to address these recommendations.

Theoretical Framework

The primary theory which will frame this study is experiential learning theory (ELT). Kolb (2015) defined ELT as a learning cycle in which a direct experience is transformed into learning.

Roberts (2006) stated that experiential learning is cyclical in nature, which indicates learning from experience is an on-going process. Kolb's (1984) model of the experiential learning cycle includes two modes of grasping experience which include *concrete experience* and *abstract conceptualization* and two modes of transforming the experience into knowledge which include *reflective observation* and *active experimentation* (figure 1). Learners should engage with all four modes of this cyclical process for knowledge to be created and learning to occur (Kolb, 2015). While this process is cyclical, there is no beginning or end, and learners may enter this learning process at any stage (Kolb, 2015; Roberts, 2006).

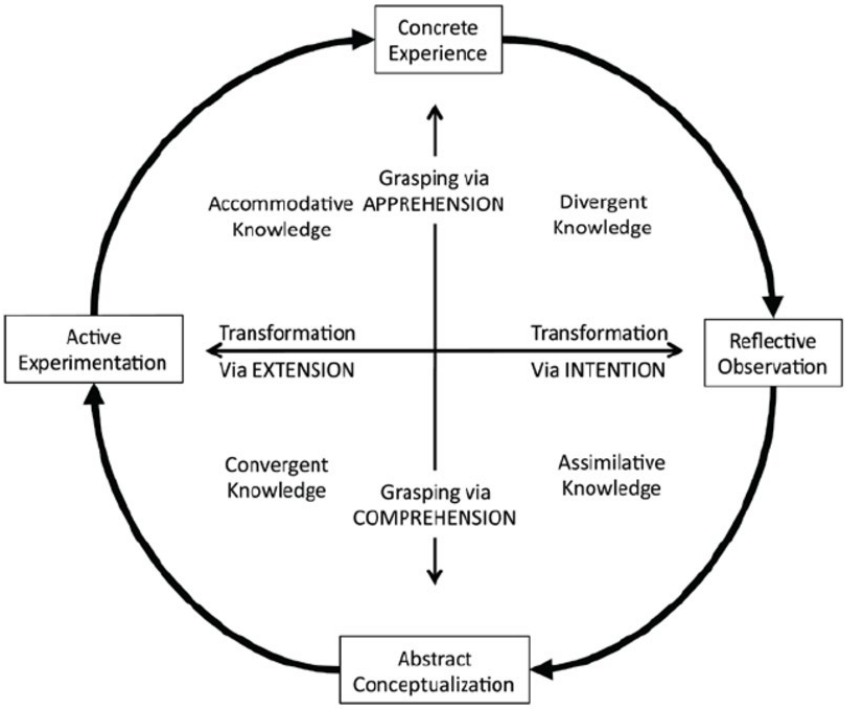

Figure 1. The Experiential Learning Cycle (Kolb, 1984)

Kolb (2015) explained the experiential learning cycle is an oversimplified explanation of learning, and that learning is the process of knowledge creation. Dewey (1938, p. 39) stated, "experience does not go on simply inside a person." Rather, a transaction between a person and their learning environment must take place to constitute a learning experience (Kolb, 1984). Dewey (1938) continued by explaining experiences are objective in the sense that previous experiences can affect how one perceives and understands subsequent experiences. Accordingly, educators should recognize their responsibility of controlling the environing conditions when providing learning experiences which lead to educational growth (Dewey, 1938).

While Roberts (2006) agreed experiential learning can be defined as a *process*, it can also be defined by the *context* in which it occurs. Learning does not occur in a vacuum and is dependent upon the context in which it occurs (Dewey, 1983). Roberts (2006) proposed four continuums in which to define the context of a learning experience: the level, the duration, the setting, and the intended outcome. The *level* of an experience can be defined as abstract or concrete. The *duration* of an experience occurs on a continuum ranging from seconds to years. The *setting* in which an experience can occur can be formal, non-formal, or informal. Finally, the *intended*

outcome of an experience can be dissemination, internalization, identification, participation, or exposure (Roberts, 2006).

Reflective Observation

Reflection is an important facet of experiential learning, and is defined as the internal process in which an experience is transformed into learning (Kolb, 2015). Kolb (2015) explained reflection is not emphasized enough as a crucial component for learning and development to occur. Schön (1983) created the concepts of reflection-in-action and reflection-on-action. Reflection-in-action serves as an active evaluation where learners reflect during an experience, whereas reflection-on-action encourages learners to reflect after an experience occurs (Schön, 1983). Reflection-in-action is compared by Schön (1983) to knowledge-in-action. Reflection which occurs *in the moment* is classified as reflection-*in*-action and allows one to convert performance to knowledge. Reflection on an experience which has already transpired is classified as reflection-*on*-action and depends on intuitive knowledge which stems from an internal representation of one's experience (Schön, 1983). Schön (1983) emphasized the relationship which exists between thinking and action by stating, "reflection enabl[es] the inquirer to criticize, test, and restructure his understandings" (p. 277).

In a study by Lamm et al. (2011), it was found that while various learners may prefer to reflect differently, reflection is integral to learning when teaching experientially. Therefore, it is equally important for instructors to dedicate time and attention to reflection activities (Lamm et al., 2011). In fact, Phan (2013) found a statically significant relationship between higher-order refection and student academic performance. Andrusyszyn & Davie (1997, p. 123) emphasized this relationship by stating, "reflection and learning share a symbiotic relationship." As the scope of student reflection expands, so does the scope of learning (Andrusyszyn & Davie, 1997). Educators should ultimately recognize the important role reflection plays within the learning process, and provide their students with opportunities to reflect (Andrysyszyn & Davie, 1997; Blackburn et al., 2015; Lamm et al. 2011; Phan, 2013).

Abstract Conceptualization

Abstract conceptualization is a learner's ability to grasp knowledge through the creation of concepts and integration of observations into logical theories (Kolb, 2015). When grasping knowledge through abstract conceptualization, ones' working memory becomes stimulated and situates new knowledge and facts with those which already exist. This function, noted as intelligence, requires emotional and mechanistic aspects of learning to occur (Kolb, 2015).

Previously learned and relevant concepts are foundational to new learning and knowledge retention (Ausubel, 2000). The *level* of abstraction influences learning and developmental readiness. For example, more abstract, higher-order, and complex topics have implications for intellectual ability. Therefore, the level of abstraction also influences knowledge retention and thinking processes. Learning and retention of content knowledge is hierarchal, and the level of abstraction one receives plays an important role in the hierarchy (Ausubel, 2000). This perspective aligns with Kolb's (2015) belief that the quality of an experience is more important than the order in which the learning process occurs.

Purpose and Objectives

The purpose of this study was to examine the effects of reflection type and abstraction order on content knowledge and content knowledge retention when teaching experientially. This study aligned with research priority four of the *National Research Agenda* (Edgar et al., 2016) and included six research questions:

1. What effect does an interaction between abstraction order and reflection type have on content knowledge?
2. What is the variance in content knowledge attributed to abstraction order?
3. What is the variance in content knowledge attributed to reflection type?
4. What effect does an interaction between abstraction order and reflection type have on content knowledge retention?
5. What is the variance in content knowledge retention attributed to abstraction order?
6. What is the variance in content knowledge retention attributed to reflection type?

The following null hypotheses were created for statistical analysis purposes:

> H_0 1: There is no variance in content knowledge scores due to the interaction of abstraction order and refection type.
> H_0 2: There is no difference in the overall mean content knowledge scores between reflection-in-action and reflection-on-action groups.
> H_0 3: There is no difference in the overall mean content knowledge scores between pre-abstraction and post-abstraction groups.
> H_0 4: There is no variance in content knowledge retention scores due to the interaction of abstraction order and reflection type.
> H_0 5: There is no difference in the overall mean content knowledge retention scores between reflection-in-action and reflection-on-action groups.
> H_0 6: There is no difference in the overall mean content knowledge retention scores between pre-abstraction and post-abstraction groups.

Methods

Design

This experimental research study employed a 2x2 factorial design. The independent variables for this study were abstraction order and reflection type. The first dependent variable of this study was solar energy content knowledge measured by a 25-question, criterion-referenced assessment. The second dependent variable was solar energy content knowledge retention as measured by the same assessment. The population of interest for this study were secondary students, defined as grade levels nine through twelve, enrolled in agricultural education courses. This study was conducted at a rural/suburban, Florida, high school of approximately 800 students during the spring semester of 2019. Permission to conduct this study was obtained from the agriscience teacher, school administrators, and school board personnel. The agriscience course enrollment at the high school included 140 students enrolled in eight courses. Of the 140 students, 56 participated in this study.

Non-probability, convenience sampling was used to identify the participating agriscience program. Students enrolled in agricultural education at the selected high school were randomly assigned to one of four treatment groups. Institutional Review Board and parent consent was obtained for all students who participated in this study. These groups were developed based on abstraction order and reflection type. Two groups were created for abstraction order (pre-abstraction and post-abstraction), and two groups were created for reflection type (reflection-in-action and reflection-on-action). This allowed for the use of a completely randomized factorial (CRF-*pq*) 2x2 design for this study (Kirk, 1995; See Figure 2).

	Reflection-In-Action	Reflection-On-Action
Pre-Abstraction	Treatment Group A *n* = 13	Treatment Group B *n* = 14
Post-Abstraction	Treatment Group C *n* = 16	Treatment Group D *n* = 13

Figure 2. CRF-*pq* (2x2) design for random assignment of student participants.

Ary et al. (2010) explained the design of an experiment should aid in minimizing threats to internal validity. Ary et al. (2010) discussed 11 possible threats to internal validity. The use of random assignment in experimental design is effective in controlling for threats to validity (Ary et al., 2010). The authors explained random assignment, "operates independently of personal judgment and of the characteristics of the subjects" (Ary et al., 2010, p. 284). In this study, students were randomly assigned a number (one through four) to assign them to a group. Due to this randomization, the groups were considered statistically equivalent (Ary et al., 2010). The design of this study allowed the researchers to control for 10 of the 11 threats to validity. This experiment began with 56 participants who received all assigned treatments. However, 11 students did not complete the content knowledge retention assessment. Thus, the threat of mortality should be taken into account as a limitation of this study.

Procedures

For this study, Lab-Aids© Investigating Photovoltaic Cell kits were utilized to provide a formal, laboratory experience for learning about solar-powered energy. Students assigned to a pre-abstraction group received the laboratory experience first with the solar energy lecture/discussion session to follow. Students assigned to post-abstraction groups received the solar energy lecture/discussion session first with the laboratory experience to follow. Students assigned to a reflection-in-action group received reflection questioning from the instructor throughout the learning experience. Students assigned to a reflection-on-action group received reflection questioning from the instructor at the end of the learning experience.

Learning activities should be described by the context in which they occur (Roberts, 2006). Drawing from Roberts' (2006) four dimensions to define the context of a learning experience, the experience provided to participants was *three hours and thirty minutes* in duration. Due to the hands-on nature of the laboratory experiment, the level of this learning experience was defined as *concrete*. Experiments which occur in a classroom setting, such as this one, are defined as

formal learning experiences. An objective of the learning experience was to facilitate learner involvement with photovoltaic cells. Therefore, the fourth and final dimension of this learning context can be defined by an intended outcome of *identification*.

The treatment was administered during one, three-hour and thirty-minute period in which students were permitted to participate by the school administrators. Four instructors, including three of the researchers and an agriscience educator, led each of the four groups concurrently in four separate classrooms. Each of the four instructors were certified agriscience teachers, and met prior to lesson delivery to review the lesson plan, PowerPoint©, and reflection guide to ensure consistency in teaching. The pre-abstraction groups (A and B) received a 50-minute lecture/discussion lesson on solar energy and photovoltaic cells first. The post-abstraction groups (C and D) received the 90-minute LabAids© Investigating Photovoltaic Cells laboratory experience first. The reflection-in-action groups (A and C) received reflection prompts throughout the agriscience laboratory experience. The reflection-on-action groups (B and D) were allowed to complete the agriscience laboratory experience without interruption, and participated in reflection at the end of the experience.

Data on content knowledge were collected with a criterion-referenced, 25 multiple-choice assessment which was administered during the final 40 minutes of the period. Assessment questions were developed using the content provided in the LabAids© teacher's guide, and to assess if the lesson's learning objectives were achieved. The assessment was also developed and administered utilizing Wiersma and Jurs (1990) eight factors for implementing assessments. A panel of experts, composed of two agricultural education faculty and three agricultural education PhD students, assessed the instrument for face and content validity. Based on their recommendations, five additional questions were added and one question's distractors were edited to ensure clarity. The assessment was administered in a classroom setting in which the participants were familiar with meeting for class. A pre-typed set of instructions were read aloud to ensure consistency across groups and to minimize student confusion. Data collection on content knowledge retention were collected utilizing the same assessment and testing environment two weeks following the students' participation in the laboratory experience.

Data Analysis

A two-way independent analysis of variance (ANOVA) was used to calculate the two main effects (abstraction order and reflection type) and the interaction effect between these independent variables (Field, 2018). Testing the effects of two independent variables on a dependent variable can be done by use of the two-way ANOVA (Field, 2018). A two-way ANOVA was run for each content knowledge scores and content knowledge retention scores.

The assumptions regarding the use of ANOVA were examined and met before the use of the statistical tool. When determining if equal variances were shared between treatment groups, Field (2018) strongly cautions against testing for homogeneity of variance using *Levene's test* for two reasons: (a) In large sample sizes, Levene's test may be over sensitive and detect significance for unimportant variables, and (b) in small samples, Levene's test often lacks enough power to detect violations of the assumption of normality. Field (2018) explained normality testing via Levene's test can be moot, no matter the sample size, due to the test's

dependence upon having a large enough power base to accurately detect violations of assumptions. Further, tests of homogeneity of variance matter most with small sample sizes and unequal groups, but are less effective under these conditions. In contrast, tests of homogeneity of variance matter the least with large sample sizes and equal groups, but work best under these circumstances (Field, 2018). Zimmerman (2004) reported preliminary tests of variance can lead to incorrect statistical decisions due to their subjectivity to Type I and Type II errors. In lieu of Levene's test, Field (2018) recommended utilizing histograms and Q-Q plots to identify possible heterogeneity of variance because histograms allow for testing of skewness and kurtosis. As such, unstandardized residuals for all combinations were calculated for the dependent variable. Data were analyzed with IBM SPSS Statistics Version 26. The Kolmogorov-Smirnov test and the Shapiro-Wilk test were used to determine normality. Both tests yielded non-significant results ($D(45) = .111$, $p = .200$; $W(45) = .980$, $p = .630$). Thus, the data were deemed statistically normal. In addition to the statistical analyzes, histograms and Q-Q plots were examined to ensure normality as recommended by Field (2018).

The statistical and practical effects were both reported for the findings. An *a priori* alpha level of .05 was set to determine statistical significance by the researchers. The statistical significance was used to determine rejection or failure to reject the null hypotheses (Ary et al., 2010; Kirk, 1995). However, statistical significance should not be considered alone. The practical significance of the effect should also be considered (Ary et al., 2010). Partial eta squared was utilized to determine the practical effect size. Miles and Shevlin (2001) categorize partial eta squared effect sizes as follows: (a) 0.01 – small effect size, (b) 0.06 – medium effect size, (c) 0.14 – large effect size.

Findings

When analyzing the content knowledge test scores, the means, with standard deviations in parentheses, are as follows: reflection-in-action 41.03 (5.99), reflection-on-action 42.37 (5.35), pre-abstraction 41.47 (4.61), and post-abstraction 41.92 (6.80). A report of descriptive statistics is presented in Table 1.

Table 1
Mean Content Knowledge Test Scores for Treatment Conditions of Reflection Type and Abstraction Order

Type of Reflection	Order of Abstraction	*M*	*SD*	*n*
Reflection In	Pre-Abstraction	41.85	7.37	13
	Post-Abstraction	40.38	4.74	16
	Total	41.03	5.99	29
Reflection On	Pre-Abstraction	42.71	4.27	14
	Post-Abstraction	42.00	6.48	13
	Total	42.37	5.35	27

Total	Pre-Abstraction	41.47	4.61	30
	Post-Abstraction	41.92	6.80	26
	Total	41.68	5.68	56

A summary of the ANOVA is presented in Table 2. The interaction effect of reflection type and abstraction order generated an $F(1,52) = .50$, $p = .48$, observed power = .107, and was deemed insignificant. Therefore, the first null hypothesis failed to be rejected. When analyzing the main effects, type of reflection yielded an $F(1, 52) = .65$, $p = .42$, observed power = .124, and was also deemed to be insignificant. Thus, the second null hypothesis failed to be rejected. The main effect of abstraction order was statistically insignificant with an $F(1,52) = .06$, $p = .81$, observed power = .057, which resulted in failure to reject the third null hypothesis.

Table 2
Content Knowledge ANOVA Summary Table

Source	*SS*	*df*	*MS*	*F*	*p*
Abstraction	1.99	1	1.99	.06	.81
Reflection	21.60	1	21.60	.65	.42
Abstraction* Reflection	16.60	1	16.60	.50	.48
Error	1730.30	52	33.28		
Total	99052.00	56			

Means, with standard deviations in parentheses, for content knowledge retention scores are as follows: reflection-in-action 27.27 (10.56), reflection-on-action 34.69 (8.17), pre-abstraction 31.91 (11.27), and post-abstraction 30.18 (8.73). A report of descriptive statistics is presented in Table 3.

Table 3
Mean Content Knowledge Retention Test Scores for Treatment Conditions of Reflection Type and Abstraction Order

Type of Reflection	Order of Abstraction	*M*	*SD*	*n*
Reflection In	Pre-Abstraction	29.82	8.41	11
	Post-Abstraction	24.73	12.21	11
	Total	27.27	10.56	22
Reflection On	Pre-Abstraction	38.50	4.44	12
	Post-Abstraction	30.55	9.43	11

	Total	34.69	8.17	23
Total	Pre-Abstraction	31.91	11.27	23
	Post-Abstraction	30.18	8.73	22
	Total	31.07	10.03	45

A summary of the ANOVA for content knowledge retention scores is found in Table 4. The interaction effect yielded an $F(1, 41) = 5.93$, $p = .02$, observed power = .662. Accordingly, the fourth null hypothesis was rejected. The practical significance of this difference was calculated using a partial eta squared per Miles and Shevlin (2001). The effect size for the difference was .13 which Miles and Shevlin (2001) defines as *medium*. The main effect of reflection type was found to be significant with an $F(1, 41) = 7.33$, $p = .01$, observed power = .753. Thus, the fifth null hypothesis was rejected. The effect size was .15 which is defined as *large* by Miles and Shevlin (2001). The main effect of abstraction order was found to be statistically insignificant and yielded an $F(1, 41) = .29$, $p = .60$, observed power = .082. This resulted in failure to reject the sixth and final null hypothesis.

Table 4

Content Knowledge Retention ANOVA Summary Table

Source	*SS*	*df*	*MS*	*F*	*p*
Abstraction	23.03	1	23.03	.29	.60
Reflection	590.49	1	590.49	7.33*	.01[a]
Abstraction* Reflection	477.96	1	477.96	5.93*	.02[b]
Error	3303.55	41	80.57		
Total	47860.00	45			

[a]Effect size = .15 per η_p^2; [b]Effect size = .13 per η_p^2 (Miles and Shevlin, 2001); *p < .05.

A visual model which displays the treatment groups and their respective content knowledge retention score means, with standard deviations in parentheses, is found in Figure 3. Treatment group A (reflection-in-action and pre-abstraction) had a mean of 29.82 (8.41). Treatment group B (reflection-on-action and pre-abstraction) had a mean of 38.50 (4.44). Treatment group C (reflection-in-action and post-abstraction) had a mean of 24.73 (12.21). Treatment group D (reflection-on-action and post-abstraction) had a mean of 30.55 (9.43).

	Reflection-In-Action	Reflection-On-Action
Pre-Abstraction	Treatment Group A *M* = 29.82 (8.41)	Treatment Group B* *M* = 38.50 (4.44)
Post-Abstraction	Treatment Group C *M* = 24.73 (12.21)	Treatment Group D *M* = 30.55 (9.43)

Figure 3. Mean Content Knowledge Retention Test Scores by Treatment Group
*$p < .05$.

Conclusions

The lack of simple main effects indicate reflection type and abstraction order are independent of one another when analyzing student content knowledge gains. This conclusion indicates neither the method in which students reflect nor the order in which they receive abstraction affects students' ability to attain content knowledge. While this conclusion is congruent with DiBenedetto et al. (2017), it is incongruous with Baker et al. (2014) who found reflection-in-action can positively affect student content knowledge attainment. This finding is also consistent with Kolb (1984) and Roberts (2006) who defined the experiential learning process as a cycle with no defined starting point.

The statistically significant interaction effect indicates reflection type and abstraction order are dependent upon one another when analyzing student content knowledge retention. This indicates reflecting-on-action when students receive abstraction prior to a learning experience could positively affect students' ability to retain content knowledge. The previous researchers (Baker et al. 2014; DiBenedetto et al., 2017) did not examine reflection type and abstraction order on student content knowledge retention; therefore, this is a new finding within agricultural education. This finding adds to the assertion by Ausubel (2000) that in addition to the level of abstraction one receives, pre-abstraction could be beneficial for knowledge retention when coupled with reflection-on-action.

Recommendations for Research

Baker et al. (2014) recommended to achieve a power base of .80, this study should be conducted with a minimum of 76 participants. This research fell short of that goal by 20 participants. Therefore, it is recommended future replications of this research strive to achieve a sample size of 76 participants or more. While this study analyzed student content knowledge and content knowledge retention, there are other dependent variables which could be considered. Future studies could analyze the effects of abstraction order and reflection type on other dependent variables such as students' problem-solving skills, logical reasoning abilities, and others.

Future research which also analyzes content knowledge retention should have a broader scope to include the regression of content knowledge over time. For example, in this study, if a treatment group achieved a high, post-test score, but a low, deferred, post-test score then that group would have a lower rate of knowledge retention than a treatment group who achieved a low, post-test score and a similarly low, deferred, post-test score. Multivariate research, and the use of a repeated measures ANOVA, should be used to analyze knowledge retention rates over time (Field, 2018; Kirk, 1995). To achieve this, it is necessary to have the same group members in each data collection point over time. This study did not accomplish this due a lack of control for mortality and the blinded nature of the testing instrument, thus, making it difficult to remove participants who did not participate in both assessments. Future research which includes this procedure could have stronger arguments as to which variables, if any, impact student content knowledge retention.

The context of the learning experience in this study was defined with an intended outcome of *identification* per Roberts (2006). While this study analyzed the order of abstraction on content knowledge and knowledge retention gains, Ausubel (2000) purported the level of abstraction is fundamental to learning and retention. Future research should consider learning contexts with higher levels of intended outcomes and their effects on knowledge and retention. For example, if a learning experience provides abstraction that prompts complex, higher-order thinking, what implications might this have for student knowledge and retention?

The last recommendation for future research is one of practicality. Those wishing to conduct this study at the secondary school level should consider the amount of time and preparation involved. Attaining IRB approval, parental consent, and school administrative permission when conducting experiments with secondary school students may take multiple weeks. Accordingly, researchers should prepare to conduct similar studies well in advance of school holidays and semester breaks.

Recommendations for Practice

Experiential learning is foundational to agricultural education and is widely used by agricultural educators (Phipps et al., 2008; Roberts & Ball, 2009). This study supports the notion that the agricultural instructor plays a crucial role in facilitating reflection when teaching experientially (Baker et al., 2012). This study indicates those who implement experiential learning should provide intentional reflection opportunities for their students – regardless of reflection type. Additionally, practitioners should note the cyclical nature of experiential learning, and recognize while abstraction is an important part of the process, the order in which it occurs has little to no bearing on student content knowledge gains (Kolb,1984; Roberts, 2006). This study, however, would indicate practitioners who are interested in knowledge retention outcomes should implement purposeful reflection-on-action techniques when delivering abstract conceptualization prior to an experience. Faculty members who lead pre-service teacher preparation programs should teach about how the theory of experiential learning informs the process (Roberts, 2006). Intentionality matters when planning learning experiences to include purposeful reflection and effective abstraction techniques.

Experiential learning is fundamental to agricultural education, and it is a teaching methodology frequently used by agricultural educators (Baker et al. 2012; Phipps et al., 2008; Roberts 2006; Roberts and Ball, 2009). However, not all agriculture teachers utilize holistic experiential learning (Shoulders & Myers, 2013). Therefore, agricultural educators should receive training on operationalizing the theory of experiential learning into practical teaching settings. Pre-service teacher education programs should emphasize the importance of including all four components of experience, abstraction, reflection, and experimentation when teaching experientially.

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Acceptance, Tolerance, or Distance: Determining a Degree of Closeness to Multicultural Student Profiles

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Abstract

Social identity theory posits that people do not have one personal sense of identity, rather multiple identities based on group memberships. After four years of involvement in a secondary agricultural education program, the identity of the seniors is molded by the environment surrounded them over their tenure. The purpose of this study is to identify the acceptance level high school seniors, throughout a state, have toward multiple student profiles that reflect a diversity of social, racial and sexual identities. Using a social distance scale, the results reveal that students were more accepting of a student who resides from a farm background and are heterosexual; however, results reveal a resistance against a student not from a farm background, Black, and gay to enroll in agriculture courses. Results reveal a level of implicitness that hinders the enrollment of students from cultures different from the social identity of the current group membership. Recommendations for inclusive programs that provide opportunities for secondary students to collaborate with culturally different individuals as well as development of agricultural curriculum that encompasses a transformational approach to gaining cultural competence.

Introduction

The benefits inclusion and diversity pose to agricultural education can be readily found within previous educational research. Chatman, Sherman, and Doerr (2015) found that groups charged with a collectivistic task were more likely to complete the task better when the group consisted of diverse cultural nationalities. They also found that heterogeneous groups who were prepared to be more individualistic were more likely to execute the task worse (Chatman, Sherman, & Doerr, 2015). These findings could be utilized within education to create interventions that teach collectivistic mindsets to overcome the effects of homophily and in-group mentality. Chang and colleagues (2003), as cited in Stayhorn and Johnson (2014), found that racially diverse environments lead to both qualitative and quantitative gains as they stimulated creativity and speculation. Furthermore, Terenzini et al. (2001), as cited in Stayhorn and Johnson (2014), found that racial/ethnic composition of a classroom aided the development of students' problem-solving and group skills. The benefits of diversity and inclusion have been found to increase student gains, but it also allows all students to develop a sense of belonging and Osterman (2000) found individual sense of belonging affects students' feelings about themselves. Therefore, one could posit that the inclusion of diversity within the secondary agriculture classroom would provide students with more learning advantages.

Diversity and inclusion may also provide critical, soft skills that the business sector is beginning to demand of its employees. Cultural competence is increasingly being considered as an essential skill in professional workplaces (Wood & Landry, 2008). This ability to integrate and transform knowledge about individuals and groups of people into specific standards, practices, and

attitudes used in appropriate cultural settings increases quality of service and produces better business outcomes (Davis, 1997). While there is a gap in research of "business case for diversity" regarding the impact it has on the bottom line (Coleman, 1995), the current research has focused on the potential for increased performance (Wood & Landry, 2008). Cultural diversity can provide businesses with diverse experiences and knowledge, which are beneficial qualities for companies with an orientation towards growth (Cox, 1994; McLeod et al, 1996; Priem, Harrison, & Muir, 1995). Furthermore, when inclusion is implemented by an organization, employees are more likely to feel valued and supported; therefore, tend to be more innovative (Eisenberger, Fasolo, & Davis-LaMastro, 1990). Diversity and inclusion will need to find its place in the agricultural education classroom to continue to meet the changing skill and knowledge demands of the 21st century agriculture industry.

Theoretical Framework/Literature Review

Social identity theory was created by Tajfel and Turner in 1979. Social identity theory says people do not have one personal sense of identity, rather multiple identities based on group memberships. They also say that these salient groups provide a feeling of belonging. In efforts to increase self-image, people boost the significance of the group they belong to, otherwise known as in-group mentality. The research team also found that intergroup discrimination would occur in attempt to boost group importance (Turner, Brown, & Tajfel, 1979). Members are able to enhance the status of their group by being more charitable and less envious of their fellow group members (Chen & Li, 2009). Charness, Rigotti, and Rustichini (2007) discovered that people naturally use their group membership as a compass to navigate social environments. Therefore, people will assume an identity that provides meaning and builds self-esteem (Vignoles, Golledge, Regalia, Manzi, & Scabini, 2006). While social identity theory presents positive motivation, it also holds the potential to create groupthink or negative peer influence.

Ekmerkci and Casey (2009) found that a higher frequency of interaction within a group and the more information received about the group will cause a person to create a stronger identity within the group. The more salient the group becomes in the formation of a person's identity the more predictable their behavior becomes according to Griepentrog, Harold, Holtz, Klimoski, and Marsh (2012). They argue within their paper that the closer the organization's values align with their own helps predict whether they will join the group. Griepentrog et al (2012) found that organizational identification, or defining yourself in terms of a particular organization, can occur before being formally brought into the group. Organizational identification is important in predicting whether the individual has intentions to pursue joining the organization or withdrawing from it (2012). Therefore, the more homophily found between the group and the individual combined with the frequency of interaction greatly impacts the group's amount of influence and consequently the individual's identity.

Social identity theory impacts how an individual looks at leadership and the relationship between a leader and employee. Chrobot-Mason, Gerbasi, and Cullen-Lester (2016) found that the stronger level of identification a person has with the company, the more likely they are to view fellow group members as leaders. Kalkhoff and Barnum (2000) found that when a person is looking for leadership, people within the group will always be more influential than a person outside the group. Next a high-status individual will be more influential than a low-status

individual within the in-group. While the term high and low status stems from status-organizing theory, the research team found it run concurrently with social identity theory (Kalkhoff & Barnum, 2000). Hogg and Terry (2000) discuss that social identity and leadership within organization contexts when minorities were unlikely to attain positions of leadership because they are less likely to match the organizational prototypes or in-group requirements prescribed by the organization. These findings display the importance leadership has within an in-group. In-group leadership sets the tone and organizational prototypes the rest of the group will model. If leaders do not set an inclusive mentality within the group, or even worse, do not set an ethical administration within, the group will follow suit.

Social identity theory and in-group mentality have provided positive outcomes as well. Chattopadhyay, Tluchowska, and George (2004) found that employees are more motivated to help a company that they feel a sense of belonging to. They do so through the creation of a model that explains both the positive and negative effects of group dissimilarity (Chattopadhyay, Tluchowska, & George, 2004). Van Knippenberg's (2000) posits that if social identity is important within a group then it is recognized that high work performance is in the best interest of the group. These findings explain how social identity can be used as a motivator to increase quality performance produced by students. Inclusivity of a group and a sense of belonging is a powerful influence for individuals to perform.

Purpose and Objectives

The purpose of this thesis is to evaluate the inclusiveness of Kentucky secondary agriculture students towards students of race (Black or White), sexuality (Heterosexual or Homosexual), and clique (Non-Farm Background and Traditional Farm Background) and to determine whether homophily was occurring within Kentucky, secondary agriculture classrooms.

The following research objectives and corresponding hypotheses were developed to be the focus of this study:
RO1: Describe the breaking point in each social distance scale of the 8 Mock Student Profiles
RO2: Determine the rank of acceptance/tolerance by student profiles based upon Social Distance Scale means.
RO3: Determine the relationship of demographic variables to the identified breaking point from each student profile.

Methodology

The methodology of the research was based off of the transformative epistemology. Transformative epistemologies believe that research needs to address social oppression and the imbalance of power that results from it (Creswell, 2014). Transformative epistemologies traditionally address empowerment, inequality, oppression, domination, suppression, and/or alienation as the focal point of the study (2014). After receiving an "exemption certification" from the Institutional Review Board for protocol number 17-0579-P4S, data was collected.

Research Design

Social distance referred to as Bogardus' (1928) social distance scales, are psychological testing to empirically measure people's willingness to participate in social contacts for varying degrees of closeness with members of diverse social groups (Wark & Gilliher, 2007). One main concept of Social Distance Scales that was used within the study was the concept that an individual would "go just so far" in letting a person of another group near him or her, but would go no further, otherwise known as a *breaking point* (Newcomb, Turner, & Converse, 1965). How "far" the participants will let a person get in relation to themselves can be illustrated by the term *degrees of closeness*. The breaking point can be calculated by having a participant evaluate how close they would let a hypothetical person near him or her on varying degrees of closeness. The researcher will be referencing seniors enrolled in secondary agriculture classes throughout a state and their willingness to include students of diverse groups in varying degrees of closeness (i.e. allowing a student of a diverse group into their school versus sharing a room with the student on an FFA trip). The breaking point is the degree of closeness where the participant no longer feels comfortable with the Mock Student Profile (MSP). Once a breaking point occurs, the general population begins to follow suit on their degrees of closeness (Svensson et al., 2015)

Population and Sample

The population consisted of seniors enrolled in secondary agriculture throughout [STATE] during the fall semester of 2017 (N = 2,766). Seniors were purposefully selected because they are considered the face of four-year programs as they reflect the philosophies set-forth by the leaders before them (Dhuey & Lipscomb, 2008). A recruitment letter was sent out to all 140 secondary agriculture programs, requesting the participation of the seniors within each program through a provided school log-in and survey link with a designated time to complete. Of the identified seniors, 417 agreed to participate from 57 secondary agriculture programs. The programs resided throughout the state rather a particular region; particularly a minimum of three schools from each of the 11 designated regions. After removal of incomplete questionnaires due to the lack of consent, a remaining 399 responses deemed usable.

Of the 399 senior participants, the majority of the participants had never obtained an officer position within their FFA chapter nor served in a leadership role within other clubs and/or sports. Similarly, the participants were primarily rural, had never traveled abroad and identified themselves as Christian. When asked, the majority of the students reported that the highest accomplished educational level of at least one parent was a high school diploma and perceive to have a family household income between $50,000-$74,999.

Once a participating senior obtained a direct link and connected to the questionnaire, a method of stratified sampling was utilized regarding the profiles being completed. Researchers generally want to obtain an overall estimation through inexpensive means (Jackson, 2011; StatPac, 2014); therefore, an online approach was selected versus face-to-face. In order to maximize response rate, teachers were provided weekly email reminders for the six-week duration of project's data collection. Furthermore, the researcher followed the data collection techniques of sending reminders to non-responders set by Dillman, Smythe, Christian (2014) to improve response rate.

Instrumentation

An internet-based questionnaire was used for the benefits of user-friendliness, timeliness in reaching the participant, elimination of mailing expenses, decreases human error in entering data, and reduces time spent on coding responses (Roztocki, 2001). The questionnaire was divided into three sections. The first section included student consent.

The second section included social distance scales. The social distance scale was created by Emory Bogardus in 1924 (Faris, 1967). The social distance scale is an attitude scale used to measure prejudice. It is also an example of a Guttman scale in that it is unidimensional and cumulative (Wark & Galliher, 2007). Social distance scales traditionally use five to seven statements that prompt progressively more or less intimacy toward the group or person considered (2007). Eight mock student profiles were developed based off three bi-variate variables; Race (African-American and Caucasian), Sexuality (Heterosexual and Homosexual), and Social Subgroup (Ag kid with a farm background and athletic, not from a farm background). In order that all cultures were equally explored, the student profiles were separated into all possible existing options (see Table 1). Because students were stratified randomly by the online questionnaire, participating seniors only received 2 of 8 Mock Student Profiles.

Table 1
Mock Student Profile Narratives (*n* = 8)

Mock Student Profiles	Description
MSP 1	Student 1 is an FFA member who has transferred to your school from another high school. They consider themselves to be an Ag kid with a farm background, White, and straight.
MSP 2	Student 2 is an FFA member who has transferred to your school from another high school. They consider themselves to be athletic, not from a farm background, White, and straight.
MSP 3	Student 3 is an FFA member who has transferred to your school from another high school. They consider themselves to be an Ag kid, from a farm background, White, and gay.
MSP 4	Student 4 is an FFA member who has transferred to your school from another high school. They consider themselves to be athletic, not from a farm background, White, and gay.
MSP 5	Student 5 is an FFA member who has transferred to your school from another high school. They consider themselves to be an Ag kid from a farm background, Black, and straight.
MSP 6	Student 6 is an FFA member who has transferred to your school from another high school. They consider themselves to be athletic, not from a farm background, Black, and straight.
MSP 7	Student 7 is an FFA member who has transferred to your school from another high school. They consider themselves to be an Ag kid from a farm background, Black, and gay.
MSP 8	Student 8 is an FFA member who has transferred to your school from another high school. They consider themselves to be athletic, not from a farm background, Black, and gay.

Participants were able to manipulate the social distance section to express the degree of closeness, or the distance they were willing to include the mock student into their own life. The variables of social distance were: a) accept this student as a member in my school; b) accept this

student as a student enrolled in my Ag class; c) accept this student as a member of my FFA chapter; d) accept this student as a member of the same FFA competitive team as me; e) accept this student as my FFA chapter President; and f) accept this student as my roommate on trips. The degrees of closeness range included a five-point scale where a "1" represented Strongly Disagree and "5" represented Strongly Agree. The final section of the questionnaire requested characteristic information, such as leadership positions, international travel, parental education, favorite genre of music, practicing religion, parental income, number of people in household, rural, suburban, or urban home residence, and race/ethnicity.

Validity and Reliability

To establish validity, a review process of a panel, consisting of experts in the field of inclusion and diversity as well as youth of similar backgrounds and ages, was established. All panel experts received documents containing the research purpose, objectives, and copies of the questionnaires. The members were asked to examine clarity, verbiage, understanding of phrases and visual appearance. Modifications were made following the expert panel's reviews to improve the age appropriateness of the questionnaire. To establish construct validity, the multitrait-multimethod matrix (Campbell & Fiske, 1959) was implemented. After assessing the six major considerations for construct validity, the scale reached critical value deeming it to be valid.

Reliability of the Social Distance scales were tested via test-retest for each Mock Student Profile. A pilot group of college freshman who were, the year prior, a senior in a secondary agriculture program reflected the demographic of the participants. Mock Student Profile 1 received an $r > .906$. Mock Student Profile 2 received an $r > .832$. Mock Student Profile 3 received an $r > .819$. Mock Student Profile 4 received an $r > .857$. Mock Student Profile 5 received an $r > .810$. Mock Student Profile 6 received an $r > .899$. Mock Student Profile 7 received an $r > .842$. Finally, Mock Student Profile 8 received an $r > .852$. According to Santos (1999), a Pearson correlations score on a test/re-test greater than 0.70 is considered reliable.

Data Collection

A recruitment letter was sent via email listserv to the state's 140 agricultural teachers. The agricultural educators distributed the questionnaire link to the senior members to increase response rate and minimize non-response error. Teachers were requested to provide time for students to complete the questionnaire from any electronic device that had connection to the internet as the questionnaire was designed to for compatibility on a computer, tablet, and smartphone. Email reminders were sent three times over the course of six weeks. A comparison of completed questionnaires following the first invitation to the last reminder was completed and no significant difference was determined; thus, no error was present in respondent's delay. After the closure of the survey, answers were kept on a secure, online statistical analysis website.

Data Analysis

The questionnaire, in its entirety, was created in Qualtrics and then transferred over to the Statistical Package for the Social Sciences® [SPSS] 24. Frequencies and percentages were collected to describe the depth of inclusion at each degree of closeness for each Mock Student

Profile, as reported by the five anchors presented. To determine the breaking point of inclusion for the social distance scales the number of nonresponses to each degree of closeness was calculated. A study conducted by Tourangeau and Yan (2007) found that respondents are less likely to answer questions that are sensitive and make them uncomfortable. Tourangeau, Rips, & Rasinski (2000) defined the term *sensitivity questions*, as questions closely related to the traditional concept of social desirability, to which a question elicits answers that are socially unacceptable or socially undesirable

The researchers based the breaking point calculations off Tourangeau and Yan's (2007) findings that to determine a breaking in degrees of closeness for the population, sensitive questions reflect a nonresponse rate that begins at 3%. Therefore, the research team calculated all breaking point for each mock profile when the nonresponse was above 3%. For the remaining objectives, the researchers utilized measurements of central tendencies and linear regression.

Findings/Results

Research objective one sought to determine the breaking point within the social distance scale by each Mock Student Profile (MSP). Breaking points were set at when a degree of closeness received a 3% nonresponse, as set by Tourangeua and Yan (2007). Based upon the findings, as provided in Table 2, no identified breaking point was determined for MSP 1 (Farm, White, Straight) and MSP 5 (Farm, Black, Straight). Mock Student Profile 2 (Athlete/Non-Farm, White, Straight), MSP 6 (Athlete/Non-Farm, Black, Straight), and MSP 7 (Farm, Black, Gay) identified a breaking point of acceptance at the 5th degree of closeness, *I would accept this student as my FFA chapter president.* The senior participants identified the 3rd degree of closeness, *I would accept this student as a member of my FFA chapter* as the breaking point for MSP 4 (Athlete/Non-Farm, White, Gay). Finally, MSP 3 (Farm, White, Gay) and MSP 8 (Athlete/Non-Farm, Black, Gay) had the earliest breaking point at the 2nd degree of closeness, *I would accept this student as a student in my Ag class.*

Table 2
Frequencies of Non-Response on Social Distance Scales by Student Profile (*n* = 399)

Degrees of Closeness *I would accept…*	MSP 1	MSP 2	MSP 3	MSP 4	MSP 5	MSP 6	MSP 7	MSP 8
…this student as a member of my school.	0 (0.0%)	0 (0.0%)	1 (1.1%)	1 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (2.4%)
…this student as a student in my Ag class	0 (0.0%)	1 (1.3%)	3 (3.4%)	2 (2.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (4.8%)
…this students as a member of my FFA chapter	0 (0.0%)	2 (2.5%)	4 (4.5%)	3 (3.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (6.0%)
…this student as a member of the same FFA competitive team as me	0 (0.0%)	0 (0.0%)	6 (6.8%)	7 (7.4%)	0 (0.0%)	2 (2.2%)	1 (1.4%)	6 (7.2%)

…this student as my FFA chapter president	0 (0.0%)	3 (3.8%)	10 (11.4%)	9 (9.6%)	2 (2.3%)	3 (3.3%)	3 (4.2%)	9 (10.8%)
…this student as my roommate on trips	1 (1.0%)	0 (0.0%)	13 (14.8%)	14 (14.9%)	0 (0.0%)	4 (4.4%)	10 (13.9%)	13 (15.7%)

Research objective two sought to rank the acceptance/tolerance level of the senior participants perceptions of each Mock Student Profile on the social distance scale. Before a rank could be provided, measures of central tendencies were obtained for each MSP by degrees of closeness (see Table 3). Then an overall mean for the Mock Student Profile was determined by the average of each degree of closeness. From each Mock Student Profile, it appears, as determined by Wark & Gilliher (2007), that the mean steadily decreases as it gravitates through the degrees of closeness.

Table 3
Mean Social Distance Score by Mock Student Profile (*n* = 399)

	Mean/SD					
	I would accept as a member of my school	I would accept as a student enrolled in my Ag class	I would accept as a member of my FFA chapter	I would accept as a member of the same competitive team as me	I would accept as our FFA chapter President	I would accept as my roommate on trips
MSP 1	4.65/.79	4.63/.78	4.63/.77	4.52/.87	4.27/1.05	4.39/1.05
MSP 2	4.43/.95	4.31/.94	4.29/1.09	4.20/1.16	3.59/1.49	4.05/1.15
MSP 3	3.98/1.28	4.15/1.12	4.04/1.25	3.92/1.19	3.53/1.47	3.57/1.43
MSP 4	3.95/1.47	3.89/1.45	3.74/1.51	3.65/1.49	3.27/1.60	3.42/1.69
MSP 5	4.62/.74	4.65/.72	4.62/.91	4.59/.78	4.40/1.05	4.36/1.01
MSP 6	4.64/.75	4.54/.90	4.48/.96	4.47/.95	3.87/1.42	4.29/1.29
MSP 7	4.41/1.06	4.34/1.15	4.34/1.15	4.14/1.37	4.02/1.34	3.38/1.57
MSP 8	3.92/1.36	3.83/1.31	3.80/1.35	3.68/1.41	3.29/1.51	3.20/1.60

Once an overall mean was determined from the degrees of closeness on each Mock Student Profile, a ranking could be ascertained. The ranking provides insight to a preferred acceptance/tolerance, as determined by the senior participants. Based upon the overall mean in Table 4, MSP 5 (Farm, Black, Straight) had the highest ranked mean (*m* = 4.54) on the social distance scale, followed by MSP 1 (Farm, White, Straight), MSP 6 (Athlete/Non-Farm, Black, Straight and MSP 2 (Athlete/Non-Farm, White, Straight). Mock Student Profile 8 (Athlete/Non-Farm, Black, Gay) received the lowest ranked mean (*m* = 3.63) on the social distance scale.

Table 4
Ranking Social Distance of the Mock Student Profiles by High School Seniors (*n* = 399)

	Mean	Ranking
MSP 5 – Ag kid from a farm background, Black, and straight	4.54	1
MSP 1 – Ag kid with a farm background, White, and straight	4.52	2
MSP 6 – Athletic, not from a farm background, Black, and straight	4.39	3
MSP 2 – Athletic, not from a farm background, White, and straight	4.15	4
MSP 7 – Ag kid, from a farm background, Black, and gay	4.11	5

MSP 3 – Ag kid from a farm background, White, and gay	3.87	6
MSP 4 – Athletic, not from a farm background, White, and gay	3.66	7
MSP 8 – Athletic, not from a farm background, Black and gay	3.63	8

To solve for research objective three, which sought to determine a relationship of degree of closeness breaking point for each Mock Student Profile by the provided demographics of the seniors participants, a linear regression was ran for each MSP. Significance was set at the $a \leq .05$. Based upon Mock Student Profile 1 not having a breaking point, a regression was not analyzed. Significance in determining a demographic relationship to the breaking point was found in MSP 7 (Farm, Black, Gay) and MSP 8 (Athlete/Non-Farm, Black, Gay).

Based upon Mock Student Profile 7's breaking point, significance was determined that students who were not an FFA officer predicted a portion of the variance of social distance ($\beta = .85$; $p = .00$) within the fifth degree of closeness. Mock Student Profile 8's breaking point was the second degree of closeness. Students who were/are FFA Officers, from lower household income levels and reside in rural residence predict a portion of the variance of the social distance at the second degree of closeness.

Table 5
Linear Regression Analysis for Social Distance Towards Mock Student Profile by the Breaking Point in Degree of Closeness

	$\beta(p)$							
Demographic	MSP 1 NO BP	MSP 2 BP5	MSP 3 BP2	MSP 4 BP3	MSP 5 NO BP	MSP 6 BP5	MSP 7 BP5	MSP 8 BP2
FFA Officer	NA	.17 (.42)	.18 (.59)	-.30 (.32)	NA	.03 (.87)	.85 (.00)*	-.95 (.01)*
Team Captain	NA	.21 (.35)	.27 (.41)	-.08 (.80)	NA	-.01 (.98)	-.04 (.86)	.07 (.85)
Traveled Abroad	NA	-.16 (.45)	.33 (.32)	-.49 (.10)	NA	.04 (.84)	-.05 (.83)	-.16 (.66)
Parents' Ed Level	NA	-.07 (.76)	.32 (.32)	.26 (.38)	NA	-.12 (.49)	.02 (.92)	.45 (.23)
Household Earned Income	NA	-.27 (.23)	.32 (.33)	.16 (.61)	NA	-.13 (.45)	.05 (.85)	.88 (.02)*
Home Residence	NA	.04 (.86)	.08 (.81)	.11 (.72)	NA	.11 (.54)	.12 (.62)	.99 (.01)*
Race	NA	.08 (.71)	-.10 (.78)	.09 (.74)	NA	-.10 (.56)	-.24 (.31)	-.44 .24

Note. MSP7 $R^2 = 0.190$ [F (6, 110) = 12.35, p-value < .02]; MSP8 $R^2 = 0.271$ [F (7, 88) = 14.77, p-value < .01]

Conclusions, Implications and Recommendations

Social identity theory posits that people do not have one personal sense of identity, rather multiple identities based on group memberships (Turner, Brown, & Tajfel, 1979). In addition, these salient groups provide a feeling of belonging. In efforts to increase self-image, people boost the significance of the group they belong to, otherwise known as in-group mentality. Within the context of this study, it would appear that the seniors reflect a larger picture of intergroup discrimination occurring in attempt to boost group importance. And considering the

demographics of the participants reflect that of agricultural education throughout the state and country, it is plausible the results mirror a mindset for a much larger population.
Based upon a degree of closeness, set by Tourangeua and Yan (2007), it can be concluded that the senior participants were most accepting of students that reside from a farm background, no matter the racial composition of the student profile. Agricultural education is deeply rooted in production agriculture, so it is not a surprise that no breaking point in the comfortability of each degree of closeness occurred. Similarly, Tajfel, Billig, Bundy, & Flament (1971) found that the subjects within their experiment mostly favored individuals with similar backgrounds in the distribution of rewards. The acceptance of students from farm backgrounds provides some positive contexts for the profession as the students in our secondary programs can assist a variety of students (i.e. new students in the school, students with disciplinary issues, etc.) if the students are reflective of the in-group's culture.

With the exception of having the student serve as the FFA chapter President, the same acceptance can be inferred regarding students who identify with a social class of "Athlete/Non-Farm background. The racial background of the student had no indication to the seniors' degree of closeness. The researchers found it interesting that the social distance scale, although considered highly reliable (Santos, 1999), did not follow the suit of degrees of closeness for the Mock Student Profiles of straight athletes that do not reside on a farm. Within the findings, students were comfortable with the student profile as their roommate, but do not believe they are worthy of serving as the chapter president. Students who reflect similar backgrounds are accepted within the school, agricultural classes, FFA chapter and competitive events, but should not consider themselves for the perceived highest leadership position. Again, social identity theory concurs as Tajfel and Turner (1979) found that group and team dynamics provide an inclusive mindset for individuals with similar cultural backgrounds, but prefer the backgrounds most like them to serve in leadership roles. In order to overcome such mentalities, the academic leader must assist the young minds in separating what is valuable in the group identity and assist them in the value of individual and group identities and how diverse identities further strengthen the dynamic of the team (Garcia Martinez, Zouaghi, & Garcia Marco, 2017).

Unfortunately, the sexuality of the Mock Student Profile played a critical role in the seniors identified degrees of closeness. In MSP 3 and MSP 8, both of which had a sexual identity of gay, the seniors expressed a breaking point in their degrees of closeness when asked if they were okay with the student enrolling in the same agriculture course as them. To assist in developing a more welcoming environment to students who enter a school and/or secondary agriculture classroom, it is recommended, based upon the results of De Pedro, Lynch, and Esqueda, (2018) that LGBTQ support groups and peer and teacher interventions be created. Each are associated with creating higher levels of safety and acceptance among LGBTQ youth in rural schools. Simple steps, such as the completion of *Safe Space* training and certifying members as Safe Zone team member helps in establishing a positive support system, while also developing a more inclusive student program toward students of different sexualities.

As an approach to better understand the social distance established by the seniors, a ranking, derived from the mean of each mock student profiles' degree of closeness. Based upon the ranking, a defining line emerged into what the students were most comfortable with as all four Mock Student Profiles that were identified with a "straight" identity outscored the Mock Student

Profiles that were identified as "gay". These results seem to reflect a common theme in secondary schools regarding the homophobia among teenagers (Pascoe, 2012).

Mock Student profiles 1 and 5 did not obtain a breaking point within the degrees of closeness; however, the other six profiles did. In order to identify a relationship between the demographics collected and the breaking points, linear regressions were utilized. Only MSP 7 and 8 were determined to have significance in predicting a portion of the variance. Both Mock Student Profiles reflected cultural identities of Black and gay; however, they were different regarding their social culture of farm or athlete/non-farm. Based upon the regression models, students who are FFA officers are more apt to provide a lower degree of closeness than the members who were not officers toward MSP8. It is unfortunate that that youth leadership are less accepting of diverse students; however, the lack of acceptance further confirms the social identity of the seniors' group dynamic. Considering the seniors resided from every region within the state and reflect demographics that mirror that of the state, it is posited that these attitudes reflect the youth throughout secondary agricultural education programs.

Brown (2018) was concerned that the current youth generation are subconsciously establishing a segregated community of friends within their school as a gap in socio-economic status continues to broaden. Within this study, the opposite is true as students provided a higher degrees of closeness if they perceive to have a higher family's household income. Coincidentally seniors from an urban community provided higher degrees of closeness than seniors from rural communities.

Establishing an inclusive secondary agriculture program is not an easy task, nor can it be accomplished quickly. Individual mindsets are shaped by the environment and groups that they are associated with (Tajfel & Turner, 1979) and these mindsets are difficult to amend. Throughout society, professional developments are provided to assist educators in gaining skills within the context of culturally relevant pedagogy; however, little results have spurred from such training. As a result, it is recommended that teachers find curricular methods that engages youth in conversations about these sensitive topics. The researchers are not recommending that teachers disengage from the necessary content requirements, set forth by their school and community, rather find ways to reform the curriculum to reflect multicultural education. Banks (1996), developed five approaches for multicultural education reform within the regular content delivery. It is recommended that classroom instruction seek methods that reach the fourth dimension, *content transformation,* and fifth dimension *social and civic action*.

Interventions can be as simple as using inclusive teaching methods or as complex as using multicultural education curriculum within the classroom. Research by Google found the most important factor of contributing to innovation by teams was "psychological safety" or the sense of confidence that a member's contributions will be valued and not embarrassed or rejected (Duhigg, 2016). Designing classroom procedures that promote crossing the homophilous lines and ensures student respect and empathy can be as simple as being cognizant when grouping students and fostering relationships across social groups.

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The Role of NFA Camps in Agricultural Education for Rural African American Boys in North Carolina

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Abstract

The New Farmers of America (NFA) was a national organization existing from 1934 to 1965 when it merged with the National Future Farmers of America (FFA) Organization. S. B. Simmons, a leader in agricultural education throughout African American public schools, and early founder of the NFA, worked diligently to provide a place for rural African American boys to develop leadership, citizenship, sportsmanship, and moral values. This place existed in the form of a North Carolina NFA camp. Established in 1953, the North Carolina NFA Camp, located in Onslow County, saw boys from across the state for a week-long experience. The benefits of the camp branched further than learning to start a campfire or host a cookout. Later dedicated the S. B. Simmons Camp, rural African American boys benefited from leadership classes, recreational activities, and even public speaking to further develop themselves. Although no longer in existence, the morals imprinted in students at the S. B. Simmons Camp are ever apparent today at the remaining North Carolina FFA camp and throughout the National FFA Organization.

Introduction

Just before the 1920's, vocational agriculture was on the rise. The Smith-Hughes Act in 1917 provided federal funding for secondary vocational agriculture programs (National FFA Organization, 2018). Throughout the 1920's, the growth and interest of vocational agriculture became ever popular among rural boys across the United States. Virginia began their own organization entitled the "Future Farmers of Virginia." The idea of the club for boys grew in popularity and the National FFA Organization was established in 1928. During the 1920's and onward to the 1960's, southern schools were primarily segregated. This meant that only white rural boys could participate in the FFA organization, leaving little opportunity for rural African American boys.

During the winter of 1926-27, Dr. H. O. Sargent encouraged the development of the New Farmers of Virginia, which was patterned after the Future Farmers of Virginia. G. W. Owens created a constitution and bylaws for the organization, which spread throughout the state of Virginia and then throughout the South (Norris, 1940). Seven years after the establishment of the National FFA Organization, the New Farmers of America, also known as the NFA, was established (Strickland, 1995). This organization was for rural African American boys enrolled in vocational agriculture. As more secondary schools offered vocational training, the popularity of NFA chapters grew. At the time of the NFA and FFA merge in 1965, there were more than 1,000 NFA chapters and more than 58,000 active members (Strickland, 1995).

Students in NFA chapters received training in traditional farming, farm mechanics, and other areas. Through NFA chapters, students could participate in contests and receive awards according to their achievements. The students were also able to obtain membership awards. There were quiz contests, talent competitions and a quartet contest (Wakefield & Talbert, 2000).

An additional event NFA members could participate in, was going to camp (North Carolina NFA Association, 2018). These camps were not limited to campfires and cookouts, but offered rural African American students valuable skills and benefits they could carry with them the rest of their lives. In the 1930's Camp Orangeburg was created for NFA members in South Carolina (FFA and NFA camps established, 2002). In 1938, Camp John Hope was opened and provided a camping experience for NFA members in Georgia (Tabor, 1947). NFA camps across the South offered similar recreational and leadership activities as FFA camps (Connors, Falk, & Epps, 2010).

Purpose & Objectives of the Study

The purpose of this historical research study was to document the establishment and organization of North Carolina NFA camps, identify the benefits of the camp, and to describe leadership and recreational opportunities available to students involved in the NFA organization. Many current FFA members are unaware that North Carolina NFA camps existed, this is partially due to the NFA and FFA merger. Although, no longer in existence, North Carolina NFA camps have a significant place in the history of agricultural and extension education.

Along with the purpose, this study was an effort to bring the knowledge and awareness of North Carolina NFA camps and their benefits to the agricultural education profession. The specific objectives of this study were to answer the following questions:

1. Who was S. B. Simmons and what was his impact on the New Farmers of America organization?
2. How were North Carolina NFA camps established?
3. What were the objectives and activities of North Carolina NFA camps?
4. How did North Carolina NFA camps benefit NFA members?

Methodology and Procedures

Historical research methods were used to guide the questions and objectives of this study. Historical research involves the systematic search for documents and other sources that contain facts relating to the questions that the historian has about previous events (Borg and Gall, 1983). The researcher used primary sources of information whenever possible (Ary, Jacobs, & Razavieh, 2002). These primary sources include documents such as diaries, manuscripts, and data collected by state and federal agencies that have responsibility for agricultural education or historical information for the United States. This method involved utilizing the documents of the North Carolina State University Rare & Unique Collections, as well as, the North Carolina State University and North Carolina A&T University archives. The location of primary sources was the goal of the researcher and provided a first-hand perspective of the event, a great benefit in a historical research study. The researcher also used secondary sources that included data from

published newspaper articles and information provided by institutions in the agricultural education and cooperative extension fields. Secondary sources were prepared for comparison against primary sources only to understand their accuracy (Ary, Jacobs, & Razavieh, 2002).

All documents and relics identified were analyzed for external and internal criticism. External criticism was achieved by inspecting documents for an author to ascertain that each document was in fact by the claimed author and was a valid relic from that time. Internal criticism was achieved by analyzing the information contained within each primary source. The information was analyzed holistically and a cross-examination of documents was performed. Similar primary sources were compared to identify that the information being presented was similar across multiple sources.

It is difficult to assign a particular research priority to this historical research. However, AAAE Research Priority Three (Stripling & Ricketts, 2016) addresses not only the need for a scientific workforce but also the need for a diverse population of people who are essential for the profession. This research paper examined a time in history prior to and right after the merger of the NFA and FFA. The research recounts a time when the FFA recognized common goals of the organizations and the need for a more diverse national organization.

The NFA Camp in North Carolina was dedicated as the S. B. Simmons Camp in 1958 after his death in 1957. To aid in readability throughout this historical study, the term "NFA Camp" and "S. B. Simmons Camp" are used interchangeably.

Results/Findings

Question One - Who Was S. B. Simmons and What Was His Impact on the New Farmers of America Organization?

Born Sidney Britten Simmons in North Carolina in 1884, S. B. Simmons led a long career associated with agricultural education. His education ranged from being one of the first students to study at Fayetteville State University, to receiving degrees in Agricultural Education from both North Carolina A&T State University and the University of Illinois with further educational studies at the University of California, Kansas State, and Colorado State College. His association with agricultural education continued as he held positions at Topeka Industrial School, Dowington Industrial School, and as a Teacher-Trainer for Vocational Agriculture at Tuskegee Institute. He brought his wealth of knowledge, and status of longest service to agricultural education of any African American in the nation, when he accepted a position at North Carolina A&T State University as the Assistant State Supervisor for Negro schools. He served in this position from 1930- 1957. At the time of his arrival, there were 23 departments of vocational agriculture, with 24 teachers in the state. His work with county and state offices increased department numbers to 142 with 144 teachers at the time of his death in 1957.

Simmons is known as a founder of the New Farmers of America Organization. His enthusiasm for the project left him actively planning the first meeting and partially responsible for the growth and development of the organization. He is credited with advancing the North Carolina Association of New Farmers of America. It is under his supervision that the program of

vocational agriculture in the Negro schools of North Carolina was deemed one of the top programs in the nation. A long-time dream of his, the North Carolina NFA Summer Camp at Hammocks Beach, valued at $80,000.00 was one of his last accomplishments before his death. Dedicated the S. B. Simmons Camp in his honor, the road to acreage for the camp was many years in the making (Bell, Dean, Johnson, & Yates, 1958).

Question Two - How Were North Carolina NFA Camps Established?

The idea for a North Carolina NFA camp came to S. B. Simmons long before the 1953 establishment of the NFA camp in North Carolina. While an FFA camp was established in White Lake, NC in 1928, it was off limits for rural African American boys. There was no established camp for rural African American boys at that time, so S. B. Simmons occasionally held temporary camps at different locations throughout the state. It was the goal of S. B. Simmons to secure acreage for an established camp for NFA members in North Carolina (Bell, Dean, Johnson, & Yates, 1958).

Simmons's ideas for a camp date back to 1927 when he held the state's first NFA camp at the Pitt County training school. This camp was described as a "weekend outing" consisting of about 35 boys. Later, in 1932, the North Carolina NFA held the first full-fledged camp at Kitrell College in Vance County. A. H. Peeler, principal of Price High School in Greensboro, North Carolina led the effort. However, S. B. Simmons realized that due to distance and poor roads, one camp in North Carolina could not serve boys all over the state. As a result, two district camps were established—one at Chowan Beach, near Winton, and a Boy Scout Camp near Kings Mountain. After the establishment of the two district camps, the North Carolina NFA decided that one North Carolina NFA camp, established at Chowan Beach, was advisable. Before work began on the permanent North Carolina NFA camp, World War II broke out, and the project was delayed (Dedication Program of the S. B. Simmons Camp, 1958). The plans for a permanent North Carolina NFA camp may have been halted, but Simmons' dream of a building of a North Carolina NFA camp was ever growing (Mosquito Express, 1956).

The war delay came as a blessing to the North Carolina NFA. In 1949, Dr. William Sharpe of New York City, deeded 4,500 acres of land on Queen's Creek in Onslow County to the Hammocks Beach Cooperation. This cooperation represented the North Carolina Teachers Association, their families, and other educational groups, including the North Carolina NFA (Dedication Program of the S. B. Simmons Camp, 1956). The North Carolina NFA immediately put in an application for a 50-year lease on 27 acres of the land. The site was selected as the North Carolina NFA Camp and work began on its development (Dedication Program of the S. B. Simmons Camp, 1958).

One year after his death in 1957, the North Carolina NFA Camp that S. B. Simmons worked diligently to establish, was dedicated in his honor (Dedication Program of the S. B. Simmons Camp, 1958).

Question Three - What Were the Objectives and Activities of North Carolina NFA Camps?

With the establishment of the North Carolina NFA camp in 1953, the dream of S. B. Simmons was carried out to give African American rural boys the opportunity to develop leadership, citizenship, sportsmanship, and moral values in the form of a week-long camp. In order to meet these goals, S. B. Simmons saw great value in training counselors and educators to aid in leading the camp (Mosquito Express, 1956). Mr. S. B. Simmons felt that the effectiveness of any camp in meeting the needs of its campers was dependent largely upon the counselors (Dedication Program of the S. B. Simmons Camp, 1958). A workshop was conducted and consisted of one week of actual camping experience, living in the same army tents that campers would. This experience was found to be very informative and gratifying, and motivated the interest of the teachers in supporting the NFA camp idea (Mosquito Express, 1956). The workshop also provided a large number of teachers, some who would serve as counselors, practical experience in camping. The training of the counselors paid off, because they realized the benefits of camping and put forth special efforts to raise funds to improve the facilities of the camp (Dedication Program of the S. B. Simmons Camp, 1958).

The early facilities of the newly established North Carolina NFA camp consisted of boys being housed in old army tents and eating meals at the dining room for the North Carolina Teachers Association, which was located about one mile away. This routine lasted for three years (Dedication Program of the S. B. Simmons Camp, 1958). Multiple camp fund drives were launched, the first in 1953 for the construction of an administration building and bath house. Enough funds were raised and another fund was launched in 1955 to construct cabins to properly house NFA campers for the following year (Mosquito Express, 1956). To aid in the fund drive, F. D. Bluford, President of North Carolina A&T State University sent a letter to S. B. Simmons regarding the fund drive and giving his endorsements. In his endorsement letter, he certified that S. B. Simmons and the NFA were building a "very fine educational and recreational center" that he "shall be very happy to commend" to his friends "as being worthy of their consideration and liberal support" (Bluford, 1955, para. 2). A confidential report of the fund raising campaign described from the 1954 fund drive, essential buildings would be constructed and tents would be used for additional camping facilities. Also, the construction work would be completed by NC NFA members (Confidential Report of Fund Raising Campaign, 1954). In an effort to raise funds for the facility, advocates of the camp described all of the uses the camp had to offer. A letter from the Director of Vocational Education, J. Warren Smith, described that the NFA camp would be utilized not only by the 8,319 rural African American youth enrolled in vocational agriculture in North Carolina, but also by the considerably larger amount of African American girls enrolled in vocational home economics. Stressing that the camp would be used by both populations was a key point in his letter in order to gain additional funds (Smith, 1955).

After the initial fundraisers of the camp concluded, additional needs were displayed in a brochure by the North Carolina NFA Members at North Carolina A&T State University providing a financial layout of what had been spent, and what was still needed. Among the amenities still needed were eight cabins—17' 4" x 28' at $2,500.00, one shop building, shop equipment and supplies, kitchen equipment and installation, a pier, landscaping and developing play area, along with two incinerators and a flag pole (North Carolina Association of New Farmers of America, 1955). Those who contributed to the NFA Camp Fund wrote to S. B. Simmons, or one of his associates, explaining the amount of the donation and specifying how the donation was to be used (Hogewood, 1955). Information documented in "A Summary of the

Money Collected by the Various Chapters for the N.F.A. Camp Also a Summary of the Chapters Who Participated in the Summer Camp" revealed that many NC NFA chapters assisted in donating money to the NFA Camp Fund through deposits of persons who did not attend camp. If a deposit was made, but a camper was unable to attend, the Vocational Agriculture Teachers Association agreed that the amount be added to the total camp contribution.

The fundraising work of S .B. Simmons was noted by several who wrote him congratulating him on his success in the creation and development of the camp. In one letter, A. L. Teachey, North Carolina Supervisor for Agricultural Education, wrote, "Frankly I was surprised at the beauty and convenient arrangement of the two buildings already completed. I want to congratulate you and all the people who made financial contributions and who participated in the planning and location of these buildings" (Teachey, 1955, para. 2). He also described that the camp grounds "have great possibilities for landscaping and becoming a place of beauty and with an air of restfulness and inspiration for many present and future NFA members" (Teachey, 1955, para. 2).

To carry out the initial objectives of the camp, a wide range of activities took place across the camp. Training began the moment the boys arrived to camp. The boys and counselors were assigned to camp chapters. There were no cliques at the North Carolina NFA camp. Every effort was made to divide local chapter groups and give campers the opportunity to meet boys from other parts of the state (Munger, 1955).

The boys of the NC NFA were housed in cabins, labeled by letters A-F. These cabins were how the boys were split up and assigned to different tasks throughout the week. Each cabin was responsible for conducting a vesper service, campfires, and cleaning duties. To coordinate the weekly activities of the cabins, officers were elected. A president, vice-president, secretary, treasurer, and reporter were appointed for each cabin. Cabins also housed several advisors (Mosquito Express, 1956). Camp chapters were established among the cabins and each chapter planned its own program for the week, which was reviewed by the camp director (Munger, 1955).

The camp program for the boys would begin similarly each day with a flag-raising ceremony, camp clean-up, and breakfast. The next part of the day would involve four hours of educational activities. These would include, practice in planning and conducting meetings, budget making, extemporaneous speaking, along with experience in meeting and getting along with people. Elective activities such as recreation or craft-work and citizenship activities would take place after lunch. Finally, flag-lowering, vespers, and a campfire program would close the day's formal activities. As a past-time campers would partake in a fish fry or cookout. During social hours, campers communicated with members from other parts of the state and shared life problems and dreams (Munger, 1956). Lights in the barracks were turned off at 10:30 P.M., marked by the distinct sound of a bugle (Mosquito Express, 1956). Friday morning concluded the camping week with a special assembly (Munger, 1956).

The facilities for activities to take place were equipped with many resources. In a letter from Harold L. Noakes to S. B. Simmons, he wrote that "the program possibilities at Hammock Beach are limitless." In addition, he wrote that "the waterway provided miles of protected water for safe boating." In his letter, he also commended the camp and gave his personal thought that the camp

could become "one of the most outstanding youth camps in the United States" (Noakes, 1953, para.6).

A camp director, counselor, and chief along with class instructors, cabin counselors, store keepers, camp inspectors and news staff oversaw the activities of the North Carolina NFA camp and assisted in running various events throughout the week. There were different supervisors for each activity every day. Recreational activities were carried out; however other topics were also focused on. The North Carolina NFA camp offered valuable information on forestry, electricity, arts and crafts, highway safety, leadership, citizenship and others, which varied by week. North Carolina NFA boys attending camp June 18-22, 1956, specifically, had the opportunity to attend informative classes on the use of electricity on the farm and in the home. What made the electricity class unique, is Eugene H. Laycock, a representative from the Carolina Power & Light (CP & L) Company in Wilmington, NC directed the classes to the boys, rather than an agricultural teacher. He emphasized the many benefits of electricity in that time and stressed the importance of using electricity in the right way (Mosquito Express, 1956).

There were multiple activities completed at the S. B. Simmons camp. Some involved recreation, leadership and development of skills, while others were merely to pass the time and bond with other NFA members. The campers may have thought they were just having fun or conducting the normal schedule of camp, however, the benefits of the activities carried out at the North Carolina NFA camp, were numerous and impactful to the rural African American boys of the North Carolina NFA.

Question Four - How Did NC NFA Camps Benefit North Carolina NFA Members?

Members of the North Carolina NFA organization did not only attend camp to participate in recreational activities. They attended to gain skills outlined in the objectives of the camp, to develop leadership, citizenship, sportsmanship and moral values. These objectives were carried out by the camp and allowed those who participated to benefit greatly (North Carolina Association of New Farmers of America, 1955). It was the hope of State Leaders, such as, A. L. Teachey, that the camp provided opportunities for boys to develop good citizenship and leadership practices and habits in addition to wholesome recreation (Teachey, 1955). The skills the boys gained from the camp were taken back to their chapters to help their advisor train other members (Simmons, 1942).

The camp program was set up to give the boys, future North Carolina farm leaders, an introduction to democracy in action. Simmons described it as: "The main function of the camp is to provide leadership training. Leadership training has been interpreted to cover all activities in which a farm boy might participate and which will help him to develop a well-rounded personality and character." Simmons also stated that, "American leadership is based on democracy. This philosophy is the basic philosophy of the camp" (Munger, 1955 para. 3-5).

An NFA member could practice and understand citizenship by giving an hour of labor to a camp improvement project. These were usually group activities such as conservation practices, or timber improvement. These experiences not only practiced citizenship, but allowed the boys to

partake in a bonus experience that would be useful when they returned to their families (Munger, 1955).

North Carolina NFA boys were also taught the art of reflection through the NFA camp. During the Friday morning assembly, they presented a report on the phase of camp that most inspired them and provided improvements for the week (Munger, 1956). The Friday morning programs not only allowed for reflection, but also the display of leadership and other skills. A visiting principal raved over the work of the agricultural teachers by the boys being able to "carry out a program, without the benefit of formerly knowing each other, rehearsing, or even, the acquaintance of the surroundings" (Mosquito Express, 1956, p. 8). This principal also noted that the training and experiences the boys obtained showed in how they were able to conduct themselves during the assembly were "unmistakably invaluable to our boys." The principal also noted that his school program and other youth organizations would do well to encourage more of this type of "Learning by Doing" (Mosquito Express, 1956, p. 9).

Public speaking was a skill practiced at the North Carolina NFA camp as boys ran for camp chief. One boy from each cabin was selected to run for camp chief. A campaign was conducted, along with speeches. The campaign speeches were made in front of the camp. Through these speeches, the boys practiced speech writing and presenting. This type of activity taught fair play to the NFA campers. Along with this, the art of patriotism was practiced every day at the flag-raising ceremony. The proper ceremony was conducted each day from formation of campers, salute to the flag, and rules for flag raising (Mosquito Express, 1956).

Additional leadership skills were taught through classes at the NFA camp. Through these classes, the NFA campers learned about leadership and how to serve as a leader. The leadership classes covered areas such as duties and responsibilities of various committees, and the essentials of an active chapter. The information presented by the teachers left little excuse for the boys to not have a more functioning NFA chapter the next fall (Mosquito Express, 1956).

Practicing recreational skills is an additional way in which each camper benefitted from NFA camps. The boys at the North Carolina NFA camp practiced recreational skills everyday by participating in elective activities such as swimming, and softball. These skills promoted healthy exercise of the campers and instilled healthy habits into their lifestyle. Recreational activities also promoted team-work and team building exercises. Sportsmanship, along with the building of character, were seen throughout these activities. The development of moral skills adds another benefit of the youth who attended the NFA camp. W.T. Johnson, NFA Executive Secretary in North Carolina wrote, "The camping program at the S. B. Simmons Memorial Camp is no different from that of other camps. The major objective is to give each camper a true sense of values and awake in him a desire to develop into a fine person" (Johnson, 1962 pp. 248-249).

Campers benefited from skills such as friendliness as they were encouraged to smile and openly talk to others. Campers practiced cooperativeness by following camp rules and listening to camp staff. Participation was encouraged for all camp activities, as well as, good housekeeping skills. The cabins and campgrounds were to be kept clean at all times. Conversation was encouraged during social hour and at every meal (Future Farmers of America, n. d.).

S. B. Simmons and others noted the great benefits the NFA Camp had on rural African American boys in North Carolina. J. M. Seabrook, Chairman, Hammocks Beach Board of Directors wrote S. B. Simmons discussing the success of the camp. He explained in his letter that "the camp was well-managed" and that he knew "nothing being done in our state that excels your efforts to prevent juvenile delinquency and to build useful citizenship" (Seabrook, 1955, p. 1). S. E. Duncan also noted the camp could result in rural leadership, conservation, outdoor living, health and recreation. In addition to those outcomes, Duncan also noted "There will, no doubt, be added many others which may accrue from contacts with representatives of the State Forestry Department, the State Highway Patrol, Health Department, religious and educational institutions and other agencies. For such is sorely needed at the moment" (S. E. Duncan, 1955, p. 1). Within his letter, Duncan thanked S. B. Simmons and offered his support in the furtherance of the camp on behalf of "today's and tomorrow's citizens" (Duncan, 1955, p. 1).

The objectives of the S. B. Simmons Camp in North Carolina were to develop leadership, citizenship, sportsmanship, and moral values among the campers who attended. Through the various activities, classes, and past-times across the camp, over the course of a week, campers reaped many benefits that shaped them into stewards of agriculture who possessed great skills that could follow them the rest of their lives.

Conclusions

In 1965, a national merger between the Future Farmers of America and New Farmers of America occurred. Once this merger occurred, the New Farmers of America no longer existed by itself, but as an integral component of the Future Farmers of America Organization. The S. B. Simmons camp was left open and served as an FFA Camp for youth studying vocational agriculture across North Carolina. The purpose of the camping period remained similar in giving supervised recreation and leadership activities to the youth studying vocational agriculture in public schools. The camp still called for giving supplemental training and education in agriculture, conservation of natural resources, practical and safe use of electricity, citizenship, swimming, and water safety, while providing more interest in the arts and crafts. A similar schedule was followed where campers were divided amongst cabin, officers were elected and select candidates ran for camp chief (Future Farmers of America, n. d.).

The S. B. Simmons Memorial Camp stayed in operation for many years after its dedication in 1958. Due to declining participation, the North Carolina FFA transferred its lease and assets at the S. B. Simmons Camp to the North Carolina Association of Vocational Educators and Other Professional Workers. The last of three FFA camps in North Carolina is still under operation in White Lake where North Carolina FFA members travel across the state to attend every summer (North Carolina NFA Association, 2018).

The S. B. Simmons Memorial Camp was the only established NFA camp in North Carolina. Rural African American boys from across the state of North Carolina were impacted by the camp due to its many benefits. Campfires and campaign speeches were two of the limitless opportunities available to the youth who attended. Leadership, citizenship, moral values, along with many other skills were focused on by the camp and taught to campers (NFA Camp Booklet, n. d.).

As the New Farmers of America Organization no longer exists, it is important to understand how rural African American youth are still benefiting from opportunities available to them, just as North Carolina NFA youth benefitted from the S. B. Simmons Memorial Camp. Opportunities for African American youth in the National FFA Organization are at an all-time high. The same benefits that North Carolina NFA members received at the S. B. Simmons Memorial Camp are being offered to African American members in North Carolina, and across the United States. There are leadership workshops at the local, regional, and state level that prepare students to lead a changing world. Citizenship, patriotism, cooperativeness and healthy lifestyles are among the same objectives of the North Carolina NFA camp that are still being promoted today through the National FFA Organization (National FFA Organization, 2018).

Although the S. B. Simmons Memorial Camp no longer exists to develop leadership, citizenship, and moral values among rural African American boys; the foundation it laid for impacting youth did not go without notice. In addition to serving the 8,319 rural youth enrolled in vocational agriculture, the camp also served African American girls involved in vocational home economics and by the State Parent-Teachers Association to host a camp for disabled children (Smith, 1955). The property has since been dismantled and Hammocks Beach now serves as state park. As the North Carolina FFA continues to grow in size, the land could be re-acquired and further developed into additional resources to enhance youth development across the state.

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What We Can Learn From a "DeaFFA" Community

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Introduction

According to Gallaudet University, there are 108 schools for the deaf and hard of hearing in the United States (Gallaudet University, 2018). An increasing number of these special population schools are incorporating Career and Technical Education (CTE) programs into their curriculum as a way to provide more postsecondary outcomes for their students. Currently, there are five known and "official" Agricultural Education programs in deaf schools: Alabama Institute for the Deaf and Blind, Kentucky School for the Deaf, North Carolina School for the Deaf, South Carolina School for the Deaf and Blind, and West Virginia School for the Deaf and Blind. These are "official" programs in that they are recognized as a chartered FFA chapter, according to the National FFA Chapter Locator feature on the organization's website (National FFA: Chapter Locator, 2018).

The youth organization FFA is not required for the fundamentals of the agriculture industry to be taught, however it is a key component of the nationally recognized three-circle model of Agricultural Education. FFA chapters not being chartered in deaf schools is just one sign of a lack of inclusion for this special population of students. While there are no rules barring deaf students from participating in FFA programs, many aspects of the FFA Organization, as well as the even broader agriculture and CTE models, are not inclusive or modified as of yet to meet the needs of deaf and hard of hearing students. For example, the FFA creed is a very poetic and properly written English composition which does not translate easily to American Sign Language (ASL); similarly, many contests and activities involved with the organization are not feasible for deaf populations to perform equally in, as they are written and scored in a way that only those who speak a verbal language (as opposed to visual) can succeed. One disadvantage the deaf encounter within the school system is English language development. Deaf students cannot easily relate their own visual language to the reading and writing components of English. In agricultural content areas that rely heavily on written and verbal skills, deaf students will score lower. However, this does not correlate to an inability to perform within the content area, nor does it correlate to intelligence levels of deaf students. A modification of the content into ASL places the deaf student on a more equitable performance level as hearing students (Reese, 2004).

There is currently a gap in deaf inclusion within Agricultural Education, as evidenced by the relatively low amount of agricultural programs in schools for the deaf. This calls for action from the National FFA Organization, in conjunction with professional CTE and Agricultural Education organizations, to work together to reexamine components of the three-circle Agriculture Education model to become more accessible for deaf and hard of hearing populations. This action aligns with recent trends and initiatives in the National FFA to create a more inclusive organization. In 2016, the National FFA created a committee for "Exploring Methods of Increasing Diversity & Inclusion in National FFA Programs" (FFA: Needs of the Committee, 2016). This committee released a report outlining the ways the organization was making efforts to include various cultural and ethnic groups, as well as methods of including

special needs populations. Deaf and hard of hearing students were addressed only regarding the commitment to providing ASL interpreters during competitions, events, and speeches, which is required under the Americans with Disabilities Act (ADA, 2010).

The deficiencies of the literature at hand are evident in regards to the population of deaf and hard of hearing students within Agricultural Education. This deficiency could be a result of the "low-incidence disability status of deafness." With modern advances in medicine and assistive hearing technology, the prevalence of deafness and hearing loss is on the decline; this means some people have never encountered a deaf person (Reese, 2004). Even so, there is still a significant population of students with hearing impairments in US schools. There are currently no publications circulating the *Agricultural Education Journal*, nor the umbrella *Career and Technical Education Journal*, that study the method of teaching agriculture to deaf audiences. The articles regarding special needs populations as a single group do not account for the individual differences that come with various disabilities. Sample sizes are also very small in all studies, making the replication of this data difficult to assess and apply in other states or programs.

In addition, there are no studies currently in publication which recognize deaf schools in their development of agriculture programs. The development of a deaf agriculture program requires heavy modification, navigation of funding, and intense planning to ensure the program is meeting the needs of a hearing impaired population, many issues which the typical Agricultural Education program may not face. If a prospective deaf educator researched how to start a program in their school, they would find little to no evidence backed by scientific research to build from. Overall, there is much work to be done to ensure that deaf and hard of hearing students are provided opportunities to participate in Agricultural Education. This is a substantial task, and perhaps the best place to begin is to examine what schools with deaf populations are already doing to provide their students access to Agricultural Education and the FFA Organization. This study clearly addresses Research Priorities 3 and 4 of the AAAE Research Agenda: Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century (Priority 3) and Meaningful, Engaged Learning in All Environments (Priority 4) (Roberts, Harder, & Brashears, 2016).

Purpose/Objective

The purpose of this study was to provide evidence which can serve as a guidepost for other educators in schools for deaf and hard of hearing populations wishing to establish an effective agriculture program. This topic has the potential to expand boundaries and spark highly influential discussions amongst people from all areas of education and community development. Most importantly, the educators of deaf students, in deaf schools and deaf communities, were given a voice to express ways in which we can accommodate their needs alongside the needs of others to create a harmonious system with which to advance the agricultural industry.

Specifically, the objective presented here guided this particular facet of a larger case study. The goal of this part of the study was to provide insight into Agricultural Education in a deaf school by spotlighting a successful program with the intent of creating awareness that will lead to more

opportunities for deaf students in the agriculture industry. In addition, the researcher asked the question, "what can others learn from an established agriculture program in a deaf school?"

Methodology

An exploratory, intrinsic single-case study (Stake, 1995; Creswell, 2006) was conducted at the Kentucky School for the Deaf (KSD). The site was purposefully selected due to the unique perspective of the school. Yin establishes reasoning for a single-case design that provides validity to the single-site nature of this case study, knowing that other cases similar to KSD do exist. In chapter two of his book, Yin provides five potential rationales for single-case designs, of which KSD can be categorized as "critical, unusual, and revelatory" (Yin, 2003, p 49). KSD is a *critical* case in that the agriculture program has proven to be well-established and developed, with a large network of participants; *unusual* in that there are currently only five known programs of the kind in the United States; and *revelatory* in that "the researcher has an opportunity to observe and analyze a phenomenon previously inaccessible to social science inquiry" (Yin, 2003, p. 50). This is due in part to the researcher's relationship with the school and educators. Yin (2003) recommends the following types of information be collected in a case study: documents, archival records, interviews, direct observations, participant-observations, and physical artifacts. This article will address some of the findings from interviews conducted at the site.

Joseph Maxwell (2013) succinctly justifies the purposeful sampling of interviewees for qualitative designs such as this in his book *Qualitative Research Design: An Interactive Approach*. Here, Maxwell states purposeful selection is preferred over random, representative sampling because "particular settings, persons, or activities are selected deliberately to provide information that is particularly relevant to your questions and goals, and that can't be gotten as well from other choices" (Maxwell, 2013, p. 88). Staff, students, and community supporters who were interviewed for this case study were selected because they have directly impacted/have been directly impacted by the agriculture program at the Kentucky School for the Deaf.

Participant selection for these interviews should be viewed in a three-stage process: first, the researcher gained access and initial knowledge of the program from the coordinator, the agriculture teacher. Next, inquiry was made of any other sources who may have aided in the creation or maintenance of the program. Finally, products of the program (i.e. current and former students) were sought out who could provide a perspective of the program as a participant.

The most obvious participant to be approached first was the agriculture teacher of the school. Having worked alongside the Kentucky School for the Deaf agriculture teacher, the researcher felt as if they had gained access to this program, in a unique way that not all researchers may be able to receive. This teacher is the gatekeeper (Tracy, 2013, p.71) for the program, and would theoretically provide the richest data, as the original founder of the program. Upon making initial contact about the study with the teacher, the researcher obtained a letter of approval from the assistant principal of KSD, stating the researcher was welcomed on the campus, and all materials must be viewed and approved prior to interaction with current students. Though no mention of current staff was found in the letter, the researcher also provided all materials concerning

interviews with staff members to the administration as well, in order to maintain professional courtesy and open communication.

The next category of participants were people who have had an influence on the creation or maintenance of the agriculture program in the school. The idea for this category came from researcher knowledge that KSD's program was developed with the assistance of two Kentucky FFA employees, as well as a former principal of KSD.These potential participants were identified when the teacher was asked about their support system as they have developed their program. These participants will further be categorized as "community supporters" and serves as the catch-all term for anyone who could provide rich data to meet the objective of this study. Finally, the teacher was asked to identify students from the program who could provide the richest data about a student's perspective in the program. The ideal was to obtain student responses from both former and current students of the program.

In total, there were 17 interviews conducted in this study: 1 current student, 4 former students, 4 current teachers/staff at the school, 1 current administrator at the school, 3 former KSD educators, and 4 community supporters. 12 interviews were conducted onsite at KSD's campus. 3 interviews were conducted virtually, and 2 interviews occurred at an offsite location. All participants were provided with both a verbal and written overview of the case study they were agreeing to participate in, as well as a consent form signed before their interview.

All participants were prompted to conduct their interviews in whatever communication style they felt most comfortable with (Spoken English, Signed English, American Sign Language, or a mixture of any of these). Where spoken English-only communication was used, the interview was recorded with only a voice recorder. Where a mixture of spoken English and Sign Language were used (as in the event of an interpreter voicing the signed interview), video recording was used. Virtual interviews occurred via FaceTime and a screen recording of the conversation was utilized. All recordings were taken for transcription purposes only. A Sign Language interpreter was to be present at any time when ASL was used. The researcher has some understanding of the language but was not confident enough to conduct this entire study without the interpreters. This understanding was beneficial for the study as the researcher could comprehend some of the language and the culture of ASL communication, nonetheless, and was able to get the effect of the interviewee's body language.

All transcriptions were analyzed and coded for emergent themes and patterns. Data was analyzed using the structural coding method as outlined in *The Coding Manual for Qualitative Researchers* (Saldana, 2009). This method was chosen because the research questions were exploratory in nature and the researcher wished to get broad, overarching themes that will lead to a better understanding of the situation before further research can be done in the area. After data collection and transcription was complete the researcher used these narratives to piece together a comprehensive story that examines the agriculture program. Significant, recurring patterns will be spotlighted in this article.

In the context of qualitative studies such as this, it is impossible to eliminate all researcher bias. However, to prevent threats to validity, the interviews were conducted, to the best of the researcher's ability, with an open mind, disregarding anything seen or learned previously during

the researcher's time working with the school. Interview questions were made broad enough to encompass the viewpoints of all potential participants, both previously known to the researcher and newly introduced for the study.

Findings

Upon review of the coded interview transcripts, the following themes emerged from the study:

Creating the Program

Most of the knowledge gained from interviews regarding the start-up of the KSD agriculture program and FFA chapter came from a former principal and the current agriculture teacher, as well as the 4 former students. The main takeaway from them was creating this program being described as a perfect storm, or more positively phrased "synergy," in that it all came together at just the right time with just the right people. Upon digging further into the story, however, the interviewees did reveal some factors that possibly played a role in creating this synergy. For instance, the principal who hired the agriculture teacher says he (the principal) grew up on a family farm and has always had a deep appreciation, not only for the agriculture industry, but for teaching hard work and strong work ethics to students. Similarly, the agriculture teacher has a deep appreciation for agriculture, and had many years of experience in the industry. The agriculture teacher had also worked for many years in various roles at KSD, and had worked her way up in leadership positions. This allowed her to have a thorough understanding of the school, the students, and Deaf culture. It can be suggested that a love of agriculture, in addition to the ability to communicate effectively with students, and the availability of supportive administrators all play a huge role in allowing a program like this to be possible.

Throughout the past 10 years since the KSD agriculture program was created, it has seen much growth and progress. The program has always hosted two career pathways: Animal Science and Plant Science. The agriculture teacher reports having taught courses such as Greenhouse Technology, Landscape Design, Crop Technology, Small Animal Technology, Large Animal Science, Equine Science, Poultry Science, and a general Principles of Agriculture course. The program is in possession of 43 acres of land that students appear very appreciative of, on which they have the opportunity to plant and harvest various crops, and build a successful poultry production from which they sell eggs in the community. Other teachers in the school report having collaborated with the agriculture teacher to co-teach agriculture science and poultry lessons at the middle school level, and an aquaculture class at the high school level. There are a variety of tools and lab spaces available for students within the program. From what was gathered in interviews, the program was created because the teacher was highly motivated and highly qualified; the administration and fellow teachers were highly supportive; and the community had an appreciation for the agriculture industry and understood the necessity of it being taught to these students. A school could theoretically orchestrate any piece of this story to begin their own program.

Start Small

The interviewees were asked questions such as, "what advice would you give to a school wanting to start an agriculture program like this one?" The resounding answer received was, "start small." Interviewees discussed the importance of examining what the school has available to it currently, what resources they could expound upon, and building from there. It can be easy to look at KSD, with their large farm and variety of labs and tools, and become overwhelmed, thinking those things are not within reach. But just like most public school programs, KSD started out with very little and due to support from administration/the community and the hard work of the agriculture teacher, within 10 years it has blossomed into an agricultural mecca that it is today.

Determining the needs of the students and the community served is another suggestion made by the interviewees. Find out the specific needs that can be addressed and choose one at a time to build upon. If one lives in an area where students can be placed in job options involving lots of horticulture and plant science, perhaps that is the area to focus on first. If later it is evident that there is also a need for more knowledge with small engines or aquaculture, then add those subjects and their corresponding labs in as the program progresses. It is not necessary to teach every single subject in agriculture immediately. Find out what the community wants, what the students need, and what resources are available. Interviewees report other schools should start with these small tasks, and build from there.

Agriculture Suits This Audience

The agriculture industry provides experiential learning and concrete evidence of abstract concepts, which is reported by interviewees to be directly beneficial to the deaf child's learning style. Agricultural Education suits this audience because it accomplishes many goals that deaf schools share, such as teaching children life skills for post-graduation, providing career options, and exposing students to new experiences and opportunities in a safe, controlled environment. The interviewees expressed how agricultural classes and the FFA chapter at KSD has taught its current and former students how to work, as well as the value of work. It has also shown them the concrete evidence of work – pulling a line from the FFA Creed, students get the chance to experience the joys and discomforts of agricultural life, while also witnessing the fruits of their labor. Students at KSD report craving exposure; they want to experience the world around them and they have a curiosity about agriculture and where food comes from. Staff at KSD report this is because food is a concrete idea, students eat it every day, and growing food is a concrete, visual process students can experience for themselves. Students report learning from their agricultural classes, they report having fun while learning, and they report that agricultural classes have helped them with their postsecondary outcomes.

FFA

The FFA chapter associated with the agriculture program at KSD is an interesting concept to be discussed as its own entity. Interviewees report KSD FFA is synonymous with KSD agriculture courses, which shows that the FFA at this school is highly intracurricular, as was the original intention of the organization. When asked what teachers at the school think of the agriculture classes, it is said they think of the students in their Official Dress, and they associate it with the FFA emblem. Most of the stories teachers told involved them calling the program the "FFA"

program, grouping the classes under the title of the student organization. It can be inferred that the FFA component of KSD agriculture is the most visible and prominent. FFA at KSD has been compared to athletics in the deaf school world, which are very popular amongst the students and creates the greatest sense of community both within the school and amongst other deaf schools. For the FFA to be regarded in the same light as the basketball or volleyball teams, this can culturally be considered a great compliment.

Some of the most notable positive impacts the FFA has had on the students include the sense of pride and inclusion they report having felt, as well as the exposure and opportunity the organization provides. Some students report wearing the standard official dress of the FFA is the first time in their life that they have been "dressed up" in "formal" attire. Families of students in the community often cannot afford these clothing items, so the agriculture teacher uses chapter funds to provide them when necessary to give the student a fair opportunity. Having a smaller student body to provide for proves advantageous in this case, as larger programs may not be able to afford this.

Additionally, being a part of the FFA may be the first time the deaf child has felt truly included and represented in their young lives, especially if they have felt outcasted by public school systems or their own families due to communication barriers. Student interviewees reported over and over again feeling a sense of pride, and loved having KSD represented on the back of their jackets. FFA is a place of refuge for many students across America, and can be even more so for a deaf child who would otherwise be "left out" of the hearing world activities. The FFA organization is very popular in Kentucky, and particularly in the central Kentucky regions that surround the school. KSD FFA members report when they put that jacket on, they view themselves just as much a part of the organization as anyone else, no matter their disability or lack thereof.

This organization at KSD has also given students opportunities to travel – for many students, it was their first time leaving Kentucky when they traveled to National Convention. One interviewee reported the National FFA concert was the first concert she had ever been to, and expressed her thanks to the agriculture teacher and the National FFA working together to provide seating arrangements and an interpreter to give her that experience.

One final notable component of the FFA chapter at KSD are the accommodations the teacher must often make in light of the formality of the FFA chapter. A concept that was described to me by one of my interpreter participants is that the FFA contains a lot of "frozen text," which are texts that never change, such as: the FFA Creed, officer installation ceremonies, degree conferring ceremonies, and the officer stations in opening ceremonies. These must all be translated into American Sign Language, and interpreters work closely with the students and the agriculture teacher to make this happen. The frozen texts themselves are not a challenge, so much as the translation.

Challenges

Just as the formality of the FFA organization can have a positive impact on students in deaf schools by teaching professionalism, the teachers at KSD also report this formality can actually

be quite foreign to the students because of their culture, thus making some aspects of the FFA a difficult concept for them to master. For example, the deaf typically communicate very directly, so the verbiage and the formality of running a meeting with parliamentary procedure may seem ineffective to them – if they want your attention or want to say something, they are used to just getting your attention and saying it. The Deaf culture as a whole is very informal and conversational – there is no need for formalities when one is amongst a very select group of people who can communicate effectively in ASL, in a way the general hearing public cannot. This is not to say the students cannot learn parliamentary procedure, but simply this may be an area that is new to them and may be a challenge when starting an FFA program in a deaf school.

Another challenge reported by interviewees is the residential aspect of the school and the widespread student population across the state. Public school FFA chapters are familiar with conducting activities at night, on weekends and during the summer. Chapters with school farms know summer is peak work season, and requires multiple hands. When students live within the district, it is easier for them to come on the weekends to an event or come throughout the summer to attend camps, conventions, or tend to the school farm. However, KSD presents a unique challenge, in that their students go home every weekend and every summer to every corner of the state. In a public school, the students may use their school farm as an SAE (Supervised Agricultural Experience), taking shifts and sharing the responsibility of tending the farm and the animals. This is simply not feasible for KSD FFA members who do not live in the same community year-round.

Vocabulary itself is a challenge that encompasses various aspects of Agricultural Education at deaf schools. This perspective came mostly from two interpreter interviewees, who expressed how difficult it can be to translate the highly specialized vocabulary of the agriculture industry, as well as the FFA Organization. One interpreter interviewee gave an in depth account on the process she goes through when interpreting an agriculture class, and how she would have to stop the teacher throughout their lesson to ask for further clarification on a word or concept that does not translate easier, or would tell the teacher or speaker that the students did not appear to be understanding. The interpreter and teacher would then have to work together to unpack these technical vocabulary words, often repeating and reexplaining multiple times. This can make a class go slower, which may seem as though the students learn slower. This is not the case; they can only learn at the pace an instructor can teach the content directly to them, and an instructor in a highly specialized field may have to do a lot of scaffolding and concept association to explain some highly specialized concepts.

Not only does the difficulty in translating agriculture terms from English to ASL pervade the classroom, it also affects the FFA chapter and activities. FFA frozen texts, as mentioned, were described by my interpreter interviewee as a challenge. The ASL interpreters interviewed all made comments that it is overwhelming and nearly impossible to impromptu translate events without any prior knowledge of FFA speeches or contests, and without any prior preparation by event staff.

It was reported the challenge on interpreters and students is further complicated when a judge in a competition has no knowledge of sign language or the interpreting process. ASL interpreters reported it is unfair to both the judge and the student to make a deaf student sign a speech in ASL

and expect the judge to score it fairly and accurately against English speaking participants. It would be similar to expecting a judge, who knows no Spanish, to listen to a speech in Spanish and then accurately determine its quality compared to English speeches. The quality of the speech lies not only in the words the interpreter speaks, but also in the body language and quality of ASL "speaking." ASL has its own dialects, nuances, and styles you can only pick up if you have an understanding of the language.

Other challenges were articulated from the student perspective, such as traveling together, miscommunication, and students being teased. These challenges were reported by students who expressed, for example, how difficult it can be to keep up with each other in crowded locations, such as National FFA Convention – a problem only further complicated by the fact that everyone is dressed alike! A very disheartening account from a hearing student who attended classes at KSD reported overhearing some rude comments made about deaf students at FFA events, on multiple occasions.

Finally interviewees responded to the question, "why do you think there aren't more agriculture programs in deaf schools?" Many interviewees proposed ideas such as not having a certified agriculture teacher, or not having resources like KSD's program. One idea that reoccurred across multiple interviews, was the notion that many people in the realm of Deaf Education do not know about agriculture programs, or do not know agricultural careers are an option for deaf students.

Solutions

To address the challenge of having FFA members spread out across the state, the agriculture teacher has instituted a CSA (Community Supported Agriculture) program at the school. The students get the experience of learning about gardening and crops. The students get to raise them from seeds in the greenhouse, plant before they leave for the summer, and then harvest at the end of the summer when they come back to school. Teachers and deaf community members have developed a tradition of working various times throughout the summer to plant, weed, and collect fruits and vegetables from the garden. In exchange for their work, they get to divide the spoils of the harvest amongst themselves. This not only benefits the students, who still get the opportunity to see the agricultural process from start to finish, but it also has a secondary, unintentional effect of strengthening the sense of community and relationships amongst the teachers and deaf community members who work together towards a common goal.

The Kentucky School for the Deaf has been able to provide opportunities to students in response to the inability to attend FFA camp. The agriculture teacher and the principal worked together to create Ag Camp at KSD, a two week program that is open to all students, hearing and deaf, both in Kentucky and from other states. During these two weeks, students and their camp counselors travel around Kentucky on field trips to various agricultural sites and businesses. They also host speakers and activities on-site at KSD. This camp is reported to be equally informative, educational, fun and experiential for the students. Several former students expressed their satisfaction with the camp and cited it as a highlight of their KSD experience. The agriculture teacher hires former students as "Counselors in Training" (CITs) for the two weeks, thus

bringing them back and providing them the opportunity to put their learned leadership skills and agricultural experiences into action, guiding and mentoring younger campers.

One of the simpler solutions to the language barrier posed by an interpreter, and reinforced by the agriculture teacher and past experiences of students, is to create an ASL frozen form for FFA traditional texts, like the creed and other scripted manuscripts it is expected for FFA chapters nationally to follow. Some examples of things that could be turned into an "ASL frozen form" (meaning we create an agreed upon ASL version of these things and use it across the board for deaf members) might include: the FFA Creed, the FFA Motto, the FFA Mission, Greenhand/Chapter/State/American degree ceremonies, Opening and Closing ceremonies, and even common words and phrases to the organization like "official dress." Creating these frozen forms, however, would only be acceptable to the Deaf culture if they passed the inspection of a Deaf person.

On an individual basis, working with an interpreter in advance of any speech, lesson, or event is vital to providing the deaf participant with the absolute best experience possible. One interviewee discussed the term "ELK" (Extra Linguistic Knowledge). Finding an interpreter who already has life or professional experience with a topic ensures one will get a more accurate translation. For example, finding an interpreter who has grown up near or within the agricultural industry would be greatly beneficial. After having been interpreting for KSD FFA for 10 years, there are some staff interpreters who have learned enough about agriculture and FFA that they feel more comfortable with the vernacular and the expectation of the students, so they can give that student in turn a better translation and experience.

When an interpreter has no prior experience, however, and needs to be trained from the beginning, the KSD interpreters offered some advice in their interviews on the best way to prepare interpreters for agricultural content and FFA events. If a student is giving a speech, have the student work with the interpreter beforehand to practice the speech, so the interpreter can ask questions and help the student hone their signs to be best understood the day of presentation. This works even better when the interpreter already has a prior working relationship with the student, as is the case with many students who have grown up at KSD using the staff interpreters. The needs of the student should always be a top priority, and pairing the student with an interpreter that matches their skill and style should be considered. If a student is comfortable with their interpreter and has a connection with them that allows both parties to understand each other effectively, the deaf participant is going to have a better experience.

Not only should the interpreter work with the student, but they should also prepare themselves individually and take responsibility as an interpreter when working with hearing people. The interviewees suggest doing one's own research on a topic to prepare for a wide range of possible vocabulary – specifically, become familiarized with the FFA website, handbook, rules of contests, etc. before the actual event. This is not new information to interpreters – they are trained to know this. However, many people in the general public do not see the work interpreters put in on the back end of an event, all they see is the day of as interpreters sign our messages effectively. Coordinators of events, agriculture teachers and anyone who requests an interpreter should be cognizant that the more preparation is given to the interpreter, the better the experience will be for the deaf person.

Interpreters should also be sure to explain the interpreting process to new judges at FFA contests, and clarify any misconceptions or questions a judge may have before the student comes in the room. Telling the judge what the experience is going to look like, especially if they have never been in that situation before, will ease their own discomforts and give the student a fair view. Even better, though, would be to ensure there is at least one judge in the room who is familiar with sign language, who can evaluate the student based on their facial expressions, body language, and eloquence of signing. These are all just as much a part of the speech as the words the interpreter speaks.

Finally, many interviewees gave helpful examples of ways we can spread the message of Agricultural Education in deaf schools, citing the KSD FFA social media platforms as a start. Interviewees cited making videos about the program and sharing them on the social media pages. Two former students both had the idea of sending students and/or the agriculture teacher to other deaf schools and setting up a panel to encourage dialogue about starting an agriculture program.

Community

All interviewees either explicitly gave account of the effects of community on KSD FFA, or unintentionally made mention of examples of community.

Danville, Kentucky, where KSD is located, appears to take great pride in the school and boasts its rich history via historical landmarks and mention of the school as a highlight of the town. Many interviewees echoed this apparent support, saying the city and the citizens of Danville may not totally understand what happens at KSD, but they are supportive and welcoming of the deaf community regardless. Hopefully, other deaf schools experience this same sense of community support. The deaf community of Kentucky, which consists of employees at the school as well as deaf adults who call Kentucky home, have shown themselves to be supportive of the KSD FFA and agriculture program. Many deaf community member interviewees made mention of their great excitement to see agriculture back on the campus, and unanimously agreed the agriculture program was beneficial for their young deaf students.

Additionally, members of the deaf community expressed continued interest in the program, being more than willing to volunteer to mentor young deaf agriculturists, and stepping in often to fulfill role model positions and comforting relationships where the child's family cannot. The KSD community is reported to be a sanctuary where they feel safe to be exactly who they are, and interact with people who accept them.

It is because of this sense of community, which has long been engrained in the Kentucky deaf community, that the big picture of FFA seems to make sense to deaf students at KSD. They already have an understanding of community and support far greater than the general population. Interviewees report that deaf schools should know their students crave community, and FFA is one avenue of access for this sense of belonging and accomplishment.

Conclusion

Deaf and hard of hearing (D/HH) students are fully capable of participating in agricultural courses and agricultural activities. Agricultural Education techniques have proven to be quite similar to Deaf Education techniques, with an emphasis on experiential learning and visual representation of concepts. Agricultural Education is highly suited to this audience and their learning styles, and both students and staff at KSD report finding value, benefits, and enjoyment from the courses.

If a deaf school were to begin the process of creating their own agriculture program, there are several people who should be at the table for the conversation. The administration of the school and the governing body legislating the school would first need to determine that this is a good fit for the population and that the students would be interested in this. Copious amounts of evidence in this case study would suggest most schools would benefit from a program, and most students would appreciate the opportunity. Next the school should look for a candidate in the hiring process that possesses two key skills: agricultural content knowledge and an ability to communicate well with D/HH students. Though this may seem to limit the candidate pool severely, it is an ultimate goal to strive for, as it seems to be the key that has kept KSD's program ever advancing for 10 years. This educator should immediately begin working with the state Agricultural Education staff to create, modify, and adapt curriculum and activities to make the agriculture classroom possible. Though an FFA chapter is not truly necessary to teach agriculture curriculum, the FFA component adds extra value to the program via a sense of community. Perhaps the most valuable thing a new program could acquire would be some form of agricultural experience or facility beyond the walls of a classroom. This study found students excel in this agriculture program, most likely due to the wide array of visual and physical experiences they are provided. A new Deaf FFA advisor should begin to look for funding and collaborate with administration to provide experiential learning for the students.

As reiterated throughout, this study was exploratory in nature. There is still much to be learned, and collaboration through communication will be key to truly include deaf schools and provide opportunities to these students. Future research should include focused studies of other deaf schools with agricultural programs. Agricultural Education programs at the collegiate level, along with national Agricultural Education advocacy groups like the NAAE (National Association of Agricultural Educators) could pursue further research and investment in understanding these programs, how to effectively educate these students regarding agricultural content, and taking action to assist in placing qualified teachers in these schools. Future research in this area should keep in mind the ultimate goal of finding ways that we can serve this student population and provide equal access to Career and Technical Education for deaf and hard of hearing students.

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Students for Cultivating Change: Perspectives on LGBTQ+ Inclusion in Virginia Tech's College of Agriculture and Life Sciences

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Abstract

The lack of representation of LGBTQ+ agriculture students in higher-education may reflect the cultural assumption that these youths are not present in agricultural or rural communities. LGBTQ+ rural identities are unique because of the historical framing and this absence of rural LGBTQ+ identity has occurred in research leading to little being known about rural LGBTQ+ individuals' identity. The researchers sought to answer three questions through this descriptive qualitative study, how do the members and allies of the Virginia Tech Students for Cultivating Change (S4CC) chapter understand identity, what are members' and allies' perspectives on the role of 4-H and FFA have on LGBTQ+ identity, and, what are the members' and allies' perspectives on the role and importance of S4CC? Researchers found that participants in this study had internalized the lack of representation of LGBTQ+ in agriculture and the cultural assumption that LGBTQ+ individuals are not present in agricultural or nonmetropolitan communities. They were worried that they did not belong in agriculture because they did not see other students or role-models working in the agriculture industry, but also that the environments where the work would occur would be unwelcoming. Findings suggest it is important to prevent single-gendering aspects of agriculture, rather it is important to create an open umbrella of identity for all youths.

Introduction

Agricultural higher-education programs have an increased awareness of the need for diversity and inclusion. The focus has been placed on ensuring faculty are prepared to be inclusive of diverse individuals (Tindell, Young, O'Rear, and Morris, 2016) and current faculty are welcoming and supportive of diverse learners (Talbert and Edwin, 2007). However, discussions on diversity have emphasized cultural (Bettis, Allen, Christian, and McElhenney, 2015), racial (Drape et al., 2017; LaVergne, Jones, Larke, and Elbert, 2012) and gender (Daluge and Thompson, 1981) inclusion. An underrepresented population in diversity and inclusion discussions within the field of agriculture is around creating welcoming environments for LGBTQ+ individuals.

Higher- education research on LGBTQ+ student engagement is rarely field-specific and has yet to reflect the unique nature of agriculture and rural identities within postsecondary agricultural learning environments. The authors are unaware of any previously published literature on the role of higher-education organizations in supporting LGBTQ+ identities in Colleges of Agriculture and Life Sciences or the resulting LGBTQ+ graduates entering the agriculture workforce.

The lack of representation of LGBTQ+ agriculture students in higher-education may reflect the cultural assumption that these youths are not present in agricultural or rural communities (Gray, 2009). The study of the development of micro-cultures at the postsecondary level for LGBTQ+ youth indicated that experiencing a sense of belonging deepened over time and helped transform student experiences into the development of identity (Vaccaro & Newman, 2017). Three different contexts; the university, organization, and friendships fostered student growth. LGBTQ+ identity is influenced by sexual identity and outness, university messaging, and meaningful social interactions with groups (Sadowski, Chow, & Sandlon, 2009) and authentic friends (Vaccaro & Newman, 2017).

LGBTQ+ identities have been primarily urban in nature (Gray, 2007). LGBTQ+ rural identities are unique because of this historical framing and this absence of rural LGBTQ+ identity has occurred in research leading to little being known about rural LGBTQ+ individuals' identity (Gray, 2007). LGBTQ+ individuals living in rural –nonmetropolitan communities– must navigate the cultural emphasis of urban and suburban cultural iconography, leaving them to feel alone literally and culturally. Despite the cultural assumptions and reification, gay men and queer women are equally as likely to live in rural areas (i.e., small city, town or rural communities) as a large city (Stone, 2018). LGBTQ parents are more likely to live in rural areas (Holman, Oswald, Isenstark, Mendez, & Greder, 2014).

The researchers sought to answer three questions through this descriptive qualitative study:
A) How do the members and allies of the Virginia Tech Student's for Cultivating Change (S4CC) chapter understand identity
B) What are members and allies' perspectives on the role of 4-H and FFA have on LGBTQ+ identity?
C) What are the members' and allies' perspectives on the role and importance of S4CC?

Note on Nomenclature

Lesbian, gay, and bisexual are terms to describe sexual orientations, and transgender relates to gender identity (Soule, 2017). These are different psycho-social constructs (Renn, 2007). Throughout this paper, there will be references to lesbian, gay, bisexual (LGB) and transgender (T) people. Increasingly these groups are considered as one community and thus will be referred to as LGBT (Renn, 200. Additionally, Q+ refers to both queer and questioning identities. Queer is a reclaimed word that was once used as an offensive slur and now is often used in urban communities as an umbrella term to refer to the LGBTQ+ community (Soule, 2017). Questioning is used as an umbrella term for individuals who are coming to terms with their identity. + is used to include all non-identified gender and sexual-orientations expansively and inclusively.

Literature Review

Rural LGBTQ+ Identity

Gray, Johnson, and Gilley (2016) explore, through a series of essays, American literature for LGBT rural conceptualizations of queer identity to inform the mainstream conceptions and

misconceptions of LGBT presence in rural American rural communities. Gray (2009) captured the dominant assumptions of the presence of LGBTQ+ presence and identities in nonmetropolitan environments in the following quote "*Most literature frames queer youth sexualities and genders as an individual mental health issue (or crisis) rather than as vibrant, collectively negotiated identities.*[2] *Perhaps the overriding reason for our surprise at the sheer publicness and brash visibility of LGBT youth in Christian bookstores and Wal-Marts is that rural environments are presumed to be (more) hostile to queer desires, and genders and, therefore rural LGBTQ-identifying youth (at least the self-respecting ones?) must have already left their small towns for the big city.*[3] *The imagining of rural spaces as inhospitable to difference is commonplace."* (p. 50). Despite the hostility that Gray relays have not meant that LGBTQ+ individuals have all left their nonmetropolitan communities. LGBTQ+ youths and professionals remain and are present (Holman, Oswald, Izenstark, Mendez, and Greder, 2014).

Invisibility Exacerbates Social Issues for LGBTQ Youths

Bullying toward lesbian, gay, bisexual, transgender, and questioning (LGBTQ) youths is a pervasive problem and results in negative impacts on LGBTQ students' mental health and educational outcomes (Kopels & Pacaley, 2012). Only when the prevalence and dynamics of bullying toward LGBTQ students are understood can appropriate responses towards victims and bullies, and prevention interventions be implemented (Kopels & Pacaley, 2012). Learners – including LGBTQ+ youths– that experience bullying and harassment by their peers limit their formation of strong relationships with other students and from taking advantage of school resources that can support student academic success (Wimberly, Wilkinson, & Pearson, 2015).

Youths who achieve less academically and feel unsupported achieve lower grade point averages than their peers. For secondary youth, this reduced academic performance impedes ascension to post-secondary study (Wimberly, Wilkinson, & Pearson, 2015). At the post-secondary level, LGBT students are 30% more likely than their peers to consider leaving their institutions (Rankin, Weber, Blumenfield, & Frazer, 2010). While in school Wimberly, Wilkinson, & Pearson (2015) suggest that LGBTQ youth make different course-taking decisions relative to heterosexual and gender-normative decisions because of their interests. To date. the authors are unaware of any research that exposes LGBTQ+ youths course selection in secondary or post-secondary school regarding willingness or preference towards agriculture coursework.

LGBTQ+ in Agriculture

Throughout the twentieth-century society framed traditionally rooted sexuality-based dynamics, which has culturally framed homosexuals into urban consumption, and attached agricultural practices to the notion of the heterosexual family. Thus urban environments allowed visibility and freedom of expression of sexual minorities, and agriculture and rural space remained void of examples of LGBT identity; this has left gay farmers timidly advocating their existence. However, with new societal shifts, these frames of reference are being challenged (Bosio, 2016).

The emergence of the culture of sustainable agriculture stands in contrast to the mainstream LGBT movement's focus on urban identities (Leslie, 2017) and the culture of traditional agriculture (MacAuley, & Niewolny, 2016). Queer sustainable farmers may reject the

mainstream LGBT movement's emphasis on consumerism (Leslie, 2017) thus also have to have to navigate their outsider status in agriculture on two dimensions: personal identity and their economic identity.

Agricultural youth organizations. The two predominant youth organizations providing educational opportunities in agriculture are 4-H and the National FFA Organization. 4-H is the youth development organization of the land-grant university system. 4-H administrators acknowledge the presence of LGBT youths (Elliott-Engel, 2018) and adults (Myers, 2008) in their program. The program is committed to serving LGBT youths (Ingram, 2006; Walter & Grant, 2011) and has taken steps to build capacity to serve LGBT communities through publications (Soule, 2017) and even a national gathering, the Ohio 4-H LGBT Summit in 2018 (Oberstadt, 2018). After recognizing that understanding was a barrier to serving LGBT youths (LaVergne, 2013), a forward movement towards inclusion has taken place even in the face of political and grassroots pushback from stakeholders (Elliott-Engel, 2018).

After an extensive review of the available literature, little is documented about the efforts the National FFA Organization or the broader formal agriculture education community is taking to be inclusive of LGBT youth and educators. Pini, Keys, & Marshall (2017, p. 6) linked the official dress of the FFA as a symbol of rurality and thus also portraying heteronormative symbolism. Runyen (2017) described a personal narrative of involvement in FFA as a youth member and his coming out story that was informed by his desire to be supported in his identity and concern that he would not be in the Agriculture Education field. While he did not come out as a youth member, he did return to his advisor during his coming out process. He also spoke of the importance of finding a support network of other gay men who have an interest in careers in agriculture and agriculture education.

Students for cultivating change. Students for Cultivating Change began at The Pennsylvania State University campus in 2017 when students aware of the Cultivating Change Foundation decided to create a safe, inclusive network for students interested in agricultural sciences who are in or are allies of, the LGBTQ+ community. Student chapters' focus efforts on education, community, increasing awareness, and promote inclusion and visibility for LGBTQ+ individuals within College's of Agriculture. The second chapter was formed in 2018 at Virginia Tech. This paper captures the experiences of LGBTQ+ members and allies at Virginia Tech who supported the implementation of the Student's for Cultivating Change chapter.

Nonmetropolitan Support Groups

Paceley, Keene & Lough (2015) found that LGBTQ individuals were motivated to join nonmetropolitan organizations because of (1) to access support and resources; (2) to establish an LGBTQ community; (3) to be generative; (4) to affirm identity; (5) to support an LGBTQ organization; and (6) to combine one's personal and professional lives. However, barriers to effective nonmetropolitan LGBTQ organization development exist.

While living in a nonmetropolitan community LGBTQ individuals were sensitive to forming and joining organizations that would provide social support because it would mean they were

identifying and being identified as LGBTQ+ (Hulko and Hovanes, 2017) and that they needed to manage their identity publicly (Paceley, Keene, & Lough, 2016).

Rural –nonmetropolitan– LGBTQ+ individuals also talked about their intersectionality, indicating that the sexual identities and gender identities and expressions of LGBTQ individuals change across time and context and are impacted by often overlooked factors including faith, racial ancestry, disability, and class (Hulk and Hovanes, 2017; Paceley et al., 2016). Further, the size and character of the community significantly impacts LGBTQ youth identity development and expression (Hulk and Hovanes, 2017; Paceley et al., 2016). Additionally, the support groups level of diversity, group dynamics, lack of awareness of programs, workplace/school climate of the organization effected the willingness of LGBTQ+ individuals to join the group and that the scale and perceived hostility of the community where the group was being formed mattered for LGBTQ+ individuals to join (Paceley et al., 2016). In the absence of an effective local support network, another way LGBTQ+ individuals seek to ameliorate isolation is to turn to virtual connectivity through social media (Lucero, 2017).

Theoretical Framework

Campus environments are "complex social systems defined by the relationships between the people, bureaucratic procedures, structural arrangements, institutional goals and values, traditions, and larger socio-historical environments" (Hurtado, Clayton-Pedersen, Allen, & Milem, 1998, p. 296). The Transformational Tapestry Model posits that campus climate is influenced by six areas within higher education (Rankin and Reason, 2008). The six areas areas.

1. Access and retention (i.e., includes access to higher education and provision of the necessary supports for success and retention)
2. Research and scholarship (i.e., includes encouragement of diversity in educational and scholarly activity).
3. Inter-and intra-group relations (i.e., includes a diverse student body with educationally purposeful interventions and interactions)
4. Curriculum and pedagogy (i.e., includes diversity education and proactive educational interventions)
5. University policies and services (i.e., includes university commitment to diversity and social justice through response to harassment, and written and behavioral policies) (Rankin and Reason, 2008).
6. External relationships (i.e., includes acknowledgement of and response to external influences in society and government).

The university is creating an environment for individuals to learn in a formal and informal learning environment. However, the individual inherits, and is limited in their ability to change the framework of the environment University. Thus, it is imperative to recognize that the the University climate is influencing the individual's identity development.

Lesbian or gay identity development does not occur similarly to the identity development of heterosexuals. Because of the heterosexism of society, the feelings of same sex attraction that a young person experiences can be alienating and embarrassing (Gedro, 2009). The D'Augelli

(1994) framework of LGB identity development presents human development as unfolding in concurring and multiple paths, including the development of a person's self-concept, relationships with family, and connections to peer groups and community. This model suggests that sexual orientation may be very fluid at certain times in the lifespan and more fixed at others and that human growth is intimately connected to and shaped by environmental and biological factors. The D'Augelli model describes six "identity processes" that operate more or less independently and are not ordered in stages: exiting heterosexuality, developing a personal LGB identity, developing an LGB social identity, becoming an LGB offspring, developing an LGB intimacy status, and, entering an LGB community.

A LGB individual is experiencing the development of each of these processes at different rates (Bilodeau & Renn, 2005; Cass, 1984). For example, the individual may have a strong LGB social identity and have intimate same-sex encounters, but has not come out as LGB to family (become an LGB offspring). Depending on the context and timing, the individual may be at different stages of development in a given process, such as when an openly LGB person enters a new work setting and chooses not to express his or her LGB identity, but still belongs to a LGB community.

LGBT people must come to understand, identify, compare, tolerate, accept, embrace, and then synthesize their orientations (Cass, 1979, 1984; Gedro, 2009). The development of LGB identity is also complicated with the complexity of other identities the individual holds and how those identities intersect and inform the conceptualization of those identities (Poynter & Washington, 2005).

Methodology

The reflexive qualitative researcher does not simply report "facts" or "truths" but actively constructs interpretations of their experiences (Clifford and Marcus, 1986). All of the authors of this paper were involved with the formation of Students for Cultivating Change. Two of us identify as gay and two of us identify as LGBT allies. Having this relationship with the organization and our identities to the topic we decided it was too valuable to ignore our experiences in exploring our research questions. Thus we decided to approach these questions as insider-researchers.

According to Bonner and Tolhurst (2002) insider researchers have three key advantages (1) they have a greater understanding of the culture being studied; (2) flow of social interactions are unaltered; and, (3) they have an established intimacy which promotes both the telling and the judging of truth. Additionally, insider researchers have knowledge that outsiders may not be able to acquire or would take a long-time to acquire (Smyth & Holian, 2008; Unluer, 2012). Insider-researchers must also manage the risk of unconsciously making assumptions and losing objectivity (DeLyser, 2001; Unluer, 2012).

The research questions are: A) How do the members and allies of the Virginia Tech Student's for Cultivating Change (S4CC) chapter understand identity, B) What are members and ally's perspectives on the role of 4-H and FFA have on LGBTQ+ identity?, and C) What are the members and ally's perspectives on the role and importance of S4CC? These research questions

were explored in two hour-long focus groups. IRB approval was received before data collection.

Two populations comprised the purposive populations for the two focus groups, allies and participants. Four allies were recruited through e-mails to a list-serve for all of the Virginia Tech College of Agriculture Life Sciences The participating allies are all female; ages 37-52; and all straight. Additional information about the ally participants is in Table 1.

Table 1. Ally participants

Pseudonym	*Age*	*Gender*	*Ethnicity*	*Sexual Orientation*	*Gender Identity*	*Field of Agriculture*	*Agricultural Organization Affiliation*
Marie	52	F	W	Heterosexual	Cis	Agriculture Education	4-H, FFA
Ruby	51	F	W	Heterosexual	Cis	Dairy	4-H
Stephanie	50	F	Caucasian	Heterosexual	Cis	Agriculture Education	FFA, 4-H, AGR Little Sister
Virginia	37	F	Asian	Heterosexual	Cis	Agriculture Education	4-H, FFA, Dairy Club, Holstein Assoc.

All ten of the Students for Cultivating Change members and advisors participated in the focus groups. The participants are comprised of six males, three females, one non-binary; ages 19-52 and their sexual identities included gay, bisexual, asexual, and pansexual. Additional information about Student for Cultivating change are relayed in Table 2.

Table 2. Students for Cultivating Change Participants

Pseudonym	*Age*	*Gender*	*Ethnicity*	*Sexual Orientation*	*Gender Identity*	*Field of Agriculture*	*Agricultural Organization Affiliation*
Peyton[#]	52	M	Caucasian	Gay	Cis	Dairy	4-H, FFA, Dairy Club
James	33	M	White	Gay	Cis	4-H Extension Education	4-H, Postsecondary Agriculture Students (PAS)
Jack	30	M	Caucasian	Gay	Cis	Agriculture Education	FFA, 4-H, Young Farmers & Ranchers, Agriculture Ambassador
Caroline	28	F	White	Pansexual	Cis	Agriculture Education	

José	25	M	White	Gay	Cis	Horticulture	4-H, Horticulture Club, Pi Alpha Xi
Abby	21	F	Caucasian	Pansexual	Cis	Animal Science	
Reese	21	F	White	Asexual	Cis	Horticulture	
"L"	20	None	White	Bisexual	Non-binary*	Journalism	
Atticus	20	M	White	Gay	Cis	Dairy	FFA
Gerald	19	M	White	Gay	Cis	Horticulture	Horticulture Club

[#] Student for Cultivating Change Advisor
**Non-binary* is a gender identity under the transgender umbrella. Someone who is non-binary does not identify as exclusively male or female and does not identify as the gender assigned to them at birth (Richards et al., 2016).

Data were collected by recording focus groups facilitated by the two authors who at the time were Student for Cultivating Change members. Allies and participants participated in the focus groups together.

The researchers were split into two groups: analyzers and reviewers. The data were open-coded line-by-line (Corbin & Strauss, 2008). Open-codes were then coordinated into themes (Charmaz, 2014). Open-codes and themes were reviewed at each stage by the two reviewer researchers to increase trustworthiness (Gringerei, Barusch, & Cambron, 2013).

Results

Balancing Interest in Agriculture and Concerns About Rural Spaces

Agriculture is connected to rural communities and they remain perceived as unsupportive and unwelcoming to LGBTQ+ individuals. Interest in careers in agricultural careers is moderated by the potential of employment in welcoming communities. Welcoming communities were identified as urban. Even, the university-town was not recognized as being welcoming or providing enough support for the LGBTQ+ individuals.

Table 3. Balancing Interest in Agriculture and Concerns About Rural Spaces

Supporting Quotes
When I went into animal science, I was very much going towards the medicine aspect of it and not really thinking about the agricultural aspect, [focusing on] small animal. [I wasn't] even considering moving somewhere more rural. Because I knew that I was queer, and I knew that it was important to me to be somewhere where I would feel comfortable being open [about] that and knowing that if I chose to go into veterinary things or medicine in more of an agricultural way, I want it to be a large animal veterinarian. If I wanted to live somewhere where agriculture was the predominant occupation, knowing that people would be more

willing to have those discussions and that I might still be protected there. That makes all the difference.
I think there needs to be more conversations about inclusion of lesbian, gay, bisexual, transgender, queer questioning people within the agriculture industry. I think it's great that it's happening, that we haven't, we haven't gotten far enough fast enough. We haven't caught up with other industries that have opened up a lot quicker. And it feels like there's people who want to young people who want to be involved in agriculture but don't necessarily still don't necessarily see a place for them because of their sexuality and pursue careers outside of agriculture because of it. Until it's commonplace for companies and the government and schools and colleges to just freely accept people, then it's still going to have…that feeling of can I be out? Can I be authentic? Can I show who, who I am, without any fear of getting fired on a future job or negative connotation from coworkers. I specifically think it's important for this to be a little more talked about. Because as a female, I already feel some pressure in agriculture as an underrepresented population. Traditionally females just aren't thought of is when you think of a farmer that tends to go to more of a male stereotype – Abby
I agree that it needs to be more target about within companies and just like even I would say government roles in the rural areas of the fixed engine stuff, but also more heavily focused on other sorts of minorities and I don't like to think of it like this, but I almost sometimes use a group's acceptance of other minorities as like a benchmark of whether they would accept my sexuality openly. Um, so when you hear groups that aren't tolerant of like other races or even just, you know, women in the roles, it's like, well that's probably a place where I don't care to be. – José
I also will admit that I still struggled to not associate agriculture with just rural areas. I know that's not the truth, but I think that's tied [together]. I go automatically Ag to rural. - Gerald
When I think agriculture, [I] think rural. When I think typical Ag, I think the middle of Kansas cornfields. That's what I get a picture of, and that's not necessarily a safe place for people who identify as LGBTQ. – Atticus

Role of Agricultural Youth Organizations

Only a small group of the participants in this study had personal experience with 4-H and FFA. FFA was perceived as having a political agenda that was non-LGBT inclusive. 4-H was perceived as apolitical. Both organizations reflect the local communities, which because of the nonmetropolitan nature of the organizations can be more conservative, and perceived as less inclusive.

Table 4. Role of 4-H

Supporting Quotes
In 4-H it was like a non issue maybe because nobody talked about it, so it was like Clinton's don't ask, don't tell era.- Peyton
I did projects that were labeled as a female. That was always something that came with an identity thing [and] this was a problem. Maybe it's because I knew some my own identity [and] was hypersensitive to that. That [judgment] didn't have anything to do with, 4-H itself. It was the absence of support right? Thus it was a… reflection of the community. –James
When… I was in 4-H… my friends who are now out weren't. It really wasn't on the radar in

the role of the community. I can't say [4-H' had an influence because those two things never crossed boundaries. It wasn't just 4-H, it wasn't just 4-H, it was everywhere in my community, in my school there was no place where people were out, so I can't really say that that had an influence because it was just rural community 40 years ago. – Ruby

Table 5. Role of FFA

Supporting Quotes
Um, but then FFA, they never came out and said it, but they definitely look down on it. You couldn't be anything but the blue jacket and the blue jacket apparently doesn't have a line in the manual for anything but heterosexual and male usually, but not so much anymore…. But at FFA, yeah, I think if they, as an organization they did their students a huge disservice by not catching up sooner I guess. Or you know, whatever you want to. I don't know, catching up with the times I guess. And then their efforts since then have been, in my opinion, marginal at Best.- Virginia
I was an FFA, but I don't know, I wasn't maybe very active member. Um, but I, I agree. I didn't really notice like any conversations come up, I just know, like the general attitude of the entire school because half the school was in the FFA, just being so rural, was not accepting towards LGBTQ individuals. – ####
So I have a lot of involvement [with FFA]. I'm always going to state convention, always involved in CDEs, and I think that shaped me as a person. But, lgbtq issues were never a topic that was discussed. Because we don't exist where I come from, so why talk about something that doesn't exist? Quite honestly probably to the benefit of schools and people around, they would like to think that we don't exist anywhere. So [being LGBTQ+] wasn't a conversation I would have had, but I feel like if I had had it in FFA, I think it would have been beneficial to me as a person and not just me as someone who identifies, but also the people who don't identify, who don't know anything about it. – Atticus
My involvement in [FFA] [didn't] move the needle either way of whether it was positive or negative. But from experiences of being around people within the organization, I probably would have moved more negative- Jack

Allyship

The role of ally ship being explicit, formalized, claimed, and then utilized in order to create support for LGBT individuals was of utmost importance. Universally S4CC participants (allies and participants) recognized that explicit allyship meant a clear level of support between ally and individual. Data supporting the importance of allyship are relayed in Table 3.

Table 6. Importance of Allyship

Supporting Quote
Everybody wants to know they have an advocate… it might be somebody who physically walk[s] in with you to a particular place or help[s] navigate some kind of paperwork or knowing some resource… on campus. –Stephanie
[Allyship] is more then just putting a Safe Zone sticker on your door. It's about creating a culture, and formal structure, in an organization… to report on the good things. Maybe there is a company out there that is treating their employees with equality and offering, equal

benefits. Then [it's] that allies job to… report back. To say "Hey,… I noticed you looking for a position and this would be a great place for you and your partner to come work." And [for allies to] look at… what companies are doing that are also good and inclusive as well. – James
[Allyship] [need's] to be [a] super deliberate… thing.- Stephanie
To me the role of an ally is to help spread the ally system. –Marie
If we can spread the network of allies, maybe [a person] will be comfortable enough to speak up. – Stephanie
It is great to know that there are people who support us, but I don't know who they are and the fear of being like, you could love me for who I am, but you could just as likely be the next one to yell some type of horrible turned towards me is very challenging and I don't necessarily know how to go forward without an agriculture. Um, so that's one thing that I really hopeful for is that those who identify as allies can be a little more visible themselves. – Caroline

Not All Campus Space is Created Equally Safe

Not all spaces on campus are created equally safe. Participants discussed fear for both their physical and emotional safety when talking about agriculture spaces on campus. In the specific case of [University] an incident was referred to underlining the risk, e.g. frat incident of burning a rainbow flag; and, promotion posters being torn down. Table 4 is used to relay the supporting quotes.

Table 7. Not All Campus Space is Created Equally Safe

Supporting Quotes
We have people that [are] tearing down our club flyers in the hallway and make jokes about… the club [and] who have… burned a pride flag in their [agricultural fraternity] house. –Jack
as an outsider to agriculture. Um, I'm pretty lucky with my major and where I am on campus that I feel comfortable a lot of the time in my classes I can talk about what I want to talk about and I don't really feel any fear of repercussion, but when I come here and I come to these meetings, I'm always a little bit afraid. This is the only time I ever come to this building and I see people and I see like the eye contact we make and I feel afraid and I every time somebody walks by the door I'm afraid somebody is going to come in and say something. It's just a fear [of] being here. But that's as an outsider. –"L"
I compare it to: The older I get the, my preference now is to visit mostly gay bars because it's a feeling of safety going to a bar, but going into what is like a quote unquote straight bar. I don't want to say automatic protection, but that feeling of protection. There's none of that type of establishment here in this community either. Litton-Reaves is not… the gay bar of campus. –Jack
You have to take a sense of where you are before you behave a certain way. The first time you walk into a building and you don't know, you're like, well, what's it like here? Can I be myself? And usually that takes time and um, that shouldn't be a thing at all. Like, you know, you should be able to walk into any building and be like, I'd have to think about who you are and how that affects things around you. And, that happens here, and that is a problem. –Gerald

Employers have a responsibility to advance LGBTQ+ Inclusion

Potential employers have a role in setting a tone for positive inclusion. Allies are seen as being a liaison for LGBTQ+ college individuals to help be placed in accepting businesses.

Table 8. Employers have a responsibility to advance LGBTQ+ Inclusion

Supporting Quotes
Businesses and companies in the field as a whole are open to having those kinds of discussions because I think that it's sort of alleviate some of the pressure people might feel to stay out of those fields. – José
[Businesses] are becoming more mainstream about being able to showcase that they are Lgbtq [welcoming]. [Even] marketing it as part of their [recruitment] plan for a business. – Jack
it's encouraging to see increased visibility, um, before learning about like joining this group, I wouldn't have thought that there would be as many people identify a in the industry and also the people that are out within the industry as well. So I think seeing companies same industry move towards encouraging that kind of behavior, being open, being your true self, that's it's good to see. – Atticus

Students for Cultivating Change

The development of S4CC is appreciated for: (1) Safety and comfort in knowing that they are not alone. (2) Camaraderie, friendship, and support resulting from a formalized group of like-minded individuals, experience the same unique experience of being LGBT in the agriculture industry. (3) Started to raise visibility, and took the pressure off of the individual because the group has identity and provided a mantle of identity.

Table 9. Perspectives on Students for Cultivating Change

Supporting Quotes
I think [Students for Cultivating Change] is definitely important. It gives a voice and another leadership opportunity. It’s a way to contribute to the college, to kind of have a little bit of that advocacy and ally support network that everybody needs when they're doing something that's tough at college. – Abby
I feel a little safer being part of the LGBTQ community when I have an organization like this because I have in some way the university administrations backing of saying you are recognized by our university. There's at least some kind of safety net if something were to happen. And that's a very pessimistic way to look at it. But I have not felt bad at other universities. Um, you know, I never felt it was safe to necessarily be open about things because I don't even know if my own university is going to turn on me, let alone friends or colleagues or people in agriculture. Um, so to me it was like community is absolutely wonderful. But I think one thing for me it was just the association with a bigger entity that kind of provided that safe space – Caroline

I think was really important to get involved… for that safety piece and being able to identify and just see that you're not alone because I didn't have that. I didn't have an organization like this, an Undergrad and so, you know, part of this organization don't necessarily see everybody here on a daily basis, but we do meet biweekly and having them, having time for comradery and joking and talking about ways to become more involved in ways to increase visibility – Jack

Conclusions

Participants in this study had internalized the lack of representation of LGBTQ+ in agriculture and the cultural assumption that LGBTQ+ individuals are not present in agricultural or nonmetropolitan communities (Gray, 2009). They were worried that they did not belong in agriculture because they did not see other students or role-models working in the agriculture industry, but also that the environments where the work would occur would be unwelcoming. Both the adults in the industry and students exploring opportunities in the industry were expressing the straddle that they were doing between their "LGBTQ+ identity" - associated with urban characteristics (Gray, 2007)- and their "agriculture identity." As Vaccaro & Newman (2017) relayed in their study of the development of micro-cultures at the postsecondary level for LGBTQ+ individuals indicated that experiencing a sense of belonging deepened over time and helped transform student experiences into the development of identity.

Based on this study, the hypothesis that Wimberly et al. (2015) proposed, that LGBTQ youth make different course-taking decisions relative to heterosexual and gender-normative decisions because of their differing interests may be true. However, understanding how majors and areas of study are defined is also important. Framing agriculture courses as inclusive of LGBTQ+ youths allow for youths to ascribe to that identity. However, it is important to prevent single-gendering aspects of agriculture, rather it is important to create an open umbrella of identity for all youths.

S4CC is helping build relationships around joined "agriculture" and "LGBTQ+" identity together. This reflected Sadowski et al. (2009) who recognized the importance of owning one's sexual identity and outness, and creating opportunities for meaningful social interactions with groups, and the importance of authentic friends (Vaccaro & Newman, 2017).

4-H and FFA are agricultural education youth organizations with heteronormative traditions (Rosenberg, 2015). However, LGBTQ+ youth participate and are enrolled in agricultural youth-serving organizations because they are present in rural communities (Elliott-Engel, 2018). Both 4-H and FFA are reflections of their communities because they are grassroots organizations. Both organizations need to develop policy and training to help front-line staff/volunteers to support youth to have positive and inclusive experiences. 4-H and FFA can serve as unique safe pipelines for LGBTQ+ individuals into the agriculture industry if they are attentive to the needs of inclusion of youths non-binary gender and sexual-orientation identities. Both organizations are based on creating strong social bonds among peer-to-peer and youth-to-adult and thus can serve provide a safe ally support network, which may counter-act potential reduction in academic performance during secondary education.

The role of allyship is important. It is important to help LGBTQ+ individuals know who to turn for non-judgmental support, removing fear or uncertainty, providing another layer of security (Paceley et al., 2016). This explicit support by individuals within the agriculture community provided comfort for LGBTQ+ individuals to explore and own their LGBTQ+ identity publicly, even within the agriculture community. Functionally, allies are important conduits to industry. Due to the low number of public LGBTQ+ role-models allies are needed to create pathways that direct LGBTQ+ individuals towards inclusive agriculture employers. Without inclusive and supportive employer's, allies, and role-models LGBTQ+ individuals will not enter the agriculture workforce.

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A Historical Review of the Curriculum for Agricultural Science Education (CASE)

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Abstract

Agricultural education classrooms have changed the presentation of curriculum. The Curriculum for Agricultural Science Education (CASE) has focused on scientific literacy in the agricultural education classroom since 2009. CASE addressed the need to increase scientific literacy and the lack of a national agricultural education curriculum. CASE is modeled after the Project Lead the Way curriculum created to integrate science, technology, engineering, and mathematics in secondary schools. As of the 2018-19 school year, CASE is present in forty-five states and the Virgin Islands and 1,828 teachers hold CASE certifications. This paper synthesizes the research behind the creation and implementation of the CASE curriculum.

Introduction

Science is everywhere. According to studies, science education is one of the most important educational subjects for students because of its relevance to practical problem solving and critical thinking skills (University of Texas-Arlington, 2017). The United States has always placed a high value on education, particularly placing a high value on science education with the education reform in the 1980's. Science education became one of the primary measures of academic achievement in the United States over time. Classrooms across the country looked for ways to increase scientific rigor in the curriculum within different disciplines. The agricultural education discipline saw the opportunity for science education to fit within their classrooms.

To take advantage of this opportunity, discussions took place to develop resources to incorporate science into agricultural education courses. Over the past fifteen years, these resources have developed into what is now known as the Curriculum for Agricultural Science Education (CASE). CASE has become one of the primary methods to provide high quality science education in agricultural classrooms. As CASE has evolved, it is important to examine the events, individuals, and developmental steps taken to implement the curriculum. In order to understand the changes that have occurred over time researchers should examine the changes and developments in recent history. This aligns with the National Research Agenda (Thoron, Myers, & Barrick, 2016),"Priority 5: Efficient and Effective Agricultural Education Programs"(p.43) Priority 5, number 6 states: "How can agricultural leadership, education, and communication practitioners (teachers, extension agents, etc.) collaborate to deliver educational programs effectively?". As education continually evolves, it is vital for individuals in the agricultural industry continue to collaborate to provide rigorous and relevant curriculum for agricultural education programs. This paper examines the steps taken to implement science education into agricultural education and evaluate the current status of CASE.

Background

Looking back to the late 1700's, the United States of America was beginning to develop. We were beginning to understand what it took to be successful as an independent nation and the world economy (Nussbaum, 1988). A *Business Week* article titled "Needed: Human Capital" wrote the following:

> American manufacturing prowess is in large part due to a highly educated work force. The Yankees have an astonishingly high literacy rate of 90% among the free population. In the industrial heartland of New England, 95% of adults read and write. In contrast, just two-thirds of the people in Britain are literate… (Nussbaum 1988, p.100).

This article suggested the United States places a high value on education. Education allowed the United States to be successful, but contributed to downfalls when the importance of education is lost. As the article continues, it shows evidence of the wavering importance set on education in the United States over time. An addition to this excerpt reads, "Now zip ahead a century or so to the 1980s… Manufacturing superiority is being forfeited to the Japanese... In 1988, Japan's functional literacy rate is better than 95%. In America it is down to about 80%" (Nussbaum, 1988, p.100).

Recognizing the problem, the United States sought to develop a solution that will address the entire nation. The Secretary of Education, T.H. Bell, created the National Commission on Excellence in Education on August 26th, 1981 to combat the widespread remiss of the American Education System (United States, 1983). It was obvious the dominance in education, trade, commerce, and industry the United States once enjoyed had expired. With this being the consensus among Americans, T.H. Bell ordered the National Commission of Excellence to research this issue and report back with resolutions within 18 months (United States, 1983).

Research was conducted and in April of 1983 a document titled "Nation at Risk: The Imperative for Educational Reform" was released by the National Commission on Excellence in Education and set direct guidelines for the improvement of the United States education system (United States, 1983). The report showed large deficiencies specifically in mathematics and science. Six public hearings were called by the commission which covered various subjects of education. Science and mathematics were the subject of one hearing and 17 members of the invited audience spoke along with 11 from the general audience (United States, 1983). Two of the largest issues to be addressed were the United States' shortage of qualified physics, mathematics, and chemistry teachers and how mathematics and science educators are being paid 60% of the salary of their industry counterparts (United States, 1983). Additionally, the hearing highlighted the need for curriculum changes to match the intellectual development of students. The recommendations made at the hearings developed the proposed resolutions to be made within the report. Within the resolutions, the commission cites specific graduation requirements including three mathematics courses and three science courses (United States, 1983). The new graduation requirements helped to reconfigure Career and Technical Education (CTE) as changes were necessary for CTE programs to stay relevant.

The National Research Council established the Committee on Agricultural Education in Secondary Schools to assess the importance of agriculture and address issues in education (Educational Resources Information Center, 1988). The review specifically looked at the influence graduation requirements had on agricultural education within Career and Technical Education. The

Committee on Agricultural Education in Secondary Schools (C. on A.E. in S.S.), reported a broader definition of vocational agriculture was needed to address the enlarged scope and number of careers within agriculture (1988). In 1988, the term "vocational agriculture" was replaced with "agricultural education" to apply to the broader scope of agricultural students.

Recommendations for reform would improve student experience and the profession. These recommendations were to re-evaluate curriculum on state and national levels. The committee felt vocational agriculture did not fully address concepts within agriculture such as agricultural sciences, agribusinesses, marketing, management, and food production and processing (C. on A.E. in S.S., 1988). Within the agriculture program, recommendations were also made to change the name of the Future Farmers of America and a number of its components. A higher value was put on Supervised Occupational Experiences (SOE) and evaluating programs for improvement was recommended (Educational Resources Information Center, 1988). The topic of concern within the agricultural classroom was the scope of material, leadership, and agricultural literacy. Resolutions included moving curriculum away from being solely production agriculture and including legislators, superintendents, and science teachers in the effort to increase agricultural literacy (Educational Resources Center, 1988). The C. on A. E. in S. S. (1988), recommended implementing rudimentary agriculture concepts into science courses. Specifically, the report provides examples such as "A biology course that already includes modules on genetics could readily be taught with some agricultural examples. Students could learn from examples dealing with production differences among major crops, such as wheat, soybeans, corn, and vegetables." (C. on A.E. in S.S., 1988, p. 10). The recommendations of integration of agricultural concepts into science courses was seen as a way to combat the deficit in agricultural literacy.

School districts began to look at ways to incorporate science concepts into existing programs for students to obtain the needed credits with a deficit in educators. In 1988, the National Research Council recommended the acceptance of applied science courses for science elective credits (Chiasson & Burnett, 2001). This recommendation led to the acceptance of agricultural courses as science credits. Chiasson and Burnett (2001), studied the science achievement on standardized tests of students identified as agriscience students. It was determined students who were taught by integrating science principles into agriculture were higher achieving than those who were taught with a science only approach. In looking at this data, individuals began evaluating the role of agriculture in enhancing scientific literacy. Trexler & Barrett (1992), stated, "Agricultural Education joins science and research in a race toward scientific literacy" (p.7). As mathematical skills and English courses were seen to be important concepts to teach in high schools; educators began to also see the importance of enhancing scientific literacy within their curriculum.

By 1990, states began to recognize agriculture as a science credit (Chiasson & Burnett, 2001). Louisiana allowed students who had completed Agriculture I and Agriculture II to apply for a science credit (Chiasson & Burnett, 2001). Agriculture I was designed for first year agriculture students and provided an overview of animal science, career exploration, leadership development, the National FFA Organization, plant production, and agricultural mechanics. Agriculture II was designed for second year agriculture students and provided a more in-depth education in plant and crop science, soils, entomology, horticulture, and forestry. Agricultural education witnessed positive and negative responses when emphasizing teaching science principals within agricultural courses. In a study analyzing Indiana agricultural teachers, participants indicated a positive

response to this integration as the science credit creates an additional incentive for enrollment (Balshweid & Thompson, 2002). The data showed Indiana agricultural teachers were prepared to teach science but were ill-equipped with funds or equipment to teach it adequately (Balshweid & Thompson, 2002). Balshweid and Thompson (2002), found science teachers in the building to be a resource for knowledge and a source of equipment for the agricultural education program. Additionally, this study looked at how teachers would potentially need adjust with the change in instruction (Balshweid & Thompson, 2002). A large percentage of teachers indicated they would lose FFA instruction time and "good farm kids". The study concluded agricultural educators are receptive of integrating science into their curriculum, but are concerned with lack of funding, equipment, and student response (Balshweid & Thompson, 2002).

Researchers continued to look at the effect of using agriculture as a vehicle for science literacy between 1990 and 2007. Specifically, researchers evaluated the effectiveness of a Biological Science Applications in Agriculture (BSAA) course versus a horticulture course (Enderlin & Osborne, 1992). The purpose of this study was to evaluate student achievement, attitudes, and thinking skill attainment. Researchers collected student grade point averages as a measurement tool to gauge achievement and were tested after each unit in this study. At the conclusion of the study, researchers found students showed an increase in science retention after being exposed to the BSAA curriculum (Enderlin & Osborne, 1992). The BSAA curriculum showed agriculture is an effective way to teach science concepts. This information reinforces the idea students are more apt to enhance science retention within a BSAA course versus a conventional horticulture course (Enderlin & Osborne, 1992).

Project Lead the Way

In response to the need for Science, Technology, Engineering, and Mathematics (STEM) within high schools, the logical progression sought to develop a curriculum based on previous research. In 1997, the United States documented a need for engineers (Adelson & Blais, 1998). In the September 1997 issue of the American Society for Engineering Education's (ASEE) monthly publication, titled "Prism," a one percent decline in the number of college engineering students and a larger decline in those involved in engineering technologies was cited (Adelson & Blais, 1998). Additionally, labor statistics showed 190,000 job openings in the areas of software products and services (Adelson & Blais, 1998). In 1997, the generation who was primarily employed in STEM occupations began to reach the age of retirement (Adelson & Blais, 1998). In addition to the large turnover rates, fewer students were entering engineering preparatory programs (Adelson & Blais, 1998). In terms of technology, computer sciences were constantly changing. Teacher preparatory programs needed to change their programs to fulfill the needs of the rapidly changing industry (Adelson & Blais, 1998). Therefore, educators felt unprepared and were not expressing the importance of entering the engineering field (Adelson & Blais, 1998).

As a lack of interest in engineering increased, industry professionals began looking for solutions. One solution was to address the high school education classroom. As a result of a decrease in student interest of engineering programs, schools began cutting industrial arts programs (Adelson & Blais, 1998). Rather than addressing the lack of collegiate enrollment, researchers felt it would be better suited to change programming at the high school level, hoping students would choose

technology and engineering majors when entering college (Adelson & Blais, 1998). Thus, programs were implemented at the high school level to increase interest in engineering fields.

A number of different engineering programs were implemented in schools across the nation (Adelson & Blais, 1998). The engineering programs provided materials for students to develop interest, but there was not continuity or sequence to the curriculum (Adelson & Blais, 1998). The students developed interest in courses; however, they often did not have the opportunity to take additional courses. In the 1980's, Richard Blais began developing a curriculum in conjunction with the Technology Department at Shenendehowa Central School in upstate New York (Adelson & Blais, 1998). In the years following, Blais tested the curriculum for validity and developmental purposes (Adelson & Blais, 1998). During the pilot, educators elicited interest from students who had no plans of entering technology fields (Adelson & Blais, 1998). The technology board at Shenendehowa Central School was awarded funding for equipment and materials (Adelson & Blais, 1998). Additionally, a grant was approved to release this curriculum nationally (Adelson & Blais, 1998). This curriculum became known as Project Lead the Way (PLTW) (Adelson & Blais, 1998). PLTW gained traction and was adopted in schools for the 1997-98 school year. In 1998, 34 schools presented material to over 2,600 students (Adelson & Blais, 1998). PLTW maintains a five-course model where students are required to complete all five courses before completing the curriculum. The course sequence helped students to plan their schedules and continually build upon their skills and interests. Interest is built throughout four years of high school rather than losing it after one course.

To stay committed to teaching these five courses effectively, PLTW required extensive training for teachers in collaboration with local colleges. There are two options for this training: (a) teachers could choose to spend a semester at the college or (b) attend two to four-week courses over multiple summers (Adelson & Blais, 1998). As part of the agreement with PLTW, school districts purchased state-of-the-art materials with funds matched by PLTW (Adelson & Blais, 1998). PLTW also provided a laptop with needed software. After completing training, teachers returned to school to begin implementing the program with the opportunity for additional trainings as needed (Adelson & Blais, 1998).

Over the 20 years since the inception of PLTW, the program continues to grow across the nation. Currently, the program is present in all 50 states and United States territories (PLTW, 2019). Millions of students within the 11,500 schools and 14,000 programs have been exposed to PLTW curriculum (PLTW, 2019). Currently, over 65,000 teachers have been successfully trained and continue sparking interest for engineering programs and careers (PLTW, 2019). The impact of the PLTW curriculum has been seen in the STEM industry. Since the adoption of the curriculum The United States Bureau of Labor Statics has seen a growth within this occupation and expects the PLTW curriculum will continue to prepare students for these jobs (Employment in STEM occupations, 2019)

Development of Curriculum for Agricultural Science Education

PLTW noticed a decline in the number of students entering engineering programs and careers, whereas the agricultural education field noticed a decline in agricultural literacy (C. on A. E. in S. S., 1988). The C. on A.E. in S. S. (1988) report suggested science education should be taught

within the agricultural classroom to enhance scientific literacy based on evidence. In 1988, there were no existing national curriculums focused on agriculture or highlighted science components within the agriculture curriculum. Studies were completed to look at the effectiveness of teaching science within agriculture and were met with positive results (C. on A. E. in S. S., 1988; Enderlin & Osborne, 1992). However, to current knowledge there is not a sequence of courses that focus on integrating science principles into the agricultural education classroom.

In 2005 agricultural education set a goal to have 10,000 active agricultural programs by 2015 (B. Schloesser, personal communication, September 6, 2019). The Southern Region Education Board (SREB) works in 16 states to enhance education at all levels where individuals work with policy makers to make accurate recommendations for improvement. The SREB looked for ways to accomplish the goal of 10,000 programs by 2015. The board recognized there was not a national agricultural education curriculum model to their knowledge. Most agricultural programming was completed at the local level. Courses were structured and sequenced dependent on the local school or county where the agricultural education program is located. The SREB suggested creating an agricultural education curriculum model to establish a basis for agricultural education curriculum in the United States. The SREB communicated the idea to the National Council for Agricultural Education. The SREB and the National Council for Agricultural Education saw potential in modeling PLTW hoping to create a curriculum model having a similar effect on the agricultural industry as PLTW had on engineering.

Each year PLTW increases student enrollment in high school and college programs (PLTW, 2019). The agricultural education field saw the success of the PLTW model in enhancing student's science skills through engineering courses. Curriculum developers began using PLTW as a guide for a national agricultural curriculum to address the lack of science achievement and deceasing agricultural literacy cited in 1988 (B. Schloesser, personal communication, September 6, 2019). The curriculum is currently known as the Curriculum for Agricultural Science Education (CASE). The curriculum utilized national science and mathematics standards to align with standards needed for students to obtain science credits and reinforce the applied sciences. Students obtaining science credits through agricultural science allowed for science to be taught by a certified instructor even with the documented teacher shortage.

Initial conversations about the CASE curriculum began in 2005 when members of the National Association of Supervisors Agricultural Education (NASAE) had conversations with PLTW officials (B. Schloesser, personal communication, September 6, 2019). These conversations lead to the next steps of creating a national agricultural curriculum. Individuals involved begin interviewing curriculum writers and searching for funding to initiate the project (B. Schloesser, personal communication, September 6, 2019). A combination in funding is garnered from NASAE and 11 different states. Each state pledged approximately $100,000 to increase the operating capital to over a million dollars (B. Schloesser, personal communication, September 6, 2019). The funds were to be utilized to secure equipment, hire personnel, and to develop the curriculum (B. Schloesser, personal communication, September 6, 2019).

The CASE project started as an initiative of the National Council for Agricultural Education (Chaplin, 2013). In September of 2007, over 60 agricultural teachers, agriculture industry professionals, postsecondary educators, and other agricultural leaders met in Indianapolis, Indiana

for the first curriculum planning meeting for CASE (Chaplin, 2013). Individuals met to outline key concepts and to initiate the writing process for Principles of Agricultural Science-Animal (ASA) and Principles of Agricultural Science-Plant (ASP) courses (Chaplin, 2013).

Like PLTW, CASE aimed to provide rigorous content through activity, project, and problem-based instruction (Lambert, Velez, & Elliot, 2014). CASE also aligned to national agriculture, science, math, and English language arts standards within an agricultural curriculum (Lambert, Velez, & Elliot, 2014). The alignment was made for the demand for instruction in writing, mathematics, and science (Doerfert, 2011). Prior to CASE, enhancement of writing, mathematics, and science often meant the sacrifice of a CTE programs (Doerfert, 2011). Doerfert (2011) stated, "agricultural education has the obligation to show that its curriculum can be used to meet the academic challenges of today's school system while preparing students for a career in the agriculture industry" (p.26). The statement aligns to CASE's project goal:

> The project goal is to implement a national curriculum for secondary agricultural education that provides a high level of educational experiences to enhance the rigor and relevance of agriculture, food, and natural resources (AFNR) subject matter. Besides elevating the rigor of AFNR knowledge and skills, CASE provides purposeful enhancement of science, mathematics, and English language arts understanding. (CASE 2019, para. 2)

Agriculture is a broad field with a number of different components. Agricultural components were taught with production agriculture in mind. CASE identified the importance of each component and created pathways aligning with industry standards and student interests. PLTW documented the success of a four-year sequence within high school education programs (Adelson & Blais, 1998). CASE understood the importance of creating a sequence of courses for retention of students and advancement of knowledge. The initial courses in 2007 included ASA and ASP (Chaplin, 2013). Eventually, these three courses evolved into the ten courses currently in the CASE model. The ten courses are split into four pathways for a student to complete over four years of high school. Pathways contain four to five courses and are specific to Animal Science, Plant Science, Agricultural Engineering (AE) or Natural Resources (NR) (CASE, 2019). Figure 1 shows the pathways as outlined by CASE.

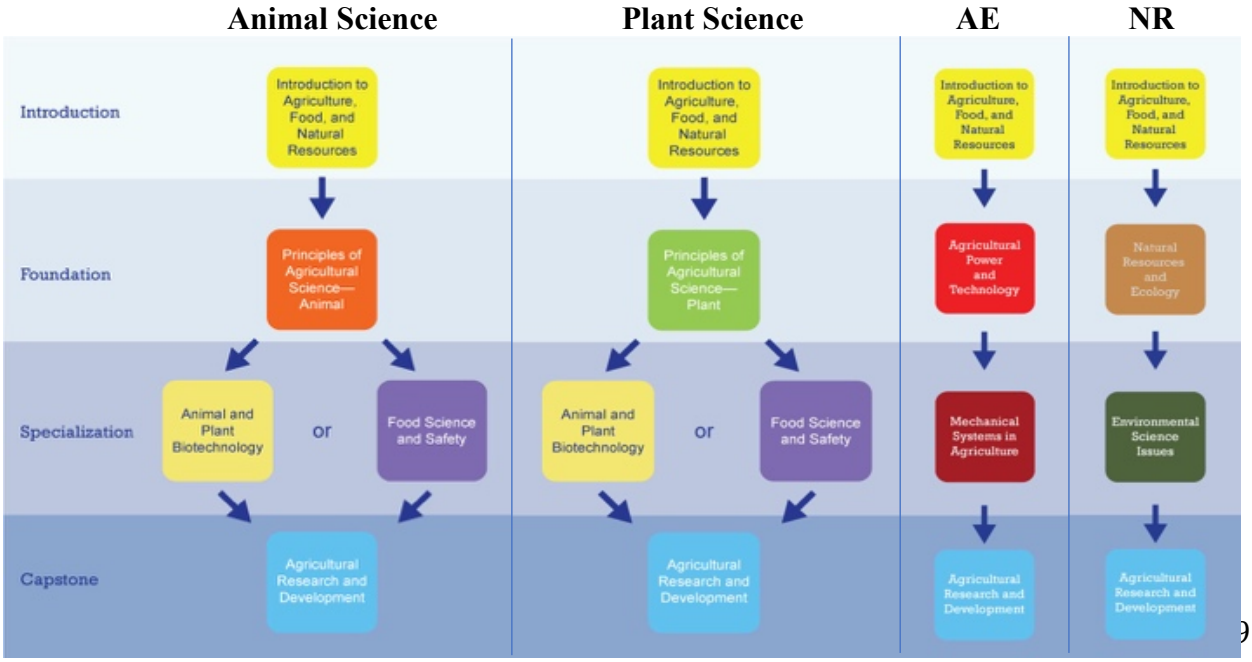

Figure 1. Retrieved from "CASE Pathways" Curriculum for Agricultural Science Education 2019 https://www.case4learning.org/curriculum/case-pathways

Students are encouraged to follow the pathways if the school system allows in order to ensure comprehension and retention of material. Courses that were not originally included within the 2007 structuring of CASE were phased in over time (B. Schloesser, personal communication, September 6, 2019). ASA and ASP courses were field tested and implemented during the 2009-10 school year (Chaplin, 2013). The following courses were phased in between 2011 and 2014: Agriculture, Food, and Natural Resources in the 2011-12 school year; Animal and Plant Biotechnology in the 2012-13 school year; during the 2013-14 school year Natural Resources and Ecology; and Food Science and Safety in the 2014-15 school year were incorporated (Mensch, 2012; Chaplin, 2013).

To uphold the goal of CASE, instructors attend extensive professional development courses, known as CASE Institutes (Curriculum of Agricultural Science Education [CASE], 2019). Professional development is specific to each course and varies in length accordingly (CASE, 2019a). Typically, these courses range from 50 to 100 hours spanning over 10 days (CASE, 2019a). In the first eight years of CASE institutes, teachers cited one of the issues of the institutes to be length of training. To address the course length, CASE began offering fast track CASE institutes in 2017. The structure of the fast track institute cuts the time spent at an institute in half from ten to five days (CASE, 2017). Fast track institutes have criteria to be met to be considered eligible (CASE, 2017). Teachers must reflect the following information within an application provided by CASE to be eligible for a fast track institute: have at least one CASE certification, have taught CASE in the classroom for two years, show understanding of the CASE model, cite reasons for attending a fast track institute, and show potential for positive contributions to the institute (CASE, 2017). Aside from the traditional and fast track institutes, CASE also provides a 4 to 6-hour professional development for the Agricultural Business Foundations (ABF) called "BriefCASE" (CASE, 2018). ABF is an elective course designed to introduce students to business management. Students utilize skills gained in earlier CASE courses to be successful (CASE, 2018). Since participants are building upon their skills learned in other institutes, ABF does not require a full institute. Professional development for this course can be offered as a workshop within a conference or other events outside of it being an entire separate entity (CASE, 2018). CASE Institutes are facilitated by teachers trained by CASE, called LEAD teachers. (CASE, 2019b).

CASE has developed a network of teachers to facilitate and promote CASE. These teachers have varying experiences within teaching and agriculture which is valuable within facilitation (CASE, 2019c). Teachers wanting additional roles within CASE can apply to be LEAD or Master Teachers (CASE, 2019c). LEAD teachers must be certified in the area of the course they are facilitating and have at least one year of experience teaching the curriculum (CASE, 2019c). Master teachers must have served as LEAD teachers for at least two years and have two or more CASE certifications (CASE, 2019c). The primary role of LEAD teachers is to facilitate CASE institutes, but also participate in additional professional development, remain up to date on CASE changes, and test program quality (CASE, 2019c). Master teachers maintain the same responsibilities, but also serve as mentors for new LEAD teachers, promote CASE, and serve as the CASE resource for their region (CASE, 2019c).

Implementation of Curriculum for Agricultural Science Education

Initially, there were hurdles to overcome in implementing the CASE curriculum. Specifically, finances were needed to administer and further develop the curriculum. CASE hired two individuals tasked with writing the curriculum (B. Schloesser, personal communication, September 6, 2019). Two individuals were hired to write the curriculum, one person writing ASA and another writing ASP (B. Schloesser, personal communication, September 6, 2019). Additionally, an individual was present as the PLTW representative/curriculum writer serving as a resource and editor of curriculum (B. Schloesser, personal communication, September 6, 2019). Brad Schloesser, former CASE Program Manager, said "justifying funds was an additional problem in implementing curriculum". States pledged funds to initiate the curriculum and wanted to know what they would obtain from their investment (B. Schloesser, personal communication, September 6, 2019). CASE provided benefits to the funding states by inviting individuals from funding states to be a part of developing the curriculum and implementing curriculum in their states (B. Schloesser, personal communication, September 6, 2019).

The CASE team began fostering relationships with companies to develop classroom materials. CASE developed partnerships with Lab-Aids, Ward's Science, and Pearson. Lab-Aids has been working with secondary education for 50 years and seeks for teachers to have access to science materials (Lab-Aids, 2019). Lab-Aids provides science material kits specific to the lessons CASE is instructing. Ward's Science prides themselves on providing cutting-edge technology to the classroom (Ward's Science, 2019). Ward's also provides biological specimens needed to complete CASE laboratories. Pearson combines world-class educational content and assessment to enable effective teaching and personalized learning (Pearson, 2019). The relationships built with Lab-Aids, Ward's Science, and Pearson aided in providing a well-rounded and effective curriculum.

B. Schloesser (2019) discussed meetings taking place to determine how CASE would generate income in the early stages. CASE knew their primary income would be from registration fees of teachers attending CASE Institutes (B. Schloesser, personal communication, September 6, 2019). In 2007, the curriculum writers had a basis of curriculum and the CASE team decided to hold the first CASE Institute (B. Schloesser, personal communication, September 6, 2019). The initial million-dollar investment began to diminish by 2007 (B. Schloesser, personal communication, September 6, 2019). Moving the project forward, a meeting of teachers interested in CASE was planned for the summer of 2008 (B. Schloesser, personal communication, September 6, 2019).

Teachers who expressed interest in forwarding the process were invited to attend a meeting on August 6th, 2008 (Chaplin, 2013). This group would become known as the "Teacher Leadership Team". Candidates who completed the coursework became CASE's first group of LEAD teachers. Six individuals were selected to lead the first CASE institutes hosted by McNeese State University and Jessamine Career and Technology Center in the summer of 2009 (Chaplin, 2013). Eleven teachers were present at the first LEAD Teacher training (B. Schloesser, personal communication, September 6, 2019). With the model in place, CASE began implementing the curriculum in the 2009-10 school year.

Success of the curriculum during the 2009-10 school year lead to an increase in the number of LEAD teachers the following year. The number of LEAD teachers increased from six to fourteen in 2010 (Chaplin, 2013). With the increase in the number of LEAD teachers, the opportunity to expand the number of states and students reached by the curriculum. Schloesser (2019),

emphasized the funding states had first rights to resources and hosting the CASE Institutes. The structure of implementation for CASE curriculum has hardly changed since the inception of CASE in 2007. After completing initial CASE institutes and seeing growth between year one and two, CASE set the goal of reaching 1,000 teachers by 2017 (B. Schloesser, personal communication, September 6, 2019). Figure 2 shows the evolution of CASE.

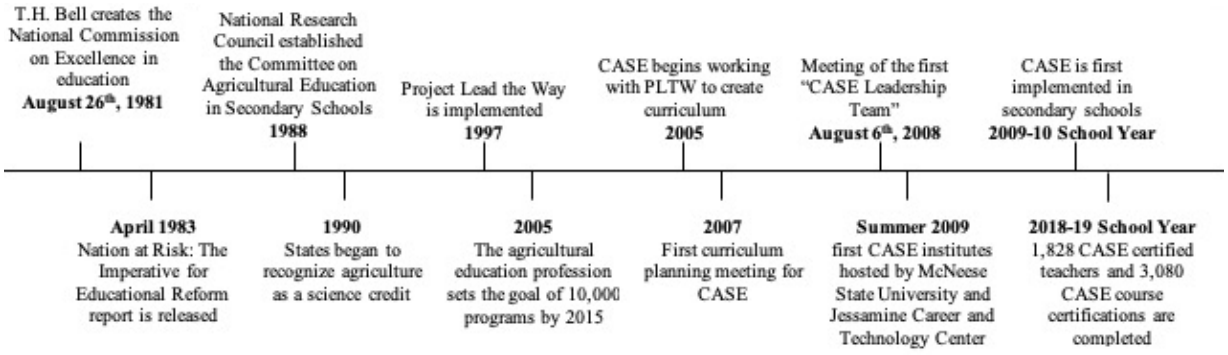

Figure 2. Evolution of CASE Timeline

Curriculum for Agricultural Science Education Currently

Currently, CASE is present in forty-five states and the Virgin Islands (CASE, 2019). The CASE project accomplished the goal of reaching 1,000 teachers by 2017. By the 2015-16 school year, there were 1,134 CASE certified teachers and 1,826 CASE course certifications (CASE, 2019). By the 2018-19 school year, 1,828 CASE certified teachers and 3,080 CASE course certifications are completed (CASE, 2019). CASE has continued looking for ways to expand their network and appeal to larger audiences. As of 2019, the network includes 24 post-secondary institutions across the United States (CASE, 2010). The institutions are asked to host CASE institutes, offer continuing education or graduate courses as professional development, and articulate college credit for CASE secondary students who successfully meet CASE standards (CASE, 2010). CASE utilizes the affiliate institutions for classroom and laboratory facilities, staff and logistical support, supplies for courses, and coordination of lodging and meals for the institute (CASE, 2010). By providing these resources, CASE continues to certify teachers and reach students (B. Schloesser, personal communication, September 6, 2019).

CASE has also developed an online platform to make the curriculum more accessible and user friendly for students. CASE Online is a collection of the modules, check for understandings, and assessments replicating the paper curriculum (CASE, 2019). In addition to CASE Online tools, CASE has also developed "End of Course" Assessments that serve as final or semester exams to evaluate the curriculum (CASE, 2019). CASE aims to provide non-traditional students access to curriculum, specifically looking at avenues to provide access to home school students.

Conclusion

The United States feels the nation succeeds and fails based on the importance put on education. The success of industry during the beginnings of the nation is contributed to an educated work force. Over time, the high value on education was lost. In 1981, the Secretary of Education created the National Commission on Excellence in Education to address the degrading education system

in the United States. After completing a review of the United States' education system over a course of 18 months, the committee reported a lack of emphasis on science and mathematics skills in classrooms across the nation. Within the committee report, national graduation requirements are established including three mathematics and three science courses. With these recommendations handed down, career and technical education programs began looking for ways to include mathematics and science credits.

Agricultural classrooms began evaluating science credits being taught in the classroom. Evaluation showed students learning science through agriculture are higher achieving on science standardized testing. The evidence showed the need for a national agricultural science curriculum developing mathematics and science principles. Project Lead the Way (PLTW) is a national science, technology, engineering, and mathematics curriculum utilized within engineering classrooms at the high school level. PLTW showed evidence of career preparation through their well-designed curriculum and course sequence. Agricultural curriculum writers utilized PLTW as a guide for the national curriculum, eventually creating the Curriculum for Agricultural Science Education (CASE).

CASE is a science based agricultural education curriculum aligning with national science and mathematics standards. Utilizing the PLTW model, CASE creates pathways allowing students the option to take multiple courses and create a four-year plan. CASE has grown rapidly over the past ten years and is currently present in forty-five states and the Virgin Islands. CASE continually trains new teachers to continue expanding the curriculum to reach agricultural education students.

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Considering Trail Users' Perceptions and Preferences of Their Environment as a Tool for Plant Selection in Future Landscape Design

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Abstract

With limited natural resources and a growing population, a sustainable relationship between humans and the natural environment is crucial to the health of urban landscapes. Cultivating value for those sustainable relationships can occur through informal education; however, understanding the initial perceptions toward urban landscapes, including aesthetics, can assist educators in tailoring learning opportunities to meet the needs of learners. The purpose of this study was to describe trail users' perceptions of existing plant species along the Watco Trail and the users' preference for future landscape change. A census survey (n=35) was conducted in Pittsburg, KS in July and August of 2019 along the Watco Trail. Results indicated that trail users were comprised of primarily (80%; n = 28) local community members and that 46% (n = 16) of these trail users would like to see more native species along the trail in future plantings. Recommendations include addressing aesthetic perceptions of beneficial plant species as a measure of community preference and in acknowledging the lack of a consistent framework for these interdisciplinary studies.

Keywords: plant preference, perception, local community, trail users, restoration

Introduction

One of the greatest challenges facing the agricultural, food, and natural resources industries today is the steady depletion and pollution of air, water, and land as the result of a growing population consuming the earth's finite natural resources (Andenoro, Baker, Stedman, & Weeks, 2016). With a majority of the US population residing in nonrural areas, building dynamic living spaces where society and nature share resources in time and space (Farahani, Maller, & Phelan, 2018) is a critical piece to solving this grand challenge. Citizen science can improve natural resource management when the citizens are educated in sustainability (Minteer, Smith, Lake, & Pokorny 2018). As is mentioned in the American' Association for Agricultural Education's National Research Agenda (Roberts, Harder, & Brashears, 2016), social change toward sustainable living spaces requires informal education that is "informed of the public dialogue" (Andenoro et al., 2016, p. 62). Communities initiating change toward sustainable environmental practices must consider the values and perceptions of their community members; if neighborhoods are not invested in environmental projects the changes are not lasting (Cáceres, Tapella, Quétier, & Díaz, 2015).

Plant species can aid in erosion control, soil amendment, enhancement of pollination, water retention, or remediation of contaminants (Eastburn et al., 2018; Hayden, Cadensasso, Haver, & Oki, 2015; Menz et al., 2011); however, considering community members' aesthetic perceptions of these plant species could aid in the longevity of sustainable projects (Hutchins, 2018). Previous studies have found aesthetics to be the primary consideration of homeowners when making landscape choices, valuing environmental aspects to a lesser degree (Fernandez-Canero, Ordovas, & Machuca, 2011; Larsen & Harlan, 2006; Spinti & St. Hilaire, 2004). Hayden et al. (2015) found that while over half of their respondents considered the ecological health of their yard when making landscape decisions, over one-third felt they lacked the knowledge required to include ecological health as a factor in their landscape decision-making. However, homeowner perceptions of their personal landscapes may not translate to residents' perceptions of community landscapes. Many studies have implied that societal perceptions and preferences involving plant species can be used to identify and to emphasize how beneficial plants are valued by different stakeholders -- but there remains a lack of local community input (Caceres et al., 2015). This lack of research in restorative plant design that include humans as part of the overall system points to a misunderstanding of how humans fit into the natural environment (Collins et al., 2011). Understanding community members' aesthetic perceptions of existing plants can help determine what variables affect their valuation of specific plant species (Brown & Amacher, 1999; Hayden et al., 2016), thereby informing future landscape choices within a community's shared spaces (Nohl, 2001; Olander et al., 2018) and providing informal educators with information to better shape community learning experiences to initiate lasting change (Andenoro et al., 2016).

Theoretical Framework

The National Research Agenda of the American Association for Agricultural Education (Roberts et al., 2016) specifically identifies the global challenge of natural resource management as one needing multiple perspectives, interdisciplinary understanding, and transdisciplinary solutions (Andenoro et al., 2016). Therefore, the theoretical framework for this study includes literature from both landscape and social sciences in an effort to approach the problem from a more fully informed perspective.

Theory in Landscape Studies

In order to understand the relationship between the social and natural worlds, understanding human perceptions of their surroundings is fundamental (Lee, Ellis, Kweon, & Hong, 2008). In evaluating perceptions to aid in future land use and design, it is possible to integrate the social and biophysical aspects of urban ecosystems (Ignatieva et al., 2011; Rademacher, 2019). While pivotal frameworks in landscape ecology have not established an accepted model for transdisciplinary studies and socio-ecological preference, authors have made attempts to provide such a framework over the past few decades. Termorshuizen and Opdam (2009), who are among authors that have tried to create a framework that promotes interdisciplinary research in landscape ecology, described the difficulty in finding an accepted and applicable theory in multi-level landscape design. Nohl (2001) developed a conceptual framework for better understanding aesthetic landscapes when they are perceived as objects by the community; Zube, Sell, and Taylor (1982) attempted to analyze the paradigms used by using perceived landscape values.

Further, Zube et al. (1982) identified a conceptual framework for four paradigms after a thorough literature review but subsequently noted an absence of an acceptable theoretical framework.

More recently, others have noted that integrative methodology for socio-natural, long-term research, has been hampered by this lack of a clear theoretical framework (Picket et al., 2017). The field of landscape ecology has been criticized for not having a strong and general theoretical framework and of being ineffective in predicting the future of landscapes and their inhabitants (Metzger, 2017). Other critiques observed that a lack of theoretical or empirical information is common regarding urban greenspaces (Jim & Chen, 2006, p. 338 as cited in Farahani & Maller, 2018). Most fitting for a study of the socio-natural interactions, Beumer and Martens (2015) suggest a new style of framework that is innovative, considering a wider scope of landscapes which would include humans as an essential part of their environment- integrating ecological, cultural, and aesthetic factors and valuation strategies related to a diverse array of plant species for a biodiverse landscape. This concept of valuation is central to the practice and science of ecological management and conservation (Metzger, 2017; Minteer et al., 2018).

A well-developed body of theory and evidence that explores concepts of value across different disciplines which include philosophy, economics, sociology, and psychology is helpful in analysis (Ives & Kendal, 2014). Insight from these disciplines provides a robust and sophisticated platform for considering the role of social values in ecological conservation, management and research (Ives & Kendal, 2013). Smith (2015) outlines several theories, of these, the ecological integration theory, which proposes that natural systems, not designed landscapes, be integrated as support elements to create healthy communities and sustainable systems. In order for these natural systems to be long-lived it is important to take account of human preference and perception (Palmer, 2013). Evaluation of these intentions and behavioral predictors has been used in studies on understanding pro-environmental behavior (PEB) and the outcome of how a community or an individual will react to an environment (Hines, Hungerford, & Tomera, 1987; Wang & Yu, 2018). Environmental aestheticians maintain that experience in nature can instill environmental ethics and by understanding how those experiences are received and interpreted, it's possible to predict or affect future behavior (Wang & Yu, 2018).

Theory of Planned Behavior in Landscape Studies

Landscape preference reasoning is usually attributed to aesthetic factors but depends on person and place and can be influenced by knowledge, community pressures, or by one's sense of self (Ives & Kendal, 2013; Khew, Yokohari, & Tanaka, 2014; Bell, 2012). As an individual's behavior accumulates and affects ecological outcomes in the landscape, the Theory of Planned Behavior (TPB) can be used as a tool in environmental psychology to predict intention, though barriers may hinder the ultimate outcome (Ajzen & Madden, 1986; Ajzen, 1991; Ives & Kendal, 2014, Schwartz, 1977).

TPB has been used in social science for analyzing an individual's intention to behave in a particular manner in order to improve the prediction of future behavior or to find drivers behind current behaviors (Ajzen, 1991, Wu et al., 2017). According to TPB, the chief incentive to carry out any behavior is the intention to perform it, which depends on attitudes, subjective norms and perceived behavioral control (Ajzen, 1991). As environmental aesthetics play an important role

in individual preference, intent, and future behavior, TPB can be used to frame PEB in landscape planning (Figure 1; Harland, Staats, & Wike, 1999; Hines et al., 1987).

PEB, like TPB, is the end result of an individual's attitude, the perceived social norm, and the behavioral control one has (Ajzen & Madden, 1986; Schwartz, 1977; Whitburn, Linklater, & Milfont, 2018). As defined by Kollmuss and Agyeman (2002) it is behavior that consciously seeks to minimize negative impacts on one's interactions in the natural world based on different personal inputs. PEB is linked to values tied to environmental ethics and personal perception. It is important to understand the variables that are inputs to an individual's behavior—for example, the beliefs that are based off of personal perceptions (Ives & Kendal, 2014). In order to create successful and sustained restorative projects, the land must be given some value by the community that resides in the landscape and that value must be understood by the landscape developers (Ives & Kendal, 2013). Figure 1 illustrates how attitudes, social pressures, and beliefs can affect intention and action regarding PEB.

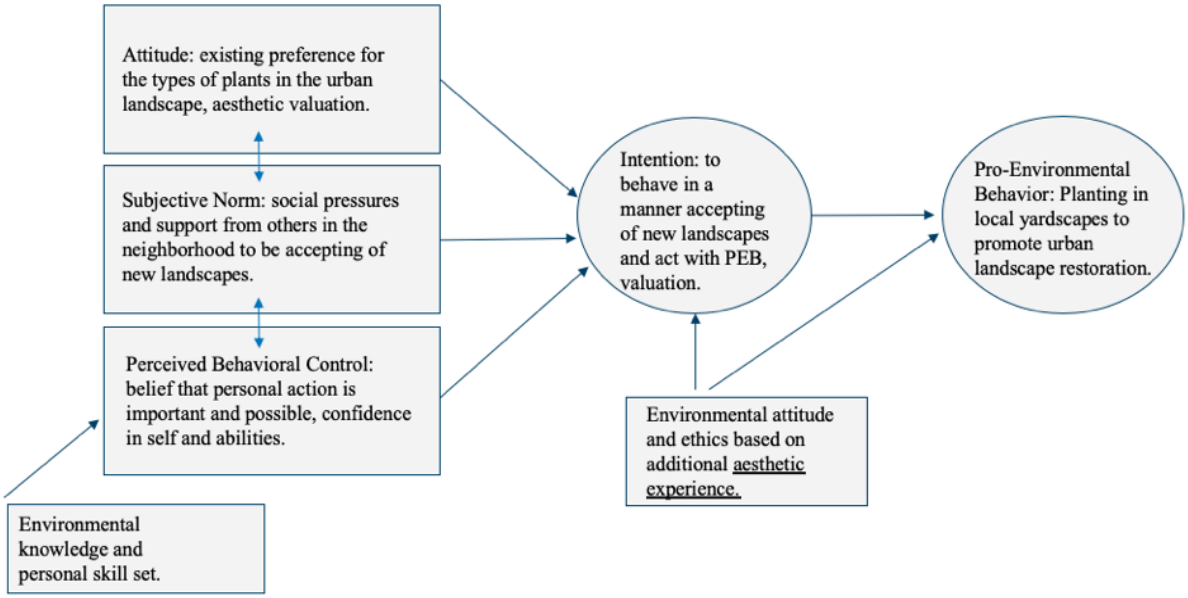

Figure 1. Theory of Planned Behavior (TPB) as applied to pro-environmental behavior (PEB) in using mixed theory an example of the aesthetic experience.

Purpose and Research Questions

This study measured trail user perceptions of existing plant species along the Watco Trail in Pittsburg, KS. Previous research shows that plants used in landscape design can be seen as having value based on cultural, economic, aesthetic, or recreational reasons (Cáceres et al., 2015; Fisher, Turner, & Morling, 2009). The purpose of this study was to evaluate perceptions regarding current greenspace in the trail environment and to discover future greenspace preference by use of aesthetic valuation based around participant attitudes.

The goals of the study were to:

1. describe trail users' aesthetic perceptions of existing plants in the greenspace along the Watco Trail in Pittsburg, KS;
2. describe trail users' aesthetic preferences for plant species choice in future landscaping; and
3. establish a baseline for a post-test study on trail users' environmental attitude before the installation of a demonstration plot along the Watco Trail.

Methods

The town of Pittsburg is located in southeast Kansas and has a population of 20,216 with a poverty rate of 28.6% and an education rate of 89% for those completing high school (census.gov). It is an area of previous strip mining; much of the land is home to non-native plant species and requires soil amendment. A demand exists for research which investigates the impact of decisions about beneficial plants (those used in restoration) and their aesthetic valuation for communities in degraded landscapes (Olander et al., 2018, Van Marwijk et al., 2012).

In May 2019, an 11-item electronic questionnaire was developed by the researcher and approved by the Internal Review Board at the University of Arkansas, which found the study to be exempt as children were not permitted to participate in the study. The questionnaire items asked for respondents' perceptions of the aesthetic value of a site and included plants along the Watco Trail. Questions were divided by context, personal interest, and environmental preference categories (Hoyle, 2015). Questionnaire items were evaluated via three cognitive interviews with Pittsburg State University Sustainability Club volunteers as participants. The questionnaire was tailored as suggested by these interviews and followed with a pilot study in July 2019. Test-retest reliability was evaluated with the pilot test administered two weeks apart with participants from Pittsburg State University Sustainability Club resulting in a Cronbach's alpha score of 0.82, which was deemed to be acceptable for this study (Cronbach, 1951). Instrument validity was established through construct and face validity by using an expert panel consisting of two experts in social sciences, questionnaire development, and informal education.

The population for this study included all adults traveling along the Watco Trail during the course of two specific weekends in July between 9am and 5pm ($N = 59$). Using a tablet to collect responses, those walking along the trail were approached and asked to complete the electronic questionnaire. A census sampling method was used at the Watco Trail in Pittsburg, KS. No repeat submissions of the questionnaire were allowed, and subjects were required to first declare that they were over the age of 18. A response rate of 59% ($n = 35$) was recorded over the two weekends in which survey was executed.

Fully-completed questionnaires were analyzed using Microsoft Excel software and are reported via frequencies. We caution readers against generalizing beyond the respondents in this study, as nonresponse error was not able to be controlled due to the face-to-face nature of the data collection.

Findings

Locality and Trail Use

A majority of the respondents were fairly regular trail users; 80% (n = 28) indicated they visited the Watco Trail either weekly or monthly, while 9% (n = 3) reported this being their first time to the Watco Trail. Slightly over half of the respondents (54%; n = 19) reported using the trail that day for exercise, while just under one-third (28%; n = 10) chose recreation as a motivating factor for coming to the trail. Most of the respondents were local and over half (54%; n = 19) had only traveled between one and three miles (Figure 2). All first-time users had travelled over five miles to use the trail, while those that used the trail seasonally were all located within three miles.

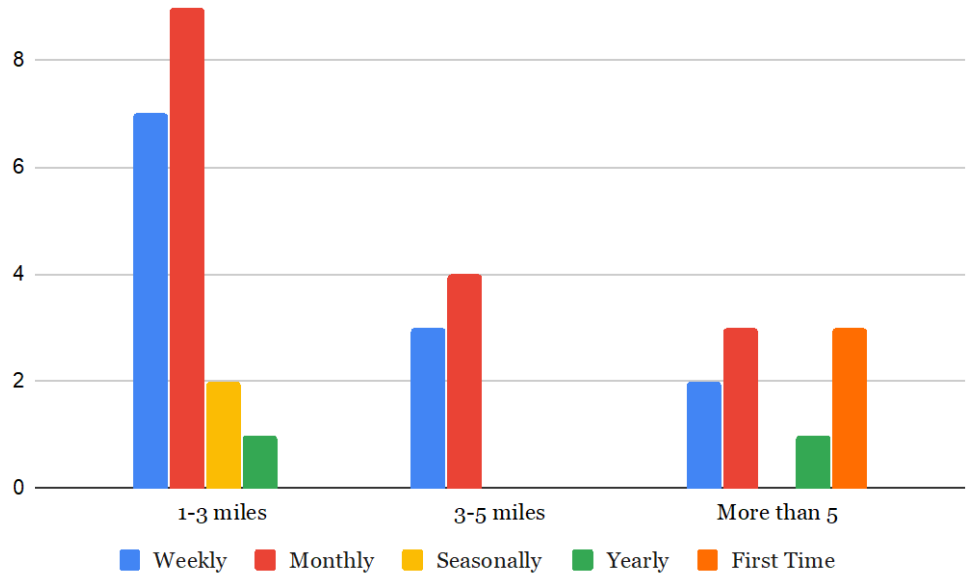

Figure 2. Trail use by frequency and distance traveled.

Trail Environment

Feedback from trail users on feelings on relaxation, attractiveness, and tidiness of the trail were addressed through questions that asked respondents to rate their answer from one (least) to five (most) (Figure 3). The majority of respondents (54%, n = 19) indicated feeling relaxed (indicated as a 4 or 5 on the scale) as a result of walking on the trail and believed the trail to be well managed (57%; n = 20). Respondents were more varied in their perceptions of the trail's attractiveness, with over a quarter of the respondents (28%; n = 10) rating the trail as unattractive (indicated as a 1 or 2 on the scale; Figure 3).

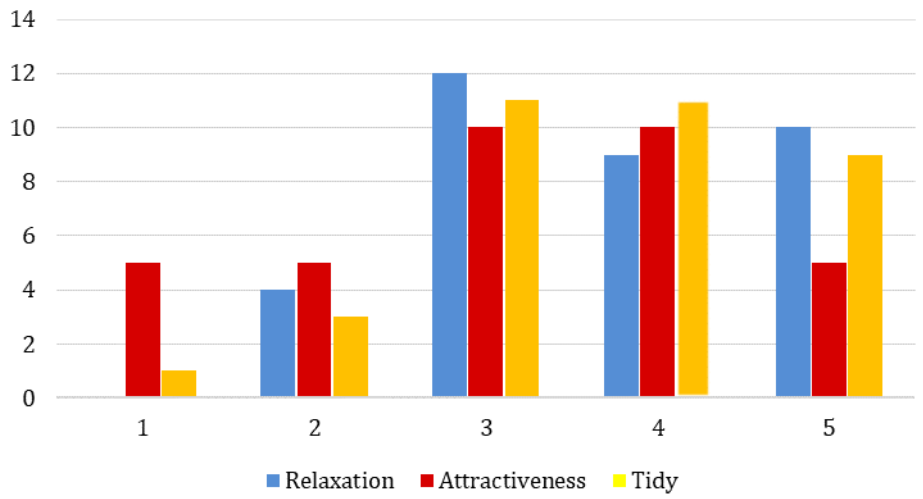

Figure 3. Response to the trail environment.

Though most of those surveyed did not express interest in gardening (71%; *n* = 25), when asked if they would prefer a vegetable, flower, or no garden at all, 34% (*n* = 12) of the respondents indicated they would like to be involved with both flower and vegetable gardening, while 23% (*n* = 8) chose vegetable gardening, and 23% (*n* = 8) chose flower gardening. Only 20% (*n* = 7) chose to not garden at all.

When asked about the plant species on the trail, 43% (*n* = 15) of the users noted that they had counted between one and three species on their walk. A majority of the respondents believed that "all" (29%; *n* = 10) or "most" (34%; *n* = 12) of the species were native. Many (37%; *n* = 13) of the trail users were not sure if the species of plant along the trail were native or non-native indicating a lack of knowledge on the concept.

When asked what type of plants they would like to see along the trail, nearly half (46%*;* *n* = 16) indicated a preference for native plantings, while the second highest frequency was found with no opinion or preference (29%; *n* = 10; Figure 4). The non-native species category was chosen by 11% (*n* = 4) and 14% (*n* = 5) felt that no additional plants were needed.

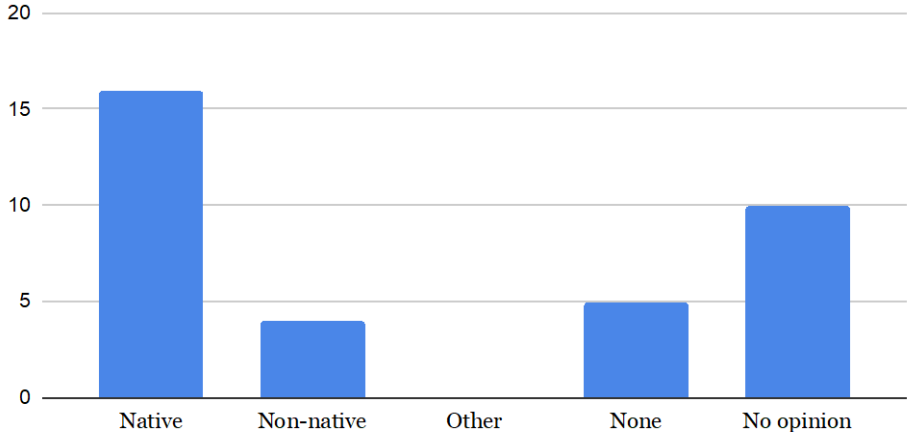

Figure 4. Reported preference for future plantings on Watco Trail.

Discussion

Examining sustainable initiatives requires an analysis of the landscape attributes preferred by the public (Cáceres et al., 2015; Gobster et al., 2007; Svobodova, 2013). Aesthetic perceptions- or the use of one's senses to discern what is beautiful- can be used to analyze societal valuation and preference of plant species (Eastburn et al., 2018). The purpose of this study was to describe local aesthetic perceptions and preferences of plants for the trail users who frequented or passed by Watco Trail as a preliminary study before implementation of a demonstration garden. A post-test will be conducted to evaluate how trail users' perceptions and preferences may change with the informational plot.

Results indicated that while the majority of respondents were regular trailgoers and felt the trail provided a sense of relaxation, their perceptions regarding the landscape's attractiveness and its current or future inclusion of native plants were varied. These findings differ somewhat from those of previous studies of homeowners, which reported aesthetics to be a high priority when making landscaping decisions (Fernandez-Canero et al., 2011; Hayden et al., 2016; Larsen & Harlan, 2006; Spinti & St. Hilaire, 2004). Further, respondents did not strongly indicate a preference for native plants, suggesting they could lack knowledge of these plants' beneficial qualities to an ecologically healthy greenspace, as was found by Hayden et al. (2015).

Numerous respondents indicated the trail was not particularly attractive and/or no preference on the future inclusion of native plants. In fact, over half the respondents did not indicate identifying any plants along the trail, suggesting the plants may have actually been unnoticed altogether by some of the respondents. Plant blindness, posited to be caused by the tendency for plants to blend together and by their lack of movement, can have detrimental implications for plant conservation efforts (Balding & Williams, 2016). It may also suggest the potential lack of support for community change toward ecologically healthy landscaping.

Recommendations for Research and Practitioners

Methods concerning perceptions are scattered and require organization to be of greater use (Collins et al., 2011; Fisher et al., 2009). A survey of aesthetic perceptions of plants can be used to identify and to emphasize how individual species are valued by different social actors but there remains a lack of qualitative input from the communities at the local level (Cáceres et al., 2015). Whether an "aesthetic" can be measured in landscape planning, design, and management is still debated (Gobster et al., 2007); however, reviewing aesthetic perceptions on a local scale may lead to sustainable future design for the landscape. Examining sustainable initiatives requires an analysis of the landscape attributes preferred by the public (Cáceres et al., 2015; Gobster et al., 2007; Svobodova, 2013). After reviewing respondent preferences for future plantings, it can be noted that there is a lack of knowledge for which species are native and which are non-native to the region.

This study quantitatively assessed community members' perceptions of a community greenspace. However, several of the results left us with further questions, providing opportunity for continued research. First, while we assessed respondents' perceptions of whether plants were native, we did not assess their knowledge of native plants, including the definition of a native

plant. We suspect knowledge of native plants was not consistently high among respondents, as a considerable number of them was unsure as to whether the plants along the trail were native. Therefore, we recommend researchers investigate knowledge of native plants to assist with future educational efforts. We also recommend qualitative inquiry into the visibility plants have among trailgoers, as plant blindness could be a factor educators and landscape designers may need to consider when garnering support for landscape changes.

The results of this study created several recommendations for practitioners as well. First, the lack of respondent consensus on the inclusion of native plants in the future and the number of respondents who were unsure whether the landscape included native plants leads us to recommend informal education on native plants for the area, as well as their ecological benefits. Informal education should also raise awareness of plants in general in an effort to thwart plant blindness along the trail. Extension agents would be well suited to provide both passive and active educational opportunities in this context. Additionally, offering demonstration gardens or informational signage may help residents understand more about the flora around them and make more informed decisions. By offering residents a choice in species selection of restorative or remediative landscaping, these same community members might implement similar landscapes in their backyards, particularly when provided knowledge through demonstration plots that encourage resident use and understanding.

Failing to understand and to incorporate society's perceptions on sustainable management may lead to incomplete conclusions, hindering policy choices (Brown & Amacher, 1999, Cáceres et al., 2015; Collins et al., 2011; Turkelboom et al., 2018). By increasing resident knowledge of restorative plant species that can enhance fall pollinators, improve soil quality, and prevent further erosion, this project exhibits a preliminary step that can be beneficial to ecologically sustainable landscaping in any region that has had previous landscape disruption. By including local stakeholder preference in future landscape design, communities can attain greater sustainability of greenscape projects. Looking at what is perceived and preferred by local inhabitants can create a sense of ownership that can contribute to the project's viability. With knowledge of stakeholder perceptions and preferences, improved aesthetic and ecologic designs can more seamlessly merge into urban greenspaces to provide for a more sustainable plantings and landscape design.

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Linking Residential Landscape Practices and Personal Well-Being to Inform Agricultural Education Programs

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Abstract

Water quality and availability are critical topics addressed by Cooperative Extension nationwide through programs that encourage practices such as outdoor water conservation and integrated pest management (IPM). Disconnect among diverse audiences and agricultural education programs poses challenges in achieving the goals of these types of programs. To discern a potential Extension programming strategy, we evaluated the relationship between residential environmental landscape management practices and personal well-being. We used a nationally-distributed electronic survey instrument to measure well-being and landscape management perceptions and practices. We employed cluster analysis to divide the respondents into homogenous subgroups, followed by analysis of variance and chi-square analyses to identify differences among the subgroups. The group that indicated the highest level of engagement with water conservation and IPM practices also had significantly higher well-being. Membership in the highest IPM and water conservation group was related to several socio-demographic characteristics, including age, homeownership, and homeowners' association membership. This group was also most likely to engage with Extension services. Understanding these indicators of engagement in best management practices and Extension education, along with higher well-being, may be useful in determining target audiences and potential engagement with Extension programs.

Keywords: audience segmentation, best management practices, integrated pest management, water conservation, well-being

Introduction

Water is the most fundamental human necessity, and beyond cultural and societal needs, humans depend on water for a range of activities including waste dilution, food and energy production, and existential purposes, such as beach vacations (Arthur, Saffer, & Belmont, n.d.; Gleick, 1996). The stress on this natural resource over time now poses a threat to the quality and quantity of water sources (Brown, Mahat, & Ramirez, 2019). Such complex issues require more innovative approaches than those used in the past. Severe water shortages are projected in some regions over the 21st century, without further adaptation efforts (Brown et al., 2019). Industries extending from agriculture to tourism depend not only on abundance of this resource, but a

consistent source of clean water (Minnesota Pollution Control Agency, n.d.). For coastal states and other places where water recreation is prominent, high water quality is critical to economic welfare. The shared responsibility of sustaining both water quality and quantity includes residents (Ramsey, Berglund, & Goyal, 2017).

The United States Environmental Protection Agency (EPA, n.d.) indicated outdoor water usage accounts for more than 30 percent of total household water use and as much as 60 percent in arid regions, and half of this amount can be lost by inefficient irrigation. To provide perspective on outdoor water use, watering the average sized lawn for 20 minutes every day for a week is equivalent to taking more than 800 showers (EPA, n.d.).

There is a clear demand for water conservation and quality protection, and the implications for policy and education justify a public stake in ensuring action is taken. Agricultural education professionals who focus on extension, teacher preparation, leadership education, and communication effectiveness are distinctively situated to lead development of these solutions (Andenoro, Baker, Stedman, & Weeks, 2016). Programmatic goals, such as human development and the protection of nature, can be approached through a lens of well-being (Beauchamp et al., 2018; Bottrill et al., 2014, Daw et al., 2015). Conservation literature has begun to incorporate the concept of personal well-being as a key consideration in designing programs and measuring resulting impacts (Agarwala et al., 2014, Beauchamp et al., 2018; Fry et al., 2017).

Agricultural education professionals are needed to lead programs that result in behavior change, a requisite partner to the emerging technical solutions to these complex environmental problems (Andenoro et al., 2016; McKenzie-Mohr, Lee, Schultz, & Kotler, 2012). Some of the potential behaviors that residents can adopt to protect water resources include irrigation practices and technologies that reduce the amount of water used for lawn and landscape irrigation and using integrated pest management (IPM) practices that can reduce the amount of pesticides used in the yard to positively affect water quality.

Some technologies that can reduce the amount of water used include drip irrigation that applied small amounts of water directly to the plant root zone and smart irrigation controls that prevent irrigation from operating when there is enough water in the soil or when rain is in the forecast (Warner, Diaz, & Kumar Chaudhary, 2018). Practices that can reduce the amount of water used include replacing high water-consuming plants with drought-tolerant species and calibrating sprinklers (Warner et al., 2018).

IPM practices include spot-treating pests as opposed to applying pesticides broadly (Diaz et al., in press). IPM is a decision-making process that offers a more effective and environmentally conscious approach to controlling pest populations across the globe (Calibeo, Oi, & Oi, 2017; Cooper, Wang, & Singh, 2015; Kass et al., 2009; Wang & Bennett, 2009; Williams et al., 2005). The process of IPM includes pest identification, surveillance, chemical and non-chemical tactics (i.e., communication, education, plant and turf health, excluding pests from building, and sanitation), and evaluation. While the process of IPM has a long history of scientific success, and can be more economical over time (Drees, Calixto, & Nester, 2013; Miller & Meek, 2004; Wang, Gibb, Bennett, & McKnight, 2009; Williams et al. 2005), it suffers from consistently poor adoption by end-users in both agricultural and non-agricultural settings worldwide.

Professionals from a number of sectors (McKenzie-Mohr & Schultz, 2014), including agricultural education, have embraced innovative approaches to behavior change such as social marketing (Warner, Stubbs, Murphrey, & Huynh, 2016). Social marketing is "a distinct marketing discipline" (Lee & Kotler, 2011, p. 7) that focuses on promoting behaviors that ultimately "improve the lives of individuals or the society of which they are a part" (Andreasen, 2006, p. 11). Social marketing is an effective approach to social change because it takes extensive formative audience research into account for program design and uses tools from commercial marketing, which include audience segmentation (Andreasen, 1994, 2006; McKenzie-Mohr & Schultz, 2014). Given the diversity among potential target audiences, segmentation can be used to establish subgroups with shared barriers and benefits to a change or other characteristics relevant to the behavior (Lee & Kotler, 2011).

Audience segmentation has proven an especially valuable social marketing tool in agricultural education contexts and has recently been used to inform consumer water conservation (Huang, Lamm, & Dukes, 2016; Warner et al., 2018) and IPM (Diaz et al., in press) programs. While a number of recent studies have demonstrated the value in using audience segmentation, the concept of well-being has not been used to characterize potential audience segments for agricultural education programs. Yet, integrating well-being into audience segmentation offers significant potential, given the focus on improving lives shared by agricultural education and social marketing fields. Here, we explore the potential interconnectedness between landscape best practices and well-being to inform innovative agricultural education programs.

Theoretical/Conceptual Framework

The concept of well-being may be understood through a hierarchy of needs (see Table 1), where lower level needs must be met before individuals can achieve a state of self-actualization, or a point at which they realize their personal potential and begin to help their community (Gough & McGregor 2007; Maslow 1943, 1970; White, 2010).

Table 4
Maslow's hierarchy of needs reflecting the multidimensional concept of well-being

Need Level	Description
Biological & physiological	Air, food, drink, shelter, warmth, sex, sleep
Safety	Protection from elements, security, order, law, limits, stability, freedom from fear
Social	Belongingness, affection and love from work group, family, friends, romantic relationships
Esteem	Achievement, mastery, independence, status, dominance, prestige, self-respect, respect from others
Cognitive	Knowledge, meaning
Aesthetic	Appreciation and search for beauty, balance, form
Self-Actualization	Realizing personal potential, self-fulfillment, seeking personal growth and peak experiences
Transcendence	Helping others to achieve self-actualization

Agricultural education professionals must consider that each individual has a different personal growth path and exhibits self-actualization differently (Kenrick, Neuberg, Griskevicius, Becker, & Schaller, 2010; McLeod, 2007). A lack of well-being can prevent individuals from objectively evaluating situations, leading to maladaptive strategies (i.e., Baradell & Klein, 1993; Caceda et al., 2014. Cisler & Kostler, 2010; Leahy, 2002; Leykin et al., 2011; Monroe, Skowronski, MacDonald, & Wood, 2005; Schwartz et al., 2002; Porcelli & Delgado, 2017; Suri, Altshuler, & Mintz, 2004; Treadway, Buckholtz, & Zald, 2013). Several researchers have reported a connection between environmental values and subjective well-being (Binder & Blankenberg, 2017; Brown & Kasser, 2005; Welsch & Kuhling, 2018), as well as water conservation behavior (Willis et al., 2011). For example, the public is more likely to adopt water conservation practices when they connect their actions to the assurance of well-being (Corral-Verdugo et al., 2008).

Research has also demonstrated positive relationships between well-being and engaging in other environmentally friendly behaviors, indicating the role of conservation in individuals' growth towards self-actualization (Brown & Kasser, 2005). Watershed education programs integrating payment for ecosystem services now include well-being as a program impact indicator (Keeler et al., 2012). Such endeavors reveal an emerging understanding that conservation is an intermediary to well-being, as there are continuous watershed level goals that can be achieved through enhanced well-being of community members. Lower order factors, such as social well-being, also positively relate to environmentally responsible behaviors (Prati et al., 2017).

Recognizing that people may not engage in conservation behaviors until lower level needs are adequately addressed, it is no longer sufficient to evaluate cognitive outcomes in isolation, and a strong argument exists for an integrative approach to delivering, connecting and evaluating programs across the needs hierarchy (Longo, Coyne, & Joseph, 2017; Maslow, 1970; McLeod, 2007). Agricultural education professionals should consider well-being as a desired outcome of their programs based on the attributes of a self-actualized individual and their potential impact on furthering community goals. Maslow (1970) recognized 15 characteristics of a self-actualized person that could represent valuable programmatic outcomes, including being problem-centered (versus self-centered), having the ability look at life objectively, being concerned for the welfare of humanity, having the ability to establish deep satisfying relationships with others, and having strong moral and ethical standards (McLeod, 2007).

Agricultural education professionals traditionally measure satisfaction and knowledge and may not include the long-term approach necessary to assess personal growth (Deshler, 1997; Lamm, Israel, & Diehl, 2013). Yet, there may be value in integrating personal well-being along with traditional means of evaluating knowledge gain and practice adoption to develop a holistic picture of a person's growth trajectory. While there are some interesting relationships elucidated in the literature, additional inquiry is needed to fully understand the concept and application of well-being in the agricultural education context to inform program design and evaluation.

Purpose and Objectives

The purpose of this study was to explore potential connections between engagement in residential landscape best practices and personal well-being as an avenue for informing holistic approaches to Extension and other types of agricultural education programming. The specific

objectives were to 1) examine whether current water conservation and IPM practices relate to well-being, 2) create audience segments delineated by engagement in water conservation and IPM, 3) evaluate whether audience segments delineated by engagement in water conservation and IPM differ in well-being, and 4) examine whether sociodemographics and interest in learning from Extension differ among the resulting segments.

Methods

We collected quantitative data using a researcher-developed electronic survey instrument in June and July of 2019. This research comprised part of a large multi-year national study of residential landscape management perceptions and practices. We submitted the research protocol to the University of Florida Institutional Review Board, and it was approved before we began our study.

Population and Sample

The target population was residents 18 years of age and older across the United States who made decisions about managing their home lawn and landscape. Since random sampling of this population was not possible, we used purposive sampling. We reduced possible errors associated with purposive sampling by using quota sampling (Baker et al., 2016; Lamm & Lamm, 2019), targeting sex, age group, and geographic region. The sample was recruited using a professional survey sampling company, and a total of 2,601 individuals provided complete responses. The average age of respondents was 48 years old, and slightly more than half of the sample was female (56.2%; $f = 1{,}462$). Respondents most frequently resported having some college (26.0%; $f = 677$) and earning a family income of $25,000 to $49,999 in 2017 (30.1%; $f = 784$).

Screening and Quality Control

We used screening questions to ensure potential respondents were 18 years or older. They also were required to review and agree to the approved informed consent statement and commit to providing their best answer to each question (as a quality control measure) before proceeding with the survey. We embedded two additional quality control items in the survey. These items were included as individual Likert-type scale items and instructed respondents to select a specific response (i.e., *very likely*). If a respondent did not select the specified response, they were exited from the survey and excluded from the study.

Instrumentation and Data Collection

The four parts of the survey pertaining to this study collected two input variables (IPM engagement, water conservation engagement) and one outcome variable (well-being; see Table 2). A fourth section collected information about engagement with educational programs and learning preferences, and the final part of the survey gathered sociodemographic characteristics.

We adapted water conservation engagement and IPM engagement scores from established instruments (Diaz et al., in press). The water conservation engagement score was the sum of *yes* responses to 18 residential landscape water conservation practices. The IPM engagement score

was the sum of frequency responses (0 = *never*, 1 = *sometimes*, 2 = *about half the time*, 3 = *most of the time*, 4 = *always*) to seven IPM practices.

Table 2
Summary of variables used in a national study of landscape best practices and well-being (N = 2,601)

Variable	*M* (*SD*)	*Post-hoc* α	Theoretical range
IPM engagement score (*n* = 1883)	18.07 (7.19)	-	0 to 28
Water conservation engagement score (*n* = 1010)	5.06 (4.92)	-	0 to 18
Well-being index (*n* = 2601)	.74 (.77)	.948	-2 to 2

Note. *n* varies because those indicating *not applicable* to any individual item were excluded.

The general well-being of study participants was measured with a 14-item scale based on the work of Longo, Coyne, and Joseph (2018). In their initial well-being scale development work, these researchers examined the most widely used conceptualizations of well-being and identified 14 common indicators of well-being, as shown in Table 3 (Longo et al., 2017). A series of three studies was then conducted to determine the validity, dimensionality, factor structure, and internal and test-retest reliability, using a panel of experts (Study 1) and two adult North American samples of 507 (Study 2) and 989 (Study 3) respondents. This work verified the soundness of the 65-item Scales of General Well-being (SGWB) as a global measure of well-being (Longo et al., 2017). Follow-up work by the same research team (Longo et al., 2018) led to the development of the 14-item short version of the SGWB, which was recommended for researchers needing a brief measure of well-being using a single index. In this study, one statement was developed from each of the 14 well-being indicators shown in Table 3. This scale was used in an earlier study examining the well-being of first-year agriscience teachers in Florida (Damiani, 2019), with a *post-hoc* Cronbach's alpha reliability coefficient of .80. Participants were asked to select the response choice for each item that best described them at the current time. Options were *strongly disagree, disagree, neither disagree nor agree, agree,* and *strongly agree*, using a scale of -2 to 2, respectively, for data entry and analysis.

Table 3
Indicators of well-being

Indicator	Description
Happiness	Feeling happy and cheerful
Vitality	Feeling energetic/full of energy
Calmness	Feeling calm/relaxed
Optimism	Being optimistic and hopeful
Involvement	Feeling completely involved and engaged in what you do
Awareness	Being in touch with how you feel
Acceptance	Accepting yourself the way you are
Self-worth	Liking yourself a lot
Competence	Feeling highly effective at what you do
Development	Feeling that you're consistently improving, developing, and advancing
Purpose	Having a purpose and mission in life

Significance	Feeling that what you do is important and worthwhile
Congruence	Feeling that what you do is consistent with how you see yourself
Connection	Feeling close and connected with the people around you

Source: Longo, Coyne, and Joseph (2018).

We shared a version of the instrument with four individuals with expertise in consumer horticulture and residential Extension programming to establish face and content validity (Hardesty & Bearden, 2004; Haynes, Richard, & Kubany, 1995; Vaske, 2008). The expert panel review generated suggestions for improving clarity on some questions. After these edits were made, we conducted a pilot test to estimate reliability of the indexes. All of the reliabilities exceeded .70 (data not presented), as estimated using Cronbach's alpha and, therefore, we determined the instrument was appropriate for use (Vaske, 2008).

Data Analysis

We used Pearson correlations to examine the relationship between IPM engagement, water conservation engagement, and well-being. Next, we conducted cluster analysis to generate subgroups using the IPM engagement and water conservation engagement variables. Cluster analysis is a procedure used to classify large sets of objects or individuals into meaningful subgroups, or segments (Aldenderfer & Blashfield, 1984). The goal of cluster analysis is to generate highly homogenous subgroups and maximize the diversity between subgroups (Aldenderfer & Blashfield, 1984; Burns & Burns, 2008). We used Ward's method of hierarchical cluster analysis to determine the appropriate number of subgroups and specified Squared Euclidean Distance as the measure of similarity (Burns & Burns, 2008). The results of this analysis indicated the appropriate solution was three groups, and we input this number in a subsequent *k*-means cluster analysis to assign individuals to one of the groups.

Finally, we conducted a series of one-way analysis of variance (ANOVA) and chi-square analyses to identify potential similarities and differences among the groups. When significant differences were identified through ANOVA analyses, we used partial eta squared (η^2) as a measure of effect size and interpreted values of 0.01 as small, 0.06 as medium, and 0.14 as large (Huck, 2012). We used *post-hoc* Games-Howell tests following significant ANOVAs.

When significant differences were identified through chi-square analyses, we used Cramer's V as a measure of effect size and interpreted values as < 0.10 = negligible effect, 0.10 to 0.19 = weak effect, 0.20 to 0.39 = moderate effect, 0.40 to 0.59 = relatively strong effect, 0.60 to 0.79 = strong effect, 0.80 to 1.00 = very strong effect (Rea & Parker, 1992). We used *post-hoc* z-tests to compare column proportions when a significant relationship was identified.

Prior to using the well-being scale, we used principal components analysis (PCA) with oblique direct oblimin rotation to evaluate whether the 14 items were indeed one component. We applied the Kaiser criterion to extract only those components with eigenvalues of 1 or greater (Field, 2018), which resulted in a one-component solution explaining 59.76% of the variance. We analyzed all data using SPSS (version 26.0; IBM Corp., Armonk, NY).

Results

Examine Whether Current Water Conservation and IPM Practices Relate to Well-Being

The three variables were correlated with one another at $p < .001$ (see Table 4). The correlation between well-being and IPM was slightly stronger than its correlation with water conservation.

Table 4
Correlations of key variables in a national study of landscape best practices and well-being (N = 2,601)

	1	2	3
1. IPM engagement	--		
2. Water conservation engagement	.450**	--	
3. Well-being	.306**	.283**	--

** significant at $p \leq .001$

Create Audience Segments Delineated by Engagement in Water Conservation and IPM

The cluster analysis resulted in three subgroups that were all significantly different (see Table 5). The effect size of these differences was large, as measured by partial eta squared (η^2; Huck, 2012). The subgroups were characterized by moderate engagement (subgroup 1), low engagement (subgroup 2), and high engagement (subgroup 3) in water conservation and IPM. The low group was engaged in an average of 2.4 water conservation practices and had an IPM score of 9.3 (interpreted as engaging in the IPM practices *sometimes* on average). The moderate group was engaged in an average of 3.2 water conservation practices and had an IPM score of 21.62 (interpreted as engaging in the IPM practices *most of the time* on average). The high group was engaged in an average of 11.7 water conservation practices and had an IPM score of 23.91 (interpreted as engaging in the IPM practices *most of the time* on average).

Table 5
Comparison of engagement in water conservation and IPM among subgroups in a national study of landscape best practices and well-being (N = 833)

	Subgroup 1 (n = 330; 39.6%) *Moderate engagement*		Subgroup 2 (n = 263; 31.6%) *Low engagement*		Subgroup 3 (n = 240; 28.8%) *High engagement*			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	η^2
Water conservation	3.20^{2*3**}	2.36	2.41^{1*3**}	3.02	11.71^{1**2**}	3.15	848.83^{a}	.67
IPM	21.62^{2**3**}	3.91	9.34^{1**3**}	3.90	23.91^{1**2**}	3.61	1106.97^{a}	.73

Note. **post-hoc* Games-Howell test $p < .05$,***post-hoc* Games-Howell test $p < .001$, [a]overall ANOVA $p < .001$,[123]Indicates different from subgroup 1,2,3. Water conservation score range: 0 to 18. IPM score range: 0 to 28. n = 833 because those who indicated *not applicable* to any individual item were excluded.

Evaluate Whether Audience Segments Delineated by Engagement in Water Conservation and IPM Differ in Well-being

Well-being was significantly different among the three subgroups with a medium effect size (see Table 6), as measured by partial eta squared (η^2; Huck, 2012). Well-being was high in the high engagement subgroup, low in the low engagement subgroup, and moderate in the moderate engagement subgroup.

Table 6
Comparison of well-being among subgroups in a national study of landscape best practices and well-being (N = 833)

	Subgroup 1 (*n* = 330; 39.6%) *Moderate engagement*		Subgroup 2 (*n* = 263; 31.6%) *Low engagement*		Subgroup 3 (*n* = 240; 28.8%) *High engagement*			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	η^2
Well-being	$.85^{2**3**}$	.71	$.46^{1**3**}$	.84	1.18^{1**2**}	.60	61.48^{a}	.13

Note. ***post-hoc* Games-Howell test $p < .001$, [a]overall ANOVA $p < .001$, [123]Indicates different from subgroup 1,2,3. Well-being index ranged from -2 (low well-being) to 2 (high well-being).

Examine Whether Sociodemographics and Interest in Learning from Extension Differ Among the Resulting Segments

Age was significantly related to subgroup membership and was lower in the high engagement subgroup compared with the other two subgroups (see Table 7). There was a small effect size associated with this difference, as measured by partial eta squared (η^2; Huck, 2012). Age was not significantly different between the low engagement subgroup and moderate engagement subgroup.

Table 7
Comparison of age among subgroups in a national study of landscape best practices and well-being (N = 833)

	Subgroup 1 (*n* = 330; 39.6%) *Moderate engagement*		Subgroup 2 (*n* = 263; 31.6%) *Low engagement*		Subgroup 3 (*n* = 240; 28.8%) *High engagement*			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	η^2
Age[a]	47.62^{3**}	16.90	46.98^{3**}	17.20	41.40^{1**2**}	15.79	10.93^{a}	.03

Note. ***post-hoc* Games-Howell test $p < .001$, [a]overall ANOVA and post-hoc Games-Howell tests significant at $p < .001$, [123]Indicates different from subgroup 1,2,3.

Of the categorical socio-demographic characteristics, HOA membership, homeownership, geographic region, and income were related to group membership (see Table 8). *Post-hoc* z-tests revealed the high engagement subgroup was more likely to belong to an HOA and live in the West and least likely to report income in the lowest range. *Post-hoc* z-tests also revealed those in the low engagement subgroup were more likely to rent their home and live in the Midwest. Effect sizes for these differences were mostly weak, as measured by Cramer's *V* (Rea & Parker, 1992).

Table 8
Comparison of socio-demographic characteristics among subgroups in a national study of landscape best practices and well-being (N = 833)

Demographic variable	Subgroup 1 (*n* = 330; 39.6%) *Moderate engagement*	Subgroup 2 (*n* = 263; 31.6%) *Low engagement*	Subgroup 3 (*n* = 240; 28.8%) *High engagement*			
	% (*f*)	% (*f*)	% (*f*)	*p*	χ^2	Cramer's *V*
Gender				.62	.96	.03
Females	49.1 (162)	46.8 (123)	45.0 (108)			
Males	50.9 (168)	53.2 (140)	55.0 (132)			
HOA membership (yes)*	25.2[a] (83)	22.4[a] (59)	45.0[b] (108)	< .001	38.52	.15
Homeownership*				< .001	24.79	.12
Own	63.3[a] (209)	51.3[b](135)	70.0[a] (168)			
Rent	33.3[a] (110)	45.2[b] (119)	30.0[a] (72)			
Other	3.3[a] (11)	3.4[a] (9)	0.0[b] (0)			
Region*				.03	14.47	.09
Midwest	20.3[ab] (67)	24.3[b] (64)	15.4[a] (37)			
Northeast	18.8[a] (62)	18.3[a] (48)	16.3[a] (39)			
South	45.2[a] (149)	40.3[a] (106)	42.5[a] (102)			
West	15.8[a] (52)	17.1a[b] (45)	25.8[b] (62)			
Education						
Less than high school	3.6 (12)	4.6 (12)	1.3 (3)	.38	15.00	.10
High school/GED	24.2 (80)	25.5 (67)	21.3 (51)			
Some college	12.1 (82)	25.5 (67)	20.0 (48)			
2-year college degree	23.9 (79)	12.9 (34)	16.3 (39)			
4-year college degree	24.8 (40)	22.4 (59)	29.6 (71)			
Master's degree	8.8 (29)	6.1 (16)	7.9 (19)			
Doctoral degree	1.2 (4)	1.9 (5)	1.7 (4)			
Professional degree (JD, MD)	1.2 (4)	1.1 (3)	2.1 (5)			
Family income (2018)*				< .001	54.09	.18
Less than $24,999	20.6[ab] (68)	28.9[b] (76)	12.9[a] (31)			
$25,000 - $49,999	29.7[a] (98)	27.4[a] (72)	26.7[a] (64)			
$50,000 - $74,999	23.9[a] (79)	20.5[a] (54)	20.4[a] (49)			
$75,000 - $99,999	13.3[a] (44)	11.4[a] (30)	13.3[a] (32)			

$100,000 - $124,999	6.1[a] (20)	4.9[a] (13)	8.3[a] (20)
$125,000 - $149,999	4.2[ab] (14)	2.3[b] (6)	7.1[a] (17)
$150,000 - $174,999	0.9[a] (3)	1.5[ab] (4)	4.2[b] (10)
$175,000 - $199,999	1.2[a] (4)	2.3[a] (6)	3.3[a] (8)
$200,000 - $224,999	0.0[a] (0)	0.0[a] (0)	0.8[a] (2)
$225,000 - $249, 999	0.0[a] (0)	0.0[a] (0)	0.8[a] (2)
$250,000 or more	0.0[a] (0)	0.8[ab] (2)	2.1[b] (5)

Note. * Indicates significant. *Post-hoc z*-tests conducted to compare column proportions when significant relationship was identified. [abc] different superscript letters indicate significant difference in proportions.

Interest in learning more about protecting water resources was related to subgroup membership for all eight Extension learning opportunities (see Table 9). There was a consistent pattern where the high engagement group was most interested in all of these types of learning opportunity and the low engagement group was least interested. All of these differences had large effect sizes, as their eta-squared value exceeded 0.14 (Huck, 2012).

Table 9
Comparison of interest in learning to protect water resources from Extension among subgroups in a national study of landscape best practices and well-being (N = 833)

	Subgroup 1 (*n* = 330; 39.6%) *Moderate engagement*		Subgroup 2 (*n* = 263; 31.6%) *Low engagement*		Subgroup 3 (*n* = 240; 28.8%) *High engagement*			
I am interested in:…	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	η^2
... visiting local Extension office[a]	.08[23]	1.11	-.60[13]	1.08	.85[12]	1.01	114.71	.22
... attending one-time Extension workshop[a]	.10[23]	1.18	-.57[13]	1.10	.90[12]	.97	112.35	.21
... having local Extension[a] representative visit my property	-.08[23]	1.20	-.69[13]	1.08	.74[12]	1.02	103.09	.20
... attending weekly Extension training[a]	-.15[23]	1.19	-.78[13]	1.07	.65[12]	1.09	101.75	.20
... receiving electronic Extension newsletter[a]	.27[23]	1.15	-.28[13]	1.17	1.10[12]	.93	99.95	.19
... reading an Extension fact sheet[a]	.35[23]	1.12	-.27[13]	1.13	1.07[12]	.94	96.98	.19
... engaging with local Extension office's social media[a]	.07[23]	1.18	-.52[13]	1.15	.86[12]	1.01	95.46	.19
... visiting Extension website[a]	.32[23]	1.15	-.23[13]	1.20	1.03[12]	.96	80.79	.16

Note. [a]overall ANOVA and all *post-hoc* Games-Howell tests significant at $p < .001$,[123]different from subgroup 1,2,3. Interest range: -2 (strongly disagree) to 2 (strongly agree).

Conclusions and Implications

We concluded higher levels of outdoor water conservation and IPM are individually related to well-being. When respondents across the United States are segmented by outdoor water conservation and IPM, higher levels of conservation also correspond with greater engagement in IPM. Further, these low, moderate, and high engagement groups have significantly different levels of personal well-being at low, moderate, and high levels, respectively.

In addition to having higher levels of well-being, high engagement group members are younger and more likely to live in an HOA. While HOAs have been shown to both support and impede engagement in landscape best practices, this finding implies that HOAs can potentially serve as a partner in supporting conservation and IPM as well as greater well-being. Perhaps having conservation and IPM practices embedded in a community's infrastructure or professional services upon move-in to this rapidly growing type of community lends to this finding. Interestingly, the high engagement group is more likely to live in the Western United States, which may not be surprising, given IPM's California-based origins. Further, this finding may reveal successful and focused impacts of these IPM programs.

Higher conservation and IPM also corresponds with having greater interest in learning about protecting water through educational methods offered by Extension. The Extension educational methods that differed among the three groups with the largest effect sizes were those that required the greatest effort (i.e., visiting local Extension office, attending a workshop), while those with the smallest effect size were those requiring least amount of effort (i.e., visiting an Extension website). This implies those who are most engaged in water conservation and IPM, in addition to having higher levels of personal well-being, are most likely to place effort into engaging with Extension services, despite most likely having lower levels of need.

This study provides rationale to extend beyond the traditional assessment of measuring programmatic outcomes and integrate measures of well-being. Our findings add further support for those programs that already integrate well-being as an impact indicator (Keeler et al., 2012). Given their unique positioning to address today's complex issues (Andenoro et al., 2016), agricultural education professionals, such as those working in Extension, need to consider well-being in program development and evaluation. This study also adds to the growing body of evidence for the value in using social marketing in agricultural education programs (Diaz et al., in press; Huang et al., 2016; Warner et al., 2016; Warner et al., 2018) by demonstrating the merit in using a tool from social marketing, audience segmentation. Findings outline possible collaborations between conservation and other types of programs, such as family, youth, and community-sciences-focused programs that target lower level needs (i.e., food and nutrition, home maintenance, budgeting, relationships, etc.).

There appears to be a relationship between higher levels of well-being and adoption of landscape best practices. This finding aligns with the many others who contend lower level needs must be met before individuals can realize their own potential (i.e., self-actualization) and contribute to the benefit of their community (Gough & McGregor 2007; Maslow 1943, 1970; White, 2010). One could argue those with higher well-being feel empowered to choose their behaviors and believe that those choices can have a positive impact. These are individuals who are energetic, optimistic, engaged, accepting of who they are and what they do, believe their life has meaning, and feel they are constantly learning and improving. They also see their actions as congruent with their views of themselves. This suggests that those who are high in these dimensions of well-being are more likely to take actions that they believe will benefit the larger good. We cannot say whether respondents consciously connect their engagement in landscape best practices with assurance of well-being; it would be interesting to explore this concept and possibly use a randomized field study to communicate this relationship as a strategy to encourage behavior change (Corral-Verdugo et al., 2008).

It is interesting to consider that conservation and IPM practices may contribute to meeting lower-level needs of having enough water for drinking and being safe from pests and disease, and those with lower levels of well-being are also least engaged in these behaviors. While this relationship is clear, there remain a number of questions to be answered by future researchers. Might well-being play a role in solving some of today's complex issues? Do higher levels of well-being lead to more engagement in landscape best practices, or might engagement in practices to protect the environment contribute to improved well-being? Perhaps it is a combination.

Research is needed to explore motivations of high engagement individuals, why they are also more likely to seek out education, and whether this is due to ease of access, education level, or other factors. An understanding of the reasoning behind this group's engagement may lead to information that is useful in creating Extension materials targeting the less engaged audiences and support stronger Extension programs for the broader, less-engaged groups. We suggest our findings should be explored in other contexts. For example, links between environmentally friendly practices and well-being may provide insight in farming and agricultural production, given that fewer people are entering the industry and lower well-being is especially pronounced within these professions.

It may be important to understand if residents also benefit financially due to engaging in conservation or IPM practices and how this additional factor contributes to their well-being. The confirmation of such connections could have economic policy implications where incentivizing good landscape practices may prove more effective than encouraging benevolent actions through Extension programs. At the same time, this might result in a need to direct education materials toward the understanding of financial welfare related to conservation practices. This can be extended further into a need for governmentally subsidized programs for landscape management and water conservation. If the goal of the government is to improve citizens' well-being, and individuals experience higher well-being by engaging in landscape best practices, one could argue the government should pursue policy that increases citizen engagement in these programs.

Although potential errors were somewhat reduced by using quota sampling, generalizability of this study is limited by the use of a purposive sample. However, an understanding of the linkages among well-being, engagement in landscape best management practices, and interest in Extension education may be useful in delivering impactful programs for diverse target audiences.

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Agribiotechnology as a Career Pathway: An Assessment of Student Learning of New Introductory Biotechnology Curriculum

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Abstract

The purpose of this study was to assess secondary agricultural education students' knowledge gained after participating in a new Introduction to Biotechnology Unit (Unit), developed by the first author and piloted by their teachers in sixteen agricultural education programs across two states. The pilot teachers do not currently offer Agribiotechnology as a Career Pathway for students, and students participating in the Unit were not enrolled in an agribiotechnology course. Before the Unit was taught, students completed a pre-test with an overall mean score of 66%; after the Unit, students' mean score on the post-test improved to 73%. This Unit is valuable, although a seven percent increase in the mean score can likely be improved. There were significant increases on individual scores for some questions. Students had high baseline knowledge (80 to 89%) on seven questions on the pre-test, which may support integrating biotechnology into other career pathway offerings. The curriculum was refined based on teacher recommendations post-piloting the Unit. This study should be replicated to identify findings in other states to see if they are similar or different to the study's findings. One recommendation is to include student demographic information in the pre-test and post-test to determine their prior exposure to and/or classes covering biotechnology, where allowed by IRB.

Introduction

An outcome of science education is to "enable students to develop a deeper understanding of the world around them, and to be able to engage in relevant discourse about science in everyday life" (Dawson, 2007, p. 59). In order for people to make better choices in society, they need reliable information about science and technology (Usak, Erdogan, Prokop, & Ozel, 2009). Dawson (2007) posited that young people need to be highly literate in science to be prepared to (a) research issues, (b) think critically, and (c) question issues and claims in society today, especially in the area of biotechnology. Prior research has indicated that early exposure to scientific principles to increase science competence can increase the likelihood of students pursuing science related college majors and seeking careers in science (Beghetto, 2007).

Students need literacy in the basic concepts of biotechnology to understand, debate and make decisions in the future for themselves and their families (Dawson, 2007). One of the goals addressed by the National Science Education Standards (NSES) was to create a more science literate society, with science literacy meaning someone "can ask, find, or determine answers to questions derived from curiosity about everyday experiences" (NRC, 1996, p. 22) and assess scientific information as to its source, the means in which it was produced, and generate

conclusions from data. However, Brossard and Shanahan (2003) found that biotechnology scientists were not influential presenters of research findings to the public because biotechnology is highly technical. To achieve a society literate in biotechnology, science education and agricultural science education must adapt to biotechnology developments (Chen, Chu, Lin, & Chiang, 2016). Multiple researchers have established the need for education of the general public on biotechnology topics to make decisions as informed citizens (Braun, 2002; Braun & Moses, 2004; Colavito, 1999; Dawson, 2007; Dawson & Schibeci, 2003; Glynn, Taasoobshirazi, & Brickman, 2007; Harms, 2002; Munn et al., 1999; Sohan, Waliczek & Briers, 2002). For example, biotechnology-related issues are often included in political debate.

After the national Committee on Agricultural Education in Secondary Schools was formed to create new agricultural education instructional goals, vocational educators and industry professionals supported revisions for addressing "the sciences basic to agriculture, food, and natural resources; agribusiness; marketing; management; international economics; financial accounting; and tools to improve the efficiency of agricultural productivity (National Research Council, 1988, p. 35). This is important to note as a result of ever-changing technological advances in agriculture, which impels curricula to be constantly updated and taught in secondary classrooms. The National Agriculture, Food, and Natural Resources (AFNR) Content Standards for agricultural education leaders and educators was revised in 2015 to include the Biotechnology Systems Career Pathway (The Council, 2015), indicating the national awareness and importance of biotechnology education within agricultural education programs. All facets of agriculture have seen an explosion in the use of technologies over the last century. In addition, some experts predict an additional 3 billion people will be added to the global population by the middle of the 21st century (Fedoroff et al., 2010). It is critical for individuals across the globe to be open minded to the use of biotechnology in agriculture if we are to have a chance of producing enough high quality, safe food for the growing population (Fedoroff, et al., 2010).

It is estimated that between 2017 and 2027 STEM jobs in Kentucky will grow by 13% (Vital Signs, 2017). Biotechnology is critical for the 21st century economy as it is at the forefront of innovations in medicine, agriculture, food production, and alternative fuel production. As the demand for skilled adults increases for careers in unchartered areas, secondary school students need to learn about and engage with new technologies, such as biotechnology, in agricultural education classes prior to attending postsecondary technical schools, community colleges, and/or universities.

However, Mansius and Hanegan (2008) found that many science educators are not adequately trained to use biotechnology equipment or have not had research experience when they graduate with their teaching certificates. Professional development programs for teachers are useful for educating teachers on gap-knowledge, yet teachers make their own choices in which professional development programs they desire to participate. If teachers lack training or confidence in teaching biotechnology content or using lab equipment, their students may not be exposed to biotechnology concepts (Mansius & Hanegan, 2008). Similarly, if there are limited readily available curricula on biotechnology for secondary agricultural science teachers to utilize, agricultural science teachers may not teach the content.

In Kentucky, only seven secondary schools (C. Davis, personal communication, December 4, 2017), out of 143 secondary agricultural education programs (NAAE Kentucky, 2017), listed students as being enrolled in the Agribiotechnology Career Pathway in the 2016-2017 school year. The Agribiotechnology Career Pathway is a four year track in which students complete courses with a focus on agribiotechnology, where they complete an end-of-program assessment on the Career Pathway. The Kentucky Agribiotechnology Career Pathway end-of-program assessments began in 2013, five years after it was first offered (M. Chaliff, personal communication, September 28, 2018). In 2013, a total of 71 students completed course requirements and the Agribiotechnology Career Pathway end-of-program exam. This was the largest number of students to complete the Pathway exam to-date (Kentucky Department of Education, 2018). Table 1 shows the breakdown of students taking the end-of-program assessment in Agribiotechnology in Kentucky, showing a consistent decrease in students completing the Career Pathway and taking the exam. In 2016, the average student score was included in the annual reports as a result of a prior required composed written response being excluded. The average exam score for students in 2016 to 2018 was 59.2%, with an overall average of 19% of students passing the agribiotechnology end-of-program exam from 2013 to 2018.

Table 1
Kentucky State Reports of Agribiotechnology Career Pathway End-of-Program Assessment Results (Kentucky Department of Education, 2018)

Assessment Year	Student Count	Passed Exam	Percentage Passing	Mean Test Score
2018	22	4	18%	62%
2017	20	1	5%	56.9%
2016	61	15	25%	58.7%
2015	74	10	14%	--
2014	58	15	26%	--
2013	71	14	20%	--
Total	306	59	19%	59.2% (for 2016-18)
Overall Mean	51	9.8 per year	--	--

The state of Louisiana was also part of the study reported here. The Louisiana state agricultural education program does not currently have an agribiotechnology career pathway, but it is investigating changing its current career pathway options, including adding an agribiotechnology pathway. The Louisiana Agriculture Tech Pathway currently includes a one credit Biotechnology in Agriscience course, which is ideal for teaching the *Introduction to Biotechnology Unit* (Unit).

After a review of the literature and conversations with Kentucky State Department of Education staff and Louisiana Agricultural Education faculty, it was apparent that increasing scientific professional development specifically biotechnology-related concepts remains a crucial need. No current curricula is recommended for Kentucky agricultural education teachers to use within the Agribiotechnology Career Pathway nor for the Louisiana teachers to use in the Biotechnology in Agriscience course. Therefore, the principal question that arose from the literature review was: How will an *Introduction to Biotechnology Unit* of instruction taught to secondary students in Kentucky and Louisiana affect their knowledge of science and biotechnology concepts? The

secondary students of today will be tasked with solving critical agricultural issues. Therefore, this research specifically addresses the American Association for Agricultural Education (AAAE) National Research Priority Area III: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Stripling & Ricketts, 2016).

The **purpose of this study** was to determine the effects of an *Introduction to Biotechnology Unit* of instruction on the science and biotechnology content knowledge of Kentucky and Louisiana secondary students who had not participated in formal, full biotechnology courses in agricultural education programs prior to exposure to the Unit. The following null hypothesis guided the statistical analysis of the study:

$H_0 1$: There will be no differences in science and biotechnology content knowledge of Kentucky and Louisiana secondary students after being taught the *Introduction to Biotechnology Unit.*

Conceptual Framework

This paper leans on the integrated STEM education (Moore & Smith, 2014) paradigm and situated cognition theory (Brown, et al., 1989; Lave & Wenger, 1991; Putnam & Borko, 2000), adding to research recommended by the *STEM Integration in K-12 education: Status, prospects, and an agenda for research* report by the National Academy of Engineering and National Research Council (NAE & NRC, 2014). Integrated STEM education is when one lesson, class or unit makes an effort to combine science, technology engineering and math, making connections between these subjects and problems in the real-world (Moore & Smith, 2014). The foundation of the situated cognition theory is that knowing how knowledge and skills may be utilized is as pertinent as learning them. The *Introduction to Biotechnology Unit* was constructed with the idea of science, technology, engineering, and math all playing a role within the practical realm of agricultural careers and life experiences. Research reports the need to broaden student experiences and exposure to STEM fields through multidisciplinary education (NAE & NRC, 2014). One way to do this is to teach content in appropriate contexts of which students are familiar. Kelley and Knowles (2016, p. 3) posited "an integrated [teaching] approach seeks to locate connections between STEM subjects and provide a relevant context for learning the content" rather than hoping students understand the real-life application from the topics taught separately. Emphasizing STEM subjects through secondary agricultural science courses in the form of biotechnology is one way to enhance student knowledge, understanding and experiences (Moore, 2008) in context of the real-world.

Methodology

The curriculum the teachers piloted, *Introduction to Biotechnology Unit*, is made up of five lessons. The lessons are titled 1. Introduction to Systems, 2. Introduction to Sustainability, 3. Introduction to Biotechnology, 4. Ethics in Biotechnology, and 5. Rethinking Ethics in Biotechnology. The Unit was developed by University of Kentucky agricultural education professionals to fill a gap in biotechnology curricula in Kentucky and Louisiana for agricultural education teachers as a part of a NSF grant on sustainability and exploratory biotechnology-related to plants. The lesson topics were selected as they paired up with Kentucky standards for the Agribiotechnology Career Pathway, Louisiana Agriculture Tech Pathway, Next Generation

Science Standards, and other cross discipline standards (i.e. English, reading). Topics were selected, then learning objectives were created. Lesson plan content, activities, and associated assignments were then written. Following Chen, Chu, et al.'s (2016) recommendation, ethical issues involved in biotechnology were provided in the curriculum. Lessons were comprised of hands-on activities, videos, discussions, researching applications of biotechnology, case studies and debates to teach students to critically think about systems in agriculture, sustainability, biotechnology, and ethics in biotechnology.

Each lesson included in the Unit builds onto the next. Lesson one covers the basics of a system, including what a system is, systems in agriculture, different types of systems in society, and effects disruptions have on systems with a national perspective. This lesson included images and activities for students to create systems in agriculture and/or to draw other systems of which they are familiar. Lesson two introduces students to sustainability and sustainable agriculture, as well as the three pillars of sustainability. It also covers how ecosystems are sustainable and has students analyze sustainability within agricultural systems. The lesson includes a video that is publicly available online about sustainability as well as handouts and a worksheet activity. Lesson three delves into biotechnology basics, including exploring historical impacts of biotechnology on agriculture and investigating current applications of biotechnology in agriculture. This lesson has a historical event card activity for students to complete in small groups, an optional timeline worksheet, a biotechnology history of plants and food events handout, and a case study on a genetically modified organism (GMO). Furthermore, lesson four contains an Applications of Biotechnology mini research assignment in which students will present orally on two biotechnology applications they investigate. A grading rubric for the assignment is included with the lesson. Lesson four covers the basics of ethics, explores ethical issues in biotechnology and has students analyze case studies and ethics from different individuals' perspectives in a community based on GMO crops. Lastly, in lesson five, students reflect on what they learned about systems, sustainability, biotechnology and ethics in biotechnology, and they learn about the debate process and conduct online research related to a debate topic on biotechnology in groups. The second day of this lesson is when students participate in a live debate in their classroom based on their research as a group, using the debate activity handouts, worksheets and rubric.

The Unit was estimated to require six 50 minute class periods to complete the five lessons. The curriculum was peer reviewed by five agricultural education faculty and former agricultural science and science teachers, using a university agricultural education department pre-service teacher lesson plan grading rubric. Reviewers provided feedback using the rubric as well as additional comments and/or edits. Feedback and suggestions/edits were acknowledged and addressed prior to piloting the Unit. The Unit focuses on plants/crops and is meant to be integrated into any appropriate agricultural science course teachers were currently teaching to introduce the topics.

The teachers participated in an hour-long webinar explaining the curriculum and pilot process. A pre-test/post-test was chosen for the pre-experimental design (Campbell & Stanley, 1963; Thyer, 2012), and teachers provided links to the pre-test and post-test to students to complete prior to the first lesson being taught and following the fifth lesson being taught respectively, with specific instructions on how to complete the tests read to students per both the universities'

Institutional Review Boards. Teachers were not provided with the pre-test and post-test questions in advance of teaching the curriculum. Online data collection was chosen for pre-test and post-test delivery because of its minimal expense for the study taking place across states and the ability to achieve quick response rates (Ladner, Wingenbach, & Raven, 2002). The pre-test and post-test questions were identical to measure student knowledge gain. The pre-test and post-test consisted of 23 questions, of which six were multiple choice, 15 true/false questions, and two fill in the answer question. The pre-test and post-test are comprised of questions that were selected from the overall objectives of the five lessons in the Unit that were taught universally.

For identification purposes, only student numbers were placed on other pre-test and post-test as identifiers to compare pre-test and post-test answers and scores. To protect student privacy, no other identifying or demographic information was collected due to IRB restrictions. The pre-test and post-test scores were provided to teachers, as requested, by the researchers. This study was approved by the University of Kentucky Institutional Review Board (#43312) and Louisiana State University Institutional Review Board (#E11003). School principals also approved their respective teachers' and students' participation in this study.

The purpose of the pilot testing was 1) to validate the evaluation tools, and (2) to identify any design flaws present in the curriculum before public distribution. The researchers developed a 23-item criterion-referenced test to determine the level of content knowledge of the students involved in this study. Test items were based on the curriculum piloted. The test was evaluated for face and content validity by a panel of experts that consisted of two faculty in agricultural education, an experienced agricultural science educator, and a science education university professional staff member with a doctorate degree. The panel of experts reviewed the instrument for ease of reading, content, semantics, and general construction. Recommended changes were made to the instrument to enhance clarity and reliability prior to administration.

The population in this study were secondary school students, in ninth through twelfth grades, currently enrolled in an agricultural science class at their high schools. The new Unit was taught by 16 teachers in 27 classes, totaling approximately 800 students. All students in the classes were participants in the five lessons, whether or not they completed the voluntary pre-test and post-test.

The curriculum was recommended for tenth through twelfth grade students and teachers indicated they taught the Unit in agricultural science classes made up of ninth through twelfth grade students. Students voluntarily completed the pre-test and post-test via Qualtrics® software. Students completed the pre-test and post-test via school-owned classroom Google Chromebooks, classroom computers or their personal smartphones, depending on the schools' technology availability.

Results

To determine the change in student knowledge, a pre-test was given immediately prior to the teachers beginning the Unit. A post-test, with identical questions, was administered immediately following the teachers' completion of teaching the Unit. Sixteen teachers, for a total of 27 classes, taught the Unit. The data collected were compared to determine the change in

knowledge. A total of 429 students attempted the pre-test, but 29 pre-tests were left incomplete leaving a total of 400 completed pre-tests. A total of 369 students attempted the post-test, of which 30 were incomplete, for a total of 339 completed post-tests. Students were able to opt out of completing the pre-test and post-test at any time. Students may have backed out of completing the pre-test or post-test if they did not want to answer any further questions, due to time constraints, as a result of distractions, or other reasons. Some students completed one test but not the other.

Descriptive statistics were derived for the pre-test and post-test instruments. Demographics were not collected from students as a result of assessing students of which some were minors, aged approximately 13-18 years of age, per IRB restrictions. The pre-test and post-test initially had 25 questions, 23 of which were based more on the lesson objectives on biotechnology. After conducting inter-total correlations, two questions were identified as outliers with low intercorrelation with the other questions. All further results are based on the 23 questions.

From a maximum score of 23, the overall mean pre-test score for the 400 participants was 15.15 (66%) ($SD = 3.71$). Scores ranged from 6 to 22 correct answers on the pre-test. The overall mean post-test score for the 339 participants was 16.86 (73%) ($SD = 3.84$) for an overall improvement of 1.71 points (7%) across all questions. Scores ranged from 4 to 23 correct answers on the post-test. Figure 1 shows the distribution of pre-test and post-test scores of all participants. Cronbach's alpha was calculated for the pre-test and the post-test at 0.997 for each for the 21 multiple choice and true/false items. The difference between the means of the scores from the pre-test versus the post-test is statistically significant (p-value < 0.001). Cohen's d was used to calculate effect size by comparing pre-test and post-test scores of the study, resulting in $d = 0.45$, an almost medium effect size threshold (medium effect size = 0.50; according to Cohen, 1988). As a result, the researchers reject the null hypothesis, which indicates there was an increase in student knowledge from being exposed to the *Introduction to Biotechnology Unit*.

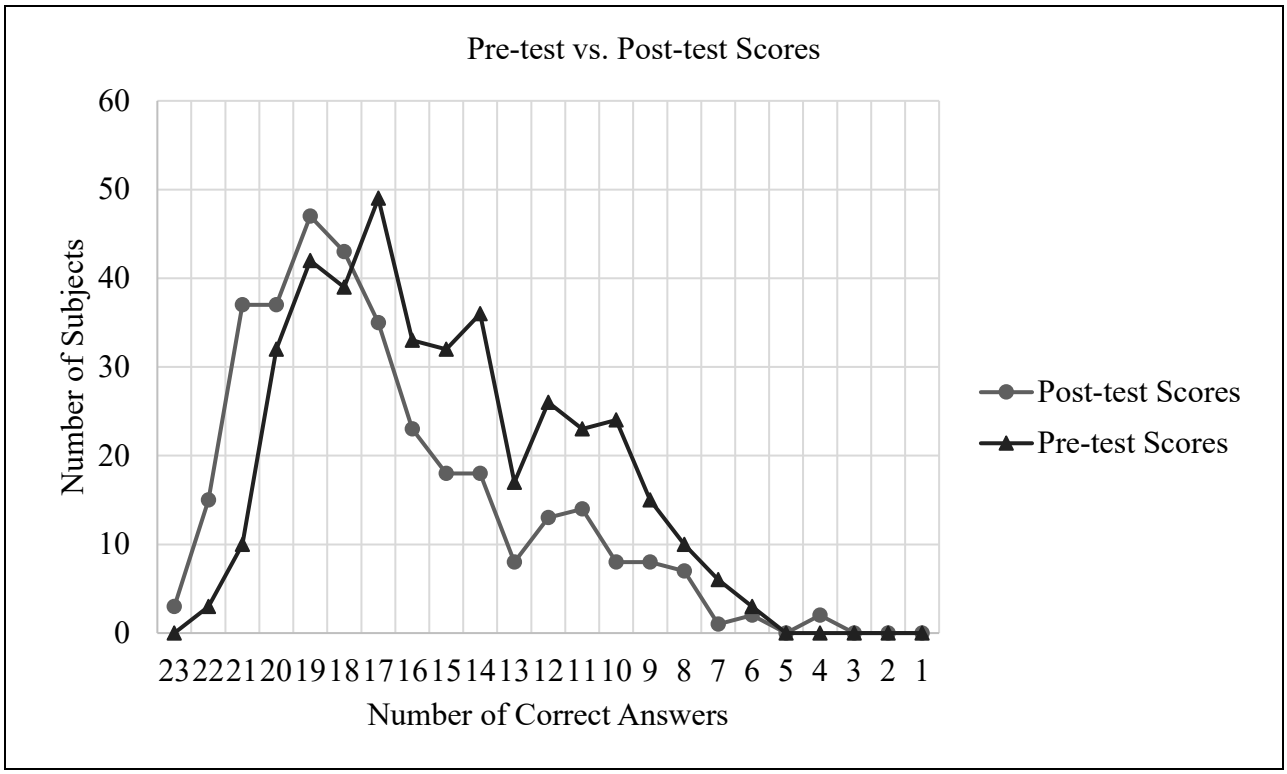

Figure 1. Distribution of the number of correct answers on the pre-test and post-test.

The pre- and post-test scores were analyzed (see Table 2). Table 2 shows the mean percent of the questions answered correctly for each question on the pre-test and post-test and the percentage of improvement on the means of questions on the post-test from the pre-test.

As noted in Table 2, there was an improvement in the number of correct answers from the pre-test to the post-test on all but quantitative questions except the question about whether a family hog farm was more sustainable than a commercial hog farm (decreased 0.78%). Overall, students showed the most improvement (13.23%) on the multiple choice definition question on agricultural biotechnology, followed by the true/false question about the three types of systems in towns and countries (12.76% improvement).

Table 2

Results for individual questions on the pre-test and post-test.

Question Type	Test Question	Percent Correct (%)		Percent Improvement (%)
		Pre-Test	Post-Test	
Multiple Choice	A system is _____.	81	88.5	7.50
	Which item or items below make up an agricultural system?	89.25	94.69	5.44
	Sustainable agriculture is the production of food, fiber or other plant or animal products using farming techniques _____.	65.50	74.63	9.13
	Which of the following is NOT one of the three pillars of sustainability?	52.5	52.51	0.01

	A debate is _____.	80.75	82.89	2.14
	Agricultural biotechnology is a range of tools, including traditional breeding techniques that _____.	55.50	68.73	13.23
True/ False	Agricultural biotechnology has saved some crops from diseases that we would otherwise not have today.	89.25	90.86	1.61
	People from different groups, for example farmers, community members, and people from other countries, have the same point of view of genetically modified food.	78.50	81.71	3.21
	The three types of systems in towns and countries are economic, social and lymphatic.	54.50	67.26	12.76
	Everything I research online about biotechnology is accurate.	83.50	84.66	1.16
	Biotechnology is the use or manipulation of an organism or parts of an organism to solve problems or make useful products.	79.25	87.02	7.77
	It is unethical for Farmer Jake to tell his neighbor, who is an organic corn grower, that he is growing transgenic (genetically modified) corn plants in his field.	49	53.10	4.10
	References online with the ending ".edu" are usually unbiased and reliable.	65.50	69.62	4.12
	Ethics are often developed based on one's upbringing and experiences.	77.50	79.06	1.56
	The purpose of a code of ethics is to make citizens mad so they break laws.	80	83.78	3.78
	Because of biotechnology, new crops have been developed for people in third world countries to address undernourishment.	79.50	85.55	6.05
	A family's small hog farm is always more sustainable than a commercial hog farm no matter the price of crop and livestock at market.	61.25	60.47	-0.78
	An ecosystem has parts that require sustainable relationships in order for all components to thrive.	82.75	85.84	3.09
	An example of an ethical dilemma of biotechnology is that biotechnology will help the farmer but not always the environment.	63	68.14	5.14
	The population around the world thinks it is ethical to grow pest-resistant crops to feed the growing population.	47	50.15	3.15
	For the world to be sustainable, we need to keep the environment safe while making enough food for the world to maintain long-term balance.	77.50	84.07	6.57

The last two questions on the pre-test and post-test asked students to list one way (per question) biotechnology has helped advance society and the well-being of consumers of agriculture. If they were unsure, they were to enter "I don't know" or leave the question blank. On the pre-test, 66 students provided one correct response to the two questions and 60 students (15%) answered both questions correctly, while 274 students did not know the answers or answered the last two questions incorrectly. On the post-test, 136 students (40%) answered the two questions incorrectly or wrote in "I don't know," while 90 students (26.5%) provided one correct answer to the last two questions. Over one hundred (113) students (33.33%) answered the last two questions correctly on the post-test (18.33% improvement). Students received credit for correct answers when providing a fact about biotechnology on the last two questions. Students did not receive credit if they wrote only single words such as "crops" or "fuel," with incomplete thoughts/sentences for their response. Students who wrote in two valid facts about biotechnology for the last two questions earned one point per question for the last two questions.

Discussion

Although there were hands-on activities within the Unit to help students think critically and gain skills and literacy in systems, sustainability, biotechnology and ethics in biotechnology, lab experiments were not part of the curriculum. The objectives of the curriculum were to present an introduction to basic knowledge in biotechnology so the decision was made early-on not to include labs. Mansius and Hanegan (2008) reported that many in-service secondary biology teachers taught biotechnology foci (96%) but not laboratory tools (4%) in their courses. Some reasons why the in-service secondary biology teachers did not teach biotechnology foci and use laboratory tools included: it is too time consuming, too expensive, and uncertainty in how to use biotechnology tools. Future agribiotechnology curriculum developed by the researchers will include more lab-based experiential components, yet we estimate Mansius and Hangegan's (2008) findings to be consistent with agricultural science teachers' behavior.

Gess-Newsome and Lederman (1991) stated that secondary biology teachers are considered experts in life sciences by students, being that an expert has good reasoning skills and are better at making connections within the subject than novices, including students. Yet when a teacher who is unknowledgeable serves as the expert, knowledge transfer to students (novices) becomes disconnected (Faletti, 1985). Novice learners utilize disconnected facts they are able to relate to their lives and experiences to add to their current knowledge base to make future connections (Kozma & Russell, 1997).

Teachers are the most influential element on student learning apart from knowledge and experiences students bring to the classroom (Hattie, 2003). The teachers piloting the *Introduction to Biotechnology Unit* were not provided in-depth training on how to utilize the Unit, yet an overview of the lessons and protocol for pre-tests and post-tests was explained. Teachers received the lessons and accompanying presentation slides for each lesson. Students increased knowledge from the pre-test to the post-test. A potential reason for the pre-test mean of 66% could be related to students having had exposure to biotechnology in other classes. Students were not asked where they learned about biotechnology on this knowledge test. A higher pre-test score represents some knowledge of the subject matter. However, we are unaware of other variables causing students to have pre-existing knowledge of biotechnology prior to the Unit being taught

and/or alongside the time the lesson was taught, which could have also caused their scores to increase. There is currently an Agribiotechnology Career Pathway in Kentucky, a Biotechnology System Career Pathway nationally, and a current Biotechnology in Agriculture course taught in Louisiana; however, according to the Kentucky end of Agribiotechnology program exam, scores show the need for more agricultural science teacher in-service training in biotechnology and more available curricula on agribiotechnology.

The National Academies of Science, Engineering and Medicine (2018) Science Breakthroughs to Advance Food and Agricultural Research by 2030 Report concludes that "Efforts to renew interest in food and agriculture will need to be made to engage nonagricultural professionals and to excite the next generation of students" (p. 126), with the need of educating "non-traditional agriculture professionals to be involved in food and agriculture" (p. 127). Due to the importance of the growing field of biotechnology, we recommend industry professionals, university faculty from colleges of agriculture and biology, secondary school agricultural science teachers, science teachers and state departments of education personnel work together to develop a framework for agribiotechnology to help increase the awareness and literacy of biotechnology amongst secondary school students. Roberts and Ball (2009, p. 87) conceptualized a model for "agricultural subject matter as a context and content for teaching" to produce a skilled agricultural workforce and agriculturally literate citizens, which is in line with our recommendation. The study reported did not measure students' attitudes or perceptions towards biotechnology, but others have addressed this (Chen, Chu, et al, 2016; Dawson, 2007; Prokop, Leskova, et al, 2007; Fonseca, Costa, Lencastre, & Taveres, 2012; Klop & Severiens, 2007). This study also did not assess students' critical thinking skills; however, the activities throughout the Unit were designed to help students think more critically about biotechnology and provide increased knowledge on biotechnology.

Conclusions/Implications/Recommendations

This study presents the knowledge gained by students who participated in a new *Introduction to Biotechnology Unit.* Before the Unit was taught, students' mean score was 66% on a knowledge test; after the Unit, students mean score improved to 73%. This Unit is valuable, although a seven percent increase in the mean score can likely be improved by providing teachers with more in-depth training on the use of the curriculum, and/or spending time to increase their understanding of the content. Nonetheless, the researchers are unaware of the time teachers spent on reviewing the Unit. Biotechnology is outside of the traditional curricula for agricultural education, and the topic could be challenging for teachers without specialized training.

There were significant increases on individual scores of many questions from pre-test to post-test. On other questions students already had high baseline knowledge (80% or higher) so limited improvements were noticed in those areas. The Unit materials have been refined for final publication for agricultural science teacher use across the country since this data were collected.

Within Kentucky and Louisiana, the results of this study should be shared with state agricultural education staff, university agricultural education faculty and the Kentucky and Louisiana agriculture teachers' association. These groups of professionals should work together to offer relevant professional development experiences in the area of biotechnology and/or increase the

available curricula available for agricultural education teachers to teach biotechnology. Teacher professional development in the area of biotechnology will vary from state to state, but introducing pre-service teachers to biotechnology curricula will help increase their knowledge to better prepare them to teach students. This could be a way to address the shortage of future workforce in the area of biotechnology.

This study should be replicated to identify findings in other states to see if they are similar to Kentucky and Louisiana. One recommendation is to include student demographic information in the pre-test and post-test to determine their prior exposure to and/or classes covering biotechnology. Furthermore, assessing students' perceptions of biotechnology on the pre-test and comparatively on the post-test would provide further data. These data would provide additional information towards methods to close the gap between teaching biotechnology and addressing the workforce shortage of the future.

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A Phenomenological Approach to Understanding Research at the Intersection of Gender and Graduate Student

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Abstract

Research is a requirement for fulfilling graduate-level studies. Literature in the fields of sociology and anthropology includes investigations into the experiences of female researchers, and the field of agricultural education contains research about gender, either in teaching or in the classroom. Studies focused on female graduate student researchers conducting fieldwork, however, are limited. This study used Social Cognitive Theory (SCT) framed within queer phenomenology to view how identity and orientation affect the decision-making and behavioral processes of female graduate students. Three themes emerged from the data: a) gendered (or agendered) research experiences, b) emergence of self through the research process, and c) gendered interactions in fieldwork. These themes are presented and discussed in relation to SCT through crafted profiles of each participant's narrative. The findings demonstrate that the experiences of female graduate student researchers vary, especially in viewing research and fieldwork as gendered or gender-neutral. Many participants described how their departmental environment contributed to positive or negative research experiences. Recommendations from this study include encouraging research methods educators to consider integrating concepts of gender bias into their curriculum.

Introduction

Risks in fieldwork are always present (Greenhill, 2007). In the U.S., feminists and queer theorists have begun to address the issues of sex, gender, and sexuality in fieldwork. Female ethnographers, in particular, are often more aware of their gender and sexuality and its impact on fieldwork (Gill & Maclean, 2002). Gender is never absent in the field, although some settings are more gendered than others (Pini, 2005). The exoticization of fieldwork inherently and structurally genders both discipline and practice as male. This gendering, according to Greenhill (2007), is both symbolic and real. Many researchers conducting fieldwork are female, though many times a researcher's gender is presumed male, as underlying assumptions in a binary, patriarchal society dictate that a person having access to both women and men must be male (Greenhill, 2007). The structure of academic fieldwork and research often maintains a male perspective, as its foundations often lie in a male-constructed research paradigm which frequently fails to consider the dynamics of female researchers conducting fieldwork (Williams, 2009).

Gender can affect how a researcher gains access to the field and builds rapport with participants (Mazzei & O'Brien, 2009). The gendered and social role of a female researcher, aside from physical characteristics, has implications during fieldwork, and often female researchers have to renegotiate the roles accepted as appropriate for a specific context due to external perceptions of

their gender (Mazzei & O'Brien, 2009). Chiswell and Wheeler (2016) considered several ethnical and safety challenges that young, female researchers may face while conducting interviews and other forms of fieldwork in agriculture. They examined the positionality of the researchers' gender, age, and experience in agriculture as it related to the research process when collecting data from male farmers. They found that often young and novice female researchers must travel to remote locations of farms, which can pose a safety issue. Young female researchers (often graduate students) face these challenges as well as starting their research career in an often male-dominated field. Gender is both a resource and a delimiting factor in social science research (Broom, Hand, & Tovey, 2009). Broom et al. (2009) asserted the interview process was an embodied experience, and therefore, gender affects reflexivity and the analysis of qualitative data collected through the intersectionality of gender with environmental, pscyho-social, and biographical factors. Gender can shape an interview, particularly how the gendered context can affect the relationship between the interviewer and interviewee (Pini, 2005). Previous research demonstrates women adjusting a behavior when conducting research in the social sciences. Reich (2003) explored altering her appearance or hiding her pregnancy when initially conducting research for her dissertation research in sociology. Chiswell and Wheeler (2016) compromised their feminist values by tolerating sexist comments from male farmer interviewees, which they would have never tolerated in other contexts or from other agricultural industry professionals.

Williams (2009) wrote, "in addition to all the research methods we learn […] there seems to be a special, hidden rule book for women [researchers] with a set of guidelines that male privilege shields our male counterparts from ever having to read" (p. 156). While Williams (2009) is an anthropologist, her statement is salient for disciplines involving fieldwork. Greenhill (2007) states that gender is a profoundly cultural and symbolic phenomenon, and the interaction between gender, just as the interaction between researcher and researched, is fluid and dynamic, and power relations are very dispersed and contested. Thus, there remains a need to investigate the dynamic of embodied gender in the research process as it relates to agricultural education and communication, especially when compounded at the intersection of female, novice researcher, and graduate student. Research has shown that women can show low levels of gender awareness when reporting gendered experiences such as hardship, discrimination, and harassment (Bierema, 2003; 2017). Thus, the question remains whether female graduate students who experience these occurrences would recognize them as gendered, rather than individual, experiences.

While research at the intersection of graduate student, gender, and fieldwork is limited, literature exists examining gender in the field of agricultural education (Baxter, Stephens, & Thayer-Bacon, 2011; Cline, Rosson, & Weeks, 2019; Enns & Martin, 2015; Kleihauer, Stephens, Hart, & Stripling, 2013; Murphrey, Odom, McKee, & Wilkens, 2016). Several studies focused on gender and agricultural teachers (Hainline, Ulmer, Ritz, Burris, & Gibson, 2015) and achievement, experiences, and perceptions of agricultural concepts and education by gender (Johnson & Wardlow, 2004; Rosch & Coers, 2013). Mars and Hart (2017) focused on women in graduate STEM-based agricultural education, but literature is limited that focuses specifically on female graduate students conducting research in the field and navigating research in higher education. This is an important concept to explore as graduate students are the next generation of researchers and educators in the field. Many of these students are female, so understanding their

experiences during graduate education is critical for research-focused educational efforts. This study relates to Research Priority 4: Meaningful, Engaged Learning in All Environments. (Edgar, Retallick, & Jones, 2016), focusing on graduate-level education and the experiences of those who will be the next generation of agricultural education and communication researchers.

Theoretical Perspective and Framework

The theoretical framework used in this study is Social Cognitive Theory (SCT), which focuses on individual learning and assumes that all individual behavior, personal and cognitive factors, and environmental influences determine and influence each other in triadic reciprocal causation (Bandura, 2008; Carillo, 2010). Environmental factors are external to the individual and include social support, social pressure, or situational characteristics and influence an individual's ability to successfully complete a behavior (Bandura, 2008; Carillo, 2010; Glanz, Rimer, & Lewis, 2002). Within SCT, people learn from their social environment, and human behavior results from three factors: personal (goals, self-efficacy, and outcome expectations), behavioral, and environmental variables. SCT is particularly salient for this study, as it is important for understanding self-efficacy, or a person's belief of their capability to perform a behavior within a certain environment (Schunk, 2012). Individuals also learn through observation of others in their social situations. SCT posits that individuals are self-developing, self-regulating, self-reflecting, and proactive (Bandura, 1986). Individuals witness specific modeled behaviors, interpret and reflect on these behaviors, and decide whether to model these observed behaviors (Hefner et al., 2015). However, research using this framework can exclude individual stories that provide richer context for non-normative narratives. Such narratives are valuable because they can elicit uniquely held individual epistemologies and lived experiences, both of which create a richer analysis of the data.

Non-normative narratives are a direct output of research completed under the guise of queer phenomenology, which intersects queer studies and phenomenology by investigating how bodily direction toward objects shape bodily and social space, often as an approach to sexual orientation (Ahmed, 2006). This theoretical perspective questions how we inhabit spaces and with whom we inhabit spaces. According to Ahmed (2006), "queer geographers have shown us how spaces are sexualized" (p. 543). Phenomenology views orientation to the argument that consciousness is directed toward objects and thus is "worldly, situated, and embodied" (2006). This concept of embodiment relates to Broom et al.'s (2009) assertion that interviews are an embodied experience. Within queer phenomenology, the *queer* does not refer solely to sexual orientation, but is defined by delineation from the normative (Ahmed, 2006). Queer theory questions how categorization does not fully explain how inequalities are constructed (Valocchi, 2005). It posits that power over individuals who do not fit within normative alignments contribute more to inequality than categorization. While much of this work aligns with feminist theory, using a queer lens avoids the "binary and hierarchical reasoning usually associated with concepts [such as] gender, sex, and sexuality" (Marinucci, 2016, p. 139). Queer and feminist models create space in research for resisting "the narrow, hegemonic SBR (science-based research) framework" (Denzin, 2017, p. 13). By viewing SCT through the lens of queer phenomenology, one can incorporate the concepts of identity and orientation into dominant theoretical frameworks used to describe decision-making and behavioral processes.

Purpose and Research Questions

The purpose of this study was to explore the various experiences female graduate students have when conducting research in agricultural sciences, specifically agricultural education and communication. This study uses the concepts of the SCT and queer phenomenology to examine the experiences of female graduate student researchers as they orient themselves within a social space while conducting fieldwork and research as novice researchers. The research questions that guided this study were: a) what are the experiences of female graduate students who independently conduct research or fieldwork in the agriculture social sciences?, b) what are the aspects of gender that emerge from and affect the research process?, and c) to what extent does gender affect the experience of being a graduate student researcher?

Methods

This study used phenomenology to guide data collection and analysis. Phenomenology is the study of "people's conscious experience of their life-world" (Merriam, 2009, p. 25), and emphasizes that there is "an essence or essences to shared experience" (Patton, 2002, p. 106). This methodology allows for the emergence of the intersection of SCT and queer phenomenology in the research process. The primary form of data collection in phenomenological studies is interviews (Merriam, 2009). Constructs in the semi-structured interview protocol included graduate student research, experiences conducting research, fieldwork, and experiences being a female graduate student conducting research. Due to a limited number of graduate students conducting field work in the social networks used for the snowball sampling method, only eight participants were interviewed, via Skype or Google Hangouts. The eight interviews lasted on average from 45 minutes to one hour, and occurred between May and July of 2019. Constructs in the interview protocol included demographics, including ethnic and gender identity, experiences conducting research, being a female graduate student, and conducting research at the intersection of graduate student, female, and researcher.

Participants were master's and Ph.D. students in four southeastern state universities who were enrolled in agricultural education and communication programs or had completed their undergraduate degree in agricultural education and communication. Though initially focused on students of agricultural education, leadership, and communications, the snowball (Sadler, Lee, Lim, & Fullerton, 2010) and convenience sampling techniques led to the agricultural communication concentration, as well as the concentration of the participants in only four states. A limitation to the data collection methods of this study, which intended to focus on all female-identifying individuals, is that all participants identified as cisgender females. This means all participants self-identified as "individuals who possess, from birth and into adulthood, the male or female reproductive organs (sex) typical of the social category of man or woman (gender) to which that individual was assigned at birth" (Aultman, 2014, p. 61), or individuals' whose gender aligns with their birth-assigned sex.

The interviews were transcribed by an online transcription application and corrected manually by the researchers. First, transcripts were read and interpreted for overall gestalt. Then, data were initially coded line-by-line, followed by axial coding where the two primary researchers connected themes derived from the open coding process (DeCuir-Gunby, Marshall, &

McCulloch, 2011). The researchers used the Constant Comparative Method between transcripts, which included the development of emerging themes and the identification of axial codes present in multiple transcripts (Glasser & Strauss, 1967). These themes, however, were developed to contextualize the crafted profiles used to disseminate the findings from the interviews.

Crafted profiles are a narrative data reporting technique in which the findings are co-created by the participant and the researcher, using the participant's own words to describe the story told by the participant through the data (Seidman, 2013). An advantage of this technique is that "crafting a profile […] of a participant's experience is an effective way of sharing interview data and opening up one's interview material to analysis and interpretation" (Seidman, 2013, p. 122). Thus, the content analysis that led to the identification of emergent themes contextualizes these crafted profiles while allowing the narratives told to remain open to various interpretations. Crafted profiles, being told through the participants' own words, also limits researcher bias by co-creating the findings by maintaining a central focus on the participants' perspectives and experiences (Seidman, 2013). Trustworthiness (Lincoln & Guba, 1985) was achieved through the development of a codebook (DeCuir-Gunby et al., 2011) to increase inter-rater reliability, a reflexivity statement in an attempt to mitigate researcher bias, an audit trail, and member checks of the crafted profiles with participants.

Reflexivity is critical to qualitative research (Broom et al., 2009). The idea for this study came from conversations between two of the authors who conducted independent fieldwork for their theses, and another author who had completed independent international work to collect data. They reflected on these experiences and shared how they felt their gender altered or affected certain dynamics in the field. We attempted to bracket our biases; however, our experiences and worldviews (Guba, 1990) influenced the research design and related conclusions. Self-reflexivity "encourages writers to be frank about their strengths and shortcomings" (Tracy, 2010, p. 7) and helps contextualize the findings, though we attempted to remove our personal ideals and only focus on participant experiences (Brown, Roberts, Whiddon, Goossen, & Kacal, 2010). The authors' paradigmatic views were categorized as:

1. *Emancipatory* – can be defined as "research contain[ing] an action for reform that may change lives of participants, the institutions in which they live and work, or even the researchers' lives" (Creswell, 2007, p. 21). This paradigm is often associated with critical and feminist theories and Freirean participatory action research (Lather, 2006).
2. *Deconstruction* – can be defined as "revers[ing] the resident hierarchy […] and to expose the unacknowledged (and perhaps unconscious) taken-for-granted power hierarchies" (Rolfe, 2004, p. 275). Deconstruction has fewer defined methodologies and procedures for data collection, but is often associated with queer theory, post-structural, and postmodern theories (Lather, 2006).

Findings

Several themes emerged from the data: (1) gendered (or agendered) research experiences, (2) emergence of self through the research process, which includes discussions of self-efficacy, needing to prove oneself, and second-guessing their work, and (3) gendered interactions in fieldwork. These themes will be discussed related to the crafted profiles of each participant.

April

April described how her research alone led to some frightening experiences, but she felt compelled to continue her work because she was driven by the data and her participants' encouragement.

So, one of the times, [friend's name] took me to one [interview] in [city name] and he waited in the car. I think I felt knowing that he was there, because it was a really sketchy place. But all the time that I was inside I [thought], '[Friend's name] there.' So, I was feeling safer. But when I found out that I was going to turn that into my thesis and I would have to interview more people, I was going to buy a car eventually but then I bought a car earlier so I could just go to the interviews and wherever they were and, it was my first experience driving [in the U.S.] and when I'm driving to places that were like three hours away, so I felt alone then because just like going to places, [because] if [the car] didn't have GPS, I would never get there and get back [home] honestly, I don't know this area, I don't know anything, I only knew [university city] and the close surroundings. It was challenging to go to those places by myself. I kind of felt alone, it seems silly but having to drive to those places because it was not something common for me. I felt alone sometimes going to the farms, especially ones because the farmers work all day. So, the interviews were mostly in the evenings and even like [at] night. To drive back from the rural areas at night by myself, I was a little scared also and because there was no phone service, so when the GPS was not really working, I had to pay attention to the way I was going so I could figure it out how to go back. I felt alone. I was always feeling like I wish someone was here with me. One of the first interviews was okay because it was exciting and something new. But sometimes, I [thought],' I don't want to go. […]' just because I'm really feeling alone, and […] I [thought], [if] I disappear now, is someone going to notice? How long [would it take] for someone to notice that I'm not there because it was just me. Of course I have friends. but they don't monitor me all the time...it was scary. […]. What really helped me to keep wanting to do this was the participants. When I explained what I was doing and what I wanted to do with the research, [they] agree[d] to participate and to be interviewed because [they] believed in what [I was doing]. That was mainly what encouraged me to keep going and interviewing people even when I was scared, but I knew that I was going to get something out of it, and I need[ed] that data.

April took a moment to reflect on how being a woman intersected with being a graduate student researcher, relating to the gendered research experiences theme. She then discussed how she felt it was important to take precautions to protect herself as a female researcher, yet her gender should not stop her from conducting research, connecting to the gendered field experiences theme and the emergence of self theme.

I guess, we as women, we want to do everything […] We want to be able to do everything and I think we should. So, by that we should try to think of ourselves as researchers, but also, there's that question about trying to protect yourself from stuff. Unfortunately, there are still some people that are sexist and they're going to harm women just because they are women. Not even just physical, but psychologically [too]. Some people are just going to say stuff and diminish you because you are a woman. They're not going to believe in me, in your work or research because you're a woman. I think it's important for us to be aware of that and be aware that that's not

right, so we can protect ourselves. I think [we] should be considered equal in every aspect [in research] and academia.

Carma

Carma described several issues she encountered while conducting fieldwork with farmers. When asked to further explain this dynamic in the field, described the impact that her male partner had on the data collection process. She also responded to a question about how the man's absence may have limited the completion of the project, which connects to the theme of gendered fieldwork experiences. Her description included how her environment impacted her experience due to her gender. Carma's feeling of being an outsider represents her feeling different in a small-town culture's normative alignment, both relating to SCT and queer phenomenology.

I went […] every morning [to where] the farmers had their morning coffee and tried to get them to help me conduct my study. […] I think for me it [was] just such a different culture. You forget how intimidating academia can be for some people. [… I] was accompanied by someone to conduct the research]. They trusted him, they knew him. I would tell him what to do and then he would tell [the farmers] the same thing, but hearing it from him they would do it or were able to do it right because they knew him. That was very interesting. [Also,] I feel like an outsider [in this state]. I moved here a year ago, but [State] just feels like an alien landscape to me […] This whole year, I just feel different. Then you go to these little tiny patches of towns that [are] small communities and they meet up […] every day to have their coffee and chat together and someone new walks in. First of all, I'm just a new person. […] So someone from [University] is here to talk to [them], they're not used to interacting with [people from the university]. They were intimidated by that, you could tell. I would explain what my project was about and then tell them to do it and then [he] would go closer to them and […] essentially repeat what I said […] His presence made it much more acceptable and much more doable. […] They were maybe doing it as a favor to him because they knew him. I realized very quickly that I don't know if I could have [accessed] that population without his help. […] No one would have told me […] that [the farmers] get together [for coffee]. Where I come from, people don't do that. […] He also knew the days to go. One day he said "we can't go this morning, because they're all going to be out spraying". […] So part of it was just his knowledge of the area and of the culture. But I also don't know if as many people would have been inclined to do it if, I mean, it's hard for me to say because I don't know, but I do have a feeling that people wouldn't have been as inclined to help if he wasn't there. I don't know if that, I don't think, maybe not because I was a female, but just because I was this new different person that they didn't know and couldn't bridge the motivations for the research to how I would help them.

Nancy

During Nancy's interview, she took a long pause to reflect on how her gender might impact her graduate research experience. She concluded no difference existed between her and the male students in her program, relating to the agendered research experiences. She attributed aspects of her personality in how she could overcome challenges related to her gender. She felt being a woman researcher was exciting, empowered by the process and encouraged by the environment

of her graduate program. This exemplifies the second theme: emergence of self through the research process.

I would tend to guess that it's not that much different than a male conducting research. I think that there is a chance that our culture and society have made us hypersensitive to situations that actually aren't that threatening. And that's okay to be more aware, but I also am not afraid to be in the same room as an older male producer or older male participant. But I mean that has to do with my personality as well. Just being I think a strong female who knows how to hold her own because I've been in this situation before and so it's not a big deal and I've had so many experiences where it wasn't it issue and that everybody respected each other's boundaries. So, I would tend to say that it's not that much different than being a male. That being a female researcher is exciting in order to advance ag communications in our field and discipline and show that, you know, I feel like the quantitative versus qualitative questions is much more sensitive to researchers sometimes than the male versus female researcher. The differences lie in there, but I feel more empowered to conduct whatever research I'm interested in. I have my department and my advisors to thank for that and just am encouraged to try out new things and to always say something if I feel uncomfortable or I'm not sure what to do.

Nancy discussed how her departmental environment and personality influence her orientation to research. She also reflected on how cultural and societal environments influence peoples' reactions to certain situations. Nancy demonstrated how she feels empowered based on varying factors within SCT.

Nicky

Nicky described when conducting research, how the male students in her group were not given the same instructions for safety, connecting to gendered fieldwork experiences.

We have a male graduate student who works in our group. He is not told as much about, "oh, you be safe going this way or that way," [or] "make sure that you use the bathroom before we go." None of that is ever really told to him. I mean, he is a strong male. He's very good and nice, but as females we are told to be more vigilant and to understand what some risks are. For instance, every once in a while, we'll stop at a gas station that we're not entirely sure [of the location's safety], and my professor will [say], "Well, thank goodness we still have [male student's name] with us" and that's fine. So, I don't think he's warned about as many things. Obviously, he is told the same as I am in regard to how to act when we're at extension activities and different places. The safety measure is not really emphasized with him as much as it is with the females. […] One other thing, he is stronger, not just because he's a male, but he is a strong man, and so some of the work that we do, it takes muscle having to be able to do it. Which thankfully, like for me, I have developed muscles. I can do [the] work, but it is easier sometimes for me to say, "oh well you need to take care of that."

Nicky highlighted how her professor contributed to an environment that subtly reinforces these gendered ideas, not only within research, but society as a whole. Her self-efficacy was evident, because she knows she can do the work, but doesn't ignore the role that gender plays in her behavior and that of others.

Taylor

Taylor described the process of conducting research alone and the frustrations of understanding how academic journals and conferences seem to differ, invoking the gendered research experiences theme and the emergence of self through the research process theme by describing second-guessing herself and her work throughout the research process.

I feel like I had to figure out a lot of it [research] out for myself. It's just mostly, here's your idea, well just go and do it. Then kind of show me when you're done or when you get stuck. I don't know. I feel like despite having multiple classes in methods and statistics, I don't feel super confident in those. […] When I'm doing stuff, I'm often second guessing myself and wondering if it's the best method or the best procedure, or just the best way to go about it in general. Additionally, there is an element of a time crunch or certain things and deadlines to get posters and papers in. So sometimes I feel like my worst kind [of projects], are not so great just because it was kind of like, I've got to hurry up and do this, get it done. So it's not as thorough, I guess, as I think it could be. And with that, then I wonder, okay is this secretly a piece of crap? I don't really know until they tell me whether or not it is[…].

Taylor also discussed where she felt gender intersected during a process of submitting work to a conference, connecting to gendered research experiences and the emergence of self through the research process. The SCT concepts of social environment, goals, and self-efficacy emerge in her thoughts about proving her place.

Reviews came back on papers for a conference and a lot of the […] men did not get their papers into the conference, where I […] did. They were so mad [which made] me so mad, on the fact that…they […] just didn't believe it. And so it really frustrated me and it kind of took me down this path like, "These men are so entitled." They think […] obviously their work is best. So that moment like really kind of made me feel like, wow, I have to almost up my game and prove my place.

Lyndsey

Lyndsey described an incident conducting research alone where her gender intersected in the process. Her role as an agricultural researcher was only viewed as being a wife, or the socially constructed norm of the environment of the farmers she was studying. She described the range of emotions she felt and was surprised at how differently she was treated because of her gender in her environment.

I went off and I was meeting with a couple of our producers and I hadn't met them yet and they were explaining that I was a graduate student who was going to come help with this research for them. Anytime that I'm brought into that area, I always tried to really play my production ag card to that. I'm lucky that I can't play that card, that I do come from production ag so I can kind of talk the talk and walk the walk a little bit. They asked what I was majoring in and I said Ag communications. They said, so seriously, at first I thought I was a joke and they said, oh, she'll be a great wife one day. That's so awesome that you're getting your degree in Ag Communications. Communication is so vital in marriage." I would've never ever got that

response in [different region in the US] and talking and I've never had that response. […] I kind of waited a minute to see if he just kidding. I was waiting there, [thinking] okay, he sincerely means this. He is literally congratulating me on trying to be this awesome wife one day and I was just appalled, and I was infuriated, and I was all these different things. I was talking to my friend who also kind of served as my mentor and she [said]—he really meant that from a good place. That is this sad thing. It's just a southern thing.

Linda

Linda revealed the agendered research experiences theme in her discussion of graduate student research, but connected her gender to future career plans.

To be honest, I never think about [being a graduate student or conducting research] in terms of […] my gender. I never think about my work in terms of, "Oh, I'm a female and doing this and that's why it's important". It's [that] I'm doing something that I love and I'm going to do it despite any obstacle. So, I honestly never look at me being a female as a hindrance or an addition, honestly. Because I don't know, […] just the way I was raised, it was kind of "you do what you want, no matter what, how hard it is to make that happen". I never focus on if my male counterpart was doing the same research, would [it] be easier or harder. I just do the work and do what I love. So, for me, being a female grad student, I'm just a grad student. You know, I don't attribute what I do to being female. But I will say it is cool to be in a department where there are other women that get some of the struggles of what it is to be focused in graduate work. And then looking forward to the career of like, "Oh, do I have a family? Do I not, do, I focus on this right now" [I appreciate] having kind of that group of people to talk with because our department is majority female. For me, I don't see them as linked. I've wanted to come to school and it wasn't because I had something to prove. I just loved […] research and I was like I need to learn more and how do I do that? So, for me, […] I never think of it in terms of, oh, I'm the woman doing this, I'm just […] going to do it.

Linda reflected on how her familial values continued to encourage her work today. She also described how the social environment within her department contributes to the support that assists with her work.

Sarah

[University] is a tier one research institution, so as soon as we walked through the door, research was drilled into our brains as an absolute requirement. […] My experience conducting independent field research] was my first time traveling away from really [University City]. I'd never met any of those people before, but honestly it was really fun. It was really outside of my realm of knowledge and experience, but working with the extension agents was really, really cool. A couple of them [have] actually even emailed me since [and] asked me questions about other things we're doing in the department. So that definitely expanded my network. Interviewing the growers was also difficult. It was definitely challenging in a sense that I did not really speak their language, so it was difficult for me to relate to them and get the best data possible.

Sarah further elaborated on the challenges she faced conducting independent field research as a novice researcher. Like other participants, she reflected how the presence of other professionals increased her perceived success with data collection.

In several of the situations I was one of the only females there and I was also, a lot younger than a lot of these people. So I really had to bring myself out of my shell because a lot of them were looking at me like, what are you doing? Who are you? […] I got several strange stares because I think they were a little bit confused. It was in the middle of a field in the middle of nowhere, so it was just kind of a strange setting. […] I think I grew from it because it was probably the most uncomfortable data collection experience I've had, but beneficial and a good experience overall. But yes, I definitely faced challenges. [I think] the experience would have been different if those extension agents just were not there to help me. I think the people who talked to me pretty much did it because the extension agents were there. Definitely, it would've just looked different because I would have had to be more forward and introduce myself personally to all these people individually, whereas the larger introduction was just so much more convenient. It definitely would've looked different in a sense that I think I would've gotten less people because I would've had to justify who I was and why I was there to every person individually as opposed to just kind of having people, a few people line up to talk to me when the timing was appropriate. Definitely would have looked different and I think been much less successful. […] Other than the extension agents, they don't typically [interact with] people from the university alone, they really just associate themselves with their extension agents who they trust a lot., I'd like to think it was his expertise and visibility [that contributed to the success of the data collection] and just the fact that I was associated with him and he was on the grant project really, but I think a lot of these older male producers are just more comfortable probably not talking to me. I really do. I sense that a lot.

Sarah described being a female graduate student conducting research as something she had not previously thought about, but described how research was how graduate students proved their value. This connects to the emergence of self through research theme, and also to SCT through the environmental factors in her department that motivate her and contribute to her goals.

[You] definitely feel the need to prove yourself constantly. Also, [in] our department the students are [mostly] female. We don't have any male [students] right now. […]. It's pretty even in terms of male, female faculty, but in that sense, I don't feel, I'm not so much aware of it and be in the department. I've never really thought about that question because of that. […] We feel in this department that we are of value if we are viewing and producing research. It's definitely what we are valued for here. So it means a lot. But I think that the reason too that we also are […] trying to figure out what's the next step. [What can we] add to our repertoire, I guess you could say, to kind of increase our ability or capability to do research. […] How can we challenge ourselves even more? […] So, we were just trying to keep raising the bar for ourselves and challenging and pushing ourselves too.

Conclusions, Implications, and Recommendations

The findings of this study demonstrate that the experiences of female graduate student researchers vary, particularly when elements in the environment, social relationships, and gender

intersect. Gender, while an issue to which participants reacted differently, did not adversely affect the overall graduate research experience, although various gender-based experiences were powerful enough to have emerged in their narratives. Many participants described researching as vital to their positive growth in self-efficacy as researchers when faced with challenges. The ability to overcome challenges can prepare students when they are faced with certain discrimination outside of higher education, including gender, age, status, appearance, ethnicity, or culture. Many participants referred to the world of academia as a gender-neutral environment, where they never felt like their gender was treated differently than other students. When discussing conducting their research, many participants eluded to feeling gender-neutral working in the field as well. Though some participants described stories where their gender was highlighted or differentiated, many discussed how they felt genderless conducting research. April, Nicky, and Tracy viewed themselves as researchers, but when asked the question relating to being a woman student researcher, they had never thought or reflected on the intersection. Many female graduate students did not think about their gender as a researcher, which is problematic for several reasons. Firstly, the lack of consideration of gender might influence participants' inability to recognize safety concerns. Secondly, participants might not acknowledge the subtlety of gender bias when it does occur, which Bierema (2017) described as "gender unconscious" (p. 159). Connecting to Williams' (2009) description of the unspoken guidelines for female researchers that male researchers do not have to know, recommendations include integrating discussions of safety in the field as part of educating on the research process.

Individuals, according to SCT, often learn from others in their social situations (Schunk, 2012). Most participants discussed how their departmental and familial environments (social support) contributed to their current self-efficacy or motivations; however, a few described how situations within their research environments caused them to second-guess their work. Others described how their personal attributes often contribute to their behavior. SCT provides a valuable framework for interpreting these results, but the presented themes framed within queer theory build on the concepts provided by SCT. The emergence of self through the research process is particularly interesting, as much of the discourse within this theme related to second-guessing themselves, understanding who they are based on interactions within the process of research, and understanding their identity as a female graduate student researcher is a valuable perspective for research educators. By asking what SCT leaves out of the narrative, we are able to see what emerges from the nuances that occur between environment, cognition, behavior, and personal characteristics.

Some limitations must be considered due to the nature of this study. Limitations include the small number of participants and the geographical limitation in participant recruitment. All participants identified as cisgender females, which leaves the perspective of transgender and non-binary researchers out of this study. Finally, all participants identified as white, and thus the intersection of gender, graduate studies, and race was unable to be investigated. Future research should be intentional about expanding the participant demographics in order to capture the more nuanced and intersectional aspects of graduate studies and gender.

Risks in fieldwork are constantly present (Greenhill, 2007), and can disproportionally affect female researchers physically or mentally (Gill & Maclean, 2002; Pini, 2005). By incorporating these discussions and providing space for them to occur, educators can facilitate a discursive

space for female researchers to share their stories and increase awareness of what to do in a situation where one feels unsafe. Addressing this risk openly could encourage female student researchers to take more risks in the field by understanding what resources they can access and knowing they have a space to dialogue about their experiences. Mars and Hart (2017) supported previous findings that women are not being prepared during their graduate studies for the professional realities they will likely face in agriculture and other gendered career pathways. They recommend that faculty in research intensive STEM-related departments integrate concepts of gender bias in the research-methods curriculum. Thus, the question remains: have research methods been constructed and taught in a way that unintentionally ignores the needs of those who do not fit within the primarily male-dominated research paradigms? How can universities better educate about the research process when considering the stories that often are not told? It is important to consider whether the culture of a department contributes to the openness in which this dialogue can occur so that we can contribute to a more inclusive space and dialogue.

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A Critical Study of Women Graduate Student Experiences in Agricultural and Extension Education

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Abstract

The American Association for Agricultural Education (AAAE) aims to build a more inclusive and collaborative organizational culture. In 2017, women faculty and graduate students comprised 37.8% of the total AAAE membership. The need to recruit and retain diverse faculty and students in agricultural and extension education (AEE) remains if the AAAE organization is to achieve its goal. Women faculty experiences in AEE have been studied previously, yet less attention has been given to women graduate students. The purpose of this critical inquiry study was to develop a profile of women graduate students in postsecondary AEE by describing the mentoring experiences and organizational climate for women graduate students in the profession. Four emergent themes described women graduate students' experiences in AEE: (a) reflections on graduate school, (b) realities of graduate school, (c) future in academia, and (d) the pursuit of mentorship. Participant reflection on the graduate school experience was conflicting. The realities of graduate school in AEE described a man's world, the good ol' boys club, microaggressions toward women, and the questioning of women's competency. Participants seemed confident, unsure, or concerned about a career in postsecondary AEE. Faculty and fellow graduate students were considered encouraging mentors, but a void of women leaders to serve as role models in AEE was identified. AAAE should promote a more positive, inclusive, and intentionally mentored graduate school experience in order to retain more women in postsecondary AEE. More critical research related to graduate student experiences is encouraged to improve the inclusivity of the AEE profession.

Introduction and Background

According to the National Center for Education Statistics (NCES, 2018), 56.7% of college students enrolled in the U.S. during 2019 are female. Sixty percent of all master's degrees and 54% of all doctoral degrees will be awarded to women in 2019-2020 (NCES, 2018). According to the *Graduate Enrollment and Degrees: 2007 to 2017* report from the Council of Graduate Schools (2018) women in the U.S. earned the majority of graduate certificates (64%), master's degrees (57.3%) and doctoral degrees (53%) in the fall of 2017. Additionally, they earned the overwhelming majority of graduate certificates in education (78%) and doctoral degrees in public administration (76%) (Council of Graduate Schools, 2018). While women have now matched and even surpassed men in terms of educational attainment, men have continued to constitute the majority of graduate degrees in engineering, mathematics and computer sciences, physical and earth sciences, and business (Bettinger & Long, 2005; Bradley, 2000; Council of Graduate Schools, 2018).

Extensive literature surrounds the "leaky educational pipeline" metaphor (Blickenstaff, 2005; Gasser & Shaffer, 2014; Massachusetts Institute of Technology, 1999; Pell, 1996), suggesting

that over the progression of women's lives, fewer and fewer remain involved in the sciences and even fewer reach the eventual level of a tenured faculty member. Many of the "leaks" are attributed to an early lack of self-esteem beginning in elementary school and continuing through adolescence, into college, and later into graduate school and the job entry period (Pell, 1996). It is estimated that at least 40% of students who begin a doctoral program fail to complete it and little information is available pertaining to the reasons students leave these programs (Golde, 2005). Many efforts have been made by government, companies, and schools to increase female representation in male-dominated fields, with a particular focus on hiring more female faculty to serve as role models to students (Bettinger & Long, 2005).

An additional phenomenon occurring with female graduate students is the increasing length of time it takes for completion of a doctoral degree (Maher, Ford, & Thompson, 2004), particularly within the fields of education and other non-science and engineering degrees (National Science Foundation [NSF], National Center for Science and Engineering Statistics [NCSES], 2018). In 2017, it took 12 years on average to complete a doctoral degree in education, compared to a science and engineering doctoral degree which averaged six to eight years (NSF, NCSES, 2018). Additionally, this time constraint means a lack of ability for women to earn to their full potential, thereby widening the gender parity in the labor market (Maher et al., 2004; Bradley, 2000). Reasons attributed to this extenuating length of time include "the availability of funding resources, the nature of the advising relationship, the extent to which students receive research preparation and opportunities, and individual student concerns about marital, family, or health problems" (Maher et al., 2004, p. 387).

Workforce/workplace misalignment is another contributing factor to the leaky pipeline phenomenon (Cabrera, 2009). Today's workplace environment is very different from that of the idealized worker of the past - usually a man who was able to dedicate himself completely to his job because a spouse was at home taking care of the home and children (Cabrera, 2009). According to the Bureau of Labor Statistics (2019), the labor force participation rate of mothers with children under age six was 69%, compared to the participation rate for married fathers, at 94%. While men are expected to take on more household responsibilities, women still shoulder the brunt of these activities and often cannot compete with escalating work demands (Cabrera, 2009).

Women within the agricultural education discipline, a historically male-dominated realm of education (Enns & Martin, 2015), have been significantly under-represented, particularly at the secondary and postsecondary education levels (Foster & Seevers, 2003; Kelsey, 2006b; Seevers & Foster, 2003). One of the factors attributed to women's late entrance into the field is a lack of strong female role models to advocate for advancement to higher educational levels (Enns & Martin, 2015; Seevers & Foster, 2003). While women in the discipline appear committed to their role within the profession when properly encouraged, a distinct lack of mentoring and/or support networks has been noted and called for within the profession (Baxter et al., 2011; Foster & Seevers, 2003).

While a recent study has examined both the challenges and opportunities experienced by women faculty within agricultural and extension education (Cline, Rosson, & Weeks, 2019), little, if no information exists pertaining specifically to the experiences of women graduate students within

the discipline. There is also a notable lack of discipline-specific graduate attrition data. Many of the women faculty who participated in the 2019 study referenced experiences from their graduate work, thereby prompting further exploration of this phenomenon.

Purpose

The purpose of this study was to develop a profile of women graduate students in postsecondary agricultural and extension education (AEE) by describing the mentoring experiences and organizational climate for women graduate students in the profession. The study was conducted as a component of a larger study to update the profile of women in AEE ([Author] et al., 2019; Foster & Seevers, 2003; Seevers & Foster, 2003). The study was guided by two research questions related to the perceptions of women graduate students regarding the unique challenges and opportunities in AEE and their mentoring experiences.

Epistemological and Theoretical Perspective

Constructionism, which considers knowledge as truth co-created between individuals within a social context (Crotty, 1998), was the epistemological perspective guiding this study. The collective experiences of the individual participants provided meaning to our research questions. A variety of angles used to study women experiences in AEE at the secondary and postsecondary level suggest forces of influential power among genders in the profession (Baxter et al., 2011; [Author] et al., 2019; Foster, 2011a; Kelsey, 2006a; Kleihauer, Stephens, Hart, & Stripling, 2013; Murphrey, Odom, McKee, & Wilkens, 2016; Stephens, Brawner, Dean, Stripling, & Sanok, 2017). To identify and better understand the power dynamics, critical inquiry as a theoretical perspective is used to propose how predominate social beliefs, practices, and organizations can be transformed (Kincheloe, McLaren, Steinberg, & Monzó, 2018; Patton, 2015). The evaluation of the lived experiences of women graduate students in AEE was approached through critical inquiry (Patton, 2015). Crucial to the study's problem were the meanings of women graduate students in AEE.

Methods

This study was a component of a larger study conducted to update the profile of women faculty in postsecondary AEE. The original research protocol (Foster & Seevers, 2003; Seevers & Foster, 2003) was followed closely. After obtaining the original questionnaire, we adapted it for electronic administration through the Qualtrics survey platform. Some questions were slightly changed to improve the meaningfulness and relevancy of the questionnaire (e.g., agricultural communications was added as a possible course type selection because it was not included in the original instrument). Male and female faculty members in AEE from various universities served as a panel of experts to assess the face and content validity of the questionnaire. Likert-type and open-ended questions comprised the five sections of the questionnaire: a) educational and professional background, (b) current professional status, (c) mentoring, (e) professional treatment, and (f) demographics. Instrument reliability was not addressed due to this study's focus on the 10 open-ended mentoring and professional treatment questions and use of qualitative analysis.

Common themes and patterns were identified to describe the perceptions of women graduate students following basic interpretive qualitative methodology (Merriam, 2002). We independently analyzed 267 responses to the open-ended questions. The first cycle coding method used to reflect broad social constructs as recommended for critical inquiry studies were concept codes (Saldaña, 2016). Code mapping was then used to compare and sort initial concept codes into emergent categories (Saldaña, 2016). Axial coding was determined as the second cycle coding method based on its ability to indicate relationships between categories and subcategories according to shared characteristics, attributes, and dimension (Saldaña, 2016). Final data analysis resulted in six main categories and 21 sub-categories represented by four emergent axial codes with 13 dimensions and properties. We kept and reflected on detailed analytic memos during the interpretation to systematically guide the analysis (Saldaña, 2016). By maintaining member voice and analyzing the positionality of truth, trustworthiness was maintained in this critical inquiry study. We were intentional to feature differing views among the women graduate students in order to not imply universal or majority viewpoints among the participants (Lincoln, 1995).

Participants

The population for this study consisted of all women graduate studies in agricultural and extension education programs. The 2017 American Association of Agricultural Education (AAAE) member directory provided an initial list of 91 women graduate students (15.9% of the total membership). University websites listed by AAAE as having an agricultural education, communication, extension, leadership or similar program were searched to identify AEE women graduate students not included in the AAAE membership; an additional 17 participants were identified. It was important to include AAAE and non-AAAE members from agricultural education, extension, communications, and leadership as participants to conduct a census (N = 108) of women graduate students representing the extensiveness of postsecondary agricultural education (Barrick, 1993; Mannebach, 1990; Newcomb, 1993). Ten women (9.2%) opted out of the study. We agreed to take out questionnaires less than 50% completed *a priori* and removed five (4.6%). A response rate of 43.5% was achieved (n = 47). Although non-respondents (n = 46; 42.6%) were contacted, we were unable to solicit additional completion of the questionnaire and compare early and late respondents.

Most women graduate students reported they received their master's degree (n = 29; 61.7%). Doctoral degrees were earned by two women (4.3%). Almost half of the participants reported being involved in agricultural education classes (n = 24; 51.1%), FFA (n = 26; 55.3%), and/or 4-H (n = 21; 44.7%) during high school. Thirty-two (68.1%) women graduate students were graduate teaching and/or research assistants at the time of the study. Thirty-eight (80.9%) participants self-identified as members of AAAE, representing 41.8% of the women graduate student membership for the year 2017.

Statement of Subjectivity

We wish to acknowledge our personal perspectives related to this study, understanding subjectivity is inherent in the qualitative research process (Peshkin, 1988). Each of us have personal experience in AEE at the university level as female graduate students, instructors, and

faculty in agricultural leadership. This line of inquiry was pursued because we are committed to fostering inclusion in the profession. Our personal experiences have included both positive and negative graduate school memories and realities, gender-based microaggressions, and varying quality mentorships in the AEE profession. Additionally, we acknowledge the influence of societal women empowerment movements since 2017. We recognize the lens we used to interpret the data in this study may have been impacted by these influences and took steps to mitigate biases before, during, and after data collection and interpretation. To ensure data interpretation was conducted as neutral as possible, our biases were noted, discussed, and challenged throughout the process. We believe the findings for this study fully reflect the perceptions and experiences of the AEE women graduate student participants.

Limitations

Generalization of findings is not suggested in qualitative research (Patton, 2015), and is the case in the study since response to open-ended questions did not provide contextual information. This study sought to describe and interpret the perceptions of women graduate students. The constraint of resources and the desire to include as many viewpoints in the study as possible prevented us from conducting one-on-one interviews or focus groups with women graduate students. It is also noted that while the questionnaire was administered as a census among women graduate students in AEE, the entire population did not respond. Therefore, the findings of this study cannot be generalized to the entire population of women graduate students in AEE. Readers are encouraged to assess the findings to determine transferability within their context.

Findings

Four axial codes with 13 properties and dimensions emerged during the analysis to describe the perceptions of the unique challenges, opportunities, and mentoring experiences of women graduate students in agricultural and extension education: *(a) reflections on graduate school, (b) realities of graduate school, (c) future in academia,* and *(d) the pursuit of mentorship.* Direct quotes from the participants are included with the interpretation of findings to support the emergent themes. Participant names and potential identifiable information were removed to maintain confidentiality.

Reflections on Graduate School

The first major theme to emerge from the women graduate students in AEE was identified as *reflections on graduate school*. As participants considered the opportunities and challenges they experienced in AEE, many self-reflected on whether the decision to attend graduate school was fruitful. *Rewarding, flawed,* and *sacrifices* were categories used to describe the students' choice to pursue graduate education in AEE.

For almost a third of the AEE women graduate students, their experiences in graduate school were described as rewarding and positive. One participant stated, *"It has been an amazing experience . . . I wouldn't trade my degree for anything in the world…"* The participants did not deny the challenge of graduate school but found the effort worth the benefits. *"Of course I would make the same sacrifice again because so many doors have opened since getting my master's*

degree," another student commented. Graduate school was also seen as beneficial to helping students figure out what to focus their career on in the future and as an opportunity "*to take* [their] *education and knowledge to new heights."* The rewards of attending graduate school were best described by the following participant: "*Although it was a tough decision to leave my job and pursue graduate work, I know this is where I am supposed to be. . . .even if things have been very difficult from time to time."*

The decision to pursue graduate school was confounded by the perception of a flawed system for another group of women graduate students in this study. While the women were appreciative of the opportunity, they did not hesitate to share how less-than-positive occurrences as female graduate students in the AEE profession had impacted their overall experience. *"I have enjoyed my time . . . I just see the flaws in the system and wish they could be changed,"* shared one participant. For most of these women, they did not regret their decision to attend graduate school, but perhaps felt bitter toward the extreme workloads and limited resources offered to graduate students. One student put it this way:

> *In academia, school is my life, especially as a graduate student. I don't date. I don't have many friends outside of school. I live too far from my family to see them more than once or twice a year. . . The sacrifices, I hope, will be worth it.*

Other participants commented specifically on the expectations their faculty had for "*graduate assistants to put in more than the allotted hours a week we get paid"* in order to *"accomplish what need*[ed] *to get done."* A participant who was about to complete her doctorate shared she was not sure she would do it all over again because, in her experience, "*graduate students [were] not treated well. At all."* For some, the sense of unrealistic expectations in graduate school led to personal neglect, concern for mental health, and inattention to "*parts of my life which I find gratifying, such as volunteering and mentoring youth."*

Sacrifices experienced during graduate school led some participants to rethink their decision to earn a higher degree in AEE. *"Some days I regret pursuing my master's degree,"* said a participant. The regrets of *"choosing my professional life over my personal life at times . . .",* taking a huge pay cut, and/or denying job offers in order to earn a graduate degree were repeated by several students. Some participants felt the decision to attend graduate school negatively impacted their current relationships with family and friends and would limit their personal life opportunities down the road.

> *Family is very important and if I had known going into it that it would require so much time away from family, I would really have to think about it. I am extremely thankful for everything I've had the opportunity to do, but if I had the opportunity to do it again, I am not sure I would.*

> *I firmly believe my desire to be at the university level is intimidating to people outside of the profession. As a single female, with goals and ambitions, I find that males are intimidated by my demeanor and drive, and I am unsure if my dreams to have a family will come true.*

Realities of Graduate School

The second theme to emerge from the data described the realities of graduate school for women graduate students in AEE. Many participants shared the sentiment that the agricultural industry (including the AEE profession) operated as a man's world. Graduate students voiced opinions about the existence of a good ol' boys club in AEE, one in which they felt they did not belong or benefit from. Experiences of gender-based microaggressions were shared and seemed to be expected behaviors from men in the workplace. Numerous women graduate students expressed the questioned competency of women professionals and educators as the greatest barrier in AEE.

Agricultural and extension education was frequently referred to as a man's world and seemed to be an accepted notion among the participants. It was highlighted by some students that while sectors of the profession may have predominantly female students (e.g., communications) or have seen an increase in female enrollment (e.g., teacher education), gender biases *"seems to be magnified in this field." "*[I've had to figure out how to] *deal with the patriarchy institutionalized in the system of academia,"* reflected a participant. *"A majority of women are students . . . Faculty and department chairs are predominantly male. [There is an] imbalance of power results in a profession of suppressed wages and lower expectations for leadership,"* another participant pointed out. The perceived imbalance of power based on gender in the AEE profession was cause for concern to the students, as it seemed to reinforce gender stereotypes. Women graduate students reflected on specific perceived instances during their graduate program when they were denied opportunities or responsibilities because of their gender. Other participants spoke of times when they were discouraged by stories of women not being as respected in the perceived male-dominated profession. Students also felt their feminine behavior and attitudes were perceived as less valuable or unprofessional when compared to the traditional masculine expectations of the profession. *"Agriculture and academia are both male dominated. Some men simply do not treat women as equal, especially smart, accomplished, independent women,"* reported a participant. The perceived reality of AEE as a man's world appeared to be a source of discouragement for women graduate students to pursue a career in the profession:

> *This friend of mine was seeking employment after graduating with her Ph.D. [in AEE]. I commiserated with her in regard to how minds like hers may not be appreciated in agricultural education today. She is highly innovative and thinks outside of the box frequently. This would be appreciated more if she were a man in this discipline and tenured. Instead, she is a young female in our profession who is still regarded as 'a little out there' in her ideas. I fear the same outlook for myself.*

Existence of a good ol' boys club in AEE was a common sentiment among the participants. As one student put it, *"beating the stigma of the Good Ol' Boys club,"* seemed to be one of the greatest barriers for women graduate students in AEE. *"I feel that women don't fit the 'good ol' boy' club feel of middle aged and older men in agriculture. Often, the women seem to be doing all the work and it's expected,"* said a participant. Other students observed the tokenizing of women faculty and students by the perceived good ol' boys club. The preferential treatment given to male colleagues by tenured male faculty was a source of annoyance for many of the women graduate students. *"I would be extremely frustrated when I initially started my program because guys I started with would be invited out for drinks with tenured faculty (who were all*

male). However, it would be 'inappropriate' for me to attend," reported a participant. "*We miss out on social and professional opportunities when male faculty are taking male graduate students on fishing or camping trips,"* shared another student.

> *Male peers of mine have received different treatment, seemingly because of their gender and that they can fit into the "good ol' boys club." It seems that quite a few men in our profession belong to this club with invisible rules, but it does seem advantageous to be white, male, from a rural setting, and regularly chew tobacco to be a member of this club . . . it does seem that my peers who have membership in the good ol' boys club have been given preferential treatment compared to myself. This was particularly challenging my first year of graduate school.*

Another reality women graduate students frequently referred to in the data was prevalence of experienced microaggressions during their graduate school tenure. *"In our profession, the frequent microaggressions that women can't teach Ag Mechanics, cause drama, or when discussing the decline of males in Ag Ed accidentally or unknowingly make their solution anti-female"* was a barrier identified by participants. Microaggressions toward women in the profession mentioned in the data ranged from not being taken seriously as a woman in agriculture to perceived disrespect from older men to being overlooked in decisions or for opportunities in their department, even though they have the relevant experience to contribute. *"Just today I was discussing with another female colleague in Ag Ed how hard it is to deal with comments that feel sexist, but not knowing how to handle them,"* a student expressed. Examples of sexist comments provided by participants described situations of being considered a child rather than a job candidate, being called "young lady" or "miss" in professional settings, and the assumption made of being married and referred to as "Mrs." in email and person. *"I have been introduced as 'the new shop teacher' while the individual condescendingly eyed me up and down,"* said a student. One participation was even "*asked by a male if* [she] *was pursuing an agricultural degree to find a farmer husband."* Similarly, a participant reported:

> *I have been approached many times while at professional workshops or industry conferences where individuals automatically assume I am only in attendance because I am with my husband, even though I am not married, and I am there completely on my own.*

The bias displayed toward women graduate students extended to the classroom as well. One participant revealed that *"compared to male professors,* [she] *got more push back and criticism from students and had more instances of being treated disrespectfully or aggressively confronted (specifically by White male students)."*

A fourth reality of graduate school shared by the participants was the barrier of having their competency in AEE questioned. *"Men are given a greater amount of confidence starting out – women have to earn respect in this field, whereas it seems to me that men are awarded that respect more immediately,"* stated a participant. Many students felt *"it [took] women longer to establish their credibility in the workplace."* It was also perceived that others saw the women graduate students as less capable and found it challenging to be treated like they did not know as much about agriculture as someone else. Because of their gender several participants felt

stereotyped when their ability to teach or lead certain subjects, such as agricultural mechanics, was questioned. The effort to establish themselves as credible researchers and/or teachers appeared to be a weighty emotional tax according to the study's data.

> *There were times early in my career that people doubted my ability to teach agriculture because I was a female . . I worked my tail off to prove them wrong . . . Instead of spending my time doing my job well, I had to spend time convincing people that I was capable as a woman to teach welding, mechanics, etc.*

Also, in the study were a few participants who did not negate the realities of other participants, but did report being viewed as capable in the AEE profession. As one participant stated, *"perhaps I am naïve, but I have never experienced someone doubting my abilities because of my gender."*

Future in Academia

The third significant theme to emerge in the self-reflections of the women graduate students examined their perspectives of a future in academia. When considering if they would pursue a career in postsecondary AEE, the participants could be categorized into three groups: (a) confident about an AEE career, (b) unsure about a career in AEE, and (c) concerned about the AEE profession.

The first group of women graduate students in this study expressed confidence in their desire to pursue a career in postsecondary AEE. Comments such as *"I'm very confident in my decisions and my conviction in the career I have pursued," "I really enjoy being at the university level and believe it is the right path for my career,"* and *"I really enjoy what I do and want to become a faculty member"* demonstrated the positive attitude this group of students had toward the AEE profession. This group felt encouraged by the profession to continue toward a career path in postsecondary AEE: *"In the short time I have been engaged in AAAE, I sense a strong commitment to collaboration between faculty members from various universities and truly feel they are cheering me on as I pursue this new career."* The women graduate students found the work in the AEE profession rewarding and exciting. They also recommended other women pursue a similar career despite the hardships and sacrifices needed to reach their goal.

Unsure described the second group of women graduate students' desire to pursue a postsecondary AEE career. When reflecting on the sacrifices they made during graduate school in AEE, some students said they would *"see if it was worth it."* Other students provided comments demonstrating a sense of disappointment with their decision to pursue a career in academia.

> *I am unsure if this is the direction I truly want to go now that I have gotten this far. I truly believed I would love research, and I hate it . . . I almost feel like I have wasted two years (with another still to go – but I'm too far to change now).*

> *I'm aware of my innovativeness and overall tendency to think differently than most in this field. If I was aware of this sooner in life, I may not have tried to make myself be a square peg unable to fit in a round hole.*

Some of the participants voiced concerns about being able to find employment in AEE at the university level and sensed limited diverse opportunities in the field. *"I would only encourage other women to pursue this career if it was something they were truly passionate about – only if it is something they commit to and are willing to navigate a variety of challenges"* said a student.

The third group of women graduate students, when considering a future career in academia, appeared concerned about the sustainability of the AEE profession. Some students discussed being discouraged by observations of *"poor leadership," "the conduct of faculty and their visible character,"* and *"the negative conversations about tenure and the 'hoops' one must jump through that are seemingly against your success."* This group of participants also noted a perceived sense of counterproductive competition among women faculty. *"Women in my department have a competitive nature, which leads to negative interactions when attempting to work collaboratively,"* said one student. Another participation felt it was *"difficult to be a woman in a department with very little support for other females."* For one former extension educator, she felt *"women bonded together more* [in the industry]. *It's not that way in academia."*

This group of women graduate students also expressed concern about having full-time employment in postsecondary AEE while raising a family. *"I believe work-life balance would be one of the major barriers faced by women in comparison to men,"* a student parent in the study commented. Many participants seemed apprehensive about moving *"through the promotion and tenure ranks while trying to raise a family."* One student said she witnessed *"women navigate this successfully, but it seem*[ed] *a daunting task."* Second-shift responsibilities for women in academia was mentioned by several participants in the study's data. *"The professional demands of work coupled with second shift responsibilities are a recipe for disaster and increased attrition rates,"* a participant reported.

The Pursuit of Mentorship

The fourth theme to emerge in the study centered on the AEE women graduate students' *pursuit of mentorship.* Finding and maintaining positive women role models was a consistent response among the participants. Although the participants expressed meaningful *faculty encouragement* during their time in graduate school, the women students still perceived a *leadership void* of women faculty to serve as examples to younger members in the profession. Many participants also emphasized the importance of graduate students mentoring each other, regardless of gender, to promote completion and success in AEE graduate programs. Overall, *"finding positive mentorship relationships, which provide the necessary support for success"* was essential to the participants' experience in the AEE profession.

The participants in this study attributed much of the encouragement they received in graduate school to both men and women faculty. Participants mentioned the many opportunities afforded to them by their advisors and valued the constructive feedback faculty provided. *"We see our*

professors as mentors and they make it a point to guide us through the program and advise us even after we graduate," a student noted. For some students, the majority of faculty who supported them were male, but they felt it was a function of the demographics of the faculty population. One participant shared the opposite experience: *"A lot of my mentors/advisers have been very respected females . . . they've always told me I can do anything I set my mind to, and my thoughts, ideas, and work are just as good as anyone else's."* The majority of participants were reassured that their AEE professors were willing to help better them as future professionals.

However, the participants still felt there was a lack of opportunity to network with women professors and mentors in the AEE profession. A *leadership void* of women faculty to serve as examples to younger members in the profession was also referenced by participants numerous times. There was a consensus that postsecondary AEE needed *"more women in leadership positions."* Postsecondary AEE was often described as having *" a great deal of female graduate and undergraduate students, but very few tenured women who serve as positive role models for the students."* A participant explained the lack of women representation in leadership at her university by describing the distinguished alumni wall as *"all White males . . . not a single female has received the distinction."* The participants challenged more women to pursue leadership roles in order to diversify and change the status-quo of the AEE profession.

> *We are in need of tenured individuals to step up in departmental administration roles and serve as our chairs and leaders, but no one wants to do it. Furthermore, the women who should be stepping up in service and who hold the qualifications are raising families, or even intimidated by the power and politics that accompany the position.*
>
> *It is important for women to fill leadership roles in any industry, even when it is uncomfortable. They have valuable and needed perspectives that the industry can benefit from and should learn to regard as highly as anyone else's contributions."*

A common thread among the mentoring experiences of women AEE graduate students in this study was the emphasis on peer mentoring. Students strived to encourage other students for success in AEE graduate programs, regardless of gender, and valued the reciprocal encouragement from their peers. *"Primarily I have received support from my fellow female graduate students,"* said a participant. Many students shared a personal policy to *"to uplift other women"* and ascribed to the motto, *"women should empower other women."* Participants desired to *"build people up, not tear them down"* and *"eagerly recruited other women with similar interests and interesting backgrounds to contribute to the diversification of the profession and of our food system."* The significance of pursuing all levels of mentorship as a woman graduate student in AEE was best summarized by a participant:

> *The reason I made the sacrifices I made in my own life was because I wanted to prepare students for the workforce – to do what I used to do – to make a difference in the world. It really doesn't matter if that student is a man or a woman. I want to see them all succeed. But of course I want my female students to know they can do anything they want as long as they are willing to put in the blood, sweat and tears to accomplish it. When they ask me what it's like I give them the truth, and the truth is, being a woman in a male-*

dominated workforce is challenging, and frustrating at times, but also incredibly rewarding.

Conclusions, Implications, and Recommendations

The critical lens used to analyze the findings of this study reveal the complex experiences of women graduate students in postsecondary AEE. Experiences were unique to each participant, with common perceptions varying in degree and intensity as they related to the decision to attend graduate school, the realities of graduate school, their future in academia, and their pursuit of mentorship. Acker's (2012) explanation of *gendered organizations* helps us derive meaning from the complexity of women graduate students' experiences in AEE. According to Acker (2012), a gendered organizational culture is perceived to have invisible processes that influence assumptions about gender based on (a) "the sum of particular images, attitudes, beliefs, behaviors and values" (p. 216), (b) interactions between colleagues that contribute to perceived levels of power, and (c) assumed gender roles and identities.

To help the AAAE association build a more inclusive and collaborative culture, members are encouraged to examine experiences of women graduate students - the future of the organization - in more depth. The women in this study described a variety of experiences as graduate students in AEE, ranging from rewarding and supportive of future academic careers to full of sacrifices and concerned about the profession. We wonder if this gamut of perceptions toward academia by women graduate students is a contributing factor to anecdotal attrition of women in the AEE discipline (Cabrera, 2009).

The data from this study also supports a less-than-positive experience and reality for women graduate students in postsecondary AEE based on the perceived imbalance of power (Acker, 2012). According to the "leaky educational pipeline" metaphor (Blickenstaff, 2005; Gasser & Shaffer, 2014; Massachusetts Institute of Technology, 1999; Pell, 1996), lack of self-esteem continuing into graduate school and the job entry period (Pell, 1996) is attributed to fewer women remaining in academia. The participants in this study spoke of the emotional tax frequent questioning of competency, microaggressions, and navigation of a perceived male-dominated profession impacted their success and satisfaction in AEE. How the organization can intentionally support women graduate students and tackle predominant attitudes, behaviors, and beliefs toward gender needs to be further investigated critically by AAAE.

Although calls for improved AEE mentoring and support networks for women have been made previously (Baxter et al., 2011; Cline et al., 2019; Enns & Martin, 2015; Seevers & Foster, 2003), it appears from the findings of this study that not much progress has occurred. The women graduate students yearned for stronger women networks, mentors, and role models, particularly in leadership and administrative roles. More stories of women successfully navigating promotion and tenure in AEE and achieving leadership roles in academia should be highlighted to combat students' concerns about work demands and personal responsibilities. It is recommended AAAE pursue the development of an intentional and structured mentorship program to pair women faculty members with women graduate students interested in postsecondary careers. The creation of a respectful, honest, and transparent environment for

women to share experiences and receive advice for success in the AEE profession may improve the retention of a more diverse faculty and staff.

If AAAE is truly committed to inclusion, the organizational culture and climate of the AEE profession should continue to be studied for all underrepresented populations and males provide a comprehensive snapshot of the state of the profession. In-depth interviews with underrepresented groups in AEE are suggested to provide a richer understanding of individual experiences in the profession. Additional attrition data for underrepresented populations in postsecondary AEE careers should also be studied to establish a baseline for improving retention.

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Women in STEAM: Barriers to Advancement

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Abstract

When looking at administrative leadership positions in university academia as a whole, the numbers of women as Vice- Presidents, Presidents, Department Heads, etc. in agriculture and the sciences are deficient compared to other departments. Women are currently not represented in Science, Technology, Engineering, Agriculture, or Mathematics (STEAM) through leadership positions in the numbers that men are represented. In this qualitative study, women's experiences in male-dominated, agriculture-related sciences were reviewed and described, as well as compared to their male counterparts. Findings from this study indicate that there are common barriers preventing men and women from the chance to obtain upper-level leadership positions in male-dominated careers; however, it can be seen that females have additional barriers preventing their succession to leadership at the administrative level.

Introduction and Review of Literature

Over the last 30 years, society's view of women entering the workforce has drastically changed (Griffeth, 2013). Since World War II, the majority of females in the United States started entering into once male-dominated jobs (Fernandez, 2007). Comparatively, today in the 21st-century women now control 51% of the wealth, 73% of spending in the economy and make up 57% of the workforce (Charas, Griffeth, & Malik, 2015). Even though these statistics show women present in the workforce, women are still sorely underrepresented in upper-level management and administrative leadership positions (Northouse, 2016). Mejia (2017) recently calculated that only 6.4% of CEOs of Fortune 500 companies are women, and currently only 23% of Congress is represented by women (Kurtzleben, 2018).

This trend is prominent in Science, Technology, Engineering, Agriculture, and Mathematics (STEAM) as well. The acronym STEAM includes Science, Technology, Engineering, and Mathematics while incorporating aspects of agriculture (Taber, 2018). According to the United States Department of Education (2018), the skills that students learn in order to "solve problems, make sense of information, and…gather and evaluate evidence to make decisions", are all learned through interactions with STEAM fields (para. 1). Although enrollment of women in degree programs related to science, technology, engineering, and math has steadily increased (Perry, 2018), leadership positions in these fields continue to be male-dominated.

Out of 31 Secretaries of Agriculture in the United States, only one has ever been female (Former Secretaries, 2019). However, the United States Department of Agriculture reports that 31% of the workforce in agriculture is female (Hope & Korb, 2013). Additionally, according to the National Science Foundation, National Center for Science and Engineering Statistics (2012) 44% of all faculty positions in agriculture and the sciences at universities were held by women. However Griffeth (2013) discovered through the Association of Public Land-Grant Universities

database, only 6% of Deans of Colleges of Agriculture (Forestry Resources, etc.) were female. This information showcases the gap in leadership between the genders that exists in academia.

Women are constantly having to balance their competence and likability in their workplace competing against masculine energy (Griffeth, 2013). However, research shows that women are equally as effective leaders as men (Northhouse, 2016). Griffeth (2013) states that men tend to have a more hierarchical view of the world than women. Commonly male-dominated leadership can be comprised of "hegemonic ideologies of mostly white men to be perpetuated throughout workplace systems" (Griffeth, 2013, p. 20). Research has shown that contrary to popular belief, women do not lead more relationship oriented and less task oriented compared to men (Northouse, 2016). Burke and Collins (2001) found that women self-reportedly more often used contingent reward and transformational leadership techniques and styles, compared to men. Northouse (2016) noted that this use of a democratic form of leadership is an adaptive style in which females have found to produce a more positive reaction and attitude toward their role as a leader. Evidence of women's leadership ability leads one to think that there must be some other obstacle besides leadership capability hindering females from taking on leadership positions such as mentorship and sponsorship, work-life balance, and sexual bias.

Having a mentor or sponsor can play a significant role in the success of moving up the ladder in the workplace (Baumgarten, 2019). Cline, Rosson, and Weeks (2019) found that women felt a sense of isolation when there was not a formal mentor program available. Ragins (1996) states that when acquiring a mentor, the mentee usually makes the first move. However, women have more contrasting barriers to gaining a mentor compared to men (Ragins, 1996). This is because there is a lack of women in upper-level positions that can mentor, resulting in females most likely having to obtain and start a mentee/mentor relationship with the opposite sex, which can pose some gender-related awkwardness and issues (Ragins, 1996). The three barriers that women consider with opposite sex mentorship are 1.) sexual issues, 2.) sex-role expectations, and 3.) opportunities for meeting mentors (Ragins, 1996,). These issues surface because of stereotypical opinions of women actively pursuing matters from the opposite sex, as well as outsider and coworker opinions (Ragins, 1996). Not being able to obtain a mentor or sponsor is one of the many reasons that women opt out of applying for advancements and leadership roles (Barsh & Yee, 2011).

Baumgarten (2019) defines mentorship as having an individual who helps "facilitate a career vision, provide insight, as well as feedback to their mentees" (para. 2). Charas et al., (2015) believe that one of the reasons that women are not as successful as men in obtaining leadership positions is because they were not sponsored, rather over mentored and under sponsored. Mentorship does not always lead to positive outcomes for both parties involved (Charas et al., 2015). This can then translate over into sponsorship.

Baumgarten (2019) defines sponsorship as an individual having a protégée. A sponsor is someone invested in their protégée's "career success, network connections, and sponsors use their status to help their sponsored protégée gain promotions, pay increases, etc." (Baumgarten, 2019, para. 2). For men, obtaining a sponsor comes more naturally, because of the personality traits associated with sponsorship: power, assertiveness, control, self-promotion, non-empathetic,

while mentorship characteristics are more closely related to women: honesty, trust, focus less on personal gain, morality (Charas et al., 2015).

Today, the common practice of undervaluing women's leadership abilities in a workplace environment seems to be a pervasive trend (Griffeth, 2013). Societal norms have an influence on women's workplace participation around the world (Bierema, 2001). Many factors and stereotypes in today's society have contributed to different attitudes towards women in leadership positions (Griffeth, 2013). Research shows that there are some women who brush off workplace gender biases, even though their encounters prove the biases to be true (Demaiter & Adams, 2009). Demaiter and Adams (2009) also note that understanding gender structures can allow women to confront these issues and open the door for more favorable circumstances. Bierema (2001) states that "if women are to advance in organizations and promote systematic change truly, their learning efforts must address issues of power and oppression" (p. 60-61).

Jagacinski (1987) found another barrier for women to be that men, more often than women, reported they were more satisfied with their career advancement opportunities and salaries. Another barrier for women in the workplace is known as the "glass ceiling turned labyrinth" (Northouse, 2016, p. 398). The glass ceiling is an invisible obstacle that prevents women from making it to the top of a glass escalator, where upper-level leadership positions are (Northouse, 2016). However, Eagly and Carli (2007) noted some issues with the ceiling metaphor in that it makes the obstacle a flat line and the same for everyone, when in fact it is different for each person, calling it a labyrinth instead. Sheryl Sandburg, former Chief Operating Officer of Facebook, in her book *Lean In* (2016) compared the glass labyrinth to a jungle gym that many face, some conquer, but most struggle to navigate.

Jagacinski (1987), established in his research that both men and women obtained several similar career influencing factors when considering their college pathway and career choice. However, there were substantial differences in perceptions found between the genders when they were considering demographics, job status differentiation, and perceptions of career advancement opportunities (Jagacinski, 1987). Another reason for this could be that women hold a negative attitude about a career in math and science because most of the career choices are not considered to be family friendly or flexible (Frome, Alfred, Eccles, & Barber, 2006).

Over the last decade, Colleges of Agriculture have seen an increase in female enrollment by 75% (Laughton, 2019). Currently, 55% of undergraduate agricultural majors enrolled in the United States are women (Laughton, 2019). This research suggests that even though women are just as present in the STEAM field as men, they are underrepresented at all levels of higher leadership positions. Research shows that women seek elevation, higher pay and better opportunities just like men do, but the lack of role models, sponsors, and exclusion from specific communities prevent that from happening (Barsh & Yee, 2011). Frome et al., (2006) mentions that these rigid practices in male-dominated fields impede women from reaching their goals in their careers. Griffeth (2013) found that research analyzing women in administrative leadership positions in Colleges of Agriculture is almost non-existent and suggests that there is room to explore women in leadership roles and analyze what prepared them to partake in a higher level of leadership.

Purpose for Study

There has been research conducted over the last decade that provides evidence that having a more significant number of females in management and leadership positions is parallel with a higher quality of performance in an organization (Catalyst, 2013). However, the National Science Foundation, National Center for Science and Engineering Statistics (2012) published a report showcasing that females held 44% of faculty positions in academia in agriculture and the sciences, but Griffeth (2013) determined that out of the Deans of Colleges of Agriculture (Forestry Resources, etc.) from the Association of Public Land-Grant Universities directory, less than ten female deans of colleges of agriculture, out of 107 total. Therefore, the purpose of this study is to understand the barriers assessed experiences of females in leadership positions compared to men's experiences.

Cline et al., (2019) outlined female experiences as faculty in agriculturally-related fields. From this study, it was found that there were barriers and challenges for them in a male-dominated career field. As a result, this study aims to compare those experiences between the genders in leadership positions in the male-dominated, agriculture-related sciences of STEAM. The following research questions guided this study.

1.) What are the common barriers for females obtaining a leadership position in male-dominated, agriculture-related sciences?

2.) What are the experiences of men and women comparatively obtaining administrative leadership positions?

Theoretical Framework

According to Eagly and Karau (2002) females in elite leadership positions are a rare occurrence. For this study, Eagly and Karua's (2002) Role Congruity Theory was used as a theoretical framework. This theory towards women in leadership roles leads to two forms of prejudice: (a) women are perceived as less favorable in leadership roles than men and (b) leadership traits are more closely associated to masculine traits, therefore these are off-putting characteristics when enacted by women. The theory indicates that prejudice depends on the amount of incongruity between females and leadership roles (Garcia-Retamero & Lopez-Zafra, 2006). It also states that this incongruity would be higher in male-dominated organizations (Garcia-Retamero & Lopez-Zafra, 2006). Whisenant, Lee, and Dees (2015) note that this prejudice puts women at a disadvantage for obtaining leadership roles in male-dominated, agriculture-related sciences.

According to Deaux & Lewis (1983, 1984) and Eckes (1994) there are differences in traits associated with the genders. Moreover, masculine and feminine traits often oppose each other. There are instances in which masculine traits are more closely aligned with leadership ability, as well as obtaining sponsors (Baumgarten, 2019). Whereas, many of the feminine traits are off-putting when associated with leadership ability (Eagly & Karau, 2002). Figure 1 provides a list of stereotypical masculine and feminine traits associated with the genders.

Traditional Gender Stereotype Traits

Feminine	Masculine
Affectionate	*Aggressive*
Helpful	*Ambitious*
Kind	*Dominant*
Sympathetic	*Forceful*
Interpersonally	*Independent*
Sensitive	*Self-Sufficient*
Nurturant	*Self-Confident*
Gentle	*Prone to act as a leader*

Figure 1. Stereotypical masculine and feminine traits associated with the genders. (Deaux & Lewis, 1983, 1984; Eckes, 1994)

Methods and Procedures

Interviews were held to describe participants' beliefs, opinions, and feelings about the process of obtaining administrative leadership positions within STEAM fields (Ary, Jacobs, & Sorensen, 2009). Through these interviews, the goal was to obtain male and female leadership perspectives and opinions on barriers and experiences faced when obtaining administrative leadership positions in male-dominated career fields (Ary et al., 2009). These interviews were partially structured and each individual was asked the same set of questions, with the interviewer modifying the format of the questions to fit the individual's answers (Ary et al., 2009). During the semi-structured interview process, the same questions were asked to each interviewee in a consistent order, however the interviewer is encouraged to probe and digress during the interview to flesh out additional data (Lune & Berg, 2017). While interviewing participants, the primary researcher took notes to use during interview transcription and data analysis. This method of triangulation was chosen in order to increase validity and reliability of the data collected (Fraenkel, Wallen, & Hyun, 2015). Moreover, this procedure provides a much more detailed account of a person's experiences than they would have provided through structured interview questions (Lune & Berg, 2017).

Interview questions were centered around four main themes identified as common barriers to women in STEAM fields, (a) contributors to a positive work environment (b) contributions to a toxic work environment (c) mentoring in the profession and (d) work-life integration (Cline et al., 2019). Interview questions were reviewed by an expert in qualitative research to ensure they were not double-barreled (Litwak, 1956). Also, since the researchers were both collecting and analyzing the data, along with being female, there was a chance for researcher bias (Miles, &

Huberman, 1994). To validate this study, participants member checked the synthesized analyzed data in order to ensure they were represented correctly and to check for bias in the study (Birt, Scott, Cavers, Campbell, & Walter, 2016) In addition, approval from the University Institutional Review Board was obtained prior to the beginning of this study.

Sample

Per recommendations from Cline et al., (2019), both male and female experiences were investigated to "provide both a comparative and holistic snapshot of the state of the profession" (para. 39) and understand individual experiences more in depth in STEAM fields. Inclusion criteria for the study consisted of those in administrative leadership positions in Science, Technology, Engineering, Agriculture, and Mathematics at Mississippi State University (MSU).

Due to the close proximity and convenience of MSU, all individuals interviewed were employees of the University. Cresswell (2014) notes that because the entire population is not represented, results cannot be generalized beyond this study due to the nature of it only describing one institutions administrative culture in STEAM. Participants were identified using the University directory and singling out departments related to Science, Technology, Engineering, Agriculture, and Mathematics by the researchers. From there, individuals in each department were categorized by having administrative leadership positions. Five males and five females were contacted for interviews. All ten individuals responded and were interviewed. Females were coded as F (1-5) and males were coded as M (1-5). All individuals were recruited via email by the researchers.

Data Analysis

To capture the participants' responses for transcription, an audio recorder was used (Fraenkel, Wallen, & Hyun, 2015). Interviews were then transcribed using software that reduced the speed of the audio for an accurate transcription. Then, three researchers reviewed the transcripts individually and identified themes through a constant comparative analysis (Creswell, 2014). This was used to outline the themes that the interviews contained (Glaser, 1965). Themes were integrated based on their similarities, then delimited, assessed, reintegrated, and finalized (Glaser, 1965). Then, as a group, all three researchers met and discussed the common themes provided throughout the individual interviews (Fraenkel et al., 2015). Researchers found and agreed upon five themes for research question one and five themes for research question two.

Findings

The interviewees ($N = 10$) for this study were 50/50 male and female. Four Associate Deans, one Dean, two Lab Directors, and three Department Heads in STEAM were interviewed for this study. For this study, it should be noted that in the Mississippi State University College of Agriculture and Life Sciences, instructors and lecturers were majority female around 60- 80%, with the remainder being male. Looking at assistant professors, the ratio of male to female was 50/50, and from associate to full professor the numbers flip to being 60-80% male. Females participating in this study had a combined 66 years of experience at the participating university while males had a combined 73 years of experiences at the participating university. One of the

males, F5, was in a leadership position not directly related to STEAM, however they previously came from a STEAM-related faculty position.

Research Question One - "What Are the Common Barriers for Females Obtaining a Leadership Position in Male-Dominated Agriculture-Related Sciences?"

Six themes emerged when answering research question one. All females interviewed in this study experienced some type of sexual bias, while several males, though they had not experienced it, had witnessed it. There were also several instances of women bullying other women, and evidence that there was a lack of support for them entering into STEAM fields.

Theme #1: Women experience sexual bias among other barriers. Both men and women did suffer from barriers, however it was apparent that the number of barriers that females faced was greater than their male counterparts. Both M3 and M4 stated that they could not recognize any hindering barriers to obtaining their administrative leadership positions while F1, F2, F4, and F5 all noted several additional barriers in addition to sexual bias. F2 noted that she felt like she had to work harder than her male counterparts to be half as successful, while F4 described an instance where her height was commented on saying "there was [an] Associate Dean who said we will have to make a rule to say I can't wear heels. You know I think he was joking, but he still wasn't joking".

None of the men participating in this study had ever faced any type of sexual bias, however two of them noted that they had been a witness to it happening to women in the past (M4, M3). Females F1-F5 had all encountered some type of sexual bias with F1 stating "I was told that one of the reasons I got the position was because I'm a woman" , while F2 said, "Yes, there have been cases I have [been in] where I have been told that I could not do something because I was a woman and people stood in the way of professions sometimes because of that". Additionally, F3 recounted

> The main thing I guess was at [a previous university] when I started out I was not married. I got married a few [years] in, had three kids, got tenure with no trouble. By the time I was up for promotion for professor I did have an issue and so I went up once and I did not get it. I went back and they said these are the things you need to do so the next year they said oh well now you need to do these things so I realized they were going to move the bar every time because they didn't like me basically.

Furthermore, Interviewees F4 and F5 included respectively

> We went to the keynotes speaker address at a conference one time, he put a cartoon image of a man in a suit with a lady on his lap in a bikini. It said something along the lines of you can have office hours like this too. So, I got up and left and have never actually been back to that conference.
>
> [My PhD advisor] would do everything for the male students and made it really challenging for me. She came right out and said that women had to work that

> much harder, be that much stronger, so she treated me that way. And then the person I reported it to, worked really hard on her programs but she did it to lots of women where she would act like a great mentor, and then the minute you started getting recognized she would get real damaging.

Alternatively, male interviewee, M2, was quoted as saying "No I don't think I have faced sexual bias or discrimination, but there have been situations where there was a distrust of me because I was a male", and M3 stating "Not against me personally but I've seen it unfortunately with colleagues or peers but I have never felt that way", along with M4 noting "No I don't think that I have [witnessed sexual bias]".

Theme #2: Women bully other women. It was noted many times that women did not feel supported by their female colleagues. F1 stated that women can be very cut throat and harsh with one another. She noted that she feels as though this does all women a disservice. F2, also reiterated that it was mostly females she had been criticized by and not males.

> Honestly my biggest supporters have usually been men and my biggest opponents have usually been women unfortunately. I have noticed that the women do not support, they selectively support each other. And if you excel then it tends to be more like a jealousy type thing that occurs, I feel, and so it becomes a real difficult environment at times (F2).

When asked if the interviewees thought women were more critical of women, F4 stated "yes I do feel that way. I don't know why and that eats me up. I feel that not with all of them but several of them, they're always taking my accomplishments and comparing them to theirs you know". F4 also had an instance where she was mentoring a male colleague who was experiencing females bullying him. Similarly, F5 supported that statement by saying "I hate saying this but yes, [women are more critical of women than men are critical of women]. Women who don't support women I think are really horrible people".

Theme #3: Men almost always had sponsors who helped them obtain their leadership position whereas both groups usually had mentors. Mentors and sponsors were both needed to obtain a leadership position, however sponsors seemed to have more of a positive effect. To clarify, Baumgarten (2019) notes that a mentor is someone to seek advice and council from, whereas a sponsor is an individual who helps network and uses their position to help elevate others. How each group obtained mentors was common in that the most beneficial mentor relationships came about naturally (F1, F2, F4, F5, M1, M2, M3, M5).

When deciding on whether to obtain a leadership role, M2, M3, and M4 stated that their position had been an open invitation set up by what Baumgarten (2019) classifies as their sponsors. M5 stated "I think...I was invited and I saw it as an opportunity to help the lady who invited me". While M3 said "I ended up with some leadership training opportunities [presented by my sponsor]. It was kind of laid in front of me so I kind of took advantage of it". M5 responded, when asked if they sponsored anyone, by stating " I do. We sometimes meet for drinks or coffee", whereas when asked if they sponsored any women they stated "I feel weird that my wife would not be comfortable with me going out with another successful female".

Theme #4: A lack of support for women engaging in the STEAM fields. Several females noted that they had never considered pursuing careers in STEAM due to the lack of encouragement they encountered. F1 stated "I think that the issues that women face are very different than the issues that men face. I think a lot of support systems are designed to support men's issues". F2 experienced being told that "I can't do math, because that is the message I heard all through growing up". F3 mentioned when she first started working as a faculty member

> there was nothing that talked about race equity [referring to policy] or women. Women in some departments that had a child during the semester either had to pay their own replacement or in one case come back to work on a Monday after having the baby on a Friday. It was pretty bad, and the salary gaps were there.

Men, however, never once questioned what field to go into. When asked why they chose STEAM, M2 stated "I love technology and I love accomplishing things at an individual level", while M3 said "I took an intro class and then realized you can get a degree in that so I switched". There was never a question if they could obtain a career in a STEAM-related field.

Theme #5: A lack of female role models in leadership positions in STEAM-related fields. Males pointed out that they had male role models in their previous or equivalent positions, whereas females did not. One of the interview questions specifically asked if the individual in the position before them was a male or female. Nine out of ten individuals indicated males had been in their position before they were hired. (F1, F3, F4, F5, M1, M2, M3, M4). F2 was the first person in her position and M5's position had been previously occupied by a female. Also, F1, F2, F3, F4, F5, M1, M2, M4, and M5, all had male mentors throughout their career. All of the women in this study never once mentioned a female role model. However, M1, M3, M4, all participants mentioned having male role models.

Research Question Two -"What Are the Experiences of Men and Women Comparatively Obtaining Leadership Positions?"

For research question two, five themes emerged. Themes such as an unhealthy work-life balance, discrimination in many different forms, and instances of being over looked as the point of authority were discovered. There were similarities and differences between men's and women's experiences.

Theme #1: Reasons for obtaining a leadership position varied. There were patterns between the participants' answers regarding their motivation for obtaining their current position, however females constantly referenced extrinsic motivation when it came to leadership compared to men. In the male responses a more intrinsic motivation surfaced (M1, M2, M3, M4, M5), whereas females mentioned selfless agendas multiple times, as well as, giving back to a group.

F1 stated "I had worked with them and there were some issues I thought I could address. That's why I really did it. I loved that I could make a difference, so I was willing to do it", while F2 stated "I like mentoring and motivating people that I work with". M2 said " I have always been somewhat of a malcontent in terms of not being satisfied with the status quo", and M4 saying "I

have always felt I've had a decent understanding of things beyond just my very narrow niche role in the department".

In addition, male answers centered around their personal skills that could be contributions to an organization. M5 stated " I think handling business on my end put me in the position to be considered", along with M4 saying " I am really good at organizing, I think I have a broad perspective on things, I understand how bureaucratic structures work, and so there were skill sets I thought I had".

Theme #2: Work-Life balance. For many of the participants, there was no such thing as work-life balance. F1 was quoted saying "I have a terrible work-life balance", while F2 pointed out "There is no healthy work-life balance for me unfortunately". Additionally, F3 and M4 both used the term "workaholic" to explain their working style. M2 and M3 both noted that they worked well over the 40 hours required of them every week by M2 stating "I have always tended over my whole career to work 12-hour days and it robbed me of a lot of enjoyment of my children", while M3 said "a 40-hour work week isn't a normal week but a 60-hour week is". Interestingly, F4 noted that work-life balance was "Not an issue for me because I was always very upfront with everyone that family came first. You know I'd do everything I could to ensure to not impact my job but if my family needed me that's where I needed to go".

Theme #3: Overlooked as the point of authority. Both males and females claimed to have been overlooked as the point of authority at some point or another. F1, M3, and M4, all stated that they had not experienced this while F2, F3, F4, F5, M1, M2, and M5 had all faced this at some point. The reasoning however were very different between the participants. F2 states that she has difficulty with students sometimes not respecting her position. F4 noted "Nearly all the time. Very frequently do faculty go right over me and to the [Dean], or right over both of us to someone else." While M5 stated "Yes. Sometimes the managers would go and do what they wanted. And if they felt like they would get an answer that was something other than what they wanted, they would skip around me and try and go right to the [Dean]". F4, F5, M1, M3, and M5 all noted that faculty and staff would sometimes overlook them as the point of authority. Additionally, M5 noted that he felt very disrespected when that higher authority did not send those individuals back to him, while F4 noted that her superior did and was very appreciative.

Theme #4: Discrimination. Both sets of participants had faced some sort of discrimination that was displayed in many forms. F2 suffered from age discrimination saying " I shortlisted at one of the top tier schools for a faculty position when I finished my Ph. D. and I was told that the faculty felt that I should have already been a professor by now because of my age". F3 and F4 both experienced discrimination due to their concentration in their field of study. M1 stated he had faced this by saying "It has been a struggle given where I got my Ph. D. and the fact I was at a southern school".

Theme #5: Similarities in leadership style. When asked if the participants saw differences in the way that they lead from their male/female counterpart and if so was it due to gender, many of them stated that they did not see gender as a factor in the way that they led. F1 stated this by saying "I would say some are similar and some are very different. I think it had a lot to do with the organizations that they are in." F2 said "I have seen men successfully run and

be in leadership roles and do things very similarly to what I am doing, and I pattern myself after that." M1 stated “I think there is a lot of overlap between the genders”, and M4 was quoted saying “I don't know if there is a gender difference in our leadership styles”.

However, F4 says that women can be more open stating “The openness I think is gender-related…women share too much. In general, women are more direct than men”. It can be noted that it was off putting for both genders when a female tried to replicate masculine traits in their leadership styles. F2 stated "Yeah I once had a woman tell me in a meeting that if I wanted to be successful I needed to not ever cry and [I needed to] act like a man". Additionally, M2 remarked.

> the winning through intimidation thing is just not a healthy way to go and unfortunately for women in traditionally male fields they tend to feel that they go to the extreme of trying to be a man and their view of what a man is can be very dictatorial and very arrogant...and they go to the other extreme instead of just being and owning that they are a woman.

Conclusions and Recommendations

Over the last several years the lack of females in leadership positions has become a popular topic in the media. With 44% of faculty positions in colleges of agriculture and the sciences being female, and only 6% of Deans of these colleges being women, the need for research in this area is apparent (Griffeth, 2013). When identifying the common barriers for females obtaining leadership positions in male-dominated agriculture-related sciences and comparing the experiences of men and women obtaining leadership positions, it is evident that men and women have different leadership experiences, while also sharing some similarities at the same time.

Females in this study had faced discrimination through societal norms, but contrary to Bierema’s (2001) study that claims societal norms dictate women’s workplace participation, these individuals pursued male-dominated careers. Griffeth (2013) noted that men have a more hierarchical view of the world than women do, which is evident in theme #1 from research question #2 that stated the *reasons for obtaining a leadership position varied*. For example, many of the men looked to themselves when questioning why they obtained a leadership role, whereas females looked at helping the group as a whole.

In theme #5 of research question #1, *a lack of female role models in leadership positions in STEAM-related fields*, it was noted that nine out of the ten previous leaders had been male. According to Ragins (1996), this can be seen as a barrier to women seeking mentors and sponsors due to there being a lack of women in these positions. This results in barriers on its own with Ragins (1996) study stating that there are barriers in mentoring with the opposite sex. This can be exemplified by M5’s response when asked if they sponsored any one they stated “ I do. We sometimes meet for drinks or coffee”, whereas when asked if they sponsored any woman in the same way they do men, they stated “I feel weird that my wife would not be comfortable with me going out with another successful female”.

Frome et al., (2006) stated that women held a negative attitude about pursuing careers in STEAM-related fields because they were not family friendly. Several females in this study were

able to get married and have children, while others did not. However, all five women continued to pursue careers in STEAM. Moreover, in research question #1, theme #5, *A lack of support for women engaging in the STEAM fields*, there were notes of negative connotations about STEAM-related fields because they were always told that girls could not do math or science.

Additionally, Barsh and Yee (2011) noted that even though women seek better opportunities, they suffer from exclusion from specific communities preventing that from occurring. In this study, this is evident through the women's lack of sponsorship compared to men's. None of the women interviewed ever mentioned having a sponsor fitting Baumgarten's (2019) definition. However, M1 did note experiencing discrimination for having a degree from a certain institution.

In Eagly and Kaura's (2002) Role Congruity Theory they explained that there were two forms of prejudice against women. The first form of prejudice was that women are perceived as less favorable in leadership roles than men by society. The second prejudice was that leadership traits are more closely associated to masculine traits; therefore, these are off-putting characteristics when enacted by women (Eagly & Kaura, 2002).

Overall, contrary to Eagly and Kaura's (2002) theory, when both genders were asked if they were ever overlooked as the point of authority, there were mixed answers of both yes and no from both men and women. It was noted that this was a sign of blatant disrespect by the participants. When asked if they were accepted by their peers and administrators, the acceptance did not depend on their gender, but rather if they were internal or external to their department.

When considering the leadership traits of men and women, more specifically off-putting characteristics by females, the resulting answers more closely aligned with the Role Congruity Theory (Eagly & Kaura, 2002). F4 referenced women's tendency to be more open and M2 noted

> the winning through intimidation thing is just not a healthy way to go and unfortunately for women in traditionally male fields they tend to feel that they go to the extreme of trying to be a man and their view of what a man is can be very dictatorial and very arrogant...and they go to the other extreme instead of just being and owning that they are a woman.

The findings of this study indicate that while men and women share similar ideas about what it means to be a leader, there are differences in their motivations for obtaining leadership positions. Moreover, each person interviewed in this study followed a different path that led them to the position they are in today. Due to the small sample size of participants in this study, it is recommended that both qualitative and quantitative data continues to be collected pertaining to men's and women's roles in academia and STEAM-related fields. Additionally, research should be conducted to get a better understanding as to why women are not supportive of other women.

Lastly, it is recommended that women currently in leadership positions identify, and reach out to women striving to obtain leadership roles as mentors and sponsors. Moreover, females should start seeking out sponsor relationships, rather than just having mentor relationships. It is also recommended that Universities offer leadership development trainings that help females gain the tools and to navigate the "glass labyrinth" in their STEAM-related fields (Northouse, 2016).

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Home Demonstration Work in North Carolina: Leading the Way for Rural Women

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Abstract

Canning and home demonstration clubs played an important role in improving agriculture and home life shortly after the turn of the 20th century. Organized in their local communities, these clubs for young girls and their mothers provided the opportunity for females to engage in experiential learning through the growth and canning of vegetables. Club work and activities allowed the involved individuals to learn important concepts to improve their home life including more nutritious meals, record keeping, maintaining the family garden, and other work surrounding the home. In addition, the work of these clubs allowed for cooperation among various groups, fostered friendships, and provided opportunities for farm women to earn a profit. Movements such as these increased the demand for agricultural and extension education and many of the strategies developed through these clubs can be implemented in both formal and non-formal education today.

Introduction

Throughout agricultural and extension education many professionals are aware of the concept of demonstration work founded by Seaman Knapp. Yet, many of these professionals may not know the impact that Dr. Knapp's work had on the development and improvement of the farm home through young girls and women. Even those who are aware of girls' and home demonstration clubs, some may find it difficult to provide information on the purposes and benefits that they provided to women in the early 1900s.

Starting with the creation of boys' corn clubs, the girls were eager to get involved or to start their own organizations. In 1910, the formation of a club for girls began through the growing and canning of tomatoes. The organizations were under the supervision of a local leader which assisted the young girls throughout the whole process of producing, canning, and marketing the tomatoes (Martin, 1921). This experiential learning method greatly impacted these young girls by allowing them to improve their agricultural knowledge, as well as many other life skills (Trace, 2014).

The benefits of these clubs were far reaching, soon allowing their mothers and other community members to become involved in the work. The increasing participation of rural women demanded that a separate club be created, resulting in home demonstration clubs (Cline, 1936; Martin, 1921). Those involved in the work of the clubs reaped many benefits including the creation of friendships, improvements of the farm home, and increases in the cash available to the families involved (McKimmon, 1945).

While often in the background of boys' corn clubs, there are several reasons why professionals in agricultural and extension education should have an in-depth understanding of the work and

development of girls' and home demonstration clubs. Understanding the work that those before us have encountered can provide a greater appreciation for the evolution and development of the agricultural industry, as well as agricultural and extension education. A better understanding of the work of these organizations will provide greater insight into the pedagogy surrounding the work of these clubs. Many of the techniques and pragmatic learning that were used throughout these clubs serve as the founding techniques implemented today through agricultural and extension education.

Purpose and Objectives

The primary purpose of this historical research study was to document the creation and establishment of home demonstration clubs in North Carolina, focusing on the work of Jane McKimmon and how the organization of these clubs advanced the livelihoods of farm women throughout the state. Historical research studies play an integral part for interpreting events that have occurred in the past and their influence on current developments (Rury, 2006). The historian systematically and objectively finds, analyzes, and explains evidence from which we can learn about events that have occurred in the past (Ary, Jacobs, & Razavieh, 1985). While familiar with the overall concept behind home demonstration clubs, few are aware of the tremendous impacts these clubs played on the advancement of the lives of farm women and how they specifically operated. This is mainly due to the fact that the history and the role home demonstration clubs played in the past has largely gone unnoticed by professionals in agricultural and extension education with more attention focused on other historical extension efforts.

Along with the primary purpose and objectives of this study was an attempt to bring an understanding and awareness of the canning and home demonstration clubs that occurred in the past and how they have impacted the current state of the Cooperative Extension Service today. In order to facilitate the primary purpose of the research, specific objectives for the study were created:

1. Explore why and how girls' canning clubs and home demonstration clubs were created.
2. Describe Seaman Knapp and Jane McKimmon and how they played an essential role in advancing the work of the clubs.
3. Identify the effects that canning and home demonstration clubs had on the lives of women and girls, and how they improved the lives of rural individuals.
4. Examine the impact that these clubs had on past generations and how they relate to the advancement and current state of agricultural and extension education today.

Methodology and Procedures

Historical research methods were used for this study involving the systematic search for documents and other sources that contain facts relating to the questions that the historian has about previous events (Borg & Gall, 1983). Based on the information gathered, the historian draws conclusions regarding the past to increase our knowledge of why and how these events occurred and the process of how past events lead to the present (Ary, Jacobs, & Razavieh, 1985). The historian examines artifacts, documents, and archived sources in order to gain an

understanding of the events that have occurred in previous times. After examination, the researcher interprets and analyzes the information studied, allowing inferences to be made regarding the person, place, or event (Fraenkel & Wallen, 2006). This historical research study used primary sources of information such as personal correspondence, manuscripts, books, extension publications, and data collected by state and federal agencies that are involved in agricultural and extension education. All of the primary sources involved the work of Seaman Knapp, Jane McKimmon, girls' clubs, home demonstration clubs, why they were needed, and their impacts. Secondary sources included journal articles, books, and other information available through institutions. The secondary sources were compared to the primary sources to determine their accuracy.

All sources were subject to both internal and external criticism. Internal criticism allows the researcher to ensure that the contents of the documents chosen for the research are accurate with both the information contained and the truthfulness of the author. External criticism refers to the genuineness of the documents used and makes sure that they were prepared by the proposed author. External criticism also refers to an examination of the purpose of a document, when it was created, where it was written, and the versions of the specific documentation to ensure genuine materials are selected and used for the research (Fraenkel & Wallen, 2006). Internal criticism was determined by examining the accuracy and truthfulness of the information presented by triangulation or comparing the work to other archived resources. External criticism was also taken into account with the help of North Carolina State University librarians to ensure that original documents were selected and used for the research study. Many of the sources used in this paper were archived in the North Carolina State University Libraries Special Collections Research Center. These materials are accessible to the public, however, individuals wishing to conduct research must request the documents in advance. All items must be viewed in the Special Collections Research Center Reading Room.

While it is difficult to assign a particular research priority to this historical research, Research Priority 6: Vibrant, Resilient Communities as defined in the AAAE Research Agenda is applicable (Graham, Arnold, & Jayaratne, 2016). This research priority certainly pertains to the impact home demonstration work had on rural communities through agricultural and home-life education for young girls and women. Today, extension continues to strive to meet the needs of communities and families. Home demonstration work and home-life education look quite different than in the early 1900s, but the overall goals are still the same, focusing on building vibrant, resilient communities.

The Father of Demonstration Work

Seaman A. Knapp, commonly referred to as the "Father of Extension" is known as the founder of the Farmers' Co-operative Demonstration Work. He was a strong proponent in the benefits of adult education in agriculture, starting first with farmers, and eventually leading to their wives, sons, and their daughters (Martin, 1921). Dr. Knapp once said, "You may doubt what you hear; you may even doubt what you see; but you cannot doubt what you hear, see, and are permitted to do for yourself" (McKimmon, 1945, p. v). Seaman Knapp firmly believed in the work of demonstration farms so that farmers could be taught how to maximize the output on their operations. The movement in farm demonstration work began in Texas in the early 1900s with

the outbreak of the boll weevil. Interest in the work of demonstration farms began to spread throughout many states in the south. By 1907, Mississippi, Alabama, Virginia, North Carolina, South Carolina, and Florida were experiencing the benefits of these farms. Farmers taking part in this work were able to learn the importance of diversifying their farming operations and the family's food supply. After encountering some resistance from farmers to buy and settle, Dr. Knapp resorted to farm demonstration work to prove that there was fertile soil and that farming could be profitable. Dr. Knapp was able to subsidize a few good farmers in Louisiana to demonstrate good farming methods and to prove that the soil in these areas would make them a profit (Martin, 1921). The power of his demonstration work allowed Dr. Knapp to be appointed at the head of the U.S. Bureau of Plant Industry in 1902 to assist with getting research to farmers so they might accept the information and put it to use on their own farms. Dr. Knapp passed away at the age of seventy-seven (77) just as the work he had started with farm demonstrations was coming to fruition (Cline, 1936; McKimmon, 1945).

Not only was Dr. Knapp interested in adult education, but a portion of his work was spent through boys' corn clubs and later the girls' canning clubs, directly resulting from his work with farm demonstrations. Boys were required to plant one acre of corn and to keep a record of costs and the yields produced. The incorporation of the boys into these clubs allowed them to learn important methods to use throughout their family's farming operation in order to improve productivity (Cline, 1936). Through Dr. Knapp's demonstration work, momentum increased over the years and in 1906, an agreement with the General Education Board was created to finance the work of Knapp in the states that had not yet been impacted by the boll weevil (Martin, 1921).

The success of the corn clubs caused many of the farmer's daughters to gain an interest in joining the work of the boys' corn clubs. Seaman Knapp was encouraged by the eagerness of the girls to become involved in the club work and was adamant about helping to minimize the drudgery and monotonous work around the home. According to Knapp, "If much can be done for boys interest and instruct them in their life work, more can be done for the girls" (McKimmon, 1945, p. 2). Knapp was able to see the need of the girls and discussed this with his assistant O.B. Martin. The early stages of the work with girls clubs started in 1909 when Mr. Martin addressed the South Carolina School Improvement Association. Marie Comer was the first to carry out the work of girls' clubs, and was met by great excitement from rural farm girls (Martin, 1921).

With the involvement of the girls picking up speed, Knapp decided it was time to hire a home demonstration agent. Dr. Knapp's request to hire a home demonstration agent was met with criticism from Secretary of Agriculture Wilson. However, in 1913, during discussions of the Smith-Lever Bill, Congress expressed concerns that the farm women should also receive the benefits of this act. In 1914, the act passed both houses and was the first time that the Federal Government was willing to help farm women solve their problems and lessen heavy burdens (Martin, 1921; McKimmon, 1945).

The Involvement of Rural Farm Girls

North Carolina was one of the five pioneer states in the organization of home demonstration work for girls and women who lived on farms in the southern United States. At the beginning of the 1900s there was not much cash in the North Carolina farm home. After the implementation

of the boys' corn clubs, many of the farm girls saw and observed their brothers making money from their corn plots and having fun along with it. These farm girls wanted the same luxuries as their male counterparts and could not understand why they were not given the same opportunities. The persistence of the girls to be able to join the corn clubs and the eagerness for the mother and fathers to get involved with the work allowed Dr. Knapp to create a solution that would allow girls to come together and be successful as well (Home Demonstration - Past, 1929).

With the help of O.B. Martin, as mentioned previously, they came to the conclusion that growing a garden and canning the vegetables would be the best solution to help farm girls learn new skills and techniques to further advance the farm home. Mr. Martin agreed to start the gardening and canning plan in his home state of South Carolina. In 1909, at a meeting with South Carolina teachers, Mr. Martin presented a plan to involve the girls in growing and canning tomatoes. The plan was adopted and Marie Cromer, a teacher and organizer for the South Carolina School Improvement Association decided to try this project out with her students (Martin, 1921; McKimmon, n.d.)

In the spring of 1910, Marie Cromer spent many afternoons and Saturdays writing letters and visiting girls throughout Aiken County, South Carolina to gather their thoughts on the plan. Forty-seven girls in the county decided to organize a club and each grew one-tenth of an acre of tomatoes (True, 1928). Through the work of the county superintendent, the corn club agent, and the U.S. office of Farmers' Co-operative Demonstration Work, information, letters, and bulletins were created and distributed to provide guidance on planting and cultivating tomatoes. In 1910, equipment for canning was shipped from the Department of Agriculture in Washington, D.C. The girls who had participated in the club were able to see demonstrations and were taught the right methods of canning tomatoes in Aiken, South Carolina (McKimmon, 1945; True, 1928).

The first year of growing and canning tomatoes in South Carolina brought along many difficulties for those that were involved. However, this was the first time that farm girls were able to work together to produce a product that could be marketed to the public. The pioneering work of Marie Comer and the girls involved proved that the growing and canning of vegetables would be a viable option for farm girls to gain a sense of belonging, learn new techniques to improve the home, and create friendships with those that shared similar interests as themselves (Hoffschwelle, 1998). The benefits of allowing girls to come together and create a marketable product helped other states to implement these types of programs as well. After the implementation of the program in South Carolina; Virginia, Mississippi, Tennessee, North Carolina, Alabama, and Georgia soon began their own programs for farm girls, benefitting homes and communities (McKimmon, 1945).

The First Home Demonstration Agent in North Carolina

Jane S. McKimmon was a pioneer in home demonstration work in North Carolina, and one of only five workers in the United States in the early 1900s. She was the only one of these five workers who remained continuously in home demonstration work from 1911 until her retirement in 1937 (Early Work, n.d.). Mrs. McKimmon attended State College and obtained her Bachelor

of Science degree in 1926 and her Master of Science degree in 1929. In 1934, she received her Honorary Doctor of Laws degree from the University of North Carolina (Who's Who, n.d.).

Mrs. McKimmon had a great reputation and knowledge of agriculture. Before being offered the position of home demonstration agent, McKimmon was the director of women's institutes from 1908-1911. Through her work with the women's institutes, she was able to understand the importance that demonstrations play on the lives of rural women by teaching them how to cook, sew and improve the home. Shortly after discovering the success of the girls' work in South Carolina, I.O. Schaub, who was in charge of organizing the boys' corn club work in North Carolina, accepted the offer of the General Education Board in cooperation with the State College for the organization of girls' work (McKimmon, 1945). With the creation of this new work in the state, Mr. Schaub reached out to Jane McKimmon to see if she would be interested in organizing and supervising the garden and canning clubs. In 1911, she became the State Home Demonstration Agent for North Carolina, opening up the doors for her to improve the lives of countless women and families (Harrill, 1939).

Mrs. McKimmon helped home demonstration work grow from 416 white farm girls in 14 counties to a membership of 59,826 Caucasian and African American farm women and girls in 1936 (Home Demonstration Work, 1911-1936). In addition to the success that Jane McKimmon had over the years through home demonstration work and the agricultural extension service, she was the first woman in the United States to be awarded the "Distinguished Service Ruby" by the National Epsilon Sigma Phi honorary fraternity of the United States Agricultural Extension Service (Who's Who, n.d.).

Throughout her work as a home demonstration agent, Mrs. McKimmon was deeply concerned with the life among rural farm women and girls. After assuming the role of State Home Demonstration Agent, she launched a program of activities that helped to relieve these women from their drudgery. Mrs. McKimmon took it upon herself to examine the commercialization of packing and marketing the vegetables grown (Mckimmon, 1945). As a result of her hard work and dedication to improving the lives of women in rural areas, North Carolina home demonstration clubs were the first in the country to put products from these clubs on the market. The development of this program soon expanded into a general gardening and canning program. With the help of McKimmon, a special brand name and standard requirements were created to ensure quality products were produced from the demonstration clubs (Martin, 1921). Through the establishment of an expanded home demonstration program for women, the lives of rural women, girls and their families benefited from the work. These programs helped women and girls of rural families learn the importance of proper sanitation and food preservation techniques, and a multitude of home improvements were able to be made, including water systems, lighting, restrooms, and other home conveniences (A Sketch of Mrs. Jane S. McKimmon, 1911-1921).

Mrs. McKimmon was one of the founders of the State Home Economics Association, and served a large role in getting a Department of Agriculture and Home Economics into the North Carolina Teacher's Assembly (A Sketch of Jane S. McKimmon, 1911-1921). Not only did the work and programming of Mrs. McKimmon improve the living conditions of rural families, but through the work of the home demonstration clubs, many young women were able to afford and attend college. These programs served the need to develop intelligent, happy, and productive citizens all

while helping to foster community development toward social, educational, and economic improvement (McKimmon, 1945).

Early Home Demonstration Work in North Carolina

Among the first counties to organize home demonstration work in North Carolina were Alamance, Catawba, Edgecombe, Moore, Pitt, Wake, Wayne, and Wilkes. All of these counties had placed their new home demonstration agents by the spring of 1912. The involvement in the work of these home demonstration clubs were very popular after their creation in the early 1900s. In order to maintain the growth and advancement of home demonstration work in North Carolina, the state decided to keep the number of organized counties at 14 for the first two years. This allowed for plans and programs to be outlined and for several girls and other volunteer women leaders to be trained to assist others with the work (Home Demonstration Work, 1911-1936; McKimmon, 1945). These women that were selected to become home agents were educated and experienced in the areas she was asked to teach such as a gardener, orchardist, and a farmer while also excelling in the areas of cooking, sewing, and planning (Martin, 1921). Many of these selected agents were school teachers, allowing them to supervise the work of girls' home demonstration work. The agents selected were familiar with all areas of farm life and they were held on a high plane from the very beginning of their work. These agents had to take part in physical labor and were required to have a love for bettering the lives of others in their communities (Martin, 1921; The Home Demonstration Agent, 1940-1954).

Through the first years of organizing the home demonstration clubs, many of the rural women involved in the clubs received criticism and distrust of the work they were involved with. However, shortly after starting the canning work, many of the county commissioners who had questioned the risk of spending $75.00 per year of the counties money were in agreeance that a full time home demonstration agent should be hired to progress the work of these rural females (McKimmon, n.d., 1945). The creation and development of marketed canned products which were intended for projects for the young farm girls, started to get the appeal of their mothers as well, creating a mother-daughter partnership. This was monumental with the adult education movement for farm women which grew to reach at least 60,000 farm families in 1936. The canned products produced were marketed with state institutions, hotels, and individuals. Those who bought these products were impressed with the quality, continually bringing the clubs more business (Home Demonstration Work, 1911-1936).

Impacts and Benefits to Women in Agriculture

In 1914, 32 counties were engaged in home demonstration work for women. With the increase in attendance of mothers and other farm women, several clubs started organizing separate club meetings for both the women and girls. Soon women's clubs outnumbered those meant for the girls and the programming for the home demonstration clubs began to become more developed and adapted to assist farm families with making an income from the products produced on the farm. Marketing home products by farm women and girls was an additional program created to keep up with the growth of home demonstration work (Home Demonstration Work, 1911-1936). In 1936, throughout North Carolina, there were home demonstration markets that served 38 counties. These markets created an avenue for farm families to make additional money off of any

extra products produced on the farm. Many items sold at these markets included poultry and eggs, fruits and vegetables, cakes, meat, dairy products, flowers, and other miscellaneous items (McKimmon, 1945).

The girls throughout North Carolina greatly benefitted from the creation of the tomato clubs. The organization and teaching of the principles related to growing and canning tomatoes allowed the girls to experience firsthand marketing, record keeping, disease and insect control, grading produce, and the work involved with canning. In addition, Jane McKimmon (1945) stated, "If nothing else results from what has been done here, it is worth the time and money the state spent to have lifted even for two days the dull monotony from these barren lives" (p.10). The creation of the tomato canning clubs allowed the girls to be able to generate a sense of belonging to their community, while making friends with others involved in home demonstration work. The creation and development of the tomato clubs promoted experiential learning, taught important agricultural concepts, and provided the girls with spending money. Often the girls were able to use the money made from the canning clubs to pursue higher education. In addition to these improvements, family nutrition was enhanced, self-esteem increased, industrial food concepts were taught, and modern technologies were introduced to the families involved in the work of the home demonstration clubs (Martin, 1921; True, 1928; United States Department of Agriculture [USDA], 1951).

After the establishment of the tomato clubs for the young girls, their mothers became interested in the work as well. The interest from these women created the home demonstration clubs and advanced interracial cooperation during a time when segregation impacted the lives of many individuals in the south. This allowed the women involved to develop their leadership skills, while also providing a way for both Caucasian and African American communities to come together and work on these canning projects. Both Caucasian and African American home demonstration agents were able to share information with one another and teach each other lessons that they would then be able to pass on to those that were members of their clubs (McKimmon, 1945; True, 1928).

Significance to Agricultural and Extension Education

The early work of Seaman Knapp, O.B. Martin, Marie Cromer, Jane McKimmon, and many others who were involved in the formation and development of girls' canning and home demonstration clubs provide several insights and opportunities to examine the impacts that these clubs had on the future of agricultural and extension education throughout the United States, specifically North Carolina. From the early beginnings of these clubs, the concept of experiential learning was developed and formed in the lives of many young children (Trace, 2014). The girls involved in the canning clubs were able to experience and learn firsthand many concepts related to agriculture and life in general beyond just monotonous housework. Each girls' club had an agent or teacher that was able to help gather information and research that was applicable to the production of their tomatoes. The agent would visit the girls' plots of tomatoes to check on the progress and to ensure that the girls were doing their portion of the work. To complete the process of growing and canning the tomatoes, the girls were required to keep records, understand crop management, and learn marketing techniques for their canning projects (Martin, 1921; McKimmon, 1945). From the early start of this work in rural communities, these girls were able

to engage in a project that allowed them to develop and foster specific skills through hands-on learning that would benefit them in their lifetime.

The use of these methods allowed girls to engage and become involved in work to benefit their homes, families, and communities, but also generated a movement in agricultural education. The enactment of experiential learning through the use of girls' canning and boys' corn club work allowed for a new era in education, specifically agricultural education to occur. Today, supervised agricultural experiences are an integral component of agricultural education classrooms by allowing students to explore multiple career choices, develop life skills, and apply the knowledge they have learned in the classroom or another setting (National FFA Organization, n.d.). Currently, and years following the creation and development of agricultural education in public schools, supervised agricultural experiences (SAE) were developed based on the work of Rufus Stimson and the project method to help these students learn specific skills needed to improve the family farm (Moore, 1988). Even today, with the mass exodus of young children leaving rural areas, the concept of a SAE is still used in agricultural education. Due to the increases in an ever growing urban population, agricultural education programs have been required to adapt to these changes by finding additional opportunities to engage students in hands-on learning. Today may look different than those originally thought of by Stimson, however, SAE is still a major component of the three circle model helping to develop future agricultural leaders.

The development of home demonstration clubs not only benefited girls but also farm women by providing many benefits to the farm home through their establishment. Farm women were able to learn the importance of tending to a family garden, food preparation and storage, and other aspects of beautifying and managing the home. These clubs provided many social benefits to the lives of the women involved, but also provided a way for them to market the items they produced. The opportunities for farm women to get involved in these programs greatly improved the social aspects of their lives, while also providing a way for them to make extra money and increase the flow of cash needed for the home (McKimmon, 1945; True, 1928; USDA, 1951).

Today, a version of home demonstration work is still in existence through the efforts of the Cooperative Extension Service. With the increase in technology and diversification of agriculture and other sectors, there is constant a need for more specialized agents. The adapted work of the home demonstration agent has evolved into the use of Family and Consumer Science and 4-H Youth Development professionals to carry out work involving families and children. Specifically in North Carolina, Cooperative Extension has offices in every county, meeting the varied needs of the area where they are serving. Extension professionals are tasked with transferring research-based knowledge to all people in areas pertaining to agriculture and food, health and nutrition, and 4-H youth development (North Carolina Cooperative Extension, n.d.).

Conclusions and Implications

The development and progression of the girls' and women's clubs surrounding agriculture and work around the home offer many insights to the factors that rural women faced in the early 1900s. The creation of a place where females could come together and learn important skills and concepts to advance the home were crucial to the advancement of agriculture and the lives of

those living in rural areas. Women who were able to take part in these clubs benefitted by learning an array of skills, while also developing their leadership potential and building their personal network in their communities. The impacts that these clubs had on the life of women not only improved the living conditions of their families, but they provided something for these individuals to look forward to by giving them a greater purpose beyond the household (McKimmon, 1945).

The pioneering women who were involved in the formation of these clubs often encountered those who were opposed to the development of these organizations and projects (Martin, 1921). However, this did not stop these individuals from reaching their goals and impacting the communities in which they lived. What started out as canning projects for young girls soon opened up markets and opportunities for girls and rural women to create and market products, earning additional money for their families (Home Demonstration Work, 1911-1936). These changes and the progression of the work proved the importance of diversification and advancements in programming needed for agricultural and extension education in order to keep up with the changing needs of the public.

In today's society where many individuals are far removed from the agricultural industry, it is important to look back and reflect on the advances and contributions of women from past generations. These individuals had a strong impact on their communities and demonstrated the importance of hard work and dedication. With the amount of people engaged in agriculture everyday declining and the average age of the farmer increasing, it is important to grow and develop young leaders to improve and advance the agricultural industry. Even though in today's society you will not find many young men or women growing crops or vegetables for 4-H projects, the need for experiential learning in agriculture is important now more than ever before. Instruction in both formal and non-formal learning environments can have an important impact on opening up career opportunities for these younger generations within all areas of agriculture (Kaplan, Parr, Sowerwine, Thrupp, & Van Horn, 2016).

Agricultural education classrooms are becoming more diverse each day, and agricultural educators on all levels must know how to embrace the complexities of a diverse population so that enrollment can be achieved within agricultural programs. In addition, educators must be willing to adapt to technological changes and find ways to incorporate the learning material to everyday life (LaVergne, Jones, Larke, & Elbert, 2012). In order to recruit and develop programs that are accessible and inclusive, extension professionals, as well as agricultural education teachers will need to develop and implement curriculum and programs that appeal to a wide variety of audiences.

For the past several years, individuals living in both urban and rural areas have become more interested in knowing where and how their food is produced (Perez, 2015). With this movement, agricultural and extension educators have the opportunity to implement gardens near schools and surrounding communities. Educators should take advantage of this opportunity to reach out to these populations and provide them with experiences to learn about food production. These facilities have the ability to serve as pragmatic learning opportunities so children and adults can see firsthand how food is grown and harvested. The implementation of programs such as these

provides an opportunity for educators to inform the public about the truths of the agriculture industry, while also allowing consumers to try out their green thumb.

After conducting this research, the researcher suggests that the role of girls' and home demonstration clubs be examined in order to further facilitate program development in agricultural and extension education. This will help to create opportunities for new generations to understand the importance that these clubs had on changing the face of agriculture and the rural farm home. Throughout both formal and non-formal learning experiences, the implementation of hands-on learning in agriculture can help to spark an interest in the careers and opportunities involved within this vast industry just like it did for these girls and women who started a new movement back in 1910.

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Extension at the Crossroads: An Assessment of Organizational Strengths

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Abstract

Sharing the importance of agriculture, agricultural education, and programmatic efforts through Extension is vital to ensuring policy makers and the general public understand the need for supporting the overall agricultural industry. However, communicating such importance can be challenging without accurate language to describe what makes agricultural initiatives distinct and without evidenced-based research to support those arguments. Furthermore, having knowledge of the unique strengths of Extension and other agricultural initiatives builds a foundation of resources agricultural staff can use in problem-solving, communication, and education techniques. A Delphi study was conducted to research the unique strengths of University of Georgia Extension in an effort to better educate and communicate with local and state stakeholders. Findings resulted in 11 strengths that gained 100% agreement from research respondents and document strengths in an explicit way that can also help with internal communication and education efforts within the Extension organization.

Keywords: Extension, strengths, appreciative inquiry

Introduction

"Strengths are the qualities that enable us to accomplish the organization's mission" (Sreeramana, 2015, p. 233; "Benefits of SWOT Analysis," 2016). Therefore, to have an abstract understanding of why individual and collective strengths are important, but not intentionally identify those strengths may result in missed opportunities where strengths can be connected to meaningful organizational initiatives. Strengths are related to competence and, "an organization with strong competency also has a solid brand identity built upon expertise, capabilities and resources within the organization" (Williams, 2019, para 2). Expertise, capabilities, and resources refer to strengths that give an organization its consistency and the brand for which it is known ("Benefits of SWOT Analysis," 2016; Sreeramana, 2015). Whether tangible or intangible ("Benefits of SWOT Analysis," 2016), strengths are organizational qualities that can include, "…human competencies, process capabilities, financial resources, products and services, customer goodwill and brand loyalty" (Sreeramana, 2015, p. 233).

Focusing on an organization's strengths coincides with focusing on its success ("Benefits of SWOT Analysis," 2016); direction for this type of focus can come from an organizational internal analysis. When an organization prioritizes an internal analysis, there is an indication that, that organization seeks to improve and remain relevant in its respective field. The organization, as a whole, benefits from internal analysis data that has the potential to be foundational to future strategic plans and objectives (Williams, 2019). SWOT (Strengths, Weaknesses, Opportunities, Threats) Analyses ("Benefits of SWOT Analysis," 2016; Williams, 2019), or SWOC (Strengths,

Weaknesses, Opportunities, Challenges) Analyses (Sreeramana, 2015), are widely acknowledged in businesses and organizations ("Benefits of SWOT Analysis," 2016). No matter which terminology is used, it is evident that an internal analysis should include highlighting the strengths an organization possesses. Looking at both the strengths and weaknesses of an organization can guide its members on how the organization should position itself for future growth and success (Johnston, n.d.). On the same token, it is possible that improving upon weaknesses can be much more difficult and confusing when an organization does not know its strengths; knowing where and how an organization excels opens doors to possibilities and problem-solving methods that may not be realized otherwise. An analysis should not be, nor appear to be, one-sided, ignoring the weakness factors of the organization and areas in which it can improve. However, how does an organization align its resources to face internal and external environmental challenges if it is not known what resources are currently available? Strengths are foundational and can inform the weakness, opportunity, and threat aspects of an organization.

The purpose of the study highlighted in this paper was to conduct an internal analysis of the organizational strengths associated with University of Georgia (UGA) Extension. A list of strengths was captured using the Delphi technique, which involved the consensus of a group of employees representing the Agricultural and Natural Resources, 4-H and Youth Development, and Family and Consumer Sciences programmatic areas of Extension. A brief conversation with stakeholders who benefit from University of Georgia Extension services will prove that the organization has strong points. However, by conducting an internal audit, this study essentially worked to make implicit strengths more explicit in a way that documents and clearly articulates the importance and influence of University of Georgia Extension and Extension in general.

Benefits of Analyzing Organizational Strengths

Including strengths-based information in internal analyses and needs assessments gives an organization a beneficial opportunity and the data needed to understand its strengths (Bowman, Settle, North, & Lewis, 2018) and how to capitalize on them (Johnston, n.d.). Strength identification engages organizational members in necessary discussions, provides insight, promotes collaboration, synthesizes information, gives a foundation upon which to build, and establishes an opportunistic basis for everyone to be on the same page about an organization's standing ("Benefits of SWOT Analysis," 2016). Intentionally seeking out what is going well within an organization illuminates resources an organization already has that may have been previously ignored or not fully developed ("Benefits of SWOT Analysis," 2016). Additionally, acknowledging what an organization does well and to what extent it is successful can complement reasons why the organization is in existence and needs to continue being sustained (Johnston, n.d.). Conducting an internal analysis of organizational strengths not only confirms the necessity of an organization, but gives internal members and external supporters language to articulate what sets an organization apart from similar initiatives (Williams, 2019). Having evidence-backed and agreed-upon language about why an organization is important in the grand scheme of a community, an industry, or a society, can be critical to organizations such as Extension that rely on government funds to provide what it promises to stakeholders (Steede, Fischer, Meyer, & Meyers, 2018). Strengths are important to the sustainability of any organization (Sreeramana, 2015) and in addition to helping maintain funding, strengths also help organizations retain quality personnel. An organization with a strengths-based perspective has

information that highlights the unique skills and characteristics its employees bring to the table, which can lead to boosting morale and motivation on an organization-wide scale. Informing staff of how their roles impact the organization's success, sharing success stories, and ensuring the value-added proposition of the organization to the larger society can help employees feel more engaged and satisfied (Kohll, 2018). Lastly, successes are generally not anomalies separate from layers of decisions and intentional effort toward specific and well-explained goals. Thus, an internal analysis can be used to, "look at your strengths as a vehicle for reviewing the quality of your decisions" (Johnston, n.d., para 4).

The importance of why individuals should know their strengths also translates to why larger entities like organizations should also know their strengths. Pillay (2014) suggests that a person conducting an audit on their strengths and weaknesses gives them a better understanding of themselves and their actions. Individuals who know their strengths are inherently more prepared for the future when faced with certain decisions, which helps them grow more by exceling in areas they know achievement is possible (Pillay, 2014). This concept also relates to organizations, whose decisions can have far-reaching effects on individuals and communities. When people talk about their successes, it promotes engagement, motivation, and confidence ("Introduction to Appreciative Inquiry," n.d.). Therefore, being strengths-focused increases one's confidence, excitement, and general performance and lends to the improvement an individual seeks (Pillay, 2014). Acknowledging strengths on an organizational scale can produce similar results. Strengths can help develop and pinpoint the identity of an organization while also helping its performance.

Regarding attempts to improve in one or more areas, it is suggested to focus on improving strengths rather than weaknesses (Pillay, 2014). Cooperrider and Srivastva (1987) once asserted that, "research into the social (innovation) potential of organizational life should begin with appreciation" (p. 154). They believed a strengths-based approach to problem-solving was more effective, arguing that organizations, in and of themselves, are affirmative (Cooperrider, Barrett, & Srivastva, 1995). Viewing an organization from a positive, strengths-based approach, rather than from a deficit-approach:

> assumes that every social system "works" to some degree – that it is not in a complete state of entropy – and that a primary task of research is to discover, describe, and explain those social innovations, however small, which serve to give "life" to the system and activate members' competencies and energies as more fully functioning participants in the formation and transformation of organizational realities. (Cooperrider & Srivastva, 1987, p. 154)

This sentiment is supported by the research Srivastva helped Cooperrider complete for his doctoral dissertation. His research, about egalitarian organizations (where employees are equals as opposed to a hierarchical organizational structure) and done with a medical facility, expounded upon the power of exposing the strengths of an organization through inquiry. Results from the five-year study eventually led to, "…more than 50 structural, behavioral, and relational-attitudinal changes…that showed significant [organizational] increases in such things as face-to-face interaction, consensus decision making, unity of purpose, [and] opportunity for involvement" (Cooperrider et al., 1995, p. 181). By analyzing what organizations internally do

well and what employees bring to the table, strengths have the power to, "…stretch the organization's imagination and expand its sense of the possible" (Cooperrider et al., 1995, p. 177).

Expanding what already is and what is possible for the future is a concept of hope that can be applied to Extension. The information shared in this study links to a national conversation surrounding a topic that should be re-visited in Extension; in 2005 (National Association of State Universities and Land-Grant Colleges, 2005) and 2007 (Peutz & Kroth, 2009), the Extension Committee on Organization and Policy (ECOP) Leadership Advisory Council shared information about a report that used Appreciative Inquiry (AI) to explore Extension's organizational and personnel strengths. In 2009, Peutz and Kroth (2009) called for more strengths-based studies and interventions to aid Extension in problem-solving and responding effectively to change. This paper aligns with that sentiment and furthers the conversation, acknowledging that strengths can create positive change in the way Extension approaches the work we do (Peutz & Kroth, 2009) and the stakeholders with whom we communicate. Stakeholders include the general public and policy makers; therefore, the idea of communicating effectively with others about what University of Georgia Extension is and what it offers, directly aligns with the first research priority of the 2016-2020 American Association for Agricultural Education (AAAE) National Research Agenda (Roberts, Harder, & Brashears, 2016). Research priority one focuses on, "public and policy maker understanding of agriculture and natural resources" (Roberts et al., 2016, p. 9). As research agenda authors Enns, Martin, and Spielmaker (2016) express, "Agricultural educators, communicators and extension personnel will need to continue to seek methods, models, and programs which best educate the public and policy makers about the important and vital work occurring in the agricultural industry" (p. 16). Being intentional about making Extension's state dynamics, local connections, and needed expertise explicitly known is a beneficial step in exploring how to promote education in a way that aligns with organizational resources and strengths.

Conceptual Framework

A communication strategy is vital as organizations communicate internally among organizational members and externally with stakeholders and the general public (Frost, n.d.). Communicating the strengths of an organization is just one example of information that is created and perpetrated on behalf of an organization. As it relates to the power of dialogue, communication, and the exchange of information, Cooperrider and Srivastva (1987), have stated that, "The most powerful vehicle communities have for transforming their conventions, their agreements on norms, values, policies, purposes, and ideologies – is through the act of dialogue…" (p. 135). This sentiment can also be applied to how organizations use and communicate strengths-based language and data.

Though not a foundational theory per se, appreciative inquiry (AI) is an example of a communication theory building block that can prove helpful to organizational communication strategies. It is similar to communication theories that are based on the social construction of reality (Paranjpey, 2017) and have organizational change as their outcome (Cooperrider & Srivastva, 1987). However, unlike some communication theories, AI can be more easily applied to studies about communication on a macro-scale, equipping organizations with the tools and

language needed to broadly educate and communicate with external stakeholders, other organizations, the general public, and society at large. Beyond individual and interpersonal communication, the study highlighted in this paper is about intra-organizational and community-level communication dynamics and education effectiveness. Additionally, meaning produced from the interpretation of conversations and interactions can be perceived as negative, positive, or indifferent by those involved in communication. AI emphasizes the concept of meaning similar to mainstream communication theories, but it looks at certain types of meanings, positive and strengths-based meaning-making processes in particular. Though an official AI process was not conducted for this study, the underpinnings of AI are an appropriate lens through which to look at the study theoretically because it leads us to ask: "What if, instead of seeing organizations as problems to be solved, we saw them as miracles to be appreciated? How would our methods of inquiry and our theories of organizing be different?" (Bushe, 1999, p. 62).

Cooperrider and Srivastva (1987) formalized the concept of AI and are still enhancing their research agenda today. AI is an action-research (Bushe, 1995), strengths-based way of thinking and asking questions to help individuals and organizations problem-solve and strategize. It is an example of applied theory and an iterative research process that bases individual and organizational change on data. The benefits of AI are that, by valuing strengths over weaknesses, it uses collaboration and intentional, strengths-based questioning to energize people to brainstorm new possibilities (Paranjpey, 2017). By helping organizations re-allocate under-utilized resources, AI helps groups recognize what is normally taken for granted.

> At its heart, AI is about the search for the best in people, their organizations, and the strengths-filled, opportunity-rich world around them. AI is not so much a shift in the methods and models of organizational change, but AI is a fundamental shift in the overall perspective taken throughout the entire change process to 'see' the wholeness of the human system and to "inquire" into that system's strengths, possibilities, and successes. (Stavros, Godwin, & Cooperrider, 2015, p. 113)

The illumination of an organization's strengths affirms the organization and its members while highlighting factors that help an organization reach its potential. These factors are not only celebrated, but they are further developed to propel an organization to its next level (Cooperrider & Srivastva, 1987). Therefore, the dimensions of AI have been stated to involve: the "Best of What Is," "Ideals of What Might Be," "Consent of What Should Be," and "Experiencing of What Can Be" (Cooperrider & Srivastva, 1987, p. 153). More specifically, there are principles that guide the AI mindset. In their challenge to Extension professionals to familiarize themselves with AI for the purposes of using it more often, Peutz and Kroth (2009) expound upon the principles and application of AI. The AI philosophy is based on five principles (Peutz & Kroth, 2009) that recognize: humans' roles in creating social reality through conversation (the constructionist principle), "seeds of change" (Peutz & Kroth, 2009, para 3) being rooted in the first question of an inquiry and an organization putting its energy in the direction of that question (the simultaneity principle), the value of gathering information and letting people express feelings through storytelling (the poetic principle), the impact of individuals' thoughts and imagination on their future (the anticipatory principle), and the power of positivity for learning and contagious energy (the positive principle). Peutz and Kroth (2009) go on to explain how these principles are applied in an AI process, though every process will be unique to specific

situations and contexts. Phases of applying the principles are summarized in a cycle of 4-Ds: Discovery (encourages an entity, such as an organization, to direct attention to strengths-based positive change), Dream (builds outcome-oriented vision based on the organization's potential realized in the Discovery phase), Design (acknowledges possibilities based on what a positive, ideal environment and situation would be for an organization), and Destiny (generates momentum and positive anticipation around purpose, innovation, and adaptiveness). During these phases, questions about times when the organization (or individuals in the organization) was at its best and what people value about the organization can prove beneficial. From responses to these type of questions, one can then ask, "What is it about the people, the organization, and the context that creates peak experiences at work?" (Bushe, 1999, p. 63). Paranjpey (2017) contends that AI is about more than positivity; it is about changing individuals' mindset and behaviors. Some would say AI also is not about being unrealistic or too optimistic, but that it involves rationality, emotions, intellect, and insight to create new ideas about a situation (Peutz & Kroth, 2009). Appreciative inquiry juxtaposes an appreciation for the past and a look into what the future could become.

Benefits of the AI philosophy (Peutz and Kroth, 2009) are also associated with how it fosters humility, brings diverse groups together, promotes the equal treatment of people, and is a means of creating a better future through positive change (Whitney, 2014). In a study that introduced AI to an organization, Paranjpey (2017) found that AI is one way to get an organization to communicate more openly about change and internal analysis processes, build empathy, and boost morale in environments where distrust and uncertainty affect employees' experiences. In practice, the Delphi study explained in this paper included voices from all University of Georgia Extension programs and represents a process that invited participants to share and be heard. Therefore, while some communication theories focus on individuals' interpretation in the communication process, AI allows for the exploration of "collaborative interpretation" as groups reflectively put their current strengths and idealistic possibilities, "into the conversational stew as ingredients to simmer and nourish collective meaning-making" (Whitney, 2014, p. 27). This concept of communicative group collaboration also aligns with tenants of the Delphi technique.

As an organization development intervention, AI can help people recognize the beliefs they have constructed about the systems they live, work, and are embedded in; using those beliefs can aid in the development or change of those systems (Bushe, 1995). Appreciating the past and the present affirms groups and helps them reach their desired future because they move in the direction of potential positive successes to come ("Introduction to Appreciative Inquiry", n.d.). Without a perspective similar to AI, "Groups and organizations are treated not only as if they <u>have</u> problems, but as if they <u>are</u> problems to be 'solved'" (Bushe, 1999, p. 62). According to Cooperrider and Srivastva (1987), viewing organizations from a deficit point-of-view can limit generative conversations (Bushe, 1999), reduce new ways of looking at the current reality in order to change it (Bushe, 1999), and drain individual and collective energy ("Introduction to Appreciative Inquiry", n.d.). The internal and external communication of an organization can be negatively affected by such consequences.

Purpose and Research Objectives

The purpose of this study, informed by the following research objectives, was to identify core strengths of the University of Georgia Extension organization in an effort to enhance the external education and communication strategy of the overall organization. The research objectives included:

1. Generate a comprehensive list of University of Georgia Extension strengths.
2. Arrive at a consensus, based on agreement levels of study participants, on the communicated strengths that are most prevalent to the mission and program implementation of University of Georgia Extension.

Methods

Dalkey & Helmer's (1963) Delphi technique was used to explore the research objectives of this study. The Delphi method is based on a group communication (Terry & Osborne, 2015) and consensus-building process (Ludwig, 1997) that facilitates the research of a, "…phenomenon that cannot be directly tested or observed" (Costello & Rutherford, 2019, p. 1). Usually beginning with open-ended questions (Terry & Osborne, 2015), the Delphi technique involves a panel of experts who participate in repeated questioning (Dalkey & Helmer, 1963) for the purposes of gathering useful (Costello & Rutherford, 2019, p. 1), agreed-upon information. Despite variations of the technique existing, experts are one of the components of the technique (Gamon, 1991) and include people who are connected to the study because of their background and expertise related to the topic at hand (Costello & Rutherford, 2019, p.1). "Strengths of the Delphi are its combination of qualitative (written) and quantitative (numerical) data and its ability to form a consensus of expert opinion" (Gamon, 1991, para 6).

For-profit businesses, not-for-profit organizations, and governmental agencies are among the entities that have used the Delphi method to gather information, forecast future issues and opportunities, and make change (Ludwig, 1997). In Extension and agriculture specifically, the Delphi technique has been used to study topics such as turf grass instruction modules (Mayfield, Wingenbach, & Chalmers, 2005), farmer-centered research (Polush, Grudens-Schuck, Exner, & Karp, 2016), workplace issues related to Extension educator recruitment and retention (Kroth & Peutz, 2011), leadership (Nistler, Lamm, & Stedman, 2011), international agricultural journalism (Kubitz, Telg, Irani, & Roberts, 2013), and agricultural literacy (Frick, Kahler, & Miller, 1991).

This particular study focused on explicitly identifying the strengths of the University of Georgia Extension organization. Nineteen panel experts participated in a three-round Delphi process and were identified as experts because of their role in the organization as representatives from the organization's Extension Leadership Team. Specifically, there were experts representing the administrative, Agricultural and Natural Resources, 4-H and Youth Development, and Family and Consumer Sciences programmatic areas. Furthermore, the individuals represented all four districts within the state. The panel of experts, seven of which were male and 12 of which were female, held role titles such as State Program Director, District Extension Director, and Program Development Coordinator. All three rounds of the Delphi were administered using the Qualtrics online survey tool. Questionnaires were administered according to the recommendations of the Tailored Design Method (Dillman, Smyth, & Christian, 2008). In particular, a pre-notice message was sent to participants prior to the survey invitation. The survey invitation was sent

approximately three-days later. Reminder messages were sent approximately every three days following the invitation. The surveys remained open for approximately two-weeks. Response rates for round one, round two, and round three were all 100%.

During the first round of the study experts were asked to respond to the prompt: *In your opinion, what are the top strengths of the Georgia Extension System?* Individuals were asked to provide a word or short descriptions to describe up to five strengths. Responses from round one were analyzed using the Dedoose qualitative analysis software (Dedoose, 2016) with minor editorial intervention including grammar, spelling, and removal of duplicate items. Responses generated from round one were used to develop the questionnaire used in round two.

The questionnaire used in round two was administered to hone in on the initial strengths provided in round one. Experts were presented the list of strengths and were asked to the level of importance they associate with the strengths identified in the first round using a five-point Likert scale (1 = *Not at all important*, 2 = *Somewhat important*, 3 = *Important*, 4 = *Very important*, 5 = *Extremely important*). Responses from round two were downloaded and analyzed in the SPSS version 25 statistical software package. Average scores for each item were calculated and those receiving a mean score higher than 3.55 were retained for the next round (Garson, 2014).

Items that were retained from round two were used to construct round three of the process. Round three was administered to gain a level of consensus from the experts and to establish a final list of strengths that reflected the most collaborative thought-process of the group. Experts were presented the list of strengths and were asked whether each of the strengths should be retained using a binary response scale, *Yes* or *No*. Responses from round three were downloaded and analyzed in the SPSS version 25 statistical software package. Each item that had greater than 80% of collective agreement was retained (Garson, 2014).

Results

The first round of the study produced 50 unique responses following item consolidation (Table 1). The list of 50 items was then presented to the panel in round two of the process. There were a total of 44 items (88%) which were retained for round three after six were below the 3.55 mean cutoff point. The means for the strengths provided in round two ranged from 3.16 to 4.79. The organizational strength gaining the highest level of agreement and the lowest deviation related to Extension's *strong impactful programs locally*. The remaining top ten strengths related to Extension's presence in and support from local counties, state-wide influence and support, and personnel who are not only skilled, but are invested in the services they provide.

Table 1
Delphi Round One and Two Results: Level of Importance for University of Georgia Extension strengths (n = 50)

Strength	*M*	*SD*
Strong impactful programs locally	4.79	0.42
Strong local support	4.74	0.45
County delivery model and faculty across all counties in Georgia	4.63	0.68
Strong impactful programs across the state	4.58	0.61
4-H Program	4.58	0.69

Strong state support	4.58	0.61
Local connections to communities and stakeholders	4.58	0.51
Responsiveness	4.58	0.61
Connection to the Land-Grant University	4.53	0.77
Dedicated, motivated, passionate workforce of highly trained employees	4.53	0.70
Vision and leadership	4.47	0.84
Statewide network of well educated University of Georgia faculty and staff	4.47	0.70
Connection to Youth in both Rural and Urban Georgia	4.42	0.69
Partnerships with local groups	4.42	0.69
Strong local community connections/collaborations	4.42	0.61
Being tied directly to the people in a given county	4.42	0.77
Ability to build and sustain relationships	4.32	0.75
Employees who care about people in their communities	4.32	0.67
Access to up-to-date, science and research based, unbiased, valid data	4.32	0.89
Access to the expertise needed to work with communities and citizens to solve problems	4.26	0.73
Respected as source of knowledge	4.21	0.85
A sustained and efficient organization with a long record of success	4.21	0.79
Targeted education to address Georgia's leading concerns	4.21	0.85
4-H is a partner in public education with school delivery model	4.21	0.92
Resources from the University	4.16	0.76
Ability to collaborate with other agencies and government entities	4.16	0.76
Local needs being met daily	4.16	0.90
Strong administrative infrastructure supporting county operations	4.11	1.05
Strong educators	4.11	0.81
Needs based	4.11	0.94
Ability to address a multitude of relevant issues with resources and knowledge	4.11	0.88
Excellent strength of specialists	4.11	1.05
Access to specialists	4.11	1.05
Ability to convey knowledge	4.05	1.03
Partnerships with state groups	4.05	0.85
Available to everyone	4.00	1.00
Great collaborators	4.00	0.88
4-H Program's ability to reach so many kids	4.00	1.05
Commitment to training up experts	4.00	1.00
Many Ext ANR specialists/researches are top in their field	3.89	0.81
Specialist funded to work directly with county faculty	3.89	1.20
Program planning to address needs	3.84	1.07
Faculty strengths based on local needs	3.84	0.83
FACS is equipped to address many educational needs around issue based areas -- we just need more agents	3.79	1.13
Ability to attract external grants and dollars in ways no other network can that can bring resources to communities	3.53	0.96
Applied research	3.53	1.07
Partnerships with national groups	3.53	0.84
Family programs	3.53	0.90
Offering assistance	3.37	1.07
Low cost	3.16	1.26

In the third and final round, participants were given the opportunity to share their level of agreement about the remaining 44 items. Levels of agreement ranged from 70.59% to 100%. Six strengths fell below the 80% cutoff point, while 38 strengths were retained (Table 2). An agreement of 100% was reached for 11 strengths. These top strengths revolved around resources gained from University of Georgia, having highly skilled and motivated educators, and being able to partner with school districts to deliver 4-H curriculum. Additional strengths agreed upon by all research participants included strong local partnerships, access to research-based information, and programs that are recognized as being impactful for local communities and the state of Georgia as a whole. Fifteen strengths achieved levels of 94.12 - 94.44% agreement, while 12 strengths achieved levels of 82.35% to 88.89% agreement.

Table 2
Delphi Round Three Results: Level of Consensus with University of Georgia Extension strengths (n = 44)

Strengths	Consensus %
Resources from the University	100.00
Strong educators	100.00
Dedicated, motivated, passionate workforce of highly trained employees	100.00
4-H is a partner in public education with school delivery model	100.00
Strong local community connections/collaborations	100.00
Partnerships with local groups	100.00
Statewide network of well-educated University of Georgia faculty and staff	100.00
Access to up-to-date, science and research based, unbiased, valid data	100.00
Strong impactful programs locally	100.00
Strong impactful programs across the state	100.00
Responsiveness	100.00
Connection to the Land-Grant University	94.44
Employees who care about people in their communities	94.44
Ability to collaborate with other agencies and government entities	94.44
Ability to build and sustain relationships	94.12
Strong administrative infrastructure supporting county operations	94.12
Strong state support	94.12
Strong local support	94.12
4-H Program	94.12
Partnerships with state groups	94.12
Many Ext ANR specialists/researches are top in their field	94.12
Access to the expertise needed to work with communities and citizens to solve problems	94.12
Program planning to address needs	94.12
Needs based	94.12
Ability to convey knowledge	94.12
Ability to address a multitude of relevant issues with resources and knowledge	94.12
Vision and leadership	88.89
Local connections to communities and stakeholders	88.89
Excellent strength of specialists	88.89
Access to specialists	88.89
Available to everyone	88.89
Commitment to training up experts	88.24
4-H Program's ability to reach so many kids	88.24

County delivery model and faculty across all counties in Georgia	88.24
Connection to Youth in both Rural and Urban Georgia	83.33
Respected as source of knowledge	82.35
Local needs being met daily	82.35
Faculty strengths based on local needs	82.35
Being tied directly to the people in a given county	77.78
A sustained and efficient organization with a long record of success	76.47
Great collaborators	76.47
Specialist funded to work directly with county faculty	76.47
Targeted education to address Georgia's leading concerns	76.47
FACS is equipped to address many educational needs around issue based areas -- we just need more agents	70.59

Conclusions, Implications, and Recommendations

Organizations are guided by missions and purposes that meet societal needs and that galvanize action and participation. "[T]hrough discipline and training[,] the appreciative eye can be developed to see the ordinary magic, beauty, and real possibility in organizational life" (Cooperrider & Srivastva, 1987, p. 158). The purpose of this study was to delve into the strengths and appreciative aspects of the University of Georgia Extension organization by using a three-round Delphi research method. Similar to AI procedures (Paranjpey, 2017), the process was generative in nature and provided a lot of information in a short time span. Though conducted for the context of University of Georgia Extension, the study's findings relate to the context and purpose of the overall Extension organization. Findings also relate to agricultural education in particular, which "is not a one size fits all discipline; however, future research with existing or developing frameworks, centered on the conceptualization and operationalization of agricultural literacy, will provide the support needed to determine the most effective methods, models, and programs for informing public opinion and preparing people to inform policymakers on agricultural and natural resource issues" (Enns, Martin, & Spielmaker, 2016, p. 15). This study highlights ways in which we can communicate with stakeholders and thus relates to the current and future research needs of agricultural education. Also, similar to AI procedures and strengths-based theoretical lenses, the study can help agricultural employees, "understand their unique contribution and how it fits in the overall success of the organization" and feel their voices are represented and heard (Paranjpey, 2017, p. 120). Communication in general is important, but specifically communicating strengths has the potential to be a powerful catalyst for change. Conducting an internal analysis and extrapolating organizational feedback based on organizational strengths has multiple benefits involving enhanced internal communication, improved external communication, and reinvigoration of an organization's mission and purpose.

While the results of the research are encouraging and provide a foundation upon which to build future applied and theoretical endeavors, it is also important to acknowledge the limitations associated with the study. First, the results of the study are limited to the insights of the individuals invited to participate in the expert panel. Although care was taken to ensure a diverse set of programmatic viewpoints were represented on the panel, the use of internal personnel limits the potential for external perspectives. Additionally, organizations exist within larger contexts and are malleable depending on external factors (Lamm, Lamm, Rodriguez, & Owens, 2016). For example, political or institutional priorities may cause rapid changes that are external

to the organization, yet fundamentally alter the scope and priorities of the organization. Therefore, the results should be considered as accurate at the point of collection; however, it would be expected that these observations may change in the future. Nevertheless, the results of the study provide a rigorous insight into the organizational strengths of an Extension system that may also provide insights and a starting point for similar like-type organizations.

Results from this state-wide study align with national strengths-based Extension research from 14 years ago and reiterate that Extension's organizational strengths such as community involvement, personnel quality, and the land-grant structure make a positive difference (National Association of State Universities and Land-Grant Colleges, 2005). Implications from the current study involve improved problem-solving and reduction in duplicated efforts because of a clearer focus on current resources and capabilities. The information generated also helps the organization see its current state in comparison to future trajectories. Additionally, the results give internal staff more ways to articulate the purpose and influence of the organization to stakeholders across the state. Not only can this process provide useful information to employees and community members who are new to Extension, but it may also help employees become more collaborative in the future because of the collaborative nature of involving all Extension programs in the study. Collective inquiry, a component of AI and Delphi processes, cuts through silos that may exist and gives employees more understanding about other programmatic components of a large organization with which they may be less familiar. Lastly, a practical implication of the study is that it can assist the organization in articulating to policy makers and other stakeholders why Extension is worth investing in while keeping the organization internally accountable to continue delivering on the strengths stated in the study.

With this study as a foundation, future research could involve conducting a Delphi with external stakeholders on various levels (community members, industry leaders, legislators, etc.) to see what University of Georgia Extension's strengths are from an external perspective. Juxtaposing stakeholder responses with the results of this study could be of interest, especially if external stakeholders' feedback aligns with internal employee feedback or if new themes emerge. Furthermore, much research and popular press information exists about the importance of individual strengths. However, there is an opportunity for more research to be done on organizational strengths, especially as it relates to exploring more strengths-based, AI-type studies. Currently few psychological AI studies exist in the literature and fewer articles merge AI and Delphi techniques for the purpose of applying them to communication. In addition to strengthening multi-disciplinary research, more intentional information about strengths-based organizations can not only help entities explain what they offer internally and to the greater good, but it can also assist in other initiatives such as hiring practices based on aligning individual strengths with the organization's collective strengths to help fill gaps where the organization can improve. Overall, the AI philosophy and the Delphi technique are action-research tools that can assist organizations, like Extension, with educating and communicating internally with leaders and employees and externally with stakeholders and the general public.

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Improving Extension Support to Organic Growers by Building Bridges

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Introduction

The United States (U.S.) is expected to lead global economic and agricultural growth for the next eight years (Interagency Agricultural Projections Committee, 2018), supporting increasing food demand and diversification of food consumption globally. According to the United Nations (2019), by 2030, sustainable food production systems and resilient agricultural practices should be adopted by growers to increase food production while improving the quality of ecosystems globally.

Organic agriculture has the potential to improve the environmental performance of U.S. agriculture by reducing pesticide residues in water and food; reducing nutrient pollution and carbon levels in the atmosphere; improving physical, chemical, and biological conditions of soils; and enhancing biodiversity (Greene et al., 2009). According to the U.S. Department of Agriculture Certified Organic Survey (2012; 2017), between 2011 and 2016 the total number of farms under USDA certified organic operations increased over 55% nationally and over 100% in Georgia. The USDA survey did not take into account organic operations that were classified as Certified Naturally Grown (CNG), thus, undercounting total acreage in organic production nationwide. There are over 750 CNG producers in the U.S., most of which are located in Georgia (Certified Naturally Grown, 2019), which prompted us to explore Extension agents' experiences with supporting organic growers in this state.

Our previous research with organic producers in north Georgia uncovered many challenges and barriers to growing and marketing organic produce including a lack of accessible research-based information made readily available to conventional growers by Extension agents (Marabesi & Kelsey, 2019). Extension is fundamental to the entire agricultural sector and has the potential to encourage organic growers as well as recruit new producers to grow organically (Authors, 2019). The Extension model used to support conventional growers requires a more knowledge-intensive and bi-directional mode of engagement between Extension agents and growers; therefore, investigating how Extension agents perceive organic agricultural practices is important for identifying improved outreach strategies targeted to organic growers (Agunga, 1995; Ozkaya, 2003).

Despite numerous studies reporting the economic profitability and increased yields in agriculture resulting from Extension agents' efforts, there is a dearth of literature exploring Extension agents' experiences working with organic growers. Therefore, the research reported here explored *what* University of Georgia (UGA) Extension agents experienced while supporting organic growers and *how* they experienced it in terms of conditions, situation, and context. From a phenomenological lens, we analyzed Extension agents' experiences in providing support to organic growers (Creswell & Poth 2018; Moustakas, 1994; Van Manen, 2014). The essence of

these experiences emerged from the data to inform recommendations for establishing Extension educational programs to better serve organic growers. We present an original model for extending land-grant university research-based knowledge and educational support to organic growers using Extension agents as change agents.

Cooperative Extension Service History of Supporting Organic Agricultural Growers

The Cooperative Extension System's (CES) purpose is to promote improved agricultural practices among U.S. growers by diffusing research-based information regarding agriculture and home economics to the public. Extension is an interpersonal communication network that delivers scientific information to shift attitudes and change behaviors among agricultural growers to adopt best practices (Rogers, 2003). Agunga (1995, p. 171) stated that, "farmers' full comprehension of an innovation is the necessary first step to adoption or rejection". Therefore, Extension has served as an important educational mediator by maximizing growers' access to research-based information for the purpose of improving practice (Agunga, 1995; Boone et al., 2007; Diehl et al., 2018). Over the last century, Extension has confirmed their capacity to conduct research and teach best practices through trained agents, evolving as a fundamental agency supporting U.S. agricultural development (Brunner & Yang, 1949). Goetz (2016) estimated that federal CES programs have helped more than 137,000 growers stay in business since 1985. Between 1984 and 2010, 490,000 growers left farming, yet without CES and the underlying research supporting agricultural innovation, it is estimated that the U.S. would have lost an additional 28% of growers (Goetz, 2016).

While Extension has played a significant role in supporting U.S. agriculture, it has fallen short in regard to serving organic growers.. In their seminal work, Beus and Dunlap (1992) reported that land-grant university faculty were more inclined to conduct research and outreach regarding conventional agricultural practices and were oriented toward large-scale growers. This finding has been echoed by numerous authors over the past three decades (Agunga & Igodan, 2007; Beus & Dunlap, 1992; Crawford et al., 2015; Gailhard et al., 2015; Hall & Rhoades, 2010; Authors, 2019; Pretty & Vodouhe, 1997; Rolling & Pretty, 1997). In summary, the literature strong recommends expanding research and Extension efforts to include alternative agricultural practices; however, the scope of the problem remains unknown due to a lack of research on Extension agents' experiences in serving organic growers.

Extension and Organic Growers

The term *organic* goes beyond USDA certified organic status. The USDA organic certification process requires that organic food production must not use conventional pesticides and herbicides, petroleum-based fertilizers, sewage-sludge-based fertilizers, genetic engineering, antibiotics, growth hormones, or irradiation (USDA Certified Organic Survey, 2017). Alternatively, the International Federation of Organic Agriculture Movements (IFOAM) defined organic production systems as those that sustains healthy soils, ecosystems, and relies on ecological processes, biodiversity, and cycles adapted to local conditions, while simultaneously building relationships that ensure fairness among current and future human generations (IFOAM, 2018). Since the USDA certification process was considered expensive and bureaucratic by

organic growers in Georgia, many growers have pursued other types of certification, such as Certified Naturally Grown (CNG) or remained non-certified (Authors, 2019).

The literature has concluded that effective communication between Extension agents and organic growers was essential to further extend research-based knowledge to organic growers and promote best practices among all growers (Crawford et al., 2015; Hanson et al. 1995). For example, Agunga and Igodan (2007) explored Ohio growers' attitudes toward Extension. They reported that organic growers had a strong interest in receiving support from Extension; however, they thought Extension agents did not have sufficient knowledge regarding organic agricultural practices to help them. The authors recommended increasing professional development opportunities for Extension agents and establishing stronger relationships with organic growers (Agunga & Igodan, 2007). Likewise, Crawford et al. (2015) found that establishing relationships between Extension agents and organic growers was challenging but recommended further research to measure Extension agents' perceptions of organic agriculture that could be used to develop an improved model for service delivery.

Agents of Change

A number of studies have shown potential to further the role of Extension in organic agriculture (Agunga & Igodan, 2007; Beus & Dunlap, 1992; Crawford et al., 2015; Gailhard et al., 2015; Hall & Rhoades, 2010; Marabesi & Kelsey, 2019; Pretty & Vodouhe, 1997; Rogers, 2003; Rolling & Pretty, 1997). Rogers (2003, p. 160) suggested that Extension agents work as change agents by delivering research-based information that helps form attitudes and change behaviors among agricultural growers. Rogers recognized agricultural Extension service as the "oldest diffusion system in the United States" and claimed that research and Extension support for a determined innovation can expedite its adoption in a state or county, whereas the lack of support can hinder an innovation's adoption. Accordingly, previous research suggested that receiving information from formal actors using various forms of interpersonal communication increased the probability of adoption of environmentally friendly practices (Gailhard et al., 2015; Hall & Rhoades, 2010). Further, Nagel (1997), Pretty and Vodouhe (1997), and Rolling and Pretty (1997) suggested that participatory methods and approaches were important to increase learning between Extension agents, researchers, and growers; moreover, growers became more confident that agents could help them when participatory approaches were employed.

As Extension agents diffuse university-based research regarding best practices in agricultural production, they are uniquely positioned to introduce and support sustainable practices to all growers and stress the value of community engagement due to their historical mission of disseminating agricultural knowledge to the public (Brunner & Yang, 1949). Given these trends, exploring Extension agents' experiences in working with organic growers is important to gain a better understanding of how they go about establishing effective communication channels with this unique and increasingly relevant clientele-base.

Conceptual Framework

We built upon Rogers's (2003) the theory of diffusion of innovation (DOI) and Ajzen's (1985) theory of planned behavior (TPB) to further understand Extension agents' attitudes and

behaviors toward organic growers. As such, we considered Extension as the diffusion system that delivered research-based information to organic growers.

Rogers's (2003) DOI theory provided a framework for understanding how new ideas and technologies are adopted and communicated in society. Rogers considered diffusion as a type of communication channel that is diffused through social systems for the purpose of creating a mutual understanding of the innovation that shifts over time. The process by which individuals seek information concerning an innovation is called the innovation-decision process and occurs through five main steps:

1. Knowledge: Exposure to the innovation and knowledge acquisition regarding how it works.
2. Persuasion: Development of a positive or negative stance regarding the innovation.
3. Decision: Decision-making process on whether to adopt or reject the innovation.
4. Implementation: Application of the innovation to determine its usefulness.
5. Confirmation: Seeking of interpersonal reinforcement regarding an innovation-decision to finalize the decision to continue using the innovation.

The rate of adoption of the determined innovation can be understood as the relative speed with which an innovation is adopted by individuals. Rogers (2003) suggested five categories of adopters: innovators, early adopters, early majority, late majority, and laggards. Rogers (2003) emphasized the role of "opinion leaders" and "change agents" as influencers of adoption behavior within the diffusion of innovation process. While opinion leaders are "members of the social system in which they exert their influence" (p. 28), change agents are influencers external to the system. Traditionally, Extension agents have been regarded as change agents (Rogers, 2003).

According to Ajzen's (1985) TPB, individuals make decisions rationally by considering the implications of their actions before deciding whether to behave in a certain way. Peoples' behavioral intentions are affected by their favorable or unfavorable attitudes toward a certain behavior, the subjective norms (what other people think about their behavior), and their perceived behavior control (perception of their ability to succeed in performing the behavior, which includes self-efficacy and controllability). According to TPB, people are more likely to intend toward certain behaviors when they believe that they can execute them successfully.

Extension agents' normative beliefs help determine the subjective norms, their control beliefs give rise to their perceived behavior control, and their behavioral beliefs influence their attitudes towards certain behaviors. In conjunction, subjective norms, perceived behavior control, and attitude towards the behavior have a direct effect on Extension agents' intention to perform their change agents' role to promote the diffusion of innovations within the organic growers' community. Extension agents' actual behavior leads to serving or not serving organic growers through the diffusion of innovations framework.

We combined elements from TPB with elements of the five-step innovation-decision process to create an emergent model to explain effective interpersonal communication between Extension

agents and organic growers (see Figure 1). The model considers Extension agents' behavior towards organic growers as being influenced by normative, control, and behavioral beliefs.

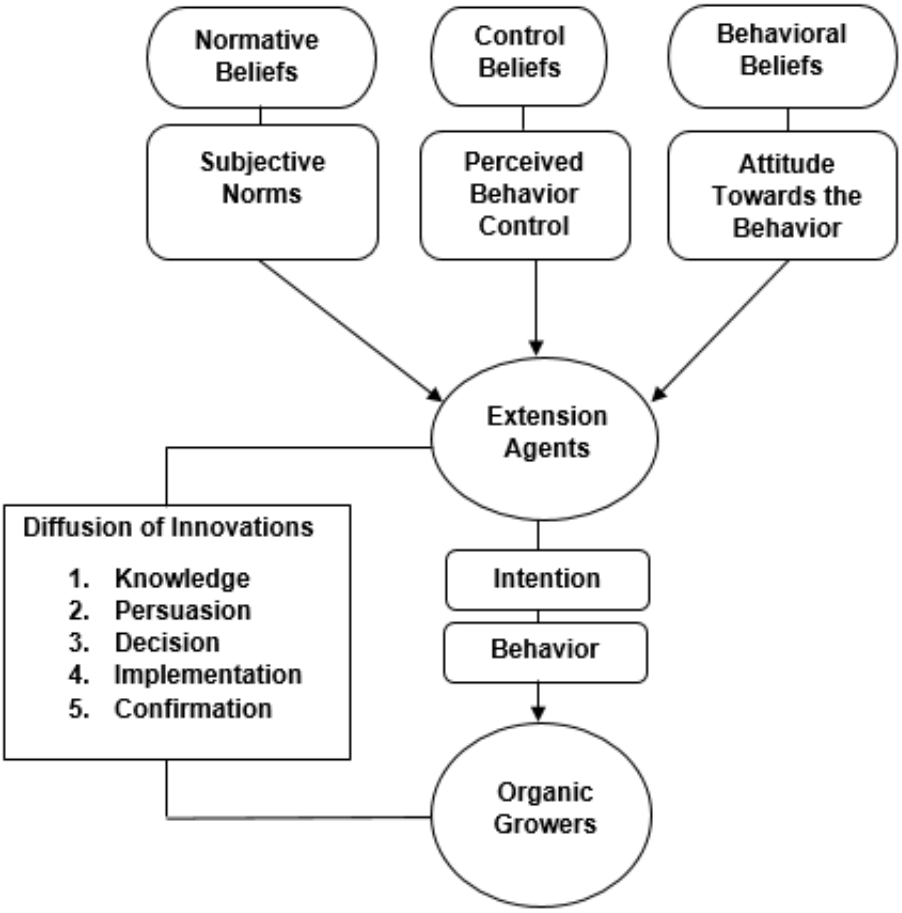

Figure 1. An emergent model for building bridges between Extension agents and organic growers.

Methodology

Participants

The population for the study consisted of 12 agricultural and natural resources Extension agents employed by the University of Georgia Extension service in the northern region of Georgia.

The University of Georgia sustainable agriculture coordinator provided a list of 21 Extension agents from Northeast and Northwest Georgia districts. We targeted these districts due to the homogeneity of the regions in terms of geography and growers' attributes. After obtaining University Institutional Review Board approval, we invited all 21 Extension agents to participate in the research study via email and 12 agents agreed to participate.

Research Design

Hermeneutic phenomenological research design was used to capture the essence of a phenomenon (Creswell & Poth 2018). In the context of this study, a phenomenon was considered a lived-through experience that emerges from one's intentional awareness of an event (Van Manen, 2014). Furthermore, hermeneutic phenomenology attempts to interpret ordinary experiences while simultaneously recognizing the complexity of our lived experiences that interact with the phenomenon (Van Manen, 1997, 2014). Phenomenological inquiries allow the researcher to understand *what* and *how* participants experience a central phenomenon and bring experiential realities to language by reflecting on themes grounded in participants' shared experiences (Van Manen, 2014).

The central phenomenon addressed in this study was Extension agents' support offered to organic growers. We emerged the essential structure (essence) of participants' experiences from textural and structural descriptions of *what* they experienced while supporting organic growers and *how* they experienced giving support in terms of the conditions, situations, and context of that support (Creswell & Poth 2018; Moustakas, 1994; Van Manen, 2014).

Data Collection

Instrumentation. We developed a semi-structured interview protocol to allow participants to describe their experiences through a conversation with the interviewer. The protocol was reviewed by a committee of agricultural and Extension specialists and followed the hermeneutic research design, utilizing insights from the literature to inform the selection of questions. We developed open-ended questions focused on participants' experiences working with organic growers, their perceptions of organic agriculture, their participation in programs related to organic agriculture, their sources of information regarding organic agriculture, and their knowledge of organic agriculture.

Interviews. After securing informed consent, we conducted face-to-face interviews with 12 participants during fall 2018. Interviews took place at participants preferred locations and lasted less than one hour. We recorded the interviews using electronic devices, transcribed the interviews verbatim, and sent the transcripts and final manuscript to participants for verification. None of the participants requested modifications in their transcripts or in the final manuscript, indicating validity of the data collected (member checking) (Tracy, 2010).

Analysis. The analysis included the following procedural steps as prescribed by Creswell and Poth (2018), Moustakas (1994), and Van Manen (2014):

1. Arising the phenomenological question and describing the central phenomenon.
2. Collecting interview data from 12 participants who experienced the central phenomenon.
3. Transcribing the interviews verbatim.
4. Member checking the transcripts to ensure accuracy.
5. The transcripts were loaded into ATLAS.ti for analysis.
6. Reducing the verbatim transcripts into 271 significant statements by highlighting sentences that provided an understanding of participants' experiences of the phenomenon (horizontalization).

7. Refining the significant statements into four themes by reflecting on what constitutes the nature of participants' shared experience.
8. Describing *what* (textural description) and *how* (structural description) participants experienced the central phenomenon.
9. Emerging the common underlying structure of participants' experiences or the essence of the phenomenon by writing a composite description from the textural and structural descriptions to explain the phenomenon.
10. Developing a metaphor to communicate the findings (the essence).

Quality Control

Ensuring quality (transferability and accuracy) throughout the study was addressed by engaging participants in the research process and following procedures to protect human subjects. Ethical procedures outlined by Tracy (2010) included approval by the University Institutional Review Board (IRB#: STUDY00005828, MOD00006435), gaining participant's informed consent before the interviews, and securing all research data. The interview transcripts were sent to participants so they could judge the accuracy and credibility of the data (Creswell & Poth, 2018). To ensure anonymity, we assigned pseudonyms to all participants and developed the findings as a composite profile rather than focusing on individual assertions (Creswell & Poth, 2018). We provided a thick description of the findings and included direct quotations to remain true to participants' voices; therefore, addressing credibility and achieving resonance through transferability (Tracy, 2010).

Reflexivity

The principal researcher earned a bachelor's degree in Agronomic Engineering in Brazil. Her interest in organic agriculture stems from her childhood experiences visiting her grandparent's organic farm in Brazil. She came to UGA to pursue a master's degree in Agricultural and Environmental Education, graduating spring 2019. The research reported here is part of her Master's thesis research. She is currently a doctoral student in Horticulture at UGA.

Findings

The 12 Extension agents who were interviewed for this study served in Northeast and Northwest Georgia counties (Table 1). All of them reported addressing the needs of both conventional and organic growers. However, they served organic growers to a lesser extent than conventional growers.

Table 1

Participants' Name, Gender, and Specialty.

Pseudonym	Gender	Specialty
Amy	Female	Entomology
Bob	Male	Ornamental horticulture

Craig	Male	Fisheries management and aquaculture
Erin	Female	Horticulture
Gary	Male	Horticulture and landscape architecture
George	Male	Biological sciences
Hank	Male	Animal science
Mark	Male	Plant protection and pest management
Neil	Male	Agricultural engineering
Oscar	Male	Animal science
Scott	Male	Plant protection and pest management
Tom	Male	Biological sciences

The following four themes provide a composite description of what and how participants experienced supporting organic growers.

Extension Agents Were Willing to Help Organic Growers

Theme: Participants were supportive of the organic agricultural community; however, they said that organic growers did not reach out to them as frequently as conventional growers, justifying low levels of engagement with organic growers.

Supporting Evidence: Previous findings suggested that organic growers from North Georgia perceived Extension agents putting more effort towards serving conventional growers (Authors, 2019). This finding was affirmed in the research reported here. Extension agent Bob said that organic growers think that Extension agents "do not know how to do anything other than spray" (16-17). Bob's statement reflected the thoughts of all 12 participants, who agreed that there was a perception from organic growers that Extension agents are "chemical pushers." For instance, Craig said that most organic growers chose not to reach out to Extension because they were able to find the information they needed on Google and because they thought Extension agents were going to recommend a non-organic pesticide to solve their problems. Neil considered Georgia's focus on agricultural commodity production as an influence on organic growers' perceptions that Extension was not willing to support them. He said,

> There are a lot of agents that all they have ever known is production agriculture, I saw that in agents' training, they will turn their nose up at organics…. So there is a perception among people who work with the university that organic agriculture is not really relevant, is not realistic, and is never going to be an important part of Georgia's agriculture (170-173).

Despite Neil's claim, all participants said they were willing to help both organic and conventional growers. Neil went on, emphasizing the role of Extension by saying,

> Extension is here to serve all of our community, all the taxpayers, because we are taxpayer funded, so I feel like it is our responsibility to help someone with crop production, regardless of what their philosophies are with respect to how they grow, whether they grow organically or conventionally or whether it is a little bit of both. To me, it does not matter, if they need help trying to produce a crop, regardless of what their philosophies are, then I think it is our position to help them in any way we can (10-16).

When participants were asked if they thought that organic agriculture contributed to the state's overall economy, Scott said no. He claimed that only a small group of people could pay the higher prices for organic products. The other 11 participants reported seeing organic agriculture as a niche market that was growing and establishing its importance in consumer preferences. In particular, Gary and George said that they supported organic agriculture and had small organic gardens at home. George grew organic produce for family consumption. Gary grew organic produce for family consumption and to sell to local restaurants. Their personal experiences with growing organically encouraged them to seek more information about organic practices, which in turn provided them with an important knowledge base to help organic growers and promoting their willingness to engage with the organic community.

Although the agents were willing to help organic growers, they reported that they did not reach out to them as frequently as conventional growers and that they had little feedback when trying to contact organic growers. Gary reported that contacting organic growers was a challenge for three reasons, first, organic growers did not show up to Extension events targeted to organic agriculture, second, they were not interested to know who their county Extension agent was, and third, they did not contact Extension regarding their needs. Gary reported feeling frustrated with organic growers, stating, "I have a hard time listening to the growers complaining that Extension doesn't try to do anything because we have and they don't show up. Eventually, you are just going to find other clientele [to serve]" (61-63). As Rogers (2003) stated, Extension agents are effective in influencing behavior, gaining knowledge, and developing new attitudes; however, growers tend to seek information sources that reinforce existing values and traditions.

A number of aspects contributed to forming Extension agents' perceptions of organic growers including a self-fulfilling negative feedback loop. Extension agents reported that organic growers did not want help from them. Craig said that Extension was not traditionally known for serving organic growers but that did not mean that agents were not willing to help organic growers. However, Extension agents recognized the stigma organic growers held towards them because they spent most of their time serving conventional growers. This stigma was a substantial factor that may have prevented organic growers from reaching out to Extension agents more often.

Extension Agents Need Educational Programs in Overcoming Communication Barriers with Organic Growers

Theme: Extension agents reported that organic growers followed organic practices because they held strong philosophical ideals regarding environmental responsibility and human well-being.

Agents reported experiencing difficulties in communicating with organic growers because the growers believed that agents did not understand their philosophies; therefore, organic growers did not trust Extension agents.

Supporting Evidence: The most frequently recurring statements within the interview data were participants' uncertainty about the central factor influencing the relationship between themselves and organic growers. Agents reported barriers to establishing productive relations with organic growers; however, they had trouble in identifying and explaining what those barriers were. Tom said that he perceived a disconnection between Extension agents and organic growers but he did not know why it existed. Erin said that Extension should provide agents with educational resources regarding organic agriculture and then show organic growers that agents were able to help them. Craig said that it takes time to build a relationship of trust with organic growers because agents did not necessarily have the same philosophies as organic growers regarding agricultural production.

Agents agreed that there was a need for more training in organic agricultural production techniques; however, Gary and Neil said that learning about the science of growing organically was relatively easy for agents since all of them had a bachelors' degree in agriculture. Neil stressed that the main need for education was with respect to understanding organic growers' philosophies and how to effectively communicate with them. Gary said that it was important to understand growers' philosophies in order to learn how to establish effective communication that could transcend philosophical stances and ultimately help agents to build rapport with organic growers, as he reflected:

> As Extension agents, we have to be sensitive to them. Because you are going to turn that person off immediately if you say 'you can't do this'. It is like religion and politics, it's a belief system. Most of the time you are not going to change that belief system but you are definitely going to turn them off to you and everything you might have to say. I really have to be careful and try to explain things sensibly. It is a challenging group to serve because of that mentality, that belief system (148-151).

Gary's statement was similar to others who noted the importance of understanding growers' philosophies in order to learn how to establish effective communication that could transcend philosophical stances. According to the agents, being able to effectively communicate with organic growers and establish a relationship of trust within the organic community was essential to improving Extension support to organic growers.

Extension Agents Need More Training in Organic Production

Theme: Extension agents reported having a limited educational background in organic agricultural production practices and claimed that if they had more training on the topic they would feel more comfortable working with organic growers.

Supporting Evidence: We asked participants about the existence of programs on organic agriculture provided by the university and their engagement in such programs. Agents reported participating in professional development workshops on cover crops in organic agricultural

systems, taught by the University of Georgia sustainable agriculture coordinator. The workshops were the only resource offered to them regarding organic agriculture and happened once a year. Amy, George, Mark, Oscar, Scott, and Tom explained that Extension agents were able to choose which professional development workshops they were going to attend and that they sought educational training according to the perceived needs in their counties. Amy, George, and Tom said that the organic movement was growing in their area and that University of Georgia Extension agents were not as knowledgeable in this subject as they could be; therefore, they were hesitant to recommend the adoption of organic practices. Specifically, Tom said,

> I think there is definitely a need for more training on organic, more support for Extension agents to provide that organic-based information to the farmer. I think if we had that, then Extension agents might be a little more comfortable working with organic farmers (152-155).

Additionally, George emphasized how agents' lack of preparation to work with organic growers might have influenced organic growers' perceptions of Extension. George said,

> It is not that we do not want to help them, it's a matter that we don't know if we have all the answers, because organic can be very difficult. Therefore, that may cause a lot of frustration among organic farmers, thinking that we are not willing to help. We just do not have answers yet (141-148).

Collectively, all participants said they could benefit from more educational programs in organic agriculture to increase their knowledge on the topic. Participants were asked about their main sources of information on organic agriculture. Craig, Hank, and Neil said that they typically contacted other University of Georgia Extension agents when they were unknowledgeable of a situation. Neil explained the network of shared knowledge of Extension agents, as they relied on each other's areas of specialization. However, Bob and Neil said that their Extension network lacked agents specialized in organic production and they would benefit from more organic specialists in the state.

Erin was the only participant who had a formal educational background in organic agriculture with a B.S. Horticulture, specializing in organic agricultural production. She was mentioned many times by other agents as a reference in the field. Erin said that organic growers from counties outside the area she served called for help. She affirmed that the Extension agents from the counties where she was serving organic growers did not have the same technical background as her; therefore, they were not able to help organic growers to the same extent. Oscar, Scott, and Tom said that a certification program in organic agriculture should be offered by University of Georgia. They said that if organic growers saw agents participating in more professional development workshops regarding organic agriculture, they would be more likely to reach out to Extension.

Besides asking for help from other Extension agents, Craig, Hank, and Neil reported reaching out to other university databases when they could not find a solution using organic agriculture resources available from University of Georgia. Neil explained,

> If UGA has a good resource, I will utilize it. But I use information from other land-grant universities every day. If I get a question that I do not immediately know the answer to, I will research other land-grant universities and what information they have available on it. I will choose the best information for my client. It does not have to be from UGA (71-75).

Seeking the best information available was also important to other agents so they could help their clients most effectively.

Extension Agents Perceive Small-Scale Organic Production as not Economically Viable

Theme: Seven agents reported not having information regarding the economic feasibility of small-scale organic agriculture in their region; therefore, they did not feel obligated to support small-scale organic production as it was considered inconsequential to the overall agricultural industry.

Supporting Evidence: Seven agents were biased against serving organic growers due to a perception that small-scale organic production was not economically viable. Bob, Craig, Hank, Mark, Neil, Oscar and Scott said the majority of organic growers in their counties had either another job, a spouse who had another source of income besides farming, or were retired and farming as a hobby. These assumptions led agents to the perception that small-scale organic farms in their counties were not economically viable. Craig, Hank, and Oscar mentioned that the "profit-making standpoint" influenced their attitudes towards organic agriculture. Hank said,

> I have not met anybody that has farmed organically on a small-scale and made money. I said that we as Extension agents have a responsibility to, if a person is interested in entrepreneurship, if they want to make money, we have the responsibility to let them know how difficult it is going to be (123-127).

Oscar claimed that organic production could not be called sustainable if it is not economically sustainable. Craig and Hank said that they would like to see a feasibility study for small-scale organic production, where the producer could show a profit without having another source of income. Gary said,

> I would like to see somebody's balance sheet that this actually works, that it is profitable, that is a viable option. When some person calls wanting to do small-scale organic farming, it is hard for me to say that they should invest money and invest time, without knowing that someone has done it without a whole lot of money sitting somewhere else, and it is just a hobby that might make some money (170-175).

Agents did not feel comfortable encouraging small-scale organic production because they had not experienced a profitable operation within their counties. They claimed that knowing how to help organic growers become profitable would help agents to better support growers.

Conclusions

According to participants, the essence of supporting organic growers is that of an *uneven bridge*. Extension agents were willing to provide support to organic growers; however, they said that organic growers did not reach out to them as frequently as conventional growers and that they experienced difficulties in communicating with organic growers, justifying their low levels of engagement within the organic community. In addition, participants reported not having access to information regarding the economic feasibility of small-scale organic agriculture in the northern region of Georgia. Due to the lack of economic viability studies regarding organic production, and therefore, perceived importance of the organic industry, agents did not feel obligated to support small-scale organic production. To establish productive relationships with organic growers, participants requested more training and access to information concerning the economic viability of small-scale organic agriculture in their region.

Our findings suggest that participants have not fulfilled their *change agent* role in regard to serving the organic community and that the relationship between Extension agents and organic growers was not well established. These findings are consistent with other researchers who reported that Extension agents did not serve organic growers to the same extent as conventional growers (Agunga & Igodan, 2007; Beus & Dunlap, 1992; Crawford et al., 2015; Gailhard et al., 2015; Hall & Rhoades, 2010; Authors, 2019; Pretty & Vodouhe, 1997; Rolling & Pretty, 1997). Furthermore, agents justified their lack of service to the organic community due to the lessened perceived initiative of organic growers to seek information. This finding supports Crawford et al. (2015) who suggested that organic growers did not perceive Extension as a primary source of information; therefore, they did not reach out to Extension to meet their information needs.

Agents described their experiences working with organic growers and reported that organic growers had a strong philosophical ideal regarding environmental responsibility and human well-being. According to the agents, it was challenging to establish a relationship of trust with growers because they felt that Extension was more supportive of conventional practices. Our findings suggest a need to support agents' professional development regarding understanding organic growers' motivation to grow organically and how to effectively communicate with them to build stronger relationships and enhance trust, thus, opening up communication channels.

Agents were willing to support organic growers; however, they needed more professional development on organic agriculture production techniques. Agents reported having limited educational resources regarding organic agriculture and claimed that if they had more training in the topic they would feel more comfortable working with organic growers. They said that Extension would benefit from a greater number of educational programs in organic agriculture and they considered the currently available professional development programs offered by the university as limited. These findings are consistent with Diehl et al. (2018) who claimed that providing contextually relevant information to organic growers is a challenge for Extension because it requires agents to engage in additional professional development that may or may not be offered by their employer. Several agents reported not having access to information regarding the economic feasibility of small-scale organic agriculture, such as budget projections, leading to skepticism that growing organic was a viable enterprise.

The limited educational resources regarding organic practices aligned with skepticism regarding the economic viability of small-scale organic production led to barriers in establishing effective communication channels with organic growers. One participant said he did not think that organic agriculture contributed to the state's overall economy and that only a few people could pay for organic products at the market. Others were skeptical of the economic viability of organic agricultural practices; therefore, said they were not likely to encourage it. These findings are consistent with Beus and Dunlap (1992), who claimed that Extension agents are more inclined to support conventional agriculture. Our findings point to counterproductive perceptions growers and agents have towards each other that results in barriers to communication and an overall lack to service to one agricultural sector in Georgia.

Recommendations

Our findings are consistent with the literature that emphasizes the need to increase collaboration between Extension agents and organic growers through participatory approaches (Nagel, 1997; Pretty & Vodouhe, 1997; Rogers, 2003). To address the barriers identified in this study, we propose a model for building bridges between Extension agents and organic growers that combines elements of the TPB (Ajzen, 1985) and DOI (Rogers, 2003) (see Figure 2).

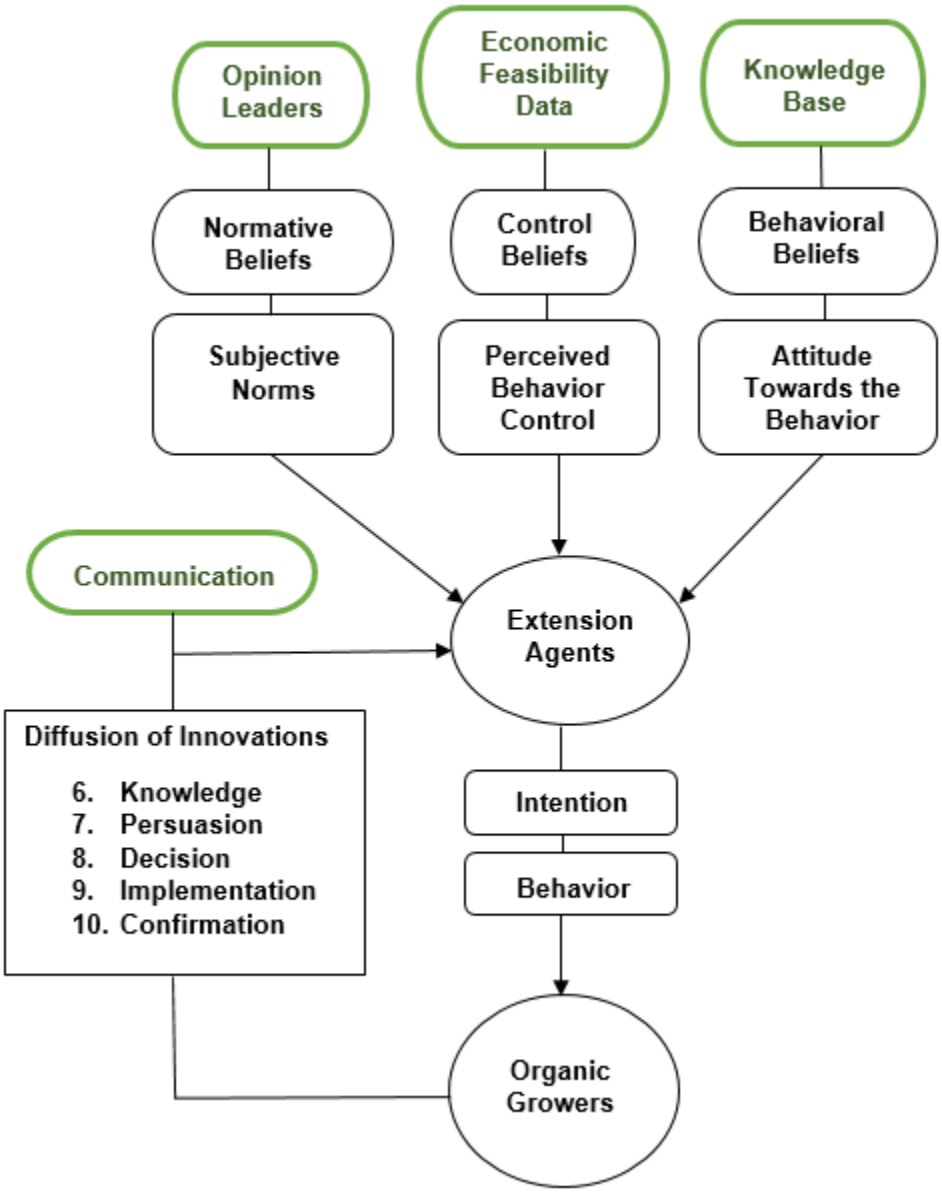

Figure 2. A model for building bridges between Extension agents and organic growers.

To efficiently act as change agents (Rogers, 2003), Extension agents are advised to:

1. *Identify **opinion leaders** within the organic growers' community and build rapport with them.* Participants reported that organic growers did not reach out to them frequently and had little feedback when trying to contact organic growers. This negative feedback loop has an impact in the subjective norms influencing agents' behavior as they thought that organic growers were not interested in receiving support from Extension (***normative beliefs***). Opinion leaders are a potential means for accessing the organic community as they are able to influence other growers informally and facilitate communication between growers and agents. Therefore,

identifying opinion leaders and building rapport with them would likely lead to an increase in the number of organic growers' responding to Extension agent's efforts.

2. *Implement participatory approaches within the organic community to facilitate* ***communication*** *and build rapport with organic growers.* Participants reported it was challenging to establish a trusting relationship with organic growers. This impacted Extension agents' ability to become a formal actor in the diffusion of this innovation as they thought organic growers did not trust them. Agents would benefit from professional development training regarding communication methods to increase trust between the two groups. In addition, agents are advised to develop a better understanding of (a) growers' motivation for growing organically through participatory approaches and (b) how to facilitate change through the innovation-decision process. This would afford agents an opportunity to cultivate interpersonal communication and learn about organic growers' unique situations by creating commonalities between groups (Pretty, 1995).

3. *Develop a thorough* ***knowledge base*** *regarding the principles and practices of organic agriculture to adapt to growers' situations.* Our findings suggest that Extension agents would benefit from more educational programs regarding organic agriculture production techniques. Improving Extension agents' expertise would shift their attitudes toward supporting organic growers as they would have more knowledge of organic agriculture topics. Such programs should be promoted and supported by the university.

4. *Promote the development of* ***economic feasibility data*** *regarding the cost of implementing and managing organic agricultural systems through economic studies.* Extension agents reported being skeptical of the economic viability of small-scale organic production, which in turn, influenced the time they spent supporting small-scale organic agriculture. Agricultural leaders are encouraged to further investigate the economic feasibility of small-scale organic production and develop accessible resources that inform financial decisions.

Implications, Limitations, and Directions for Future Research

The research reported here provides practical implications for increasing Extension agents' professional development required for better serving organic growers. By building stronger relationships between Extension agents and organic growers, there is an opportunity to increase Extension support to the organic community, regardless of financial status of farming operations.

The findings of this qualitative study are not generalizable; however, they do offer insights into what agents' experienced while working with organic growers and how these experiences informed recommendations for improving Extension support to organic growers. It is important to note that this study was limited by a small geographic region in the U.S.; therefore, further research is warranted to determine which Extension educational approaches should be adopted in other regions. Additionally, snowball sampling does not provide a representative sample of a population, resulting in a biased sample. Also, future research should test our model for building

bridges between Extension agents and organic growers to determine if the model has generalizability to other situations and whether this approach to Extension promotes the implementation of sustainable food production systems by supporting organic growers to stay in business.

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Appendix

Interview Protocol

Introduction of the researcher, review IRB and confirm consent to participate.
Date, name, professional position:

The purpose of this inquiry is to describe your perceptions and experiences in working with organic producers. The findings will cumulate in creating a model for an Extension program to support organic agriculture production among Extension agents.

1. Perceptions about organic agriculture
a. How do you feel about organic agriculture?
b. Do you think that organic production contributes to the overall economy of Georgia Agriculture?

2. Experience in organic agriculture
a. What would you say that is your knowledge level in regard to organic agriculture?
b. Have you participate in courses/trainings about organic agriculture?
c. Have you provided assistance to an organic producer? If yes, could you please describe this experience?

3. The Barriers
a. Have you ever experienced any difficulties when working with an organic producer?
b. In your opinion, what are the main challenges and barriers faced by organic producers in Georgia?

4. Wrap up
a. Whom should I talk to in order to learn more? (Snowball sampling)
b. Do you have any questions for me?
c. Thank you for your time.

Developing Conflict Management Capacity: A Longitudinal Leadership Development Program Evaluation

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Abstract

The cost of conflict avoidance and mismanagement can be detrimental to organizational environments. Thus, the need for individuals capable of managing conflict effectively is a vital and necessary leadership skillset, specifically within higher education. The purpose of this study was to examine if participation in the LEAD21 leadership development program, a national leadership program for faculty emerging as leaders in the land-grant university system, changed participant levels of conflict management capacity. The longitudinal analysis included comparisons across members of four classes in the LEAD21 program, as well as the aggregated data from all four years. Results indicated that the overall level of conflict management capacity rose by an average of 15.1%. Agricultural leadership educators can use the results to inform leadership education initiatives while also using the presented Conflict Management Scale to measure such initiatives. Study expansions, implications, and recommendations are discussed.

Keywords: managing conflict, leadership development, evaluation

Introduction

"[N]othing determines our success in life as much as our ability to work with other people. And nothing is more messy in relationships than dealing with conflict" (Maxwell, 2013, para 2). This quote from John Maxwell is the impetus behind some of Maxwell's (2013) teaching resources such as his "10 Commandments of Handling Conflict." A plethora of books about conflict are available such as Patterson, Switzler, Grenny, and McMillan's (2012) popular narrative on *Crucial Conversations: Tools for Talking When Stakes Are High*. Books that do not solely focus on conflict still touch on its existence indirectly. For example, Covey (1989) expounds upon a win-win mentality and the act of seeking first to understand before being understood in *The 7 Habits of Highly Effective People*. Collins (2001) paints a picture of the benefits of healthy conflict in *Good to Great* as he discusses how brutal honesty and spirited debates that are seemingly conflictive can be energizing, innovative, and collaborative. Additionally, countless websites and videos exist about what conflict is, why it begins, where it begins, how people should respond to it, how people actually respond to it, and the advantages and disadvantages of its existence. A simple search using the phrase *conflict management* in a Division I research university library database results in 197,257 results and a similar search using Google results in an astounding 323,000,000 results.

Conflict occurs in any industry and environment where there is interaction among humans. Though it can involve difficult conversations, emotion management, and the perception of negative feedback (Berger, 2017), some agree with the sentiment that, "Conflict is neither good

nor bad. Properly managed, it is absolutely vital" (Berger, 2017, para 1). Rather than managing it, sometimes the choice is made to shun, ignore, or passive-aggressively handle conflict (Berger, 2017; Carmichael & Gallo, 2015; Frost, n.d.; Overton & Lowry, 2013; Suarez, 2016), stemming from a discomfort which is a "natural human tendency" according to the Society for Human Resource Management (SHRM) (Lytle, 2015, para 2). However, this tendency can be costly. A global research study found that 0.9 to 3.3 hours are spent addressing conflict in the workplace per week (Overton & Lowry, 2013). Regarding how conflict indirectly affects other areas of an organization, SHRM reiterates that, "Every unaddressed conflict wastes about eight hours of company time in gossip and other unproductive activities…" (Lytle, 2015, para 5). A "…calculated expense [of conflict] based on average hourly earnings in 2008 was $359 billion in lost time" (Overton & Lowry, 2013, p. 260). Other costs of conflict avoidance or conflict mismanagement include employee absenteeism and turnover (Overton & Lowry, 2013), strained relationships, decreased productivity, and low morale (Frost, n.d.). Such costs may be the result of conflicting priorities, perspectives, assumptions and preferences (Lytle, 2015), along with poor communication, differences in personality, role confusion, stress, and ineffective leadership (Overton & Lowry, 2013). Lytle (2015) suggests that even seemingly small conflicts should be taken seriously because they can often relate to larger issues.

Higher education, and the land-grant university system (LGUS) in particular, is not immune to conflict and the need to have mechanisms in place to address it. In fact, Suarez (2016) asserts that, "to be ready to lead in higher education, you must understand how to deal with conflict…" (para 1). This sentiment is echoed by the existence of an International Journal of Conflict Management. Additionally, HigherEdJobs.com, a website frequented by higher education faculty and staff, speaks specifically about the important role leadership plays in helping with workplace conflict. HigherEdJobs.com contributor Daniel Griffith (2016) asserts that, "…managers must take responsibility for helping employees develop the capability to address their conflict situations on their own whenever possible" (para 1). Griffith (2016) goes on to propose that managers and leaders can do this by coaching employees and helping them take ownership of the situation as well as possible solutions. However, higher education leaders may not automatically know how to coach others through conflict management if they, themselves, have not been intentionally developed in this area. Griffith (2016) recognizes that not everyone may have the capacity to help with conflict management and encourages leaders to reflect on the following question before helping others: "Are you capable of managing your own conflicts so that you can serve as a credible role model for others?" Agricultural leadership education can assist current and future employees grow in the area of answering such a question. As a key leadership skill (Suarez, 2016), conflict resolution should be expected (Suarez, 2016) and can be improved upon through leadership development initiatives (Overton & Lowry, 2013).

Benefits of building upon conflict management and resolution skills are numerous. Those who have such skills can help foster stronger relationships, respect, collaboration (Frost, n.d.), and more effective communication (Mitchell, 2019) in the workplace. These skills also increase problem solving, which can aid in the flow of productivity and efficiency (Frost, n.d.). When an organization actively practices conflict management, morale is not negatively affected because tension does not build up as employees learn to view situations with empathy and from difference perspectives. Also, situations are not just seen more holistically, but more possibilities and solutions are thought of for addressing situations (Frost, n.d.). Deemed as a natural (Frost,

n.d.; Lytle, 2015), normal, and healthy occurrence (Lytle, 2015) when managed properly, conflict management can be a key ingredient to the success of an organization (Lytle, 2015). "Experts have found that the most effective teams are those in which members feel safe enough to disagree with one another. A culture where dissent is allowed, or even encouraged, can spur innovation, diversity of thought and better decision-making" (Lytle, 2015, para 8; Overton & Lowry, 2013).

The study at hand evaluates LEAD21's ability to increase conflict management capacity in LGUS leaders. LEAD21 is a national leadership development program for leaders associated with the National Institute of Food and Agriculture (NIFA) and colleges of agricultural, environmental, and human sciences. The program's influence on change leadership has already been evaluated (Lamm, Sapp, & Lamm, 2018); thus, not only does this study expound upon previous research, but it also aligns with the 2016-2020 American Association for Agricultural Education (AAAE) National Research Agenda (Roberts, Harder, & Brashears, 2016). Priority area three of the research agenda calls for agricultural education to continue developing a, "sufficient scientific and professional workforce that addresses the challenges of the 21st century" (Roberts et al., 2016, p. 9). Therefore, conflict, and the teaching of how to manage it, can be part of a larger conversation about leadership and education. Maintaining how information about conflict management curriculum is created and shared should be infused with a process of review and evaluation. As evaluation of educational outcomes continues to increase in value, so will the competency of conflict management. This skill will continue to be needed by recipients of agricultural education and those who trust agricultural educators to help them become more career-ready, soft-skilled-equipped professionals in an increasingly connected and complex workforce. In addition to "[a]gricultural education research [seeking] to connect its educational programs to 21st century skills and communication competencies" (Stripling & Ricketts, 2016, p. 32), conflict management research can also be used to aid AAAE's sixth research priority area geared toward having "vibrant, resilient communities" (Roberts et al., 2016, p. 9). Such research has the potential to enhance community relations and inform the community-based leadership initiatives influenced by agricultural educational programs (Graham, Arnold, & Jayaratne, 2016).

Theoretical Framework

Among different types of conflict that are discussed in literature, task, process, status, and relationship conflict have been identified. Task conflict, also called task-led conflict, is a disagreement over tasks and the decisions that should be made about those goals and tasks (Mitchell, 2019). Task conflict can be further nuanced into routine conflict over simple tasks or procedural conflict over more complex issues (Mitchell, 2019). While task conflict is a disagreement over *what* is or is not being done (Carmichael & Gallo, 2015), process conflict results from disagreement over *how* something should be accomplished. Even if the *what* and *how* of goals and tasks are clear, status conflict, disagreement about *who* is in charge, can still exist (Carmichael & Gallo, 2015). Either one of the above conflict types can be associated with (Overton & Lowry, 2013), or even mislabeled as (Carmichael & Gallo, 2015), relationship conflict, also known as interpersonal or emotional conflict (Mitchell, 2019). Relationship conflict occurs when a personal disagreement causes interpersonal conflict in which employees view "themselves as opposed to one another" (Mitchell, 2019, para 3). Sources of this conflict can be

personality differences or misunderstandings, making relationship conflict more stressful than other types of conflict and more difficult to manage because of the emotions and personal preferences involved (Mitchell, 2019). Overall, having knowledge of different types of conflict helps one at least, "have a starting point at which to resolve [conflict]" (Carmichael & Gallo, 2015, para 18).

No matter the type of conflict, models aimed at addressing difficult situations have the following fundamental principles in common (Overton & Lowry, 2013):

> 1. Conflict is inevitable and…both positive and negative consequences may occur depending on how the conflict is managed.
> 2. The results are likely to be better with active engagement rather than avoidance.
> 3. People must be motivated to address conflict.
> 4. Behavioral, cognitive, and emotional skills can be acquired.
> 5. Emotional skills require self-awareness.
> 6. The environment must be neutral and feel safe. (p. 260)

For effectiveness and capacity expansion, it is the responsibility of a leader to know, practice, and coach others in implementing the aforementioned principles (Griffith, 2016). "There is considerable evidence that when leaders anticipate or encounter disagreement, such conversations are likely to be stressful and ineffective" (Robinson, Sinnema, & Le Fevre, 2014, p. 260). However, conflict management capacity can be learned and developed (Overton & Lowry, 2013) and it is vital as, "Highly effective leaders [are recognized as those who] identify, understand and develop swift and smart resolutions to workplace conflicts" (Berger, 2017). Leaders are expected to be self-aware, know their positionality in a situation, accurately judge how severe a conflict is, and help create safe and respectful environments (Overton & Lowry, 2013). Additionally, conflict-savvy leaders should have a type of interpersonal effectiveness (Robinson et al., 2014), that lends to negotiation skills, the questioning of assumptions, open-mindedness, effective expression of viewpoints, positive relationships, and behavior change. According to Robinson et al. (2014), there is evidence that leadership development curriculum can aid leaders in developing such strategies. A willingness to learn, coupled with a leadership education focus "on leaders' theories-in-use, including both their behavior and the reasoning that explains it," can make a positive difference on a leader's personal development and professional practice (Robinson et al, 2014, p. 290).

Purpose & Research Objectives

The purpose of this study was to examine if participation in the LEAD21 leadership development program affected participants perceived levels of conflict management. The study was driven by the following research objectives:

Describe the participants' levels of conflict management prior to completing LEAD21.

Describe the participants' levels of conflict management after completing LEAD21.

Determine if there is a difference in level of conflict management prior to completing LEAD21 and after completing LEAD21.

Methods

Based on the purpose and objectives of the study, a descriptive and causal-comparative research design was employed. The causal-comparative methodology was selected based on the hypothesis that participation in the LEAD21 leadership development program would be associated with differences in reported levels of conflict management (Kirk, 1995; Lamm, Sapp, & Lamm, 2016). Levels of perceived conflict management were measured using a pre-test and post-test approach to quantify potential change (Rossi, Lipsey, & Freeman, 2004; Brown & Terry, 2013).

The population for this study were participants in the LEAD21 leadership development program during four classes: 2013-14, 2014-15, 2015-16, and 2016-17. This population was selected as it represented an audience that had participated in a similar leadership development program curriculum and had a consistent pre-test and post-test evaluation administered across classes. Furthermore, the audience and methodology had been previously established within the literature (e.g. Lamm et al., 2018). Within the population of interest, individuals were affiliated with the LGUS system, either as employees of LGUS institutions such as 1862 and 1890 institutions, through affiliated organizations such as the USDA NIFA, or from Non-Land-Grant Agricultural and Renewable Resources Universities (NARRU). Specific demographic data of the population are presented in Table 1.

Table 1
Demographics and Institutional Affiliation of Population

	2013-14		2014-15		2015-16		2016-17		Overall Combined 2013-17	
Characteristic	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Sex										
Male	52	59.1	42	51.2	44	51.8	47	55.3	185	54.4
Female	36	40.9	40	48.8	41	48.2	38	44.7	155	45.6
Institution										
1862 Institut.	71	80.5	69	84.1	66	77.6	68	80.0	274	80.4
Minority Serving Institut.	12	13.8	11	13.4	17	20.0	11	13.0	51	15.0
NIFA/Other	5	5.7	3	3.7	2	2.4	6	7.0	16	4.6

Data for the research were collected using a researcher-developed scale that was used as part of a larger evaluation of the program. A researcher-developed scale was deemed to be more appropriate than existing conflict management scales (e.g., Jehn, 1995) based on the specific learning objectives for the program, as well as the unique organizational context participants represent. The scale, named The Conflict Management Scale, was composed of six items. The six items included: *I know how to manage conflict between myself and others, I have strong conflict management skills, I am able to identify the root causes of conflict, I know how to*

engage others in difficult situations to manage conflict, I know how to engage others in difficult conversations to strengthen our relationship, and *I am aware of the costs associated with conflict in a group*. Individuals indicated their response on a five-point, Likert-type scale. Possible responses to each item included: 1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neutral*, 4 – *Agree*, 5 – *Strongly Agree*. A Managing Conflict Scale score was calculated by summing each of the five-statement scores and dividing by five.

The items were reviewed by a panel of experts for content and face validity (Crocker & Algina, 1986). Reliability and internal structure validity was analyzed and found to be adequate based on existing social science standards for internal consistency (Cortina, 1993; Schmitt, 1996; Streiner, 2003). Internal consistency was calculated and represented by Cronbach alpha. When all four classes were combined, the overall Cronbach alpha was calculated to be 0.83 for both the pre-test and post-test. Cronbach alpha was also calculated for each class under both pre-test and post-test conditions; values ranged from 0.81 to 0.85 (Table 2).

Table 2
Internal Consistency Reliability

Item	Pre-test	Post-test
	α	α
Overall Combined (2013-17)	0.83	0.83
2013-14	0.81	0.84
2014-15	0.83	0.85
2015-16	0.84	0.81
2016-17	0.83	0.82

A census of all 337 participants representing the four classes from 2013-14, 2014-15, 2015-16, and 2016-17 was conducted. The program consists of three seminars conducted over the course of nine months as well as periodic check-in calls and activities between seminars. The seminars range in length from four to six days. The evaluation consists of a pre-test before the start of programming, a pre-session survey, intra-session surveys, a post-session survey, and a post-test given at the end of the program experience. The pre-test and post-test are administered using an online survey tool, are distributed according to the recommendations of the Tailored Design Method (Dillman, Smyth, & Christian, 2008), and included a pre-notice message, an invitation to complete the survey, as well as a series of at least two reminders.

Among respondents, only those that had both a valid pre-test and valid post-test score were analyzed (Agresti & Finlay, 2009); a total of 262 paired responses were analyzed. Individual pre-test and post-test response rates are provided in Table 3. Response rates were considered acceptable based on established social science and online survey data collection standards within the literature (Baruch & Holtom, 2008).

Table 3
Response Rates

Item	Pre-test		Post-test	
	n	%	*n*	%
Overall Combined (2013-17)	280	83.1	275	81.6

2013-14	81	95.3	75	88.2
2014-15	69	84.1	71	83.5
2015-16	71	83.5	68	82.9
2016-17	59	69.4	61	71.8

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 25. Objectives one and two were analyzed using descriptive statistics as well as a one-way between subjects ANOVA to compare effect of group on level of conflict management based on class conditions. Objective three was analyzed using a paired-samples *t*-test (Ary, Jacobs, Sorensen, & Razavieh, 2010).

Results

The Conflict Management Scale was used to address the research purpose and objectives. The first objective, level of conflict management prior to completing the LEAD21 program, was calculated based on respondent results to the pre-test scale. The overall Conflict Management Scale had a minimum score of 1.67 and a maximum score of 5.00 ($M = 3.50$, $SD = .58$). The class from 2014-15 had the highest conflict management mean pre-test score. Results of the one-way between subjects ANOVA conducted to compare the effect of the group on level of conflict management, based on class conditions, indicated there was not a significant effect of the group on conflict management for the class pre-test conditions [$F(3, 279) = 1.61$, $p = .19$]. The pre-test mean, standard deviation, minimum, maximum, and combined conflict management scores for all four individual classes, as well as the overall combination of classes, are presented in Table 4.

Table 4
Conflict Management Scale Scores – Pre-test

	n	*M*	*SD*	*Min*	*Max*
Overall Combined (2013-17)	280	3.50	0.58	1.67	5.00
2013-14	81	3.52	0.59	2.00	5.00
2014-15	69	3.62	0.55	2.00	5.00
2015-16	71	3.42	0.59	1.67	4.67
2016-17	59	3.44	0.60	2.00	4.83

The second objective, level of conflict management after completing the LEAD21 program, was calculated based on respondent results to the post-test scale. The overall combined Conflict Management Scale had a minimum score of 2.67 and a maximum score of 5.00 ($M = 4.04$, $SD = .45$). The class from 2013-14 had the highest conflict management mean post-test score. A one-way between subjects ANOVA was conducted to compare the effect of the group on level of conflict management based on class conditions. There was not a significant effect of the group on conflict management for the class post-test conditions [$F(3, 274) = 0.50$, $p = .69$]. The post-test mean, standard deviation, minimum, maximum, and combined conflict management scores for all four individual classes, as well as the overall combination of classes, are presented in Table 5.

Table 5
Conflict Management Scale Scores – Post-test

	n	*M*	*SD*	*Min*	*Max*
Overall Combined (2013-17)	275	4.04	0.45	2.67	5.00
2013-14	75	4.09	0.48	3.00	5.00
2014-15	71	4.04	0.48	2.83	5.00
2015-16	68	4.00	0.43	2.67	5.00
2016-17	61	4.04	0.43	2.83	5.00

The third objective, to determine if there was a difference in level of conflict management prior to completing LEAD21 and after completing LEAD21, was analyzed based on comparing respondents' pre-test scale scores to their post-test scale scores. Specifically, a paired-samples t-test was conducted to compare the mean levels of conflict management in pre-test and post-test conditions. A statistically significant difference in the scores for the overall combined conflict management analysis in pre-test ($M = 3.51$, $SD = .58$) and post-test ($M = 4.04$, $SD = .45$) conditions; [$t(261) = 14.63$, $p < .001$] was observed. The statistically significant results between pre-test and post-test conditions were further observed across all four individual classes. The overall increase from pre-test to post-test conditions for the overall combined program was calculated at 15.1%. The smallest observed difference was in class 2014-15 (12.7%), followed by 2013-14 (14.6%), and 2015-16 (16.7%). Class 2016-17 had the largest observed difference (17.2%). Additional results and analysis are presented in Table 6.

Table 6
Descriptive Statistics and t-test Results for Conflict Management Pre-test and Post-test

	Pre-test		Post-test						
Outcome	*M*	*SD*	*M*	*SD*	*n*	95% CI for Mean Difference	*t*	*p*	*df*
Overall Combined (2013-17)	3.51	0.58	4.04	0.45	262	0.46, 0.61	14.63	.000	261
2013-14	3.56	0.59	4.08	0.45	71	0.40, 0.65	8.18	.000	70
2014-15	3.61	0.56	4.07	0.48	65	0.32, 0.61	6.42	.000	64
2015-16	3.42	0.56	3.99	0.43	67	0.43, 0.71	8.12	.000	66
2016-17	3.44	0.60	4.03	0.43	59	0.41, 0.77	6.62	.000	58

Conclusions, Implications, Limitations, and Recommendations

Conflict will always be present and, "although [it] cannot be avoided, it can be managed" in ways that make leaders, and thus whole organizations, better (Overton & Lowry, 2013, p. 260). This sentiment is echoed in countless popular media and academic resources pertaining to the world of organizations. Human interaction, effective leadership, and the accomplishment of organizational goals are ubiquitous with conflict management and resolution skills. A void of conflict management capacity can prove detrimental on both an individual and collective scale as misunderstanding and stress can be costly to morale, relationships, health, personnel management, and productivity (Frost, n.d.; Overton & Lowry, 2013). A desire to prevent such

consequences is confirmed by the trend of workplaces implementing conflict management coaching, mediation processes, and ombudsman conflict representatives (Brubaker, Noble, Fincher, Park, & Press, 2014; Griffith, 2016). According to Brubaker et al. (2014), leadership is a vital component to making any type of conflict management implementation successful. In fact:

> [O]ne of the fastest-growing trends in conflict management coaching appears to be for leaders in organizations—a main objective being to strengthen their conflict competence. Successful organizational interventions correlate with the ability of organizational leaders to manage themselves and their conflicts well... (Brubaker et al., 2014, p. 380)

The true pre-test, post-test study at hand highlights LEAD21 as an empirically-tested example of how leadership development can build conflict competence and can aid leaders in addressing different types of concurrent conflict, such as situations related to task, process, status, and relationship conflict (Carmichael & Gallo, 2015; Mitchell, 2019; Overton & Lowry, 2013). Higher education, and specifically the LGUS, is not exempt to the costs conflict avoidance and mismanagement can bring. Thus, the study underscored how leadership development focused on the topic of conflict management within the context of the LGUS can equip leaders for the inevitable experience of conflict (Brubaker et al., 2014; Overton & Lowry, 2013) and can thus strengthen the operation and mission of the LGUS. With results indicating conflict management capacity increases from 12.7% to 17.2% for individual classes and 15.1% overall, this study also relates to the theoretical underpinnings of helping leaders have better results with conflict through active engagement, motivation, self-awareness, and acquired skills associated with one's behavior, thinking, and emotions (Overton & Lowry, 2013). As leaders grow in these areas, they are better able to coach followers in growing in the same areas (Griffith, 2016), creating a type of conflict management capacity domino-effect that any organization would deem beneficial. Results complement Robinson et al.'s (2014) evidence that leadership development curriculum does help leaders acquire and develop skills associated with effective leadership.

Effective leaders are influential in creating safe environments (Overton & Lowry, 2013) where conflict can be a platform for learning opportunities because of intentional and constructive trust-building and problem-solving strategies (The Complete Leader, n.d.). Therefore, the continued inclusion and evaluation of conflict management in agricultural leadership education is vital. The Conflict Management Scale introduced in this study can be a resource for agricultural educators and other facilitators of leadership development programs that seek to statistically measure perceived differences in how participants comprehend conflict management curriculum. In addition to the awareness and importance of such curriculum, implications for agricultural education can extend from the classroom to conflict resolution strategies tailored for community initiatives (Graham et al., 2016). Furthermore, literature confirms that the management of conflict is related to the management of change (Brubaker et al., 2014), which connects the skillset of change leadership that LEAD21 develops in leaders (Lamm et al., 2018) with the skillset of conflict management that is also proven to be developed by the program, as evidenced by this study. Therefore, an implication for agricultural leadership education practitioners would be to strengthen conflict management capacity curriculum and development initiatives as a complement to change leadership education, helping students and leaders become even more adaptive and prepared in complex leadership environments.

The opportunity to study LEAD21 cohorts over a span of four years and to show a consistent increase on a specific content area such as conflict management is a strength of the study. However, one could argue that using an original instrument with six items is a limitation to the study's replicability. Though the reasoning behind creating an instrument was offered, it is helpful to note that this study may be expounded upon by using alternative instruments to explore what results occur in the future. At the same time, we also offer expansion of the study by encouraging other leadership development programs to engage in intentional evaluation of actual impact on participants' conflict management development by using The Conflict Management Scale to gather and analyze results.

An expansion of this study relates to the trend of leaders wanting and needing to address conflict proactively, going "from intervention to prevention" (Brubaker et al., 2014, p. 381). Though conflict is expected to happen, equipping leaders to be sensitive to the antecedents of conflict deepens their conflict management capacity and expands leadership education focused on this topic. With the foundation of the importance of conflict management capacity and methods to help leaders develop it, recommendations for further research encourage scholars to delve into how to teach leaders to anticipate conflict and empirically show the evidence of doing so. Lastly, though LEAD21 participants attended three seminars lasting four to six days each, results of this study indicate that statistically significant change in self-perceived conflict management capacity can occur despite a relatively short timeline. Not only does this observation allude to the influence of leadership education and implications of evaluative efforts, but it also lends to opportunities of future research exploring if differences among various intervention timelines exist. Overall, continued evaluative efforts of leadership education and conflict management capacity are needed for every leadership context and for the sustainability of the LGUS and healthy organizational environments worldwide.

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The Development and Validation of a Community Diagnostics Scale Based in the Community Capitals Framework

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Abstract

The precarious state of rural America and the enduring challenges confronting residents in small communities are themes familiar to both journalists and researchers. This trend is juxtaposed with the need for vibrant, resilient communities, including those within rural areas. The Community Capitals Framework (CCF) has been established in an attempt to identify the human and material capitals associated with a community. Despite the use of the CCF within the literature there was a notable gap relating to the effective measurement and quantification of capitals within a community. The present study presents the development and validation results of a community capital scale intended to provide a measure of a community's social, human, cultural, political, natural, and built-financial capital. The proposed scale was found to have robust internal structural characteristics at both the capital and overall level. Results associated with six subject counties were able to identify statistically significant differences between groups.

Introduction

The precarious state of rural America and the enduring challenges confronting residents in small communities are themes familiar to both journalists and researchers. Journalistic account of rural life throughout the country have contributed to the prevailing narrative that many nonmetropolitan areas are on the brink of socioeconomic collapse. Prominent columnists have asserted that rural communities are witnessing an intractable economic decline that has given rise to a declining and aging population, increased joblessness, and so-called "deaths of despair" due to drugs, alcohol, and suicide (Beck, 2015; Egan, 2002; Krugman, 2019). Other reports have detailed the considerable economic and demographic forces aligned against rural Americans and, perhaps more disconcerting, the paucity of feasible policy solutions directed at the underlying problems (Chinni, 2017; Porter, 2018; Shah, 2014; Simon & Jones 2017; Truong, 2018). In a particularly terse appraisal, a 2017 Wall Street Journal headline declared that "Rural America is the New 'Inner City'" (Adamy & Overberg 2017). An especially discouraging editorial assessment of rural communities asserted that "many towns with a rich history and strong community pride are already dead; their citizens just don't know it yet" (Leonard, 2017).

These portrayals suggest that rural regions of the country are experiencing a significant, and perhaps irreversible, decline in resources resulting from systemic challenges. Nonmetropolitan areas are thought to lack the necessary resources to adequately confront the existential challenges they face. There is also a considerable amount of empirical research supporting the notion that small communities throughout the country are in sustained economic and demographic decline. In the midst of such empirical conclusions is the loss of the "local school," which inevitably results in loss of local identity and a significant decline in the next generation (Roberts, Harder, & Brashears, 2016, p. 50).

Not all media or scholarly accounts of rural America are as uniformly pessimistic, however. Some reports have noted that misfortunes imputed to rural communities are due, at least in part, to urbanization processes and the manner in which rural areas are classified. When a rural county experiences significant population growth due to a positive change in local economic conditions (e.g., increased employment opportunities) or some other development, it ceases to be a rural county and is therefore not counted among the comparatively distressed areas that remain (Dam, 2019; Goetz, Partridge, & Stephens 2018; Johnson, Lichter, & Cromartie 2018). This ensures that the least prosperous counties continue to be classified as rural, thus skewing the social and economic characterizations of nonmetropolitan areas. As Goetz et al. (2018, p. 100) point out, "the validity of the notion that rural America is in decline depends on the definition of rural." They note that much of rural America's poor performance relative to metropolitan areas is due to reclassification. Removing thriving communities from the rural classification seems to overemphasize the problems of those that remain.

Although there is a question of degree when it comes to the problems facing rural Americans, there is some consensus that many nonmetropolitan communities are facing a multitude of serious challenges. These issues do not exist as distinct and unrelated problems. For instance, one cannot focus exclusively on depopulation without also confronting economic decline and lack of employment opportunities, deteriorating social bonds, cultural atrophy, decaying infrastructure, and so on. As Fey, Bregendahl, and Flora (2006) note, rural communities are systems in which each problem is linked, and managing these issues requires a holistic approach. Communities that recognize this are seeking solutions that address all aspects of local life (Fey et al., 2006). Towns and regions that focus on finding solutions to narrowly considered problems are likely to find that their efforts are merely palliative as they do not address the decidedly complex circumstances that precipitate many local challenges. A systems approach to problems facing rural communities allows for issue contextualization and the discovery of issue linkages, which serve to facilitate strategy diversification and more efficient mobilization of appropriate resources.

Priority area six of the 2016-2020 American Association for Agricultural Education (AAAE) National Research Agenda (Roberts et al., 2016) focuses on the need of for vibrant, resilient communities. Despite the known challenges associated with communities, and rural communities in particular (e.g. Krugman, 2019), there remains a dearth of tools available to inform the question, "how do agricultural leadership, education, and communication teaching, research, and extension programs impact local communities?" (p. 51). For example, McKim, Raven, Palmer, and McFarland (2019) recommend the community is an important context for education and that educational interventions should acknowledge "changes within the community (e.g. community sustainability, community vitality, community-school relationship)" (p. 182). However, the ability to quantify and track impact is limited. The intent of the present work is to address this gap by providing a valid and reliable tool for agricultural leadership, education, communication and associated professionals to use to examine communities and the impact of the efforts accordingly.

Conceptual Framework

The Community Capitals Framework (CCF) is built upon the notion that all communities possess assets that can be invested to generate new resources, or capital (Anderson 2014; Emery, Fey, & Flora 2006; Flora, Flora, & Gasteyer 2016). Inherent within the framework is the recognition that each community is endowed with different resources and, thus, different types of capital (Magis, 2010). Emery and Flora (2006) summarize the framework as offering "a way to analyze community and economic development efforts from a systems perspective by identifying the assets in each capital (stock), the types of capital invested (flow), the interaction among the capitals, and the resulting impacts across capitals" (p. 20). The CCF, then, is an analytical instrument designed to comprehensively organize and evaluate information related to community development efforts and the capitals leveraged in pursuit of those endeavors (Pigg, Gasteyer, Martin, Keating, & Apaliyah, 2013).

The CCF began as an outgrowth of the Sustainable Livelihoods Approach (SLA) to economic development, which is an analytical tool designed to address poverty at the household level. Developed in the 1980s, the SLA represents an effort to comprehensively examine the factors and circumstances that affect households, the resources available to them, and the challenges they face as they employ livelihood strategies (Gutierrez-Montes, Emery, & Fernandez-Baca, 2009). The SLA evaluates five household capitals (human, social, natural, physical, and financial) while promoting goals such as food security, improved health, greater income, general improvement in household and community well-being, and sustainable management of natural resources (Gutierrez-Montes et al., 2009). The SLA and its principal goals constitute the foundation of the Community Capitals Framework.

The CCF is organized around seven community capitals, which can be divided into two broad groups: *human capitals* and *material capitals* (Emery & Flora, 2006; Flora, Flora, & Gasteyer, 2016; Gutierrez-Montes et al., 2009). The human, or intangible, capitals are comprised of the following: social, human, cultural, and political. The material, or tangible, capitals are natural, financial, and built. Regardless of grouping, each of these community resources is related to the others in significant and meaningful ways. To provide some insight into the framework design, however, we will isolate and define each of the capitals.

Human Capitals

Social capital is perhaps the most widely examined resource within the CCF, largely due to the widespread impact of Robert Putnam's (1995a, 1995b, 2000; Putnam, Leonardi, & Nanetti, 1993) thesis concerning the breakdown of community and civil society. He defines social capital in terms of social organization components, such as networks, norms and trust, that enable individuals and groups to cooperate with each other and coordinate their activities to more effectively work toward shared objectives (Putnam, 1995a, 1995b). Putnam maintains that communities with high levels of social capital provide residents with a higher quality of life by enabling robust networks of civic engagement. These networks nurture social trust, promote acceptance of conventions related to reciprocity, and facilitate collective action (Putnam, 1995a). This view comports with Coleman's (1988) assertion that groups with substantial social

capital—characterized by the trustworthiness and trust of individual members—will achieve more favorable outcomes than groups lacking social capital.

Human capital refers to the abilities, skills, knowledge, education, self-esteem, and health of individual community members (Becker, 1962, 1993; Schultz, 1961). It can also denote the "characteristics and potential of individuals who are determined by the intersection of nature (genetics) and nurture (social interactions and the environment)" (Flint, 2010, p. 49). This type of capital enables individuals to identify and access currently available resources (internal and external) in order to improve their communities (Emery et al., 2006; Emery & Flora 2006; Flora et al., 2016).

Cultural capital has been described in a number of ways. Perhaps the most widely known and accepted delineation was provided by Bourdieu (2018), who asserted that cultural capital exists in three forms: the embodied state, the objectified state, and the institutionalized state. The embodied state denotes an individual's innate intellectual and physical qualities, while the objectified state refers to tangible cultural objects (e.g., books), which are manifestations of theoretical processes and advancements. The institutionalized state is a form of objectification; it refers to cultural capital that is formally sanctioned or recognized by an authoritative institution, such as academic credentials. These various states result in certain individuals obtaining higher cultural status, determining "what voices are heard and listened to, which voices have influence in what areas, and how creativity, innovation, and influence emerge and are nurtured" (Emery & Flora, 2006, p. 21).

Political capital is characterized by the ability of a group or community to transmute norms and values into rules and regulations that determine the distribution of resources (Flora et al., 2016). According to Turner (1999), the amalgamation of social and economic (financial) capital generates political capital. She contends that within the context of community development, political capital binds together community building, government resources, and private financial contributions. Turner (1999) also asserts that political capital influences the capacity to specify and pursue interests, which ultimately gives rise to self-directed decisions and actions. Flint (2010) states that political capital is the ability of a group or community to influence rules and regulations and the enforcement of those regulations that decide the distribution of resources. Put simply, political capital can be understood as increased community and individual capacities for control and self-determination (Flint, 2010).

Material Capitals

Natural capital provides the foundation for all other forms of capital (Flora et al., 2016). The term generally refers to a community's natural resources and amenities, such as local climate and weather, local geography, physical attributes, material beauty, and quality of the soil, surrounding air, and local sources of water (Emery & Flora, 2006; Flora et al., 2016). It can generate potential opportunities for communities and their residents, but it can also limit human activities. The resources that comprise natural capital influence human behavior but are also shaped by human pursuits and actions (Flint, 2010). According to ecological economists, natural capital can be divided into two major categories: renewable resources (e.g., ecosystems) and non-renewable resources such as oil, coal, and natural gas.

Financial capital is considered by some to be the dominant form of capital because it is perhaps the easiest to measure, resulting in a tendency to characterize other capitals in financial terms (Flint, 2010). This type of capital is perhaps best described in terms of availability of financial resources to invest in the community for the purposes of building capacities, supporting business development, and accumulating wealth (Emery & Flora, 2006). These resources take many forms, including taxes, fees, savings, loans, and credit (Flora et al., 2016). Fair distribution of financial resources results in a diverse and healthy local economy (Flint, 2010).

Built capital refers to manufactured infrastructure that supports the activities associated with the other forms of capital (Emery & Flora, 2006; Flint, 2010). These resources take various forms, including roads, bridges, factories, railroads, and information technologies (Flora et al., 2016). While generally a positive force in terms of implementing community development strategies, built capital can negatively affect the other capitals when potentially adverse consequences are ignored (Flora et al., 2016).

Community Capitals Framework: Empirical and Theoretical Insights

There is a growing body of literature concerning the application of the Community Capitals Framework. This literature ranges from further delineation and theoretical development of the framework to cases demonstrating its utilization within community development efforts and other endeavors. The CCF has been employed throughout various disciplines in multiple settings, including tourism (Duffy, Kline, Swanson, Best, & McKinnon, 2017; McGehee, Lee, O'Bannon, & Perdue, 2010; Zahra & McGehee, 2013) and childhood obesity (Flora & Gillespie, 2009). In addition, it has inspired the development of similar or modified capitals frameworks which have been used to evaluate various community and economic development outcomes, such as rural business and rural entrepreneurship (Bosworth & Turner, 2018).

As previously noted, the resources comprising the CCF are inextricably linked. When one capital undergoes change, the others will be altered in some way. Emery and Flora (2006) described these relationships in terms of assets gained and lost. When an investment is made in one of the capitals, these newly acquired assets may set in motion a process of cumulative causation in which assets build upon one another to create an upward spiral. Some recent research lends support to this proposition. Duffy et al. (2017), for instance, employed the CCF to evaluate agroecotourism development in Cuba and found that community tourism development induces a spiraling up effect. Stofferahn (2012) used the CCF to analyze disaster recovery efforts in a rural community and observed that certain capitals mobilized others in an upward spiral toward recovery.

Just as community assets can build upon one another to induce an upward spiral, a downward spiral can be triggered when assets are lost in one capital and the losses continue to spread among and within the other capitals. Emery and Flora (2006) provide an example of a community experiencing a period of job losses, which in turn, leads to population decline, decreased income, and loss of generational wealth transfer. As employment opportunities became scarce, there was a loss of human and financial capital. The lack of jobs ensured that younger people left the community in search of work, which decreased social and cultural

capital. Political capital was reduced to specific instances of lobbying and built capital (i.e., infrastructure) began to deteriorate (Emery & Flora, 2006).

Some researchers have disputed the spiraling up proposition advanced by Emery and Flora (2006). In their review of several community development projects, Pigg et al. (2013) found that community leaders frequently choose which capitals will be useful to them as they seek to achieve their primary goals. This finding is significant as it suggests that cumulative causation is not necessarily and imperative to realize effective change within a community. Community leaders are, at least in some cases, capable of leveraging certain capitals while advancing a strategy aligned with other assets and resources.

Purpose and Objectives

This study's primary purpose was to develop and validate comprehensive scale based in the community capitals framework. The study was guided by the following research objectives:

1. Establish preliminary internal structure validity for a CCF scale.

2. Determine whether any statistically significant differences were observable between pilot counties.

Methods

Following a thorough review of the literature, a CCF scale was developed to quantitatively examine each capital at the county level. The scale, which was incorporated into a community perception survey, included a series of statements designed to represent aspects of each capital. All statements incorporated into the CCF-based scale were designed to capture the perceptions of community residents. A sampling frame was developed using an online survey company employing a non-probability (or non-random sampling) purposive sampling technique. Data collection procedures were conducted in accordance with recommendations from the literature and included attention filters, only complete responses were retained and analyzed (Lamm & Lamm, 2019). The purposive sampling used in this study entailed a selection of criteria that represented the U.S. Census data for each given county targeted. Respondents indicated their level of agreement with each of the items on a five-point Likert-type scale (5 – *Strongly agree* to 1 – *Strongly disagree*).

Designed as a pilot study in the fall of 2018, the research represented in this manuscript includes six counties in Georgia Counties were selected based on University of Georgia programming and outreach efforts taking place in that county, in addition to ensuring that the six counties equally represented the nature of being rural, urban, or metropolitan. Given that the study used a non-probability sampling procedure, results cannot be generalized and therefore non-response error was not an issue. A total of 123 responses were obtained with individual county responses ranging from 10 to 33. All collected data was download into SPSS v25 for analysis. Content validity was established by employing several methods. First, a thorough review of the community capital literature was conducted. A text-based analysis of common traits and themes, identification of proposed indicators, and development of specific items related to appropriate

indicators were also used to ensure content validity. Through the content review and thematic analysis process six scales were developed to represent each of the community capitals. Due to the relationship between the assets comprising the built and financial capitals, these capitals were merged to form one scale. Lastly, a panel of experts knowledgeable in scale development and communication development reviewed the proposed scale items (DeVellis, 2017). A total of 36 items were included in the final instrument. Response process validity was established by having the proposed scale items examined by a group of experts that are familiar with the contextual domain but were not specifically involved in the scale development process. The experts were asked to review the proposed questions and provide any feedback on interpretability or possible points of confusion. Researchers then debriefed the review experience with each reviewer to further investigate the nature of the feedback. Overall only minor wording changes were suggested by the reviewers. Updates were made to specific scales items and scale directions accordingly (Crocker & Algina, 1986). Specific to the first objective, internal structure validity was established by examining: individual item response distributions, internal consistency of items (Cronbach's alpha), and exploratory factor analysis of hypothesized latent variables in accordance with recommendations in the literature (Clark & Watson, 1995; Crocker & Algina, 1986; Messick, 1989). For objective two a one-way ANOVA was conducted between counties.

Results

To address objective one, several methods were used to validate the internal structure of the scales measuring the community capitals. The individual items comprising each of the scales were analyzed using descriptive statistics. Specifically, the skewness and kurtosis of the responses were examined to ensure that the distributions were approximately normal. Results of the individual item analysis indicated that items received a sufficient distribution of responses across all five response options. Specifically, items had skewness values less than two and kurtosis values less than seven and were thus deemed to be acceptable given established thresholds (Fabrigar, Wegener, MacCallum, & Strahan, 1999; West, Finch, & Curran, 1995). Following individual item analysis, a principal component factor analysis was also conducted for each of the capital scales. Additionally, overall index analysis including internal consistency and normality were also conducted.

Factor Analyses

The combined built-financial capital scale is comprised of seven related perceptual items regarding community economics and infrastructure: (1) employer heterogeneity, (2) stable employment conditions, (3) attempts at seeking or attracting new business opportunities, (4) local investment by charitable organizations, (5) access to essential transportation, (6) the availability of communication services such as Internet and mobile phone services, and (7) a vision for the future. A Kaiser-Meyer-Olkin (KMO) test value of 0.856 suggests that the scale variables warranted factor analysis, while a Bartlett's chi-square statistic ($x^2 = 349.848$) is significant ($p < .05$). The factor analysis detailed in Table 1 demonstrates that the built-financial scale measures two latent constructs that account for 68.5% of the explained variance.

Table 1. Factor Analysis: Built-Financial Components

Items	Factor 1	Factor 2	Communalities
Well-diversified in terms of multiple employers	0.713	-0.378	0.651
Has stable employment	0.765	-0.364	0.718
Seeks opportunities to bring in new businesses	0.846	-0.177	0.747
Charitable organizations invest in the community	0.709	0.143	0.523
Access to necessary transportation services	0.520	0.719	0.787
Access to necessary communication services	0.712	0.406	0.672
Vision for the future	0.832	-0.080	0.698
Eigenvalues	3.781	1.015	—

Note: Items are copyright protected and used and presented with permission.

The results of the factor analysis seem to indicate that the two items most closely associated with built capital (access to necessary transportation and access to necessary communication services) should be removed and incorporated into a distinct built capital scale. However, there are obvious cross loadings among the two components, as evidenced by the values for these two items in each of the factor columns. In addition, the eigenvalue for the second extracted factor is a marginal 1.015. Given the traditional eigenvalue cutoff of 1.0, this additional factor is situated on the threshold, based on the close relationship between these two capitals, an integrated built-financial scale was deemed acceptable for the sake of a more parsimonious scale and associated end user experience (Crocker & Algina, 1986).

The cultural capital scale consists of five items related to community history and heritage: (1) diversity of individual values, (2) recognition of community heritage through relevant hosted events, (3) preservation of community history, (4) the presence of culturally relevant products in local retail stores, and (5) general cultural diversity. A Kaiser-Meyer-Olkin (KMO) test value of 0.840 suggests that the scale variables are suitable for factor analysis, while a Bartlett's chi-square statistic ($x^2 = 302.257$) is significant ($p < .05$). The results of a principal components factor analysis demonstrate that the scale is measuring one distinct construct that explains 67.0% of the total variance (see Table 2). Each of the scale items loads substantially onto the one extracted factor, resulting in an eigenvalue of 3.350.

Table 2. Factor Analysis: Cultural Components

Items	Factor 1	Communalities
Reflects potentially diverse community values	0.792	0.628
Events that recognize community heritage	0.855	0.731
Organizations that preserve community history	0.867	0.752
Local retail shops offer culturally relevant products	0.803	0.646
Culturally diverse	0.770	0.594
Eigenvalues	3.350	—

Note: Items are copyright protected and used and presented with permission.

The human capital scale includes seven items concerning (1) meaningful employment for young people, (2) access to educational opportunities in primary and secondary schools, (3) access to strong higher education opportunities, (4) access to healthcare, (5) professional development opportunities, (6) personal development opportunities, and (7) whether leaders reflect

community diversity. A Kaiser-Meyer-Olkin (KMO) test value of 0.909 suggests that the scale variables can be factor analyzed, and a Bartlett's chi-square statistic (x^2 = 608.507) is significant ($p < .05$). As shown in Table 3, a factor analysis indicates that the individual items comprising the human capital scale are components of the same underlying construct, with the only extracted factor explaining 69.2 % of the total variance. The factor loadings are particularly high for the items concerning personal and professional development opportunities within a community.

Table 3. Factor Analysis: Human Components

Items	Factor 1	Communalities
Meaningful employment to attract young people	0.836	0.699
Access to strong educational opportunities (K-12)	0.775	0.601
Access to strong higher education opportunities	0.790	0.625
Access to a wide range of healthcare	0.820	0.673
Access to professional development opportunities	0.900	0.810
Access to personal development opportunities	0.887	0.787
Community diversity represented in leaders	0.805	0.649
Eigenvalues	4.843	——

Note: Items are copyright protected and used and presented with permission.

The social capital scale is comprised of seven items that relate to (1) the value placed on other residents' concerns, (2) whether neighbors associate with one another, (3) trust among neighbors, (4) whether people associate with local leaders, (5) trust between residents and local leaders, (6) perceived freedom to voice concerns, and (7) perceived ability to solve problems through project involvement. A Kaiser-Meyer-Olkin (KMO) test value of 0.904 suggests that the scale variables warrant factor analysis, while a Bartlett's chi-square statistic (x^2 = 658.496) is significant ($p < .05$). When these items were factor analyzed, one factor explaining 71.7% of the total variance was extracted (see Table 4). The consistently high factor loadings across the seven scale items (all 7 loadings are above 0.8) and an eigenvalue over 5 indicate that the social capital scale items are all elements of the same construct.

Table 4. Factor Analysis: Social Components

Items	Factor 1	Communalities
Value concerns of other community members	0.856	0.732
Associate with their neighbors	0.840	0.706
Trust their neighbors	0.848	0.720
Associate with their local leaders	0.884	0.781
Trust their local leaders	0.850	0.723
Can voice their concerns	0.834	0.696
Can participate in projects to solve problems	0.814	0.662
Eigenvalues	5.020	——

Note: Items are copyright protected and used and presented with permission.

The political capital scale is made up of five related scale items concerning political leaders and other principals and groups. Specifically, respondents were asked to indicate whether their communities were perceived to have: (1) non-elected leaders who seek to bring about change, (2) non-elected leaders who listen to community groups, (3) elected officials

who attempt to initiate change, (4) elected officials who take into consideration the advice offered by community groups, and (5) community groups with the ability to mobilize resources in order to effect change. A Kaiser-Meyer-Olkin (KMO) test value of 0.881 suggests that the scale variables can be factor analyzed, while a Bartlett's chi-square statistic ($x^2 = 566.020$) is significant ($p < .05$). A factor analysis of the political capital scale determined that the constituent items are explaining the same latent construct. One factor responsible for 81.5% of the total variance explained was extracted (see Table 5). All factor loadings are above 0.88 and the eigenvalue is 4.08.

Table 5. Factor Analysis: Political Components

Items	Factor 1	Communalities
Non-elected leaders work to effect change	0.899	0.808
Non-elected leaders listen to community groups	0.912	0.832
Political leaders work to effect change	0.934	0.873
Political leaders listen to community groups	0.886	0.784
Groups can mobilize resources for community change	0.883	0.780
Eigenvalues	4.077	——

Note: Items are copyright protected and used and presented with permission.

The five items comprising the natural capital scale cover residents' perceptions concerning communities (1) having valuable natural resources, (2) taking advantage of natural resources for community development, (3) taking advantage of natural resources for job creation, (4) having parks that are accessible to the public, and (5) working to preserve natural resources. A Kaiser-Meyer-Olkin (KMO) test value of 0.823 suggests that the scale variables warrant factor analysis, while a Bartlett's chi-square statistic ($x^2 = 292.714$) is significant ($p < .05$). As the results in Table 6 indicate, a factor analysis of the natural capital scale extracted one factor with an eigenvalue of above 3.0 (3.204). This factor explained 64.1% of the total variance. With the exception of the item concerning public park accessibility, the factor loadings are relatively large. Interestingly, this is the only natural capital scale item that does not explicitly measure perceptions of local natural resources and how they are used in community development.

Table 6. Factor Analysis: Natural Components

Items	Factor 1	Communalities
Has valuable natural resources	0.791	0.626
Utilizes natural resources for community development	0.892	0.796
Utilizes natural resources for job creation	0.851	0.725
Has parks accessible to the public	0.615	0.378
Preserves valuable natural resources	0.824	0.679
Eigenvalues	3.204	——

Note: Items are copyright protected and used and presented with permission.

The complete community capitals index (including each item from the constituent capital scales) was also analyzed. A Kaiser-Meyer-Olkin test value of 0.903 suggests that the scale

variables warrant factor analysis, and a Bartlett's chi-square statistic ($x^2 = 4243.599$) is significant ($p < .05$). When the full index was factor analyzed, six components explaining 72.3% of the total variance were extracted.

The descriptive statistics presented in Table 7 demonstrate that the individual capital scales and the overall community capitals index are highly reliable, as evidenced by the alpha coefficients. The overall index, in particular, has a high level of internal consistency (Cronbach's alpha = 0.973). The validity of the internal structure was further confirmed by examining the indicators of normal response distribution.

Table 7. Community Perceptions: Descriptive Statistics and Scale Reliability

Capital Scales	*N*	Mean	*SD*	Skewness	Kurtosis	α
Built-Financial	123	3.533	0.802	-0.847	1.272	0.852
Cultural	123	3.585	0.841	-0.836	1.083	0.876
Human	123	3.405	0.968	-0.495	-0.178	0.924
Social	123	3.324	0.931	-0.263	-0.282	0.934
Political	123	3.387	0.992	-0.678	0.200	0.943
Natural	123	3.489	0.827	-0.381	0.017	0.858
Overall	123	3.449	0.783	——	——	0.973

Analysis of the individual capital scales suggests that the scales are closely related. All of the scales are significantly correlated ($p < 0.01$). Table 8 shows that all of the correlation coefficients are above 0.6 and that some are notably higher. This is indicative of the interconnectedness between the scales and the various items (assets and resources) of which they are comprised.

Table 8. Pairwise Correlation Matrix of Community Capital Scales

	1	2	3	4	5	6
1. Built-Financial	-					
2. Cultural	.774*	-				
3. Human	.785*	.748*	-			
4. Social	.693*	.712*	.805*	-		
5. Political	.652*	.663*	.723*	.811*	-	
6. Natural	.681*	.659*	.738*	.641*	.642*	-

* $p < .01$

To address research objective two a one-way analysis of variance (ANOVA) was performed in order to ascertain whether there were any differences in the responses between counties. As shown in the ANOVA output presented in Table 9, there are significant differences between at least some of the six Georgia pilot counties being analyzed ($p < 0.01$).

Table 9. One-Way Analysis of Variance (ANOVA) by County

DV: Overall Perceptions	SS	*df*	MS	*F*	*P*
Between Groups	9.559	5.000	1.912	3.427	0.006
Within Groups	65.274	117.000	0.558		
Total	74.833	122.000			

Table 10 indicates a difference between the overall mean responses in Dougherty (low end) and those in Thomas and Floyd (high end). In order to determine if the mean responses in these counties were statistically significant, a post hoc Bonferroni test was performed. This test indicated that the differences observed in Table 10 are indeed significant ($p < 0.05$) particularly between Dougherty and Thomas as well as Dougherty and Floyd.

Table 10. Descriptive Overall Community Perceptions by County

					95% CI	
County	*N*	Mean	*SD*	*SE*	Lower	Upper
Thomas	20	3.806	0.876	0.196	3.396	4.216
Floyd	23	3.722	0.521	0.109	3.497	3.948
Colquitt	15	3.563	0.848	0.219	3.093	4.033
Whitfield	33	3.365	0.749	0.130	3.100	3.631
Coffee	10	3.119	0.710	0.225	2.612	3.627
Dougherty	22	3.034	0.761	0.162	2.697	3.372
Overall	123	3.449	0.783	0.071	3.309	3.588

Conclusions, Recommendations, and Implications

The results of the study provide an initial analysis of a quantitative instrument that agricultural educators and affiliated professionals can use to more effectively measure the various capitals associated with a community. Although the interpretation and generalizability of the results are limited the initial analysis shows promise for future investigation. An associated recommendation would be to continue to analyze the structural aspects of the scale with a larger sample size. Additional responses, and associated power, would allow for more rigorous analysis and more sophisticated investigation. For example, a confirmatory factor analysis is recommended to examine the relationship between the six-factors as well as the overall latent factor. Additionally, the results of the analysis indicate that the scale was able to discern statistically significant differences among pilot counties. The observed difference provides a preliminary indication of consequential validity for the scale (e.g. Blanton & Jaccard, 2006; Messick, 1995). A recommendation would be to replicate the study in additional counties and establish a larger and more robust dataset upon which to interpret observations. Additionally, analysis between observed index scores and other outcome variables of interest is recommended. Specifically, analysis of economic, health, and education metrics relative to scale scores may provide additional triangulation and interpretability of results. For example, examining the nature of the relationship between economic indicators and specific capital areas may infer relationships or causation that would lend to future interpretability.

While these results cannot inherently identify needed solutions to communities in decline, they can lend themselves toward the identification of critical entry points unique to the frame of a given community. This becomes critical in the argument that communities are not a one-size-fits-all approach when it comes to county-level programming and engagement efforts (Borron, Lamm, Randall, & Darbisi, 2019). In addition, it creates a space by which the capacity of existing longstanding programs, such as 4-H and FFA can more effectively recruit, engage, and foster the development of essential volunteers and other leadership roles targeting today's youth to become more engaged in their communities (Roberts et al., 2016).

Lastly, valid instrumentation capable of providing consistent measurement and diagnostics at the community level may help to specifically identify the impact the agricultural educators are having on the communities in which they work (Roberts et al., 2016). A recommendation would be for professionals that are engaged in programming and capacity building at the community level consider administering an instrument capable of capturing the perceived capitals of a community, and to then use that data to inform particular interventions. From an evaluation perspective impact data can provide needed data to articulate the value of efforts and programs (Lamm & Israel, 2011).

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Examining the Relationship Between Organizational Citizenship Behaviors and Class Conditions in Undergraduate Agricultural Students

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Abstract

In addition to creating engaging learning environments agricultural educators must also maintain a focus on preparing the next generation to enter the workforce. The purpose of the current study was to examine a potential entry point for both responsibilities. Specifically, the current research study focused on the organizational citizenship behavior (OCB) characteristics of undergraduate agricultural students. Within the literature it is well established that OCBs, generally understood to be extra-role behaviors or actions that go above and beyond defined role responsibilities, are related to many positive organizational outcomes such as: higher levels of performance, reduced turnover intention, and more frequent promotions. However, despite the importance of OCBs in the workforce there is little research establishing the general OCB characteristics of undergraduate agricultural students. Of the five factors of OCB examined, students across two universities and five unique classroom environments exhibited the highest levels of courtesy followed by altruism; students reported the lowest levels of conscientiousness. The results of the study indicate that agricultural educators may find courtesy as an effective entry point for engaging learners. Engaging learners' natural tendencies towards courtesy has the potential to reduce cognitive load and thus increase preparation for learning. Additionally, the use of OCBs as a content area within educational settings may help to provide workforce development opportunities. Preparing individuals with not only the technical knowledge required for a career, but also for the skills required for success in the workforce should be a priority of agricultural educators, the current study provides recommendations and proposes OCBs as a potential candidate for success skill education.

Keywords: Organizational Citizenship Behaviors, Undergraduate students

Introduction

For better or worse, companies are corporate machines that exist to make a profit (Hagel, Brown, & Davison, 2009). Individuals are the input into these machines, and often, this workforce is sustained by the influx of university-educated post-graduates (Grubb & Lazerson, 2005). In today's global economy, employees are often required to work in groups comprised of colleagues from different professional, ethnic, socio-economic, and personal backgrounds. As such, the ability to be a good team player and work effectively with a variety of peers is a highly coveted skill (Clark, 2012). Managers are looking for high-capacity employees who can successfully collaborate with diverse personalities and maintain a network of connections ("The pros and cons", 2018). Additionally, the National Institute of Food and Agriculture (2015) reported a shortage of 22,500 qualified employees for open positions within the agricultural industry. Therefore, the responsibility of adequately preparing all graduates entering the

agricultural field becomes more critical so that new employees continue to be successful in the changing work environment.

Rivera and Alex (2008) noted that education and human resource development occurs in three locations within the agricultural sector: (1) formalized education (public schools and higher education), (2) workforce education through public and private organizations, and (3) nonformal education programs. But for academia specifically, how can higher education professionals ensure they are equipping their students with the proper skills needed to be marketable in the current job market? One method is developing emotionally intelligent individuals who cultivate an atmosphere of psychological safety (Schneider, 2017). Psychological safety is a social confidence characterized by interpersonal trust and mutual respect between team members (Duhigg, 2016). This type of environment is built by key behaviors needed to establish interpersonal bonds, such as conversational turn-taking and emotional conversations (Duhigg, 2016). Podsakoff, MacKenzie, Moorman, and Fetter (1990) found the effects of transformational leadership behaviors are mediated by the follower's trust. This finding is noteworthy based off the perspective that even leader behaviors are filtered through follower perceptions. Individuals who feel valued and secure when participating in team discussions are more likely to embrace their full potential, providing the team with innovative ideas and creative solutions (Henderson, 2017). Encouraging students to appreciate the strengths of their peers and create pathways for open communication may develop individuals who become highly-effective members of high-performing corporate teams (Steenbarger, 2018).

Much research has been conducted regarding the desired traits of students entering careers, to be successful in new agricultural careers students must obtain skill development in leadership, teamwork, critical thinking, creative problem solving, and adaptability (e.g. Casner-Lotto & Barrington, 2006; Landrum, Hettich, & Wilner, 2010; Paranto & Kelkar, 2000; Rateau, Kaufman, & Cletzer, 2015). These habits over time will holistically improve performance and may lead to increased productivity and member satisfaction in the workplace (Steenbarger, 2018). Therefore, it may be appropriate for agricultural educators to consider the role of organizational citizenship behaviors (OCBs) as both an effective classroom engagement technique, as well as a toolset to help learners prepare for the workforce.

One comprehensive review of existing citizenship behavior literature found strong evidence to indicate OCBs are related to performance (Podsakoff, MacKenzie, Paine, & Bachrach, 2000). This belief is well-founded since OCBs may help to increase employee and managerial productivity, expand resource availability, improve coordination within and across work groups, improve an organization's retention rate, and boost an organization's overall adaptability (Podsakoff et al., 2000). In addition, OCBs have been found to relate to quantity and quality of work performance (Podsakoff, Ahearne, & MacKenzie, 1997; Podsakoff & MacKenzie, 1994; Walz & Niehoff, 1996). However, not all characteristics of OCBs impact performance in the same way; some dimensions display stronger evidence for these relationships than others (Podsakoff et al., 2000).

Research priority area four of the National Research Agenda specifically identifies the need for meaningful, engaged learning in all environments (Roberts, Harder, & Brashears, 2016). Furthermore, research priority area three identified the need for a sufficient scientific and

professional workforce that addresses the challenges of the 21st Century. The current study is intended to contribute to these areas by examining college of agriculture undergraduate students' levels of the five dimensions of OCB and the classroom conditions students learn in during their college career. In doing so the study intends to address specific questions such as "what methods, models, and programs are effective in preparing people to work in a global agriculture and natural resource workforce?" (p. 31) and "how can delivery of educational programs in agriculture continually evolve to meet the needs and interests of students?" (p. 39). Agricultural educators are at the nexus between engaged learning and workforce preparation. Awareness of learner tendencies and dispositions may help to inform teaching strategies and learner outcomes (McKeachie & Svinicki, 2013).

Conceptual Framework

Organ (1988) defined organizational citizenship behaviors (OCBs) as discretionary behaviors "not part of the employee's formal role requirements, [but which] promote the effective functioning of the organization," (p. 4). Example behaviors include cooperating with coworkers, taking preventative actions against workplace issues, offering suggestions to improve the organization, and making intentional investments in one's professional development skillset (Brief & Motowidlo, 1986). Although there are numerous conceptualizations of OCB (e.g. Smith, Organ, & Near, 1983; Moorman & Blakely, 1995; Podsakoff, et al., 2000), the conceptual framework for this research is based on the model proposed by Podsakoff et al. (1990), who identified five dimensions of OCB: altruism, conscientiousness, sportsmanship, courtesy, and civic virtue. The existing literature base characterizes OCB as a fluid state which may change over time; however, this study suggests OCB may be a more stable trait related to an individual's disposition.

Altruism

Although a facet of agreeableness in the five-factor personality model (Costa & McCrae, 1992), altruism, as a dimension of dispositional OCB, is defined as discretionary behaviors which help a specific individual with an "organizationally relevant task or problem," (Podsakoff, et al., 1990, p. 115). This behavior should not be perceived as merely charity nor precipitated by personality-based dispositions which predispose individuals towards helping others (Khalil, 2004). In this context, altruism is a voluntary willingness to assist a colleague with a work-related task (Podsakoff & MacKenzie, 1994). A study examining the relationship between OCBs and rewards found altruism was positively related to promotions, salaries, and annual performance review (Alkahtani, 2015). Since altruism was related to the maximum number of rewards examined in this study, there was evidence that altruism was valued more than the other OCB dimensions (Alkahtani, 2015). Furthermore, Alkahtani (2015) found an employee's altruistic behaviors predicted salary received during the current year as well as the total salary received over the duration of service with a specific organization. A study examining the effects of professor OCB levels on the success of their undergraduate students found that instructor-level altruism positively predicted student academic performance (Khalid, Jusoff, Othman, Ismail, & Rahman, 2010).

Chen, Hui, and Sego (1998) examined the possible relationship between individual OCB level and employee turnover within a sample of supervisor-subordinate dyads. An analysis of correlations

revealed altruism was positively related to levels of organizational commitment and negatively related to turnover intention (Chen et al., 1998). Additionally, a separate analysis indicated levels of altruism were higher in the no turnover condition than in the turnover condition (Chen et al., 1998). Thus, employees who displayed a greater intent to stay with the organization exhibited more altruistic behaviors than employees who possessed a greater intent to leave the organization. Tansky (1993) found altruism had significant positive relationships with perceptions of overall fairness, job satisfaction, and the quality of supervisory/subordinate relationships within a sample of employees. These results support previous findings which have found altruism to be linked more strongly to perceptions of fairness than the other four OCB dimensions (Tansky, 1993).

Conscientiousness

It is important to note that while conscientiousness is one of the factors in the widely-accepted five-factor personality model (Costa & McCrae, 1992), this term takes on a different meaning relative to dispositional OCB. As a dimension of OCB, conscientiousness characterizes the practice of voluntarily completing task-related behaviors at a level "well beyond the minimum role requirements," (Podsakoff et al., 1990, p.115). This dimension is difficult to distinguish from in-role behavior because the distinction lies primarily in the degree to which the task is performed, not necessarily the nature of the task itself (Organ, 1988). Alkahtani (2015) found conscientiousness was positively related to promotions and individual performance. Thus, higher levels of conscientiousness may lead to an increased number of promotions an employee receives or higher scores on annual performance reports. An additional analysis found conscientiousness to predict employee total promotions and total salary (Alkahtani, 2015).

Allison, Voss, and Dryer (2001) found further support for the link between conscientiousness and performance. Undergraduates who exhibited conscientious behaviors, such as turning in work early or responding to class-related messages promptly, reported increased levels of productivity and a higher cumulative grade point average (Allison et al., 2001). An additional study examining the relation between OCB dimensions and organizational effectiveness found conscientiousness was related to more measures of effectiveness than the other OCB dimensions (Yen & Niehoff, 2004). Conscientiousness was positively related to measures of average profit, perceived reliability of service, perceived expertise, and willingness to cooperate (Yen & Niehoff, 2004).

Sportsmanship

Sportsmanship consists of an individual's willingness to assist others or "tolerate less than ideal circumstances" (Podsakoff et al., 1997, p. 263) without complaint or perceived offense (Podsakoff et al., 1990; Podsakoff & MacKenzie, 1994). This behavior involves the ability to maintain a positive demeanor, a state of general agreeableness, and a willingness to sacrifice personal interests for the good of the group (Podsakoff et al., 2000). Chen et al. (1998) found sportsmanship had a significant negative correlation with turnover intention. Therefore, employees who exhibited higher levels of sportsmanship behaviors (i.e. decreased tendency to complain) were less likely to consider leaving the organization than colleagues with lower sportsmanship levels (Chen et al., 1998). Alkahtani (2015) found sportsmanship was positively related to promotions, salary and performance. Additionally, a significant positive relationship was observed between sportsmanship and total promotions as well as salary (Alkahtani, 2015).

Podsakoff et al. (1997) found sportsmanship was positively related to quantity of work crew performance. Crews that displayed high levels of sportsmanship were less likely to find faults with individual members, focus on the negatives of a situation, or complain, which contributed to additional productivity over crews who displayed fewer sportsmanship behaviors. Although predicted to positively influence both quality and quantity of performance, there was no significant relationship observed between sportsmanship and performance quality (Podsakoff et al., 1997). Allison et al. (2001) found a significant positive correlation between sportsmanship and productivity in undergraduate students. Sportsmanship behaviors among undergraduates included not finding fault with the school or group as well as focusing on positive outcomes.

Courtesy

Courtesy is defined as a voluntary behavior that seeks to prevent the occurrence of work-related problems with other peers (Podsakoff et al., 1990; Podsakoff & MacKenzie, 1994). Alkahtani (2015) found courtesy to be positively related to all reward measurements and displayed significant predictive relationships with total promotions and historic salary (Alkahtani, 2015). Tansky (1993) found that courtesy had a significant positive relationship with job satisfaction. Additionally, courtesy had a significant positive relationship with the quality of supervisory/subordinate relationships (Tanksy, 1993). Khalid et al. (2010) found instructor levels of courtesy were positively related to student academic performance.

Civic Virtue

Civic virtue describes behaviors which exhibit concern for the organization and includes the individual's responsibility to participate in the larger group (Podsakoff et al., 1990; Podsakoff & MacKenzie, 1994; Podsakoff et al., 1997). For example, these actions may involve offering constructive criticism to elevate work-group effectiveness, which may result in increased resource availability or enhanced efficacy (Podsakoff, et al., 1997). Podsakoff and MacKenzie (1994) found that civic virtue had a positive significant relationship on unit-level performance in sales associates. On the contrary, instructor-level civic virtue was not found to be related to student academic performance (Khalid et al., 2010). These results are inconsistent with previous findings (Podsakoff & MacKenzie, 1994). Robinson and Morrison (1995) found that employees were less likely to engage in OCBs, specifically civic virtue, when they believed their employer had not fulfilled their end of the employment contract.

Furthermore, civic virtue was positively related to all rewards tested in Alkahtani's (2015) study, with a significant positive correlation observed with total performance and annual performance. Additionally, employees who possessed higher levels of civic virtue were more likely to be promoted over employees who possessed lower levels of civic virtue (Alkahtani, 2015). This finding highlighted the belief that employees were more likely to be promoted when they take an organizational level interest in the wellbeing of their employer (Alkahtani, 2015). Regression analysis indicated total promotion and annual performance reviews were significantly dependent on the civic virtue (Alkahtani, 2015). To the contrary, Podsakoff et al. (1997) found no significant relationship between civic virtue and production quality or quantity. It was suggested

the effects of civic virtue on performance may be long-term in nature and not identifiable from the limited time frame of the study (Podsakoff et al., 1997).

OCBs in Education

Additional research has been conducted to determine the effects of organizational citizenship behaviors in the classroom. DiPaola and Tschannen-Moran (2001) found that when examined in a public-school setting, OCB was better measured as a singular construct, rather than separated into different dimensions. This finding was supported by further studies (e.g. Burns & DiPaola, 2013; DiPaola & Hoy, 2005; Cooper, 2010) and was based on the assumption that the mission of public schools differs from that of private entities because it is closely tied to helping others (DiPaola & Tschannen-Moran, 2001). Nevertheless, DiPaola and Tschannen-Moran (2001) found a strong positive correlation between OCBs and school climate as well as a positive relation between altruistic behaviors and teacher professionalism. DiPaola and Hoy (2005) found that even when controlling for the effects of student socioeconomic status, faculty OCB levels had a significant effect on student achievement measures. Further research by Burns and DiPaola (2013) found that OCB had a significant positive relationship with student achievement on biology, reading, and writing standardized tests. Cooper (2010) studied the effects of OCB on school effectiveness as measured by teacher perceptions, as well as student achievement in math and reading, and found a significant positive relationship between OCB and school effectiveness.

Purpose and Research Objectives

The purpose of this study is to examine the five dimensions of OCB among undergraduate agricultural students. As such, this study is motivated by the following research objectives:

1. Describe individual levels of altruism in undergraduate agricultural students.
2. Describe individual levels of civic virtue in undergraduate agricultural students.
3. Describe individual levels of conscientiousness in undergraduate agricultural students.
4. Describe individual levels of courtesy in undergraduate agricultural students.
5. Describe individual levels of sportsmanship in undergraduate agricultural students.
6. Examine the relationship between OCB dimensions and class conditions for undergraduate agricultural students.

Methods

To meet these research objectives, a descriptive study was employed. The population for this study consisted of undergraduate agricultural students. The population was formed by four classes of undergraduate students, three of which were from a single course taught over multiple semesters at a southern land-grant university. The other class was from a single course taught over one semester at a separate southern land-grant university. It is important to emphasize that the data analyzed within this study capitalizes on data previously collected within the Lamm, Sheikh, Carter, and Lamm (2017) sample. The current study broadens the results of the previous one in several significant ways. While the previous study centered on personality analysis, this study concentrates on examining organizational citizenship behavior trends across undergraduate

agricultural classes. Additionally, the variable of interest in the current study is individual student OCB levels with class condition as a mediating factor. These disclosures are made based on existing recommendations for clarity (Kirkman & Chen, 2011).

Data were collected using a paper-based questionnaire. This questionnaire was distributed, completed, and recollected for analysis during a single class period. Demographics were self-reported by each respondent. Individual level OCB scores for each dimension were collected using the 24-point scale developed by Podsakoff, et al. (1990). Responses were rated on a five-point, Likert-type scale, with possible response ranging from *1-Strongly Disagree* to *5-Strongly Agree*. Additionally, as a measure of internal consistency and reliability, a Cronbach's α value was calculated for each of the five dimension indices, as well as the overall OCB index. In particular, the altruism index was found to have a Cronbach's α value of 0.84, the conscientiousness index was found to have a Cronbach's α value of 0.65, the sportsmanship index was found to have a Cronbach's α value of 0.76, the courtesy index was found to have a Cronbach's α value of 0.77, and the civic virtue index was found to have a Cronbach's α value of 0.70. The overall Cronbach's α value for the instrument was 0.85.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were calculated to determine the organizational citizenship behaviors of undergraduate agriculture students. Additionally, a one-way ANOVA test was employed to examine the relationships between the OCB dimensions and class conditions.

Results

Respondent organizational citizenship behavior scores were calculated using the 24-point scale developed by Podsakoff et al. (1990). Undergraduate agricultural students had the highest mean score in courtesy ($M = 4.23$, $SD = 0.46$) and the lowest mean score in conscientiousness ($M = 3.86$, $SD = 0.53$). Table 1 contains the mean, standard deviation, minimum, and maximum scores for each of the five OCB dimensions: altruism, civic virtue, conscientiousness, courtesy, and sportsmanship.

Table 1
OCB Scale Scores of Undergraduate Agricultural Students

OCB Scale Scores	*n*	*M*	*SD*	*Min*	*Max*
Courtesy	235	4.23	0.46	2.80	5.00
Altruism	234	4.01	0.54	2.00	5.00
Sportsmanship	231	3.99	0.64	1.80	5.00
Civic Virtue	230	3.93	0.51	2.50	5.00
Conscientiousness	235	3.86	0.53	2.20	5.00
Overall	226	4.01	0.36	3.00	4.96

A one-way ANOVA was conducted to analyze the effect of class conditions on level of courtesy between four undergraduate agricultural classes. The results indicated there was no significant effect on courtesy between the four class conditions ($F = 0.30$, $p = 0.88$). A second one-way

ANOVA was conducted to compare the effect of class condition on altruism levels in undergraduate agricultural students. There was no significant effect of class condition on altruism among the four classes ($F = 1.81$, $p = 0.13$). A third one-way ANOVA was conducted to determine the effect of class condition on level of sportsmanship in undergraduate agricultural students. No significant effect of class condition on levels of sportsmanship was found ($F = 2.24$, $p = 0.07$).

A fourth one-way ANOVA was conducted to examine the effect of class condition on civic virtue levels of undergraduate agricultural students. The results indicated no significant effect ($F = 0.98$, $p = 0.42$). A fifth one-way ANOVA was conducted to determine the effect of class condition on conscientiousness levels in undergraduate agricultural students. There was not a significant effect of class condition on conscientiousness levels across the four classes ($F = 0.63$, $p = 0.64$). A sixth one-way ANOVA was conducted to compare the effect of class condition on overall OCB levels in undergraduate agricultural students. No significant effect was found ($F = 1.67$, $p = 0.16$).

Conclusions, Recommendations, and Implications

The results of this study highlight the differences between dimensions of dispositional OCB. Courtesy had the highest mean score among respondents. Therefore, undergraduate agricultural students seem more likely to exhibit courtesy behaviors relative to other citizenship behaviors. Courteous behaviors include those which seek to prevent school or task-related incidents among peers (i.e. emailing to confirm group project meetings, responding politely to a peer's question, or notifying a professor of a class absence). A recommendation would be for educators to implement strategies which communicate that they value their students and the individual talents each student brings to the classroom (Chickering & Gamson, 1987). A study by Lamm et al. (2017) found students are more often motivated to prove their competence among their peers or master subject material. Thus, educators should ask discussion-provoking questions which enable students to share their individual experiences and knowledge with their peers framed within an environment of mutual courtesy. In Colleges of Agriculture, this teaching methodology is frequently utilized due to smaller class numbers and to encourage the full development of a student's comprehension and application of the taught content (e.g. Ewing & Whittington, 2007).

Another courteous strategy that educators may want to consider is minimizing performance-avoid goal orientation (Vandewalle, 1997) motivation. These behaviors would include not calling on a student that does not seem as though they know the answer or one who is not paying attention because this practice may embarrass the student. Using embarrassment to promote student engagement may not be an effective practice for undergraduate students. This recommendation is consistent with previous research that found students had lowest performance-avoid goal orientation (Lamm et al., 2017). Therefore, students are less likely to be motivated by the fear of being perceived as incompetent amongst their peers. Additionally, purposely singling out an unprepared student may lower the individual's self-efficacy, which could erode that individual's trust in their instructor and as a result, further weaken the relationship between the student and the professor (Lamm et al., 2017).

On the contrary, conscientiousness had the lowest mean score among respondents, which indicates undergraduate agricultural students are less likely to exhibit conscientious behaviors relative to other citizenship behaviors. As such, students may be less concerned with completing a school-related task to a degree beyond the minimal requirement. Students will most likely complete the assignment as required, but will probably not go above and beyond the minimum requirements necessary for submission. This trend may be due to the fact that students may not have enough time between all of their academic and extracurricular obligations to exceed the minimum requirements for each assignment they submit. A recommendation for educators would be to acknowledge that their students lead busy and often demanding lives outside of the classroom. Although these outside engagements are not an excuse for late assignments or impolite behavior, it is recommended that educators consider their students' additional obligations when faced with a lack of conscientious behaviors within the classroom.

The one-way ANOVA test revealed no significant relationships between any of the dispositional OCB dimensions and class conditions. Across four discrete class observations, these results imply OCB may be a more stable characteristic of an individual's disposition as opposed to a fluid state that may change depending on environmental factors or over time. An implication from this finding is that educators may be able to influence the dominant OCB dimension displayed by their students by exhibiting similar behaviors, which may produce desired results within the classroom (DiPaola & Tschannen-Moran, 2001).

As evident in other relationships, there is a social contract that exists between the teacher and the student. This relationship is mediated by the level of trust between the individuals involved and positively affected by levels of courtesy between supervisory-subordinate relationships (Tanksy, 1993). Previous research has found that leader behaviors are filtered through the perspectives of their followers and when leaders exhibit behaviors that fail to meet their relational obligations, subordinate trust is eroded (Robinson & Morrison, 1995). Thus, it is recommended that educators honor the social contract existing between them and their students by exhibiting courteous behaviors to their students. These behaviors convey a deeper sense of care and appreciation for the student which may increase levels of trust. Additionally, Khalid et al. (2010) found instructor levels of courtesy were positively related to student academic performance. Thus, exhibiting the same courteous behaviors of which undergraduates in this study possessed may increase learner performance within the classroom. A recommendation for further research would be to study whether instructor engagement of student OCB dimensions predicts various outcomes, such as GPA, test scores, and satisfaction.

Since OCBs are extra-role behaviors that go beyond formal task requirements, it is difficult to punish employees or students for not engaging in these behaviors. Instead, educators and managers should encourage these behaviors by emphasizing the greater purpose behind the work of the student or organization. Educators and managers must engage individual-level trait OCBs within their because stimulating these characteristics should ultimately produce desired behaviors and positive results for the group. Thus, the work to stimulate OCBs starts with teachers who emphasize the meaning behind their assignments as well as each student's contribution to the class. These practices should stimulate trait OCBs which may help a student long-term as they display these traits within the workforce.

Although the findings associated with the present study provide a foundational set of data upon which to expand there is a limitation should be noted. The scope of the study is limited and thus the generalizability is also limited. Although the results indicate that there were not any statistically significant differences based on class conditions, it is not possible to conclude that the primary observations (e.g. courtesy is highest and conscientiousness is lowest) will always remain true. Therefore, a recommendation would be for educators to consider administering an instrument like the one from the study at the beginning of a course to get a general sense for the composition of learners and what teaching strategies might appeal to learners within a specific classroom environment. An additional recommendation would be to replicate the findings of the present study and determine whether there are trends that agricultural educators can use to inform their teaching practice and create learning environments that "continually evolve to meet the needs and interests of students" (Roberts et al., 2016, p. 39). A further recommendation would be to examine OCB characteristics as a set of predictor variables within learning environments. For example, examining OCB as predictor variables to outcomes such as project team satisfaction may provide additional insights to inform additional instructional techniques.

In addition to the above noted recommendations for research, recommendations are also posited for application. Specifically, a recommendation would be for agricultural educators to consider dedicating curriculum to OCB education in addition to course content. Beyond the use of OCBs to connect with learners as an engagement strategy, the literature is clear that OCBs can have a positive effect once individual enter the workforce (e.g. Alkahtani, 2015; Chen et al., 2010; Podsakoff et al., 1997). Taking the time to inform learners about the fundamental characteristics of OCBs and the relationship with many positive workforce outcomes may help individuals to be aware of how they actions and specifically their embodiment of OCB characteristics may help "to prepar[e] people to work in a global agriculture and natural resource workforce" (Roberts et al., 2016, p. 31). The use of OCBs as a content area within educational settings may help to provide workforce development opportunities. Preparing individuals with not only the technical knowledge required for a career, but also for the skills required for success in the workforce should be a priority of agricultural educators, the current study provides recommendations and proposes OCBs as a potential candidate for *success skill* education.

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Predicting Undergraduate Project Team Satisfaction: Test of a Structural Model

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Abstract

Research and societal trends indicate the necessity and permanency of teamwork skills in the workplace thus investigating the relationship between satisfaction and students' experiences of team and group work is essential. Taking a novel and comprehensive approach the current research study examined the effect of multiple antecedent conditions on undergraduate project team satisfaction. Specifically, a structural model was proposed and tested to examine the effects of clarity, justice, frustration, and fit on project team satisfaction. The model was able to predict 52.7% of the variance associated with project team satisfaction. Among the predictor variables clarity had the largest total (direct and indirect) effect on satisfaction. Frustration was found to have the next largest total effect. Consequently, agricultural educators are encouraged to first focus on clearly articulating the expectations associated with project teams as well as to monitor project teams for emerging frustration and to intervene as appropriate.

Introduction

"Meaningful learning should engage the learner...not just [see them solely] as the recipient of knowledge" (Edgar, Retallick, & Jones, 2016, p. 38). Engaging students in the process of their own classroom education is often accomplished in the form of team and group project work. This type of teamwork relates to structured activities that promote interdependence, accountability, and shared goals (Weinstein, Morton, Taras, & Reznik, 2013). Scholars have highlighted the importance of students engaging in their own construction of knowledge along with the argument that students cannot adequately learn a new skill or concept without the assistance of an educator or peers (Ku, Tseng, & Akarasriworn, 2013; Oakley, Hanna, Kuzmyn, & Felder, 2007). Agricultural educators are among the many instructors who ask students to participate in team initiatives to complete project work, identifying it as an effective teaching method (Miller & Polito, 1999). Researchers and practitioners generally agree on team dynamics involving Tuckman's group development stages (Tuckman & Jensen, 1977) and the need for elements such as goal-clarity, communication, commitment, respect, competence, and evaluation (Ku et al., 2013; Page & Donelan, 2003; Weinstein et al., 2013). However, due to lack of group experience as well as challenges related to working with others, it is not abnormal for students to express resistance to project teams (Calongne, 2002; Oakley et al., 2007; Reinke, 2001; Weinstein et al., 2013). Educators can also experience resistance at times, due to challenges such as those related to team evaluation measures (Reinke, 2001). Therefore, more research is needed to investigate precursors that help foster project work satisfaction for both educators and students involved in team processes. The study at hand expounds upon previous team dynamics research by nuancing precursors and reviewing certain variables that may predict project team satisfaction. Findings

can give help equip educators with the information needed to work with students in creating collaborative learning environments.

Effective team project work can benefit learners in high school (Bush, Friedel, Hoerbert, & Broyles, 2017), college (Casper, 2017), graduate and professional studies (Weinstein et al., 2013), and organizational adult education training programs (Dirks, 2019). When learners are satisfied with project teams, they are more likely to perform at higher rates (Lamm, Carter, & Melendez, 2014; Weinstein et al., 2013). In addition to increased achievement (Miller & Polito, 1999), benefits of effective team experiences also include improved interpersonal skills, enhanced ability to trust others and be open, better social support and satisfaction, increased self-awareness, and greater ability to work with others from different disciplines (Weinstein et al., 2013). Cooperative and group learning can also lead to positive peer and educator interactions and can foster favorable attitudes about one's higher education experience (Oakley et al., 2007). Agricultural educators recognize that students learning in groups can learn and achieve more in teams than on their own (Bush et al., 2017), an observation students themselves have also recognized (Weinstein et al., 2013). Organizations acknowledge that decision-making is more strategic, holistic, and effective when done in teams (Casper, 2017). Thus, in the classroom and in the workplace, complex problems can be solved more effectively in groups (Dormody & Sutphin, 1991) and team products are of higher quality (Calongne, 2002).

Though the benefits of group project work are documented, "research has shown that merely putting students in groups and telling them to work together does not, in and of itself, promote higher achievement" (Page & Donelan, 2003, p. 125). Intentionally teaching learners about the process of teamwork is encouraged (Casper, 2017; Page & Donelan, 2003; Reinke, 2001; Weinstein et al., 2013) and underscores the role educators play in the satisfaction one experiences within a team setting. When educators better understand students' experiences with team project work, they are more equipped to provide guidance for the process; guidance that has been shown to promote team satisfaction and the perception of instructor effectiveness (Oakley et al., 2007). In fact, student satisfaction with their team experience, along with educator guidance, influence if students believe classroom learning objectives are met (Oakley et al., 2007). When agricultural educators are actively involved in group problem-solving, shared responsibility, and expressing respect for what students bring to the table, it can increase a student's motivation to participate in group initiatives (Dormody & Sutphin, 1991). Results of the study at hand can assist educators in preventing team dissatisfaction (Oakley et al., 2007) as they balance the guidance and ownership given to students. Ku et al. (2013) revealed that team dynamics, team acquaintance (e.g., relationship building), and instructor support accounted for 53% of team satisfaction for a sample of online learners. The current study reviews similar information, but involves students receiving face-to-face curriculum while focusing on distinct components of team dynamics. The study also builds upon research relating to team satisfaction derived from intrinsic and extrinsic motivation (Buckmaster & Carroll, 2009; Lamm et al., 2014).

Investigating the relationship between satisfaction and students' experiences of team and group work is essential to the 2016-2020 American Association for Agricultural Education (AAAE) National Research Agenda (Roberts, Harder, & Brashears, 2016). More specifically, priority area four of the research agenda challenges educators to create "meaningful [and] engaged learning in

all environments" (Edgar et al., 2016, p. 37). Incorporating teamwork into educational curriculum aligns with the sentiment of research agenda authors (Edgar et al., 2016), who posit that, "today's leaners need high-level cognitive abilities and a more personal instructional design" (p. 38). Additionally, now, more than ever, food and agricultural organizations are among the many employers looking for future workers to have effective teamwork skills (Crawford, Lang, Fink, Dalton, & Fielitz, 2011; Stripling & Ricketts, 2016). Research and societal trends indicate the necessity and permanency of teamwork skills in the workplace (Casper, 2017; Reinke, 2001). Thus, educators who help students learn how to navigate team dynamics now are also aiding in students' future workforce success (Lamm et al., 2014), giving them a competitive edge in the job market (Casper, 2017). In fact, organizations may expect educators to prepare students for collaborative work settings (Zeitun, Abdulqader, & Alshare, 2013). Educational project teams have the potential to give students other transferable skills related to teamwork such as conflict resolution and critical thinking (Dormody & Sutphin, 1991; Edgar et al., 2016; Bush et al., 2017). Teamwork is pervasive and thus, team dynamics are experienced across all areas of agricultural education. Therefore, the study at hand can assist with cross-dimension implications and can benefit multiple aspects of the field. Likewise, study findings can assist with monitoring and evaluating the effectiveness of agricultural education (Edgar et al., 2016). This research assists with the responsibility that, "Creating and evaluating meaningful learning environments is essential to educating future generations" (Edgar et al., 2016, p. 39).

Theoretical Framework

Studies have shown that satisfaction is the degree of contentment toward a student's circumstances, as determined by the interplay between diverse variables related to a one's experience (Aldridge & Rowley, 1998; Butt and Rehman, 2010; Elliot & Dooyoung, 2002; Mai, 2005). Project team satisfaction can be viewed through the lens of certain variables, specifically process clarity, procedural justice, frustration, and perceived group fit. Exploring these variables yields to the opportunity to view them collectively rather than dichotomously and in a way that investigates potential synthesis among them. Choosing and defining the variables is a generative addition to team satisfaction literature. Additionally, applying team variables that are studied in organizational literature to educational research can provide insight on how to better prepare students for team dynamics experienced outside the classroom.

Clarity

Role clarity is the information individuals need to adequately perform a role, including: 1) the expectations of the role, 2) the activities that fulfill responsibilities, and 3) the consequences of role-performance to self, others, and the organization (Kahn, Wolfe, Quinn, Snoek & Rosenthal, 1964). Lyons (1971) split role clarity into two types, objective and subjective, defining objective role clarity as the presence of adequate role information. Subjective clarity is defined as the feeling of how much information the individual perceived they need against how much they are given (Lyons, 1971). When role clarity is not present, role ambiguity results. Rizzo, Housem, and Lirtzman (1970) associated role ambiguity with the predictability of outcome for one's behavior and the clarity of existing requirements which help guide behavior. As is the case in organizations, complexity, change, and lack of communication (Lyons, 1971) can all contribute

to role ambiguity in student project teams. Kahn et al. (1964) found that both subjective and objective role clarity are related to satisfaction and reduced tension. Subjective role clarity associated with ambiguous role expectations were related to greater tension and decreased job satisfaction than clear expectations (Kahn et al., 1964). Further supporting the link between clarity and satisfaction, Sawyer (1992) found that process clarity had a direct relationship to job satisfaction, as well as an indirect relationship to job satisfaction mediated by goal clarity. Whitaker, Dahling, and Levy (2007) tested the effects of feedback-seeking on role clarity, finding that an environment which encouraged feedback-seeking from supervisors and coworkers led to increased role clarity. The authors hypothesized enhanced role clarity may increase organizational effectiveness through the improvement of task performance and the increase of employee ability to engage in contextual performance (Whitaker et al., 2007). Hu and Liden (2011) found a positive relationship between process clarity with team performance and team citizenship behavior. The effect of process clarity on team potency was maximized when accompanied by servant leadership behavior, which bolstered team confidence and effectiveness (Hu & Liden, 2011). Teams whose members understood their individual goals and procedures as well as the connections between individual goals and team goals had the greatest chance of building team potency and enhancing team performance and citizenship behavior (Hu & Liden, 2011). Thus, role clarity provides a clear standard of performance to team members, which fosters improvement (Whitaker et al., 2007).

Justice

Within the literature, there are two main types of justice: distributive justice and procedural justice. Distributive justice is the perceived fairness of resource allocation or outcomes, while procedural justice is the perceived fairness of the process used to determine this allocation of resources or outcomes (Moorman, 1991). Deutsch (1975) posited three distributive justice methods for outcome allocation among individuals. A needs-based approach operates under the assumption that outcome allocation should be dependent on individual needs, with higher outcomes being distributed to individuals who display more need (Deutsch, 1975). An equality-based approach believes outcomes should be equally allocated regardless of member contribution, while an equity-based approach means individuals receive allocations proportional to their inputs or contributions (Deutsch, 1975). Colquitt and Jackson (2006) found that an equality-based approach was more important for allocation of resources in team contexts, when the task was interdependent and the goal is to promote social cohesion and harmony. Conversely, an equity-based approach was more important for resource allocation in individual contexts, when it is possible to measure individual contributions and individual productivity is crucial (Colquitt & Jackson, 2006). Concerning justice in educational settings, Horan, Chory, and Goodboy (2010) found that students are highly concerned with classroom fairness and that their perceptions of fairness are related to their perceptions of instructor communication. These judgements of fairness were primarily based on the classroom-related procedures and policies used to determine grading, make-up/late assignments, and feedback (Horan et al., 2010). When students felt that these procedures were enforced unfairly, they typically exhibited emotional responses such as anger, frustration, powerlessness, and disgust (Horan et al., 2010). Student behavioral responses to perceived classroom injustices included dissent, hostility, withdrawal, inaction, adaption, and acceptance (Horan et al., 2010). Chory-Assad (2002) found that classroom procedural justice was positively related to student affective learning, which is the

educational equivalent of job satisfaction. Therefore, teachers may be able to enhance student affective learning by mitigating perceptions of procedural injustice through fair grading processes, high-quality feedback, and fair make-up/late work policies (Horan et al., 2010). Furthermore, Chory-Assad and Paulsel (2004) found that student perceptions of procedural justice were associated with resistance to instructor requests, either through revenge or deception. Student perceptions of procedural justice were also found to be related to student engagement with a teacher, including behaviors such as indirect personal aggression and hostility (Chory-Assad, 2002; Chory-Assad & Paulsel, 2004). Chory (2007) found that student perceptions of instructor credibility, which is composed of competence, character, and caring (McCroskey & Teven, 1999), predicted student perceptions of procedural justice. When students perceived that their instructors had trustworthy characters and cared about their students, students were more willing to report favorable perceptions of procedural justice (Chory, 2007).

Frustration

Spector (1978) defined frustration as the interference between goal attainment or the interference with goal maintenance. This emotion produces a negative emotional state and increases physiological arousal within an individual (Spector, 1978). Physiological arousal is influenced by strength of frustration, which depends on 1) the importance of the goal to the individual, 2) the degree of interference, and 3) the number of interferences within a span of time (Spector, 1978). Behaviors resulting from frustration may be classified into four categories: 1) trying a different response or alternative means to achieve a goal, 2) aggression, 3) withdrawal from the situation, and 4) abandoning a goal and choosing to either leave or remain in the situation (Spector, 1978). A study examining the challenges of a web-based distance education course found that students reported the most frustration with course content and instructor communication (Hara, 2000). Additionally, lack of prompt feedback and lack of immediate instructor assistance when experiencing difficulties with understanding course content or completing assignments exacerbated feelings of frustration among students (Hara, 2000). Moreover, students reported feelings of distress and frustration when they did not receive specifications regarding coursework, had difficulty locating resources to aid in completing coursework, and perceived unclear instructor expectations regarding coursework (Hara, 2000). Keenan & Newton (1984) examined the relationship between environmental frustration and psychological strain, finding that the presence of emotional arousal enhances the association between frustration and hostility, as well as frustration and dissatisfaction. Additionally, organizational climate was found to be an important contributor to frustration (Keenan & Netwon, 1984). Thus, a warm and supportive environment was likely to lead to a reduction of overall frustration, while a cold and hostile environment was likely to lead to an increase in frustration (Keenan & Newton, 1984). Storms and Spector (1987) found that locus of control had a moderating effect on behavioral reactions associated with frustration. Individuals with an external locus of control placed blame for their frustration on external conditions and were less likely to work toward a resolution than those with an internal locus of control. While the tendencies to engage in these behavioral actions did not differ between individuals with internal and external loci of control, the situations in which these behaviors were expressed did differ; those with an external locus of control experienced heightened incidences of aggression, sabotage, and withdrawal when frustrated (Storms & Spector, 1987).

Fit

Kristof-Brown, Zimmerman, and Johnson (2005) defined perceived fit to be an individual's direct assessment of the compatibility between themselves and their environment. Therefore, perceived fit may serve as a proxy between interpersonal compatibility of an individual and their work group (Kristof-Brown et al., 2005; Judge & Ferris, 1992; Kristof, 1996; Werbel & Gilliland, 1999). Perceived fit has been examined in the literature based on relationships with commonly studied outcome criteria. For example, Kristof-Brown et al. (2005) found perceived person-group fit had a moderate true score correlation with job satisfaction, organizational commitment, and intention to quit. Additionally, perceived person-group fit had a strong positive correlation with group cohesion (Kristof-Brown, et al., 2005). O'Reilly, Chatman, and Caldwell (1991) found that person-organization fit was positively related to normative commitment and job satisfaction, as well as negatively correlated with intent to leave and turnover rate. Further analysis showed that fit was a significant predictor of normative commitment, job satisfaction, and intent to leave (O'Reilly et al., 1991). A meta-analysis of perceived fit studies conducted by Verquer, Beehr, and Wagner (2003) found that perceived person-organization fit had a positive correlation with both job satisfaction and organizational commitment. Additionally, perceived person-organization fit was negatively correlated to turnover intention (Verquer et al., 2003). Furthermore, Hoffman and Woehr (2006) found that person-organization fit only exhibited weak to moderate relationships with task performance and turnover. An alternate theory suggested perceived person-organization fit may be a distal predictor of task performance when mediated by indirect work attitude effects (Chi & Pan, 2012; Shrout & Bolger, 2002).

Purpose and Hypotheses

The purpose of this study was to hypothesize a structural model for the direct and indirect relationships between clarity, justice, perceived fit, frustration, and satisfaction, and to confirm the validity of our model (Figure 1).

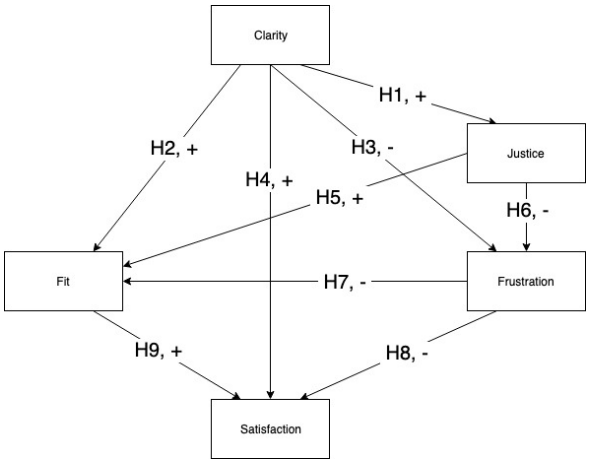

Figure 1. Project Team Satisfaction Model with Hypothesized Relationships

Hypothesis 1: Clarity and Justice. When there is greater clarity concerning role responsibilities and consequences for not meeting expectations, individuals have a greater understanding of their organization's judicial procedures (Lee, 2001). Therefore, we expect increased clarity to improve

perceptions of justice and posit that: Process clarity will have a positive relationship with procedural justice.

Hypothesis 2: Clarity and Perceived Fit. When individuals have a better understanding of their duties, this may enhance relationship quality among group members (Bang, Fuglesang, Ovesen, & Eilertsen, 2010). Additionally, this clarity bridges the gap between the individual's and the team's goals, which fosters a greater sense of unity amongst team members (Hu & Liden, 2011). As a result: Process clarity will have a positive relationship with perceived fit.

Hypothesis 3: Clarity and Frustration. In the absence of clarity, role ambiguity results and affects the way an individual internalizes and perceives the task at hand (Sawyer, 1992). This ambiguity is associated with increased tension among workers, which may result in frustration (Lyons, 1971). Thus: Process clarity will have a negative relationship with frustration.

Hypothesis 4: Clarity and Satisfaction. Much research concerning clarity has been devoted to determining its relations with satisfaction (Kahn et al., 1964). Arvey, Dewhirst, and Boling (1976) found a linear positive relationship between goal clarity planning and satisfaction; these results were furthered bolstered by Sawyer (1992), who observed direct relationships between process clarity and satisfaction. Therefore: Process clarity will have a positive relationship with satisfaction.

Hypothesis 5: Justice and Perceived Fit. Subordinate perceptions of fairness within an organization may affect how these individuals perceive their sense of belonging. This claim is bolstered by Lipponen, Olkkonen, and Moilanen's (2004) finding that procedural justice is significantly related to common in-group identity. So as members perceive greater fairness, they are more likely to feel connected to the group (Lipponen et al., 2004), which leads us to propose that: Procedural justice will have a positive relationship with perceived fit.

Hypothesis 6: Justice and Frustration. People have an inherent drive to maintain a balance between contributions to job and subsequent rewards (Adams, 1963). When this balance is disrupted by perceptions of unfairness, the responses to this lack of equity mirror responses to frustration, with members engaging in less cooperative communication and other retaliatory behaviors (Adams, 1963; Lee, 2001). Therefore: Procedural justice will have a negative relationship with frustration.

Hypothesis 7: Frustration and Perceived Fit. Worker frustration may produce negative behavioral reactions among organization members, such as sabotage, personal aggression, and withdrawal (Storms & Spector, 1987). When tension exists among group members, it is likely that the frustrated individual does not feel connected to other members of the group. Therefore: Frustration will have a negative relationship with perceived fit.

Hypothesis 8: Frustration and Satisfaction. Eaton (1952) hypothesized that worker frustration may be caused by perceived insignificance of one's work. Due to burnout being related to dissatisfaction (McHugh, Kutney-Lee, Cimiotti, Sloane, & Aiken, 2011) and frustration (Lewandowski, 2003), it is plausible that: Frustration will have a negative relationship with satisfaction.

Hypothesis 9: Perceived Fit and Satisfaction. Much research has been conducted to support the link between an individual's perception of fit within an organization or group and their subsequent satisfaction levels (Kristof-Brown et al., 2005; O'Reilly et al., 1991; Verqueer et al., 2003). When an individual feels as though they belong within an organization, they are more likely to be satisfied with their job. As a result, we posit that: Perceived fit will have a positive relationship with satisfaction.

Methods

To investigate the research purpose and hypotheses, a descriptive and correlational research study was employed. The population for this study consisted of undergraduate agricultural leadership students. A convenience sample of four classes of undergraduate students from a single course taught over multiple semesters at a southern land-grant university. The data analyzed within this study capitalizes on data previously collected within the Lamm et al. (2014) sample. The current study is fundamentally different from previous analysis in three primary ways. First, the previous study centered on motivation analysis, this study examines a unique set of antecedent variables: clarity, justice, frustration, and fit. Second, the current analysis focuses on not only the interactions of independent variables predicting team satisfaction, but also on the interactions between independent variables themselves. Lastly, the previous research only analyzed two classes of data. The current research analyzes two additional classes thus incrasing the statistical power upon which to infer conclusions. These disclosures are made based on existing recommendations for clarity (Kirkman & Chen, 2011). Data was collected using a paper-based questionnaire that was distributed, completed, and recollected for analysis during a single class period. A total of 155 respondents were included in the analysis with a response rate of 100%.

The current study was part of a larger study examining the undergraduate project team experience from a comprehensive perspective. Therefore, the current study focuses on a subset of scales that were collected and analyzed as part of the data collection effort. Specific to the variables of interest examined in the present study previously established scales were used to capture data. Clarity was operationalized using the process clarity was measure proposed by Sawyer (1992). Respondents were asked to indicate their certainty as it related to five statements on a five-point Likert-type scale (5- *Very certain*, 4 – *Certain*, 3 – *Neutral*, 2 – *Uncertain*, 1 – *Very Uncertain*). A sample statement includes: *Considering all your project tasks, how certain are you that you know the best ways to do these tasks*. The overall Cronbach's α value for the scale was 0.85. Justice was operationalized using the procedural justice construct proposed by Parker, Baltes, and Christiansen (1997). Respondents were asked to indicate their agreement with four statements on a five-point Likert-type scale (5- *Strongly agree* to 1 – *Strongly disagree*). A sample statement includes: *Members of my project team are involved in making decisions that directly affect their work*. The overall Cronbach's α value for the scale was 0.63; previous research had established internal structure validity and internal consistency sufficiency with a reported Cronbach's α of .74 (Parker et al., 1997). Frustration was operationalized using the frustration with work scale proposed by Peters, O'Connor, and Rudolf (1980). The scale was adapted to a project team context. Respondents were asked to indicate their agreement with three statements on a five-point Likert-type scale (5- *Strongly agree* to 1 – *Strongly disagree*). A

sample statement includes: *Trying to get this project done was a very frustrating experience*. The overall Cronbach's α value for the scale was 0.74. Fit was operationalized using the perceived person-organization fit scale proposed by Cable and Judge (1996). Respondents were asked to indicate their agreement with three statements on a five-point Likert-type scale (1 – *not at all,* 2 – *slightly*, 3 – *neutral*, 4 – *mostly*, 5- *completely*). A sample statement includes: *My values match those of my current project team members*. The overall Cronbach's α value for the scale was 0.86. Participants self-reported their level of project team satisfaction using a researcher adapted work satisfaction measure proposed by Judge, Boudreau, and Bretz (1994). The measure includes three items. The first item asked respondents to indicate if they were satisfied with their project team by responding *yes* (coded as a 1) or *no* (coded as a 0). The second item asked respondents to indicate how they felt about their project team in general using a seven-place circular face satisfaction series. The seven items were coded from 1 = *least satisfied* to 7 = *most satisfied*. Finally, participants reported the percentage of time that they were satisfied with their project team on average; available responses ranged from 0% to 100%. A satisfaction index score was calculated by multiplying each of the three items.

Structural equation modeling (SEM) was used to analyze the research hypotheses. Data were initially analyzed and cleaned using SPSS version 25 and then input and further analyzed using AMOS version 25. The Chi-square test of model fit was not significant. ($\chi^2 = 2.95$, $df = 1$, $p = .086$). Non-significant chi-square observations indicate strong model fit (Bollen, 1989). Additional model fit statistics were calculated in accordance with the recommendations in the literature (Hu & Bentler, 1998; Schreiber, Nora, Stage, Barlow, & King, 2006), specifically, comparative fit index (CFI), Tucker Lewis Index (TLI), and root mean square error of approximation (RMSEA) were computed. Model fit statistics were within acceptable ranges indicated good fit for CFI (.99). According to Hu and Bentler (1998) CFI values of 0.90 represent marginal fit, with values below 0.90 indicating poor fit and values 0.95 representing good fit. However, RMSEA (.09) and TLI (.84), were not within the established range for acceptable model fit. According to Hu and Bentler (1998) RMSEA values less than 0.08 represent acceptable model fit and TLI value ranges are consistent with CFI ranges. Despite the inconsistency in fit analysis, the model was deemed acceptable based on guidance proposed by Schreiber et al. (2006) "if the vast majority of the indexes indicate a good fit, then there is probably a good fit" (p. 327).

Results

Within a common five-point range for clarity, justice, frustration, and fit, individuals reported the highest score associated with clarity ($M = 4.17$; $SD = .61$). Individuals reported the lowest score associated with frustration ($M = 2.29$; $SD = .83$) as reported in Table 1.

Table 1
Index Summary

	M	*SD*
Clarity[a]	4.17	.61
Justice[b]	4.04	.50
Frustration[b]	2.29	.83
Fit[c]	3.80	.79

Satisfaction[d]	5.34	1.98

Note. Scale: [a]1 – *very uncertain,* 2 – *uncertain*, 3 – *neutral*, 4 – *certain*, 5- *very certain*; [b]5-point Likert-type scale with 1 = *strongly disagree*, 5 = *strongly agree;* [c]1 – *not at all,* 2 – *slightly*, 3 – *neutral*, 4 – *mostly*, 5 – *completely;* [d]range from 0 to 7.

The direct effects indicated that clarity and fit were both positively related to project team satisfaction, frustration was negatively related to project team satisfaction (Table 2). Of the three, frustration had the largest direct effect (standardized coefficient = -.37). Within the model frustration was predicted to be a more proximal predictor of project team satisfaction with frustration serving as a moderating variable to more distal predictors, specifically clarity and justice. Both clarity and justice were observed to have significant negative direct effects on frustration with justice having the larger observed effect (standardized coefficient = -.21). The effects of clarity, justice, and frustration on fit were also calculated. Of the three, clarity had the largest observed effect (standardized coefficient = .40). Procedural justice was not found to have a statistically significant direct effect on fit. Squared multiple correlations of predictor variables are displayed in Table 3. A total of 52.7% of the variance in project team satisfaction was predicted by the model, including both direct and indirect effects.

Table 2
Unstandardized, Standardized, and Significance Levels for Direct Effects

Parameter Estimate	Unstandardized	Standardized	*p*
Procedural Justice			
← Process Clarity	.29	.36	.00**
Frustration			
← Process Clarity	-.23	-.17	.05*
← Procedural Justice	-.35	-.21	.01*
Fit			
← Process Clarity	.50	.40	.00**
← Frustration	-.30	-.31	.00**
← Procedural Justice	.10	.07	.39
Satisfaction			
← Fit	.74	.29	.00**
← Frustration	-.88	-.37	.00**
← Process Clarity	.91	.29	.00**

Table 3
Squared Multiple Correlations of Predictor Variables

	R^2
Procedural Justice	.129
Frustration	.102
Fit	.348
Satisfaction	.527

A graphical representation of the model resulting from the SEM analysis is shown in Figure 2. Non-significant direct effects were removed from the original version shown in Figure 1 to aid in

clarity and interpretation. Of particular note is the absence of direct effects associated with procedural justice and fit. Error terms, although not indicated in the figure, were present in the analysis.

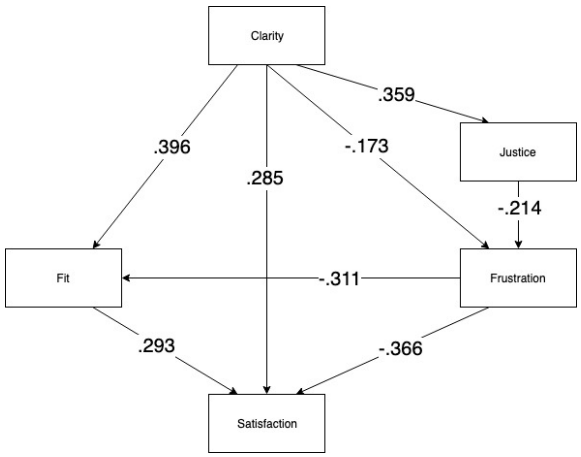

Figure 2. Results for the project team satisfaction model with statistically significant standardized direct effects noted. CFI = .99; TLI = .84; RMSEA = .09; X^2 = 2.95; degrees of freedom = 1.

The standardized indirect effects observed in the model are presented in Table 4. Of the four antecedent predictors of satisfaction, clarity (standardized coefficient = .237) and Justice (standardized coefficient = .117) had the largest significant indirect effect on the project team satisfaction variable. The standardized total effects observed in the model are presented in Table 5. Of the four antecedent predictors of satisfaction, clarity (standardized total effect = .521) and frustration (standardized total effect = -.457) had the largest significant indirect effect on the project team satisfaction variable.

Table 4
Standardized Indirect Effects of Clarity, Justice, Frustration, Fit, and Satisfaction

	Clarity	Justice	Frustration
Justice	-	-	-
Frustration	-.077	-	-
Fit	.101	.067	-
Satisfaction	.237	.117	-.091

Table 5
Standardized Total Effects of Clarity, Justice, Frustration, Fit, and Satisfaction

	Clarity	Justice	Frustration	Fit
Justice	.359	-	-	-
Frustration	-.250	-.214	-	-
Fit	.496	.131	-.311	-
Satisfaction	.521	.117	-.457	.293

Conclusions, Implications, and Recommendations

The role of clarity, justice, frustration, and group fit variables were studied alongside agricultural leadership students' satisfaction with project team work. Eight of nine hypotheses were confirmed. The roles of process clarity and frustration provided particularly significant findings; results indicate that for every one standard deviation increase in process clarity, satisfaction goes up by .521 standard deviations. Additionally, as frustration goes up by one standard deviation, satisfaction goes down by .457 standard deviations. These findings can be applied to how student-teacher interaction influences student satisfaction (Strickland & Elson, 1987). Thus, educator influence must be taken into consideration when preparing students for project work success.

In an educational setting, educators are storehouses of information. Sharing this knowledge prompts a cognitive response within students, enabling them to process the information and relocate the information from their short-term memory to their long-term memory storage (Titsworth, Mazer, Goodboy, Bolkan, & Myers, 2015). When educators communicate with a heightened degree of clarity, students are better able to process, store, and retrieve information, which is the goal of the learning process (Titsworth et al., 2015). Chesebro (2003) found that higher levels of teacher clarity were directly associated with enhanced student learning. These findings are supported by additional studies by Titsworth (2001a; 2001b) and Chesebro and McCroskey (2001). Based on the results of the study at hand, higher levels of clarity are also associated with team member satisfaction. Findings complement Calongne's (2002) propositions about how an educator's clear instructions (and the reiteration of those instructions) reduce student anxiety. Prompt feedback, defined tasks, articulation of team goals, established member roles, and intentional educator guidance (Hara, 2000; Page & Donelan, 2003) help with clarity and lead to less student frustration. Educators are encouraged to notice behaviors indicating student frustration (Spector, 1978) and to provide assistance as students process their locus of control in team environments.

Despite the results associated with the present study there are limitations that must also be considered. First, the data, while collected over multiple years, may not be representative of the broader population, therefore generalizability of results is cautioned. Nevertheless, an associated recommendation would be for agricultural educators to recall the results when working with undergraduate project teams. Specifically, maximizing clarity has the greatest potential for impact on satisfactions thus agricultural educators are encouraged to first focus on clearly articulating the expectations associated with project teams. An additional recommendation is to monitor project teams for emerging frustration and to intervene as appropriate. A second limitation of the study is the lower than desired Cronbach's α associated with the justice measure, it would have been preferable to obtain a value greater than .70 to provide additional confidence to subsequent results (e.g. Cortina, 1993). Nevertheless, the model fit was deemed acceptable based on available measures and standards (Bollen, 1989; Hu & Bentler, 1998). An associated recommendation would be to replicate the study and increase the statistical power associated with the analysis.

"Team interaction should not be avoided despite the difficulties we face when managing teams. Instead, we need to identify strategies for taking advantage of teamwork and team synergy..."

(Calongne, 2002, p. 219). Research shows that this type of effort is worth it due to the amount of potential learning and satisfaction that can take place in face-to-face, online, high-school, post-secondary, and organizational settings because of team, versus individualistic, initiatives. As agricultural educators use evidenced-based strategies, such as those presented in this study, implications of best practices can positively affect educators' influence, instructional design and evaluation, and workforce preparedness.

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Investigating the Effects of Cognitive Diversity on the Hypothesis Generation and Troubleshooting Ability of Undergraduate Students Enrolled in an Introductory Agricultural Mechanics Course at Louisiana State University

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Abstract

Problem solving has been regarded as one of the most important cognitive skills in everyday life. The complexity of problem solving in technical areas is a critical component to developing the problem solving abilities of agricultural education students. This study grounded in Kirton's Adaptation-Innovation Theory (A-I Theory), sought to identify the effects of cognitive diversity on the time to solution and hypothesis generation ability of undergraduate students enrolled in an agricultural mechanics course at Louisiana State University during the spring semester of 2018 (n = 17) and spring semester of 2019 (n = 15). Students were divided into three groups based their Kirton's Adaptation-Innovation Inventory (KAI) scores into three cognitive diversity groups including (a) homogenous innovative, (b) homogenous adaptive, and (c) heterogenous. Overall, the more heterogeneous cognitive diversity group was able to solve the problem more quickly as well as being the most successful group to hypothesize correctly, with the homogeneous innovator group being the slowest to reach conclusion. From the results of this study, it is recommended that educators consider cognitive styles when grouping students in undergraduate courses that are heavily laboratory based.

Introduction

Problem solving is defined as "any goal-directed sequence of cognitive operation" (Anderson 1980, p. 257) and has been regarded as one of the most important cognitive skills in everyday life (Jonassen, 2000). We encounter and solve problems daily as part of a routine that is integrated into our personal and professional lives. This ability has been recurrently identified as a critical skill for employment in the agricultural industry, specifically within technical areas (Alston, Cromartie, Wakefield, & English, 2009; Graham, 2001; Robinson & Garton, 2008; Robinson, Garton, & Terry, Jr., 2007). Despite the importance of problem solving, students today often do not solve meaningful problems as a part of their curricula (Jonassen, 2000). For problem solving to successfully develop, there must be social, cultural, and intellectual value placed upon the task (Jonassen, 2000).

One of the most commonly experienced and applicable types of problem solving we encounter, especially within the realm of technical education, is troubleshooting (Jonassen, 2003). Troubleshooting can be broadly defined as determining what causes a malfunction in a machine or process (Herren, 2015; Morris & Rouse, 1985). Troubleshooting includes a subset of problems where the problem is situated into a real-world situation. In order for a troubleshooter to be successful, he/she must use a multitude of domain knowledge and be able to utilize cognitive skills to find faults in a system (Custer, 1995; Jonassen, 2000; Jonassen & Hung, 2006;

Schaafstal, Schraagen, & Van Berl, 2000). Specifically, troubleshooting requires the individual to employ prior knowledge and experiences to effectively interact with the complex system (Johnson & Flesher, 1993).

However, problem solving and troubleshooting is not as straight forward as whether an individual can or cannot solve complex issues. Cognitive styles, technical knowledge and problem solving methods can impact an individuals ability to successfully solve problems (Jonassen, 2000). Dyer and Osborne (1996) researched the use of teaching methods on ability of students with varying learning styles to solve problems. This study indicated students who were taught using the problem solving approach had significantly higher problem solving ability than those taught just through subject matter (Dyer & Osborne, 1996). While no statistically significant differences were present within this study between students with similar learning styles, all benefited from the problem solving approach. Similarly, Torres and Cano (1994) found learning style had an effect on students being successful in specific situations and environments.

Within agricultural education, an area that is heavily focused on hands-on learning and problem solving in a multitude of learning environments, researchers have investigated students' problem solving in a variety of contexts. Pate, Wardlow and Johnson (2004) and Pate & Miller, (2011) investigated agriculture students ability to solve small gasoline engines related problems when implementing Think-Aloud Paired Problem Solving (TAPPS) and reported no statistically significant differences in ability. Similarly, Blackburn and Robinson (2016) found the greatest difference in time to solution among high school students troubleshooting small gasoline engines was their ability to hypothesize correctly. They further analyzed differences in problem solving ability and reported no differences based on students' cognitive style (Blackburn & Robinson, 2016). Blackburn, Robinson, and Lamm (2014) reported differences in problem solving ability of students based on the cognitive style and problem complexity. Additionally, Lamm et al. (2012) conducted a qualitative analysis of undergraduate agriculture students who had completed an international experience in Costa Rica. Upon returning to the U.S., the students were grouped purposely by cognitive style and tasked with solving a complex, ill-structured problem. Overall, it was reported that the students' ability to solve the problem differed depending on the cognitive diversity of the groups.

Theoretical/Conceptual Framework

The theoretical framework for this study was grounded in Kirton's (1976, 2003) Adaptation-Innovation Theory (A-I Theory). This theory is founded on the belief that every individual is creative and can solve problems (Kirton, 2003); however, it is important to note that the A-I theory is only concerned with the *how* an individual solves problems. This theory allows an individual to understand their cognitive style and how they go about solving everyday problems (Kirton, 2003). According to Kirton (2003) cognitive style is "the preferred way to which people respond to and seek to bring about change" (p. 43), therefore resulting in problem solving and cognitive style differences between individuals. Foundationally, the A-I theory presumes individual cognitive style is predetermined from the early stages of life and remains stable, regardless of a person's previous experiences or age.

According to this theory, individual cognitive styles fall between adaptation and innovation on a continuum from 32–160 (Kirton, 2003). This type of scale does not allow any individual to be purely an adaptor or purely an innovator. Kirton (2003) identified key distinctions in preferred problem solving style between the more adaptive and more innovative individuals. Specifically, individuals whose tendencies were more adaptive preferred a more structured environment when solving problems. However, more innovative individuals preferred an environment that allowed them to think more fluidly.

Conceptually, this study was underpinned by Bransford's (1986) IDEAL problem solving model. At the foundational level, this model draws focus on the importance of how an individual utilizes information to build new tools that will help the individual solve problems (Bransford, 1993). More specifically, this model can be utilized to address individual awareness on the problem solving process and therefore, allowing the individual to reflect and analyze. The model, developed by Bransford (1986), has five essential steps (a) Identify, (b) Define or Develop goals, (c) Explore, (d) Anticipate or Act, and (f) Look and Learn and is utilized to understand how individuals move through the problem solving process (see Figure 1).

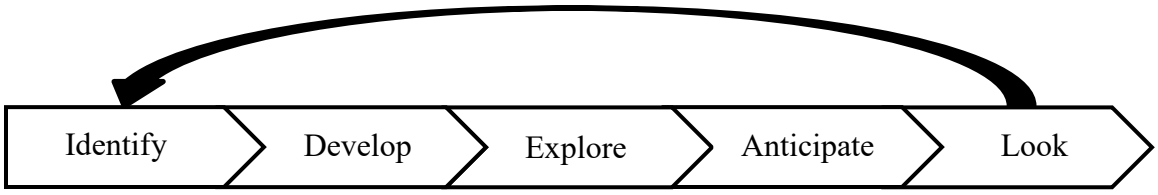

Figure 1. Bransford's (1993) IDEAL problem solving model. Adapted from "The Influence of Cognitive Diversity on Group Problem Solving Strategy" by AJ Lamm, C Shoulders, GT Roberts, TA Irani, LJ Snyder, & J Brendemuhl, 2012, *Journal of Agricultural Education, 53*(1), p.19. Copyright 2012 by Journal of Agricultural Education. Reprinted with Permission.

Problem solving and troubleshooting have been researched in agricultural education for some time. Researchers have utilized the TAPPS method (Pate et al., 2004; Pate & Miller, 2011) and cognitive styles (Blackburn & Robinson, 2016) to explain differences in problem solving ability, with no differences reported. However, Lamm et al. (2012) reported differences, qualitatively, in problem solving based on cognitive style and Blackburn and Robinson (2016) reported that hypothesis generation had an effect on time to solution. Therefore, the principle question that arose after the review of the literature was: What effect does cognitive diversity have on undergraduate students' ability to hypothesize and solve small gasoline engines problem?

Purpose and Objectives

The primary purpose of this study was to investigate the effects of cognitive diversity on hypothesis generation and troubleshooting ability of undergraduate students enrolled in an agricultural mechanics course at Louisiana State University. This research supports the American Association of Agricultural Education's National Research Agenda Priority 4: Meaningful, Engaged Learning in All Environments. Specifically, this research addresses question three, "How can delivery of educational programs in agriculture continually evolve to meet the needs

and interests of students?" (Edgar, Retallick, & Jones (2016), p. 39). The following objectives guided this study:

1. What effect does team cognitive diversity have on the hypothesis generation ability of undergraduate students enrolled in an introduction to agricultural mechanics course when solving small gas engine problems?

2. What effect does team cognitive diversity have on the troubleshooting ability, measured by time to solution, of undergraduate students enrolled in an introduction to agricultural mechanics course to solve a small gasoline engine problem correctly?

Methods

This research study was completed as part of a larger research project that investigated the effect of cognitive diversity on students' abilities to solve problems related to small gasoline engines. This portion of the research project is focused specifically on the effect of cognitive diversity on the hypothesis generation and troubleshooting ability of students to solve a small engines problem correctly. Because of the nature of this study, a preexperimental one-group pretest-posttest was utilized to collect data (Campbell & Stanley, 1963; Salkind, 2010). Preexperimental research methodology is commonly used in educational research when random sampling is not possible (Campbell & Stanley, 1963). In this approach, all individuals are assigned to the experimental group and are observed at two time points (Campbell & Stanley, 1963; Salkind, 2010) and the changes from the pretest to the posttest determine the results from the intervention.

Population/Sample

The population of this study was all students enrolled in an introductory agricultural mechanics course at Louisiana State University during the spring semester of 2018 (n = 17) and spring semester of 2019 (n = 15). Overall, one student in the spring semester of 2018 did not complete enough course material to be included in the study, therefore, the accessible population totaled n = 31. In compliance with the Institutional Review Board (IRB), students were notified of this research on the first day of class and were given the opportunity to not participate. All students, in this research study, were over the age of 18 and provided signed consent to participate in this research. Demographically, the majority of the participants were 19–21 years of age (n = 25, f = 80.6%) and female (n = 54.8, f = 17). Also, the majority of them were classified as sophomores (n = 13, f = 41.9) and majored in Agricultural and Extension Education (n = 13, f = 41.9).

To test for homogeneity, independent samples T-tests were employed to determine if statistically significant differences existed between the students enrolled in introductory agricultural mechanics in the spring of 2018 and 2019 semesters based on age (t = 2.197, df = 29, p = 0.596) and cognitive style (t = 0.006, df = 29, p = 0.109). Also, a Chi-Square test was utilized to determine if differences existed between the two semesters based on gender (X^2 = .313, df = 1, p = .576). The analysis revealed that our population from both semesters was homologous and subsequently the data were merged for further analysis.

Course Structure

On the first day of the small gasoline engines unit, the KAI and 30-item pretest were administered to the students. Due to the flipped nature of this course with the incorporation of Team-Based Learning (TBL) the students were grouped purposively by cognitive style into teams of four for the duration of the unit. The TBL layout described by Michelsen and Sweet (2008) was employed for the course. The course readings, videos, worksheets, and Individual Readiness Assurance Tests (IRATs) and Team Readiness Assurance Tests (TRATs) were all developed by the researcher.

Within the small gasoline foci, five individual modules were constructed including (a) small engine tool and part ID, (b) 4-cycle theory and fuel, (c) ignitions and governor system, (d) cooling/lubrication system, and (f) troubleshooting. After every module, students completed an IRAT to determine their content knowledge retained. After completing the IRAT, the students would then join their assigned team and complete the TRAT. Each team of four would come together during class time to complete the TRATs, where the students were allowed to collaborate with other team members to come to agreements on items they may have gotten incorrect. The goal of completing the IRAT before the TRAT is to ensure that all group members of the team contribute equally. After the TRAT, the remain class time was dedicated to completing laboratory based activities and assignments. For the purpose of laboratory activities, each team of four was further split into dyads (i.e., Team 1A, Team 1B) to complete the hands-on learning activities.

Instrumentation

Kirton's Adaptation-Innovation Inventory (KAI) was used to determine the students' cognitive style (Kirton, 2003) and that information was used to group students into teams. The students were grouped, based on their KAI scores into three cognitive diversity groups including (a) homogenous innovative, (b) homogenous adaptive, and (c) heterogenous. The KAI consists of 32 items that ask specific questions about the individuals preferred way to learn. Per the theory, individuals who score 95 or below are considered more adaptive, while individuals who score is 96 or above are considered more innovative. The internal reliability of this instrument has been measured and collected through multiple studies with individuals from varying backgrounds and demographics. From the wide use of the instrument, internal reliability coefficients have ranged from .83 – .91 (Kirton, 2003).

In order to collect data on hypothesis generation ability, Johnson's (1989) technical troubleshooting model was utilized as a guide to create the small gasoline engines troubleshooting packet. The packet consisted of three sections that included (a) hypothesis, (b) engine symptoms, and (c) troubleshooting process. Inside each packet were three sets of hypothesis sheets to ensure that if the group hypothesized incorrectly the first time they could use a different sheet to start over. This protocol was developed to follow the technical troubleshooting's model process of hypothesis generation (see Figure 2). One of the researchers kept a master time on a smartphone stopwatch application and recorded time to solution for each team. Time was not stopped and recorded until the students had successfully identified and corrected the fault. Specifically, the fault was an overtightened exhaust valve.

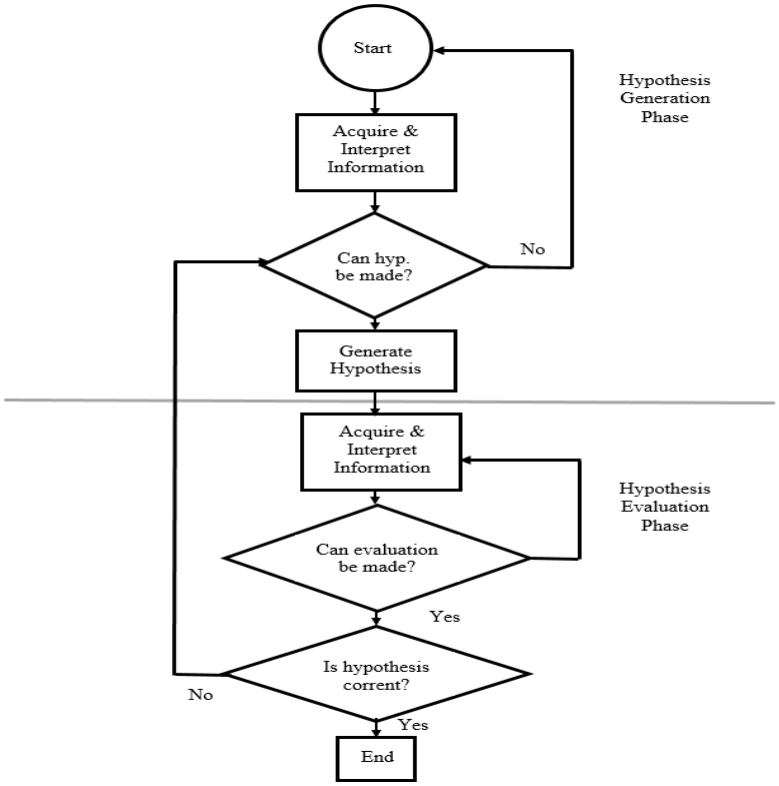

Figure 2. *Technical Trouble Shooting Model (Johnson, 1998)*

Data Analysis

During the initial data screening it was discovered that data related to the dependent variables were not normally distributed. Due to this violation of statistical assumptions, a Kruskal-Wallis test was employed to compare the effect between cognitive diversity and time to solution. The Kruskal-Wallis test is a nonparametric test equivalent to a parametric one-way ANOVA. Further, Mann-Whitney U tests were analyzed *post hoc* to determine if differences existed between the cognitive diversity groups. An *a priori* significance level of .05 was utilized to interpret the statistical significance of the analysis because this study is comparing two independent groups with no control; therefore, no adjustments to the critical value needed to be made (Lewis-Beck, Bryman, & Liao, 2004). Pearson's correlation coefficient *r* was analyzed after the Mann-Whitney U tests to calculate the effect size and standardize the measure of the size of effect observed (Field, 2011). Per Field (2009), an *r* value of .10 represents a small effect, which explains only 1% of the total variance, an *r* value of .30

To answer research question one, descriptive statistics, specifically, the frequency and percentage were utilized. Hypothesis generation ability was operationalized as whether or not they correctly hypothesized on the first attempt. Three independent Pearson's Chi-square tests were utilized to determine the relationship between hypothesis generation ability and problem solving ability have on cognitive diversity. Research questions two also utilized descriptive statistics, including mean, frequency, and standard deviation were utilized to describe the individual small gasoline engine teams and their time to completion. represents a medium effect

and explains 9% of total variance, and finally, an *r* value of .50 represents a large effect and accounts for 25% of the variance (Field, 2009).

Findings

Each of the small gasoline engines groups were given one laboratory period (e.g., 110 minutes) to generate a hypothesis and perform the troubleshooting activity. The teams were asked to hypothesize the possible problem and solution (see Table 1). Hypothesis generation ability was operationalized as correct or not correct on their first hypothesis. The homogeneous innovative cognitive diversity group consisted of all teams who were more innovative, which included team one. Based on hypothesis generation one, all four individuals hypothesized incorrectly. The homogeneous adaptive cognitive diversity group consisted of teams who more adaptive, which include team two, team four, team six, and team seven. Within this cognitive diversity group, seven (41.18%) of the 17 individuals correctly hypothesized and 10 (58.82%) hypothesized incorrectly on hypothesis one. Finally, the heterogeneous cognitive diversity group consisted of teams who were made up of a more innovative and more adaptive individual, which included team three and team five. Of the members in this cognitive diversity group, six (60%) hypothesized correctly the first time, while four (40%) hypothesized incorrectly.

Table 1
Hypothesis Generation Ability based on Cognitive Diversity Groups for Students in Introduction to Agricultural Mechanics

Cognitive Diversity	*Hypothesis Generation 1*			
	Correct		*Not Correct*	
	f	*%*	*f*	*%*
Homogeneous Innovative	0	0	4	100
Homogeneous Adaptive	7	41.18	10	58.82
Heterogeneous	6	60	4	40
Overall Total	13	41.94	18	58.06

In order to test for relationships between the cognitive diversity groups, three independent Pearson Chi-Square tests were employed to determine the effect that cognitive diversity has on hypothesis generation ability in order to successfully problem solve. The analysis from these tests revealed no statistically significant difference between the homogeneous adaptive cognitive diversity group and the heterogeneous χ^2 (.894) = 1, p = .345. Also, no statistically significant difference were found between the homogeneous adaptive group and the homogeneous innovative group χ^2 (2.471) = 1, p = .116. However, a statistically significant difference was found between the homogeneous innovative group and the heterogeneous group χ^2 (4.200) = 1, p = .040 based on hypothesis generation ability (see Table 2).

Table 2
Pearson Chi-Square Test between Cognitive Diversity Groups for Students Enrolled in Introduction to Agricultural Mechanics (n=31)

Groups	Value	*df*	*p*
Homogeneous Adaptive vs. Heterogeneous	.894	1	.345
Homogeneous Adaptive vs. Homogeneous Innovative	2.471	1	.116
Homogeneous Innovative vs. Heterogeneous	4.200	1	.040

Table 3, below, describes the teams and small gasoline sub-groups and their respective times to solution. Overall, the mean time to solution, across all groups, was 39 minutes. When looking at individual team times, Team 1A successfully completed the troubleshooting task in 90 minutes. While their counterpart, 1B, completed their engine in 60 minutes. Team 2A and 2B took 58 and 42 minutes, respectively, to complete the task. Team 3A successfully completed the task in 17 minutes; whereas, team 3B completed in 13 minutes. Teams 4A and 4B successfully completed their task in 52 and 60 minutes. Team 5A, 5B, and 5C successfully completed their troubleshooting task in 14 minutes, 21 minutes, and 1 hour and 12 minutes, respectively. Team 6A completed their task in 56 minutes, whereas team 6B completed their troubleshooting task in 33 minutes. Finally, team 7A and 7B completed their troubleshooting fault in nine minutes and 12 minutes.

Table 3
Introduction to Agricultural Mechanics Small Engine Sub-Grouping Time to Successful Completion of the Troubleshooting Problem

Teams	*Group A*	*Group B*	*Group C*
	Time to completion		
Team 1-Homogeneous Innovative	1 hour 30 minutes	1 hour	-
Team 2-Homogeneous Adaptive	58 minutes	42 minutes	-
Team 3-Heterogenous	17 minutes	13 minutes	-
Team 4-Homogeneous Adaptive	52 minutes	1 hour	-
Team 5-Heterogenous	14 minutes	21 minutes	1 hour 12 minutes
Team 6-Homogeneous Adaptive	56 minutes	33 minutes	-
Team 7-Homogeneous Adaptive	9 minutes	12 minutes	-
Mean Time Solution	39 minutes		

A non-parametric one-way ANOVA (e.g., Kruskal-Wallis) was utilized to determine the statistical significance of the effect cognitive diversity had on time to solution (see Table 4). The Kruskal-Wallis test determined that there was a statistically significant difference in time to solution by cognitive diversity, H (8.206) = 2, p = .017. Effect size was calculated to standardize the measure of the effect observed. The analysis of the effect size revealed an r value of .70, which is interpreted as a large effect (r > .50).

Table 4
Overall Kruskal-Wallis Test for Differences in Time to Solution by Cognitive Style Group for Students Enrolled in Introduction to Agricultural Mechanics

H	*df*	*p*
8.206	2	.017

In order to compare groups, Mann-Whitney U tests were employed *post hoc* to determine if a difference existed between two independent groups. Three independent Mann-Whitney U tests were conducted between homogeneous adaptive and homogeneous innovative, homogeneous adaptive and heterogeneous, and homogeneous innovative and heterogeneous. The Mann-Whitney U test between homogeneous adaptive and heterogeneous groups determined there was no statistically significant difference between the two groups based on time to solution and cognitive diversity (p = .580), however, a statistically significant difference was found between the homogeneous adaptive and homogeneous innovative group (p = .023) and homogeneous innovative and heterogeneous group (p = .004) (see Table 5). Effect size was also reported to standardize the measure of the effects observed between all statistically significant cognitive diversity groups. An r value of .61 was revealed between the homogeneous adaptive and homogeneous innovative, which is a large effect (p > .50). Also, between the homogeneous innovative and heterogeneous group revealed an r value of .63, which is also interpreted as a large effect (p > .50).

Table 5
Mann-Whitney U Tests of Differences in Time to Solution by Cognitive Diversity Groups for Students Enrolled in Introduction to Agricultural Mechanics (n=31)

Groups	U	*Z*	*p*
Homogeneous Adaptive vs. Heterogeneous	74	-.554	.580
Homogeneous Adaptive vs. Homogeneous Innovative	2	-2.886	.004
Homogeneous Innovative vs. Heterogeneous	4	-2.280	.023

Conclusions/Discussion

During the troubleshooting exercise, students were asked to create a written hypothesis based on the information they collected when trying to start their respective engines. Regardless of cognitive diversity, the teams who generated the correct hypothesis on the first attempt were more likely to solve the problem quicker; whereas, the more times the team hypothesized, the more time it took to complete the troubleshooting task. This conclusion is consistent with previous research by Blackburn and Robinson (2016), which indicated that regardless of cognitive style and problem complexity, students who generated a correct hypothesis were more

efficient problem solvers. Similarly, Blackburn and Robinson (2017) indicated the majority of students were able to identify and hypothesize regardless of cognitive style, however, more adaptive students were more likely to hypothesize correctly on the simple problem; whereas, the more innovate students were more likely to solve a complex problem. Previous research by Johnson (1989) also concluded that students who generated a correct hypothesis are more likely to be able to correctly solve problems.

Overall, 31 students completed and solved the troubleshooting problem successfully regardless of cognitive style. In terms of group cognitive diversity, the heterogeneous group solved the problem on average 13 minutes faster than the homogeneous adaptive group and 48 minutes faster than the homogeneous innovative group. The homogeneous adaptive group, however, solved the problem on average 34 minutes and 45 seconds faster than the homogeneous innovative group. Therefore, the heterogeneous cognitive diversity group was a more efficient type problem solver. Also, a difference amongst cognitive diversity groups and time to solution was identified between the homogeneous adaptive and homogeneous innovative and the homogeneous innovative and heterogeneous. Further analysis revealed that the homogeneous adaptive and heterogeneous cognitive diversity group had no differences between cognitive diversity and time to solution. This conclusion also supports the adaptation-innovation theory that indicates each cognitive style has its own distinct characteristics when problem solving, which can affect how efficiently they are able to solve problems (Kirton, 2003). This finding also supports the findings of Lamm et al. (2012) who reported, qualitatively, that homogeneous innovator groups struggle to solve complex problems, perhaps due to their ability to proliferate ideas.

The most efficient group of problems solvers where the heterogeneous teams who not only solved the problem the quickest, but were also to more accurately hypothesis. The homogeneous adaptive group was the second most efficient at solving the problem but were least likely to hypothesize the problem correctly. The homogeneous innovative teams were the least efficient at problem solving and did not hypothesis correctly on hypothesis one. This is consistent with previous research conducted in troubleshooting, which ascertain that those who generate a correct hypothesis the first time are more likely to solve the problem faster than those who require more than one hypothesis (Blackburn & Robinson, 2016, 2017; Johnson, 1989). Further, this supports the adaptation-innovation theory that no matter the individual's cognitive style, anyone can solve problems (Kirton, 2003).

Implications

The more heterogeneous cognitive diversity group was able to solve the problem on average 24 minutes quicker than any of the other groups. However, the homogeneous adaptive group was able to solve the problem almost 35 minutes faster than the homogeneous innovator group. These substantial time differences between cognitive diversity groups led to further questions about why those differences exist. It is possible that the differences in how each of the cognitive style groups go about solving problems was the primary factor in time to completion. Kirton (2003) stated that groups of homogeneous adaptors tend to excel in problem solving when the problem is structured and has boundaries. Whereas, the more innovative individuals tend problem solve more efficiently with less structure and challenge those set boundaries (Kirton, 2003). However,

Kirton (2003) also stated the most successful types of problem solvers are heterogeneous groups who are able to manage their wide variety of cognitive diversity because they are able to utilize both cognitive styles (Kirton, 2003). Therefore, per the theory, it could be beneficial to purposefully group students based on cognitive style into heterogeneous groups.

The most successful cognitive diversity group at hypothesizing correctly on hypothesis one, was the heterogeneous group. The least successful group on a correct hypothesis one, was the homogeneous innovative group. Per the A-I theory, the more adaptive individuals tend to solve problems more effectively that are structured and have boundaries, while the more innovative excel at problems with no boundaries and little structure (Kirton, 2003). Perhaps, the heterogeneous groups were more successful at hypothesis generation because they were able to utilize and manage the wide cognitive diversity range; therefore, broadening their problem-solving ability scope (Kirton, 2003).

In Johnson's (1989) technical troubleshooting model, the students are required to hypothesize once and if they indicate their initial hypothesis to be incorrect, they are to go back to phase one and hypothesize again. This process is continual until the troubleshooter correctly hypothesizes the fault. It is possible that the homogeneous innovative cognitive diversity group, were least successful at hypothesizing correctly the first time because they proliferated too many ideas and were unable to identify and recognize the problems; therefore, they struggled to make a hypothesis (Bransford, 1993; Johnson, 1989; Kirton, 2003) or they generated multiple hypotheses from symptom problems and were then unable to make a decision on the correct one. Pate and Miller (2011) found that students who utilized groups to problem solve, took an average of four minutes longer to solve problems. This could indicate that conflict within groups may can actually hinder the problem solving process when compared to allowing individuals to problem solve independently.

Overall however, the teams who hypothesized correctly on hypothesis one were more likely to have a quicker time to solution. It is possible that the heterogeneous groups were better at problem solving because they solved problems more linearly and were able to utilize all the steps in Bransford's (1993) IDEAL model, allowing them to be efficient problem solvers. Perhaps one of the reasons the homogeneous adaptive and innovative groups were less successful at solving the problem on hypothesis one and had slower times to solution was because they got lost in the details and had a harder time moving through all the steps in the IDEAL model, which created gaps in their problem solving process and led to errors (Brandsford, 1993).

Recommendations for Practice

From the results of this study, it is recommended that educators assess students' cognitive styles and then purposefully group students into heterogeneous cognitive diversity groups in undergraduate agricultural courses that are heavily laboratory based. Kirton (2003) concluded that heterogeneous groups can be more effective and efficient problem solvers if they are able to manage their wide range of cognitive diversity. Based on this research, educators should consider adopting active learning environments, like TBL, to help promote the development of problem-solving skills. It has become increasingly important for educators to adapt to new pedagogies in order to meet the demands of the 21st century (Blackburn et al., 2014) because the

agricultural industry today desires employees who are able to effectively and efficiently problem solve (Robinson & Garton, 2008). Based off the results of this study, the ability for students to hypothesize correctly has increased their problem solving effectiveness and efficiency.

It is also recommended that educators create more questions or application activities that are specifically designed to help develop an individual's procedural knowledge. Much of the literature on troubleshooting reiterates the importance of developing an individual's conceptual and procedural knowledge (Anderson, 1980; Johnson & Flesher, 1993; Johnson, 1989; Jonassen, 2003; Hegarty, 1991, McCormick, 1997). Therefore, it is important for educators to be developing the students *how* knowledge when dealing with problem solving tasks.

Recommendations for Research

Additional research is warranted to further investigate the effects of cognitive diversity on hypothesis generation and time to solution on the problem-solving ability of undergraduate students. Specifically, it is recommended that this study be replicated to increase the sample size increase statistical power and, perhaps, normalize the data. Further replication of this study is also warranted to study the effects of cognitive diversity on hypothesis generation and time to solution. To fully be able to account for extraneous variables, full randomization of treatment and control groups are needed in order to make the findings generalizable to a larger demographic.

Further research is warranted to investigate the effects metacognitive activities have on the troubleshooting ability and hypothesis generation of undergraduate students. Zimmerman and Risemberg (1997) and Davidson and Sternberg (1998) state that metacognitive skills are an essential prerequisite to effectively problem solve. Similarly, Davidson and Sternberg (1998) explain that metacognitive activities are a driving force that allows students to encode the problem type by forming mental schemas of the problem, which allows them to select the most appropriate plan.

Research is also recommended to investigate the short and long-term effects of TBL; specifically, on critical thinking, problem solving ability, content knowledge retention, and self-efficacy. Previous literature states that active learning classrooms provide students with the opportunity to engage in real-world problems, which increase critical thinking and problem solving skills (Michealsen & Sweet, 2008; Sibley & Ostafichuk, 2015), while also providing students with opportunities to learn conceptual and procedural knowledge and provides a framework for cognitive development, critical thinking skills development, and building problem solving skills (Michaelsen & Sweet, 2012).

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Perceptions of Arkansas Agriculture County Extension Agents Toward Urban Agriculture

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Abstract

As interest in local food development and urban agriculture increases, the Cooperative Extension Service is challenged to serve this community in Arkansas. Urban farmers in Arkansas have differing motivations for operation than those in production agriculture, so understanding agricultural county agents' perceptions of urban farmers is critical for program development and implementation in this sector and to bridge any gaps between Extension and urban producers. This study was conducted to determine the perceptions of, awareness of, ability to assist with, and barriers to working with urban farmers in Arkansas. An emailed instrument was sent to Arkansas staff chairs and agricultural county agents and data were analyzed using descriptive statistics. Responses from agents in more populous regions of Arkansas were comparatively analyzed to those from less populous regions. Results indicated a low frequency of interacting with urban farmers in their counties, a positive perception of the value of Extension resources for urban farmers, a low perception of personal knowledge relating to urban agriculture, and a significant difference between the responses of agents in more populous counties and those in less populous counties. Future research aims to conduct a similar survey relating to local food in Arkansas, not just urban agriculture.

Introduction

Motivations behind U.S. urban agriculture range from food security, local food system development, community development, and social justice (Reynolds, 2011; Rogus & Dimitri, 2015; Stevenson, Ruhf, Lesberg, & Clancy, 2007). Many urban farmers view urban agriculture as a way to live sustainably and provide food for themselves outside of the conventional food system and production agriculture. Ecological sustainability or social equity issues pertaining to food systems generally motivate these growers (Reynolds, 2011). Commercial urban farmers usually operate privately-owned, small-scale farms, and operational activities include production, harvest, and sales (Rogus & Dimitri, 2015).

The Cooperative Extension Service (CES) has several access points to urban agriculture, including providing technical assistance through increased horticultural knowledge among practitioners, creation of new types of community markets, management of organizational activities, information on securing land access, and mechanisms for profitability and business activities (Clark, Loveridge, Freedgood, & Hodgson, 2017; Dunning, Creamer, Lelekacs, O'Sullivan, Thraves, & Wymore, 2012; Oberholtzer, Dimitri, & Pressman, 2014; Reynolds, 2011). It is important to explore CES professionals' interest in developing and expanding programming in urban agriculture (Reynolds, 2011). Recommended activities for CES to expand

into urban agriculture include integrating urban food-system concepts into research and extension programs, building relationships with urban communities, researching ecology and agronomics for urban areas, programming for community leadership development, renewing focus on community food security, and facilitating communication and information exchange between food system actors (Reynolds, 2011). Because of the variety of access points for CES within urban agriculture, a next step to achieve successful programming is to assess the perceptions of CEAs towards urban agriculture. Relationships between CES and alternative food systems, specifically urban farmers, should be categorized by cooperation, dialogue, and co-learning (Reynolds, 2011). Some of these relationships are already in place due to work by Philyaw Perez and McCullough (2017), who organized local food meetups to determine the needs of local food system stakeholders in Arkansas, but limited social science research focused specifically on Arkansas urban farmers is available.

Though CES has traditionally focused less on urban food production, though urban agriculture is of particular interest to CES, due to the organization's history of assisting with rural and conventional agricultural communities. CES can incorporate its foundational knowledge of rural agricultural production systems into new programming designed to address areas where urban farmers struggle and provide them with resources to operate in the urban agriculture sector. CES has a history of involvement with community change, as they work with many locally elected officials and are familiar with community political networks (Clark et al., 2017). CES can play an important role in community and food system development by providing local resources; thus, it is necessary to understand the various perspectives and goals within CES for food system change (Clark et al., 2017). CES is a key community stakeholder due to its relationships with local decision-makers, producers, and consumers, and they have historically connected actors within the food system. By analyzing the baseline need for urban agriculture programming from CES's perspective, CES specialists can understand the needed direction for future programming to reach the desired audience.

This study relates to the National Research Priority 6: Vibrant, Resilient Communities, which included the research priority question, "how do agricultural leadership, education, and communication teaching, research, and extension programs impact local communities?" (Roberts Harder, & Brashears, 2016, p. 51). With population migration from rural to urban areas due to rapid urbanization, a reduction in agricultural labor has occurred, but increases in urban agriculture has been revealed in the recent decade (Rogus & Dimitri, 2015). Increased urban farming generally involves the local community, which can potentially help a community become more resilient, especially as it relates to food security.

Theoretical Framework

It is important to identify the role of CES within alternative food systems. Traditionally, alternative food system movements are associated with opposition to the conventional food system, which has made CES cautious of associations with certain change actors (Clark et al., 2017). However, many of these food systems are constructed as viable alternatives to the conventional food system, rather than as entities directly undermining it (Gliessman, 2015). This is more conducive to the function and operation of CES, as it allows CES faculty to work within

alternative food systems by helping construct market-centric alternatives that do not threaten CES's relationships with conventional agriculture (Clark et al., 2017).

Understanding change-oriented activities as social movements helps contextualize the nature and limitations of alternative food networks (Stevenson et al., 2007). Social movements create networks consisting of individuals, groups, communities, and organizations that share beliefs about a specific problem and work to create solutions. These change-oriented activities can be analyzed within the Builder, Weaver, Warrior Work theory (Stevenson et al., 2007). This theory focuses on the orientation of change activities within the local food movements and it consists of warrior, builder, and weaver work (Stevenson et al., 2007). Warrior work is the political arm of the social change framework, acting as resistance to the conventional system. Builder work is defined as reconstruction, and operates to create alternative food systems and models within the economic sector. Finally, weaver work develops strategic, conceptual linkages between warrior and builder work. It connects these two divergent actors, operating both in the political and economic sectors to mobilize civilians within society (Stevenson et al., 2007). CES personnel self-identify as builders, working within alternative spaces through economic practices, rather than oppositional spaces through political practices (Clark et al., 2017). CES respondents in Clark et al. (2017) viewed the marketplace as a mechanism for change. CES educators also identify as weavers, creating the connections as educators and facilitators, even though their change strategies more closely aligned with builder work. Much of their weaving work would yield future building work. Weaver work is necessary for long-term change strategies (Clark et al., 2017). Food system change depends on creating collaborative initiatives between individuals and organizations, and CES can play a critical role in cultivating these relationships (Dunning et al., 2012).

Methods

The purpose of this descriptive survey research was to describe the perceptions, awareness, and abilities of Arkansas agricultural County Extension Agents (CEAs) in relation to urban agriculture. The following objectives guided this study: a) describe CEAs' perceptions of urban agriculture; b) determine CEAs' awareness of urban agriculture; and c) determine CEAs' identified barriers to participating in urban agricultural programs. With the findings from these three objectives, researchers can connect these perceptions with Builder, Weaver, Warrior Work theory (Stevenson et al., 2007) to determine the best strategies for implementing programs for urban farming in Arkansas.

This study implemented a researcher-designed, quantitative, web-based, 21-item instrument containing Likert-type questions related to CEAs' activities, opinions, awareness, and attitudes of urban agriculture. This is part of a larger study where data collected from face-to-face interviews with urban farmers in a previous study informed constructs for the instrument (Dobbins, Cox, Edgar, Graham, & Philyaw Perez, 2019; 2020). The constructs addressed the needs of urban farmers, including research, information, training, and programming needs. Other constructs addressed the above-outlined objectives 1-4.

The initial instrument was pre-tested with three participants utilizing the think-aloud questioning technique commonly referred to as a cognitive interview (Collins, 2003). This complemented the

ensuing pilot test of the instrument by checking for potential misunderstandings and misinterpretations in the instrument, and allowed for an assessment of instrument validity. The pilot test was conducted with a small number of non-agriculture CEAs and CES county staff chairs who had similar characteristics and projects to agricultural CEAs. These participants included Family and Consumer Science agents and agents with 4-H assignments. Participants utilized in this testing did not participate in the final data collection. Split-half correlation was used to assess internal consistency of the instrument through Cronbach's α, which is the mean of all possible split-half correlations for a set of items or constructs (Jhangiani & Chiang, 2015). Associated measurements contributed to the reliability of the instrument. Reliability, as measured by Cronbach's alpha, was reported at .97. Face and content validity were determined by a panel of experts at the University of Arkansas, the University of Arkansas Division of Agriculture Cooperative Extension Service, and the University of Georgia. Two experts hold a background working with CES, one of whom was the leading local food expert in the state. Three were experts in instrument development ensuring that constructs measured what was intended to be measured. The University of Arkansas Institutional Review Board (IRB) approved this study (Protocol # 1809143362).

The target population for the instrument was agricultural CEAs in Arkansas. This study implemented census sampling for the identified agricultural CEAs and county staff chairs (N = 100), acquired from the CES personnel directory. Because extension professionals use email as a communication tool, it was determined that this would be an effective mechanism for dissemination (Dillman, Smyth, & Christian, 2014). Email invitations were sent to the CEAs and staff chairs to participate in the online instrument through the CES email system, which contained a description of informed consent and scope of the study. Questionnaires were emailed to the CEAs on February 1, 2019, with follow-up reminders on February 7, February 19, and February 27 respectively to improve response rates (Dillman et al., 2014). Attempts were limited to one per Internet Protocol (IP) address to prevent participants from multiple attempts. The total number of responses received at the conclusion of data collection (February 28, 2019) was 57, yielding a 57% response rate. Data collected from participants were stored in a password-protected database and converted into a Microsoft Excel spreadsheet. Through SAS and SPSS, descriptive statistics were used to establish frequencies and percentages for each construct and objective.

To report nonresponse bias, recommendations from Johnson and Shoulders (2017) were followed. Early respondents (those who responded prior to the third mailing, n = 40) were compared to late respondents (n = 17), on three questions that represented each of the three constructs present in the instrument: perceptions, awareness, and barriers. These responses were analyzed using a two-tailed independent t-test at the .05 alpha level. The effect size for the perceptions construct was d = -0.64 (a medium effect), the effect size for the barriers construct was d = -0.08 (a negligible effect), and the effect size for the awareness construct was d = -0.02 (a negligible effect). There were no significant differences between early and late respondents for any of the three constructs, $t(57)$ = -2.22, -.07, -.29 respectively with corresponding significance values indicating no significant differences found (p = .17, .31, .40). Thus, the findings were generalized to the population of study.

Results

Participants were asked to describe their perceptions of urban agriculture addressing research objective one. Table 1 displays the number of agents who agreed with various definitions of urban agriculture. Analysis of the results indicated that most participants "agreed" or "slightly agreed" with the definition "farming in and around urban areas" (90%), followed by "small farms (fewer than 10 acres) located within city limits that actively engage with the market either through direct-to-consumer sales, coordinator, or institutional/retail buyers" (88%), and "farming within city limits" (84%). Participants indicated least agreement with the statement "farming that involves education" (57%) when considering their definition of urban agriculture. All definitions demonstrated at least a majority agreement or slight agreement amongst participants.

Table 1
*Level of Agreement with Various Definitions of Urban Agriculture (*n *= 57)*

	Frequency and Percentage of Likert-Type Responses											
	No Response		Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Agree	
Statement	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Farming in and around urban areas	0	0.0	1	1.8	2	3.5	3	5.3	14	24.6	37	64.9
Farming in city limits	0	0.0	1	1.8	1	1.8	6	10.5	15	23.6	34	59.6
Farming involving community	0	0.0	1	1.8	3	5.3	12	21.1	19	33.3	22	38.6
Farming that involves education	0	0.0	4	7.0	5	8.8	16	28.1	10	17.5	22	38.6
Production, distribution, and marketing of food and products in metropolitan areas	2	3.5	3	5.3	2	3.5	5	8.8	16	28.1	29	50.9
Small farms within city limits actively engaged with the market	1	1.8	2	3.5	1	1.8	3	5.3	18	31.6	32	56.1

In addition to describing perceptions of urban agriculture, specifically, participants were asked to identify if there were small-scale, diversified farms in their counties. Of the 57 responses, 61.4% (n = 35) said yes, 29.8% (n = 17) said no, 7.0% (n = 4) said they were unsure, and 1.8% (n = 1) provided no response. After responding to this question, participants were informed that urban agriculture, as it was used in the rest of the instrument, pertained to "small-scale, diversified farms less than 10 acres inside the city limits selling and producing for markets". Participants were then asked to identify the concentration of urban agriculture in their counties. The most frequent response to this question was "low" (43.9%), followed by "nonexistent" (26.3%).

To further describe perceptions held towards urban agriculture by the concentration of urban agriculture in their counties, participants were asked to identify the frequency with which urban farmers in their county engaged with various practices. Table 2 displays the number and percentage of perceived level of usage for various practices attributed to urban farmers. Few practices were determined as highly practiced, such as crop rotation at 22.8% (n = 13) and sustainable farming practices at 14.0% (n = 8). The highest response rates included 56% (n = 32) of participants reporting a medium-level usage of sustainable practices, and 56% (n = 32) reporting a low-level usage of certified organic practices (Table 2). As demonstrated in Table 3, between 5.3% (n = 3) and 42.1% (n = 24) were unsure of the levels to which these practices were used in their counties by urban farmers.

Table 2
*Certain Practices Use by Small-Scale Diversified Farms in Participants' Counties (*n *= 57)*

	Frequency and Percentage of Responses									
	No Response		Unsure		Low		Medium		High	
Statement	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Sustainable Practices	5	8.8	3	5.3	9	15.8	32	56.1	8	14.0
Certified Naturally Grown (CNG)	5	8.8	12	21.1	25	43.9	15	26.3	0	0.0
Organic (Certified)	5	8.8	12	21.1	32	56.1	7	12.3	1	1.8
Organic (Non-Certified)	5	8.8	10	17.5	24	42.1	15	26.3	3	5.3
Permaculture	5	8.8	24	42.1	23	40.4	5	8.8	0	0.0
Chemical-Free	5	8.8	9	15.8	30	52.6	13	22.8	0	0.0
No-till	5	8.8	10	17.5	27	47.4	11	19.3	4	7.0
Cover Cropping	5	8.8	8	14.0	20	35.1	22	38.6	2	3.5
Crop Rotation	5	8.8	7	12.3	6	10.5	26	45.6	13	22.8

The majority of participants interacted with clients who require urban agricultural assistance "never" (35.1%), "yearly" (22.8%), "monthly" (22.8%), or "weekly" (10.5%). Five respondents provided no response (8.8%). No participants indicated that they dealt with these types of clients daily.

Participants were asked to determine and identify their level of agreement with statements relating CES and its urban agriculture resources, as well as CES's potential value as a resource for urban farmers (Table 3). The highest percentage of agreement (73.6%) was reported for the statement "CES is a valuable resource for urban farmers" (n = 42), while the highest percentage of disagreement (38.6%) was reported for the statement "CES should not focus on developing programs related to urban agriculture" (n = 22). Out of the 57 participants, 61.4% (n = 35) "agreed" or "slightly agreed" with the statement "CES should provide more urban agriculture resources", 42.1% (n = 24) with "more time should be set aside for CES agent training for urban agriculture", and 42.1% (n = 24) with "more funding should be set aside for CES agent training

in the area of urban agriculture". The statement "more time should be set aside for CES agent training" had a relatively high percentage (35.1%) of "neither agree nor disagree".

Table 3
*Level of Agreement with Statements Regarding CES and Urban Agriculture (*n = *57)*

	Frequency and Percentage of Likert-Type Responses											
	No Response		Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Agree	
Statement	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
CES is a valuable resource for urban farmers	5	8.8	0	0.0	1	1.8	0	0.0	9	15.8	42	73.7
CES should provide more urban agriculture resources	5	8.8	0	0.0	2	3.5	15	26.3	14	24.6	21	36.8
More time for agent training in of urban agriculture	5	8.8	4	7.0	4	7.0	20	35.1	8	14.0	16	28.1
More funding for agent training in urban agriculture	5	8.8	4	7.0	4	7.0	20	35.1	10	17.5	14	24.6
CES should not focus on developing programs related to urban agriculture	5	8.8	22	38.6	10	17.5	13	22.8	4	7.0	3	5.3

One question required participants to check all that applied to the question "have you observed any of the following benefits as a result of urban agriculture in your county?". Many participants (63.2%) indicated that they had not observed any benefits in their county (analyzed through non-response to question). Of the provided responses, 28.1% of participants identified increased access to healthy food, 24.6% identified improved local economy, and 15.8% identified increased food security as observed benefits. Participants were provided an open-response option to this question as well, and of those who responded (n = 5), benefits included "it brings farmers together to share ideas", "local farmers marketing", "increased agricultural understanding/appreciation", and "more producers selling at farmer's markets".

Participants were asked to identify their perceived level of awareness relating to urban agriculture. Questions in this section related to research objective 2, to determine CEAs' awareness of urban agriculture. The most frequent response about perceived level of knowledge was "not knowledgeable at all" (36.8%) closely followed by "slightly knowledgeable" (35.1%). Ten participants did not respond to this question.

One section of the instrument attempted to identify participants' awareness of where urban farmers in their county sell their products. The highest reported location for this section was farmers' markets, where 35 participants (61.3%) indicated urban farmers "often" or "always"

sold there, followed by on-farm or direct-to-consumer sales, reported "often" or "always" by 24 participants (42.1%) (Table 4). Participants (n = 35) reported community-supported agriculture and schools most frequently as "never" or "not often" (61.4%).

Table 4
*Participant Identification of Where Urban Farmers Sell Their Products (*n = *57)*

	Frequency and Percentage of Likert-Type Responses											
	No Response		Never		Not Often		About Half of the Time		Often		Always	
Statement	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Local Restaurants	10	17.5	10	17.5	26	45.6	4	7.0	6	10.5	1	1.8
Farmers' Markets	9	15.8	5	8.8	3	5.3	5	8.8	32	56.1	3	5.3
Community Supported Agriculture (CSA)	11	19.3	26	45.6	9	15.8	4	7.0	7	12.3	0	0.0
Grocery Stores	10	17.5	18	31.6	19	33.3	7	12.3	2	3.5	1	1.8
On-farm Sales	10	17.5	5	8.8	3	5.3	15	26.3	20	35.1	4	7.0
Schools	10	17.5	21	36.8	20	35.1	4	7.0	2	3.5	0	0.0

Research objective 3 was investigated with responses to the question "how confident are you in your ability to advise and assist urban agricultural clients?". The highest reported response was "confident" (29.8%), followed by "neither confident or not confident" (19.3%) and "somewhat confident" (19.3%). The lowest response was "not confident" (7.0%).

Participants were asked to respond to several statements or questions relating to potential barriers to serving or assisting with urban farmers and related programming outlined in objective three of this study. Constructs included difficulty assisting with clients, resource availability, current programming, and potential programming. Of the 57 participants, 24.6% "agreed" or "slightly agreed" with this statement "it is difficult to assist with urban agricultural clients' needs", while 42.1% "disagreed" or "slightly disagreed" with this statement. Equal numbers of participants (n = 14) responded "disagree" and "neither agree nor disagree", or 24.6% each. Five participants (8.8%) provided no response.

Table 5 displays frequencies and percentages of responses about the availability of CES resources for training and assistance with urban agriculture. The barrier that reported the highest percentage of "agree" or "slightly agree" (50%) was "there is not enough need for it in my county" (n = 28). Statements relating to time, including "not enough time to assist with" (54.8%) or "to seek training" (49.1%) reported relatively higher levels of disagreement. Between 17.5% and 45.6% of respondents indicated they "neither agreed nor disagreed" with the statements. Five participants (8.8%) did not provide a response to any questions in the matrix.

Table 5
Level of Agreement with Statements Regarding CES Resource Availability for Urban Agriculture (n = 57)

	Frequency and Percentage of Likert-Type Responses											
	No Response		Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Agree	
Statement	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
There is not enough CES funding to support urban agriculture	5	8.8	10	17.5	9	15.8	23	40.4	8	14.0	2	3.5
I do not have enough time to assist urban farmers	5	8.8	21	36.8	10	17.5	10	17.5	9	15.8	2	3.5
I do not have enough time to seek training about urban agriculture	5	8.8	20	35.1	8	14.0	12	21.1	9	15.8	3	5.3
There is not enough need for it in my county	5	8.8	8	14.0	6	10.5	10	17.5	10	17.5	18	31.6
I have enough time, but not enough CES funding to support urban farmers	5	8.8	13	22.8	9	15.8	26	45.6	4	7	0	0.0
I have enough CES funding, but not enough time to support urban farmers	5	8.8	13	22.8	10	17.5	26	45.6	0	0.0	3	5.3

Table 6 provides the response frequency and percentage to statements about urban agriculture programs in participants' counties. Of the 57 participants, 18 (31.8%) "agreed" or "slightly agreed" that there were urban agriculture programs in their counties, while 21 participants (36.7%) "disagreed" or "slightly disagreed" with that statement (Table 6). Of the participants that indicated there were programs in place, 13 participants (22.8%) responded that clients were unaware of them, but 31.6% indicated they "neither agreed nor disagreed" with this statement, which demonstrated significant differences between regions within the population (see Table 8). Thirty participants (53%) "agreed" or "slightly agreed" that they had interest working with urban farmers, while four (7%) indicated the opposite.

Table 6
*Level of Agreement with Statements Regarding Urban Agriculture Programs in Participants' Counties (*n = *57)*

	Frequency and Percentage of Likert-Type Responses											
	No Response		Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Agree	
Statement	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
There are urban agriculture programs in my county	6	10.5	18	31.6	3	5.3	12	21.1	9	15.8	9	15.8
There are no urban agriculture programs in my county	7	12.3	11	19.3	9	15.8	10	17.5	3	5.3	17	29.8
There are urban agriculture programs in my county, but clients are unaware of them	6	10.5	14	24.6	6	10.5	18	31.6	13	22.8	0	0.0
I have interest in working with urban farmers	6	10.5	2	3.5	2	3.5	17	29.8	13	22.8	17	29.8
I have no interest in working with urban farmers	6	10.5	22	38.6	12	21.1	13	22.8	2	3.5	2	3.5

Participants indicated the likelihood with which they would work with potential programs for urban agriculture, including, but not limited to, educational workshops, face-to-face communication, and on-site farm demonstrations. Agents were most likely to engage with face-to-face communication (73.7%), followed by on-site farm demonstrations (66.7%), educational workshops (64.9%), and meetings (64.9%). Participants were least likely to engage with online learning modules (35.1%).

The last item on the instrument asked participants to identify, in an open-response question, what types of training would be helpful for assisting with urban agriculture. Only 10 participants provided a response. Usable responses included, "any", "web-based learning", "IPM", "marketing", "vegetable production", and "hands-on in-services and fact sheets".

Conclusions, Implications, and Recommendations

This study contributes to the literature by continuing the work of other scholars (Oberholtzer et al., 2014; Reynolds, 2011) in bridging urban agriculture with Extension programs, specifically in

predominantly rural states, where urban agriculture is not yet as developed as more metropolitan areas of the country. The results of this study provided key insights about Arkansas's CEAs' perceptions and awareness of urban farming in their counties. Arkansas is a predominately-rural state; however, as the urban agricultural sector continues to grow, there will likely be an increase in the demand for urban agricultural resources from CES.

The participants indicated the following perceptions of urban agriculture, relating to the first objective of the study. The results supported definitions from the literature about urban agriculture, as well as the definition developed in a previous study focused on urban agriculture in Arkansas—"small-scale, fewer than 10 acres, diversified, and sustainable farming within city limits that engages with the market, the community, or both" (Dobbins et al., 2020). Participants indicated there were small-scale, diversified farms in their counties; however, when asked to describe the concentration of urban agriculture in their counties, most indicated a low concentration. When the term "urban agriculture" was introduced, participants reported a lower concentration than when the term was not present. This could be attributed to the rurality of many of the counties in which participants worked. Of the urban farms identified by participants, most were described as using medium-to-low levels of sustainable practices. This contradicts previous studies about urban agriculture in Arkansas that indicate a high use of sustainable practices among urban farmers in the Northwest and Central regions of Arkansas (Dobbins et al., 2020; Dobbins et al., 2019). Future research should capture rural county agents' perceptions of sustainable or alternative farming methods in use in their counties. The majority of urban farmers in Arkansas utilized sustainable growing practices, though the participating agents in this study did not reflect that finding (Dobbins et al., 2020; Dobbins et al., 2019). Capturing this data would be a way to bridge the gap between sustainable growers and CES in a predominately-rural, conventional agricultural state.

The second objective, determining participants' awareness of urban farming in their counties, resulted in various findings. Few participants reported frequently assisting urban agricultural clients, though most participants believed that CES was a valuable resource for urban farmers. Overall, participants agreed that CES should provide more urban agriculture resources. This demonstrates a gap between beliefs, values, and implementation/practice. Data describing the preferred program types by participants (face-to-face communication and on-site farm demonstrations) align with previous findings that urban farmers preferred these modes of programming as well (Dobbins et al., 2019). This triangulation should provide baseline data for future programming to connect CES with this urban farming population. Participants demonstrated a lack of understanding the scope of urban and diversified agriculture in their counties, as well as of the needs of clientele who work in the urban agricultural sector; however, they demonstrated a good understanding of potential markets for urban farmers in the state. In the Northwest and Central regions of Arkansas, two of the top three markets for urban agricultural products included farmers' markets and on-farm/direct-to-consumer sales (Dobbins et al., 2019). This relates to the Builder, Weaver, and Warrior Work theory (Stevenson et al., 2007) and corroborates Clark et al.'s (2017) finding that agents view the marketplace as a mechanism for local food system change. Participants identified increased access to healthy food most frequently as a benefit of urban agriculture in their counties. This supports Rogus and Dimitri's (2015) concept that urban agriculture can enhance community food security, which includes access to healthy food. Opportunities for increasing the benefits of urban agriculture in

communities can help enhance collaboration and communication between farmers, community members, and agents in the area.

For the third objective, relating to participants' identified barriers to participating in urban agricultural programs, a majority of participants perceived themselves as at best slightly knowledgeable about urban farming; however, just under half of participants indicated they were confident in their ability to advise and assist urban agricultural clients' needs. Future research should investigate this discrepancy to discover why agents report little knowledge of urban agriculture but higher confidence in assisting urban farmers. There is potential for increased collaboration between CES and urban farmers, though this collaboration will vary based on region. While participants disagreed slightly with the difficulty of assisting urban farmers, half agreed that there was not enough need for urban agricultural assistance in their county. More than half of the participants were from counties with populations 50,000 or below – this may be an indicator of how the rurality of a state affects urban farming growth. Urban farming in a predominately-rural state is not expected to be a major phenomenon, but future research in the state could expand upon this instrument to gauge the use of alternative or sustainable farming practices, which may capture a wider audience than a survey aimed at urban agriculture.

Several limitations exist for this study. Perceptions of urban agriculture are difficult to capture in rural areas where respondents do not associate their production methods with the term "urban", which may have biased the results of this study. Future research should examine local food that uses sustainable (i.e. organic-type, non-conventional production agriculture) methods to better capture these alternative farming networks in a rural state. Additionally, the response rate of 57% potentially did not capture the various perceptions of agents in the state as a whole. This also supports future research on local food rather than specifically urban agriculture, which may have limited the response rate.

For CES to build successful collaborative relationships through its unique set of resources, local food systems should be continually legitimized as an important issue (Dunning et al., 2012). Arkansas's CES has made steps toward this through the work of Philyaw Perez and McCullough (2017), who hosted regional local-foods meetups with key stakeholders of Arkansas's local food system; however, with urban farming being a relatively new phenomenon in rural states like Arkansas, more research into this sector is merited. Implications for practice include understanding the perceptions and awareness of agricultural agents regarding urban and sustainable agriculture. This is a growing aspect of the agricultural sector, often populated in Arkansas by people with non-traditional agricultural backgrounds (Dobbins et al., 2020), who may or may not understand the full array of services and resources available to them through CES. To better market programs to this population and to strengthen the impact of Extension research to local communities, understanding the baseline data of perceptions, awareness, and barriers of CEAs is critical for future programming in local and sustainable agriculture.

Recommendations for practice are based on the study's objectives and Builder, Weaver, Warrior Work theory (Stevenson et al., 2007) to provide a framework for urban agricultural programming in Arkansas that can serve as a model for other states with similar demographics and farming practices. As Stevenson et al. (2007) posited, Extension personnel often work as both builders and weavers within and between conventional and alternative food systems. While this study did

not directly ask participants to identify what types of training and programming they would prefer to disseminate to those in their counties who are small-scale, diversified farmers, future research could corroborate Stevenson's (2007) findings to determine whether CES agents prefer to conduct economic and market-centric programming. Extension personnel are uniquely qualified to provide assistance to urban farmers focusing on scale and business planning, production practice, marketing, and distribution (Oberholtzer et al., 2014), and agents often view the marketplace as an environment for change within food systems (Clark et al., 2017). Thus, increased quantitative investigations into the specific programs that agents would encourage for their counties would benefit the current literature. Additionally, as Clark et al. (2017) explained, the weaver work bridges the political and economic arm of alternative food network development and is necessary for long-term change strategies and building collaborative initiatives between CES, individuals, and other organizations within food systems. This work is critical for future development, prosperity, and community engagement within the agricultural sectors of each state.

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