VALIDATING AND APPLYING THE EFFECTIVE TEACHING INSTRUMENT FOR SCHOOL-BASED AGRICULTURAL EDUCATION TEACHERS

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Abstract: Change is constant in agriculture and education. Therefore, school-based agricultural education (SBAE) and its teachers must remain current to change with the times. Producing competent, qualified, effective, SBAE teachers to meet a growing nationwide demand is a daunting task (Foster, Lawver, & Smith, 2018). Teaching effectiveness is an elusive concept (Stronge, Ward, & Grant, 2011) within SBAE considering the uniqueness of the program. Eck, Robinson, Ramsey, and Cole (2019) developed a 58-item instrument through a nationwide Delphi study, including characteristics experts deemed vital to an effective SBAE teacher. The purpose of this study was to validate the effective teaching instrument and identify SBAE teacher effectiveness nationwide. To accomplish this purpose, the study was undergirded in the human capital theory and supported by the development of a conceptual framework considering the potential factors impacting the effectiveness of SBAE teachers. A census approach was the target for data collection in this non-experimental, descriptive survey research study. The population of interest was SBAE teachers nationwide (N = 12,690) (Smith, Lawver, & Foster, 2018). Instruments were received from 3339 individuals in 45 states, resulting in a 28.2% response rate. This study determined the primary components of a SBAE teacher through a principal component analysis, resulting in 26 items measuring six components. The six components include intracurricular engagement, personal dispositions, appreciation for diversity and inclusion, pedagogical preparedness, work-life balance, and professionalism. The instrument was further validated and resulted in Cronbach's alpha level of 0.87 for the complete instrument. The study included results of SBAE teachers (44.1% male, 51.2% female) ranging from 21 to 72 years of age. These teachers represented 45 states and taught in programs ranging from a single teaching program consisting of eight students to a multi-teacher program consisting of 1502 students. Although there were no statistically significant interactions present through the factorial ANOVA, there were statistically significant main effects present for SBAE teachers' intent to retire, current state of employment, classroom/laboratory personal competency, FFA personal competency, and SAE personal competency, based on composite sum effectiveness scores. The findings of this study resulted in six overarching conclusions along with recommendations for practice and research.

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CHAPTER I

INTRODUCTION

Agriculture is changing rapidly to meet growing demands of consumers (McCalla, Castle, & Eidman, 2010). Largely, these changes are out of necessity due to the expanding population growth as well as industry and technology advancements and usage (McCalla et al., 2010). The advancements in technology have improved farmers' output from one American farmer feeding an average of 25.8 people in 1962, to more than 155 people 50 years later (Smith, 2016). This substantial increase can be attributed in large part to better crop genetics and management (i.e., herbicides, fertilizers, pest management) as well as increases in production efficiency with the use of technology (Smith, 2016). When considering technology in agriculture, Percy (2018) stated we have barely scratched the surface of digital crop production, even with the advancements that have implemented over the past decade.

In addition to population growth and industry advancements, climate patterns have an impacted the agricultural landscape worldwide resulting in periods of severe drought followed by extreme flooding (Gornall et al., 2010). Such changes will require innovative ideas from the next generation of agriculturists, many of whom "come from non-farming backgrounds, but all will bring new ideas about farming and with it a desire to embrace cutting-edge technology" (Percy, 2018, Para. 1).

Advancements in the agricultural industry have helped to meet the growing demand of consumers for agricultural products, despite the fact that the average American today is more than

three generations removed from the farm (American Farm Bureau Federation, 2019). Unfortunately, the changes in the current agricultural landscape (McCalla et al., 2010), coupled with "less than 2 percent of the [U.S.] population" living and working on a farm (American Farm Bureau Federation, 2019, para. 1), have contributed to a society that is agriculturally illiterate (Kovar & Ball, 2013).

In addition to the changes in the agricultural landscape, the educational system is ever revolving. "The rapid changes and increased complexity of today's world present new challenges and put new demands on our education system" (Bar-Yam, Rhoades, Sweeney, Kaput, & Bar-Yam, 2002, para. 1). Mubarak (2014) defined education as, "the foundation on which a country is built" (para. 1). He also stated, "in the face of constant change, students will need to have different skills all the time" (para. 1). These constant changes require education to adapt by tackling the 21st century challenges (Filippousis, 2019). Marx (2014) stated people in the 21st century have the opportunity to make their mark on the future by adapting their lifestyles and implementing technology to make an impact.

The majority of changes in the world are associated with the integrations of technology and the way people learn and receive information (Marx, 2014; Winthrop & McGivney, 2016). With the availability of technology, people can learn anytime, from anywhere, at their own pace (Marx, 2014). This reality requires educators to adapt to learners through the implementation of "active learning; project-based education; real-world education; learning through inquiry; learning across disciplines; and [teach] critical thinking, reasoning and problem-solving skills" (Marx, 2014, para. 7). Winthrop and McGivney (2016) recommended the need for the next generation of students to learn skills that are "uniquely human and that complement digital technologies" (para. 2), such as critical thinking, flexibility, teamwork, and communication.

In addition to societal and technological changes, new legislation at both the state and national levels has impacted education. For example, the *No Child Left Behind Act* (U.S. Department of Education, n.d.), and the *Every Student Succeeds Act* (U.S. Department of Education, 2015) both

have had substantial impacts on the educational profession through changes implemented in classrooms for student success (Anderson, 2016; Dee & Jacob, 2010). The changing world, advancements in technology, new generations of students, and legislative acts all play roles in the way education is shaped, and school-based agricultural education (SBAE) is not immune to these changes.

With the vast changes in agriculture and education, SBAE is in continual demand (Smith, Lawver, & Foster, 2018). More specifically, "the demand for SBAE teachers continues due to program growth, expansion, retirements, and openings [in secondary schools]" (Smith et al., 2018, p. 1). Smith et al (2018) found that during the 2017 school year, there were 812 SBAE positions nationwide left vacant and in need of a qualified and credentialed teacher. This number included 216 new positions and 189 new programs. Unfortunately, only 740 agricultural education graduates were prepared and certified to enter the SBAE profession, and only 556 actually accepted positions (Smith et al., 2018). This short supply resulted in a greater demand than the available pool of teachers could provide (Smith et al., 2018). Although the demand for SBAE teachers to enter the profession is evident, the requirements for teaching in the SBAE classroom continue to evolve (Eck, Robinson, Ramsey, & Cole, 2019; Roberts & Dyer, 2004). Possessing sufficient agricultural content knowledge is one of the fundamental requirements for being an effective SBAE teacher (Doerfert, 2011; National Research Council, 1988).

Dale, Robinson, and Edwards (2017) found the current state of agricultural literacy to be "a work in progress" (p. 12). The National Research Council (2009) stated "while farming remains a vital and central part of agriculture, what defines 21st-century agriculture is much broader, encompassing a range of natural and social science disciplines" (p. 14). Therefore, the way SBAE teachers are prepared, supported, and evaluated must be reconsidered to meet the demands of an everchanging industry (Eck et al., 2019).

Just as education has changed, the definition of teacher quality also has evolved (Mitchell, Robinson, Plake, & Knowles, 2001). Rice (2003) identified five measurable factors impacting teacher quality. These factors included: teacher preparation program and degree, certification type, coursework completed specific to teaching, educational experience, and test scores on certification examinations. Similarly, Goe and Stickler (2008) framed teacher quality through four lenses: qualifications, characteristics, practices, and effectiveness. Qualifications indicate the teaching credentials, experience, and knowledge the teacher holds, and characteristics focus on the personal attitudes and attributes of the individual (Goe & Stickler, 2008). Practices are framed by the methods, strategies, and procedures employed in the classroom, and effectiveness is defined as "a 'value-added' assessment of the degree to which teachers who are already in the classroom contribute to their students' learning, as indicated by higher-than-predicted increases in student achievement scores" (p. 2). Mitchell et al. (2001) concluded:

> The job of teaching students to learn and use new information, develop and apply skills, and think critically is highly complex and demanding. Teachers need to motivate and engage all students, including students from varied backgrounds and those with different learning and language needs. In addition to being responsible for student learning, teachers are expected to provide safe and nurturing classrooms, serve as good role models, and to engage parents and the community in the business of their school. Teachers need a wide range of knowledge, skills, abilities, and dispositions to perform these many complex tasks. (p. 32)

The only thing that appears to remain constant in agriculture and education is change. Therefore, SBAE and its teachers must stay current and change with the times. These changes require new solutions so that SBAE teachers and programs remain viable and effective. To meet the challenge of providing relevant, high-quality instruction, the preparation, training, and evaluation of SBAE teachers is imperative (Goe & Stickler, 2008; Roberts & Dyer, 2004).

Statement of the Problem

Effective teaching is a multidimensional concept and can be described in numerous ways (Farrell, 2015). At the most fundamental level, effective teachers are those who have expertise in their subject matter, hold at least a baccalaureate degree, and have passed the required certification examinations in their respective states (U.S. Department of Education, n.d.). Specific characteristics of effective teachers include servant leadership, self-efficacy, and nonverbal communication (Steele, 2010). In addition, effective teachers are those who provide clarity, variability, enthusiasm, task-oriented business-like behavior, and the opportunity for their students to apply their learning (Rosenshine & Furst, 1971). Teachers in SBAE programs have additional expectations and duties outside of classroom instruction, and therefore must be effective in multiple areas. Specifically, SBAE consists of a three-component model, including "(1) classroom/laboratory instruction (contextual learning), (2) supervised agricultural experience programs (work-based learning), and (3) student leadership organizations (National FFA organization)" (National Council for Agricultural Education, 2012, para. 4). In addition to these three components, effective SBAE teachers must be proficient in the following areas: community relations, marketing, professionalism/professional growth, program planning/management, and personal qualities (Roberts & Dyer, 2004). Considering these components of the overall program requires a more diverse and in-depth assessment regarding teacher effectiveness (Enns, Martin, & Spielmaker, 2016; Roberts & Dyer, 2004).

There are various factors that contribute to student success and achievement, but is none more crucial than teacher effectiveness (Stronge & Tucker, 2000; Wright, Horn, & Sanders, 1997). Unfortunately, however, due to the 50-plus-year shortage of qualified teachers, school administrators have been forced to look elsewhere to fill their teaching position vacancies (Foster, Lawver, & Smith, 2018). In 2017, 45% (n = 462) of SBAE positions across the country were staffed by alternatively certified or non-licensed individuals (Smith et al., 2018). With the increase of non-traditionally certified teachers entering the profession, a need exists to validate the Effective Teaching Instrument

for SBAE teachers (Eck et al., 2019), encompassing the characteristics of a comprehensive SBAE program. “Teachers of agricultur[al] education teach in what may be perceived as a unique environment when compared to other teachers in a secondary school” (Harper, Weiser, & Armstrong, 1990), as SBAE is an intracurricular elective taught under the Career and Technical Education (CTE) umbrella in a public school setting (Association for Career and Technical Education, 2019). Therefore, the criteria for what makes an effective SBAE teacher is unique as well.

Need for the Study

Producing competent, qualified, effective SBAE teachers to meet a growing nationwide demand is a daunting task (Foster et al., 2018). However, it is a necessity. Roberts and Dyer (2004) concluded “creating effective agriculture teachers is imperative for the long-term sustainability of agricultural education programs” (p. 94). *The No Child Left Behind Act* of 2001 aimed to improve primary and secondary schools, with a main focus of providing highly qualified teachers in all classrooms, although the law only requires teachers to acquire state teacher licensure requirements, i.e., hold a minimum of a bachelor’s degree and pass a subject area examination to demonstrate expertise (U.S. Department of Education, n.d.). The added focus on highly qualified teachers was initiated through a teacher quality grant program available to states for the purpose of preparing, training, and recruiting teachers (U.S. Department of Education, n.d.). Unfortunately, school districts “are [only] required to demonstrate annual progress in ensuring that all teachers teaching in core academic subjects within the State are highly qualified” (U.S. Department of Education, n.d., p. 3). Alas, defining and measuring teacher effectiveness is a difficult proposition. Teaching effectiveness is “an elusive concept . . .” and a “. . . complex task . . .” considering “. . . the multitude of contexts in which teachers work” (Stronge, Ward, & Grant, 2011, p. 340).

Considering the uniqueness of the program, determining teaching effectiveness in SBAE is perhaps even more challenging. However, Eck et al. (2019) conducted a nationwide study for that

purpose. An expert panel in their study identified 58 characteristics to be essential for an effective SBAE teacher. The experts considered these characteristics as guiding principles for effective SBAE teachers, resulting in the recommendation for the validation of the instrument to measure these attributes among pre-service teachers (Eck et al., 2019).

Purpose of the Study

The purpose of this study was two-fold: (a) to validate the effective teaching instrument for SBAE teachers, as identified by Eck et al. (2019), and (b) to identify the characteristics of effectiveness of SBAE teachers nationwide, based on the identified items.

Research Objectives

Five research objectives guided the study:

1. Determine the primary components of an effective SBAE teacher.
2. Validate the effective teaching instrument for SBAE teachers.
3. Determine the internal consistency reliability of the components of the effective teaching instrument for SBAE teachers.
4. Describe the personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings) of the participants.
5. Compare the effectiveness of SBAE teachers based on personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings).

Definition of Terms

Alternative Teacher Certification: A route to teacher certification that varies "from short summer programs that place candidates in teaching assignments with full responsibility for students after a few weeks of training to those that offer 1- or 2-year post-baccalaureate programs with ongoing support, integrated coursework, close mentoring, and supervision" (Darling-Hammond, Chung, & Frelow, 2002, p. 287).

Emergency Teacher Certification: "is a process whereby states grant temporary teaching certificates to individuals who do not meet the ordinary certification criteria. Emergency teaching certificates can only be granted in cases where no certified teacher can be found to fill a given position" (Childs, 2012, para.1).

Expert Teacher: can "(1) identify essential representations of their subject, (2) guide learning through classroom interactions, (3) monitor learning and provide feedback, (4) attend to affective attributes, and (5) influence student outcomes" (U.S. Department of Education, National Center for Education Statistics, Schools, and Staffing Survey [SASS], 2011, Para. 4).

Non-Licensed Teacher: is an individual who is not a certified teacher and does not hold any teaching certificate or permit (TCTA, 2018).

Novice Teacher: is "any licensed teacher of record with less than one school year of classroom teaching experience. . . The classroom teaching experience does not include student internship or substitute teaching" (Arkansas Department of Education, 2015, para. 3).

School-Based Agricultural Education (SBAE): "is a systematic program of instruction available to students desiring to learn about the science, business, technology of plant and animal

production and/or about the environmental and natural resources systems" (National Council for Agricultural Education, 2012, para. 1).

Teacher Preparation Programs: are "designed to prepare both undergraduate and graduate students to become licensed teachers. Programs can offer students specialized coursework in the grade level and subjects they are interested in teaching. The teacher preparation program also includes a hands-on student teaching experience, which is required in most states for licensing" ("Teacher Preparation Programs Overview," 2019, para. 4).

Traditional Teacher Certification: is a program offered through an accredited college of education. The coursework varies by program and certification area, but includes pedagogical training, along with a student-teaching internship. Following all coursework, students must take and pass the state professional education licensure requirements (U.S. Department of Education, Office of Postsecondary Education, 2005).

Limitations of the Study

Limitations to the study included the following:

1. The study was limited to current SBAE teachers nationwide, with the exception of Hawaii, Michigan, Puerto Rico, and the U.S. Virgin Islands whose state staff refused participation, and Alaska, Vermont, and Virginia, who failed to provide any responses from teachers in their respective states.
2. The instrument relied on self-reported data.
3. A nationwide frame of SBAE teachers was unavailable; therefore, the researcher relied on an electronic mail contact list from 33 states as well as an electronic mail listserv access from 15 states.

4. Available resources and time were limiting to the sampling strategy and overall scope of the study.
5. The findings are limited to those SBAE teachers who received the instrument link via electronic mail and chose to participate.

Assumptions of the Study

Assumptions for the study included the following:

1. Participants objectively self-reported each of the 58-items as a personal strength or weakness regarding their practice as a SBAE teacher.
2. Each participant who completed the study had an equal and independent chance of being randomly drawn for one of 10, $100 gift cards as an incentive.
3. All teachers received an email and had an equal opportunity to participate in the study.
4. All teachers' email addresses were active and viable.
5. All teachers had access to the internet and email.
6. All teachers checked their email frequently.
7. All teachers responded to the questions accurately and to the best of their ability.

Summary

This chapter provided an overview of research related to the ever-changing landscape in education, agriculture, and SBAE, along with an introduction to teacher quality, and developing the need for the validation of an instrument to measure teaching effectiveness in SBAE. The need for the study was highlighted, leading to the five proposed research objectives. In addition to the overview and introduction, the chapter included definitions of key terms pertinent to the understanding of the

problem, along with the assumptions and limitations of the study. Chapter II will build further on the overview of literature provided in this chapter in addition to the theoretical framework for this study.

CHAPTER II

REVIEW OF LITERATURE

Chapter II provides an in-depth review of the literature regarding topics germane to the study. Specifically, Chapter II includes the theoretical framework and additional variables of interest related to the study's five research questions. The chapter is divided into six sections: effective teaching characteristics, teaching evaluations, the selection and use of the theoretical framework, recruitment and retention of teachers, certification pathways, and personal and professional characteristics germane to effective teaching.

Purpose of the Study

The purpose of this study was two-fold: 1) to validate the effective teaching instrument for SBAE teachers, as identified by Eck et al. (2019), and 2) to identify the characteristics of effectiveness of SBAE teachers nationwide, based on the identified items.

Characteristics of Effective Teachers

Defining terms such as effective or high quality can be difficult when considering teaching (Stronge et al., 2011).

> Teacher effectiveness, in the narrowest sense, refers to a teacher's ability to improve student learning as measured by student gains on standardized achievement tests. Although this is one important aspect of teaching ability, it is not a comprehensive and robust view of teacher effectiveness. (Little, Goe, & Bell, 2009, p. 1)

Considering the need for a more complete definition of teacher effectiveness, a five-point definition was created by Goe, Bell, and Little (2008):

> (1) Effective teachers have high expectations for all students and help students learn, as measured by value-added or other test-based growth measures, or by alternative measures. (2) Effective teachers contribute to positive academic, attitudinal, and social outcomes for students, such as regular attendance, on-time promotion to the next grade, on-time graduation, self-efficacy, and cooperative behavior. (3) Effective teachers use diverse resources to plan and structure engaging learning opportunities; monitor student progress formatively, adapting instruction as needed, and evaluate learning using multiple sources of evidence. (4) Effective teachers contribute to the development of classrooms and schools that value diversity and civic-mindedness. (5) Effective teachers collaborate with other teachers, administrators, parents, and education professionals to ensure student success, particularly the success of students with special needs and those at high risk for failure. (p. 8)

Cohhen-Vogel and Smith (2007) explained, "for teachers to be 'highly qualified', they must be fully certified or licensed, have a bachelor's degree, and show subject knowledge competence usually by passing a state test" (p. 735). When considering the research discussed earlier between pathways to certification, a traditionally or alternatively certified teacher meets the definition required to be highly effective according to Cohhen-Vogel and Smith (2007). What is unclear, however, is how a teacher's certification status affects student success. Research has shown conflicting results. Ludlow (2011) found a teacher's certification status had no impact on their students' performance. Other studies found teacher effectiveness to be only weakly related to certification pathway and licensure status (Aaronson, Barrow, & Sander, 2007; Rivkin, Hanushek, & Kain, 2005). In contrast, Wayne and Youngs (2003) discovered that certification status matters. They found students with who learned mathematics from traditionally certified

teachers had higher achievement scores in that subject when compared to those whose teachers were alternatively certified.

Guskey (1984) discussed the array of research dealing with the "effectiveness of teachers and particularly the characteristics and behaviors of teachers that relate to effective instruction" (p. 245). One particular research study aimed to determine specific classroom conditions and teaching strategies impacting student learning (Fisher et al., 2015, p. 6). Fisher et al. (2015) concluded that when using such a model to evaluate instruction and effectiveness, a broader view of education is needed. A teacher is more than just an instructor; he or she also manages instruction to promote student engagement and success (Fisher et al., 2015). Doyle (1977) stated:

> Teacher effectiveness formulations include both contextual variables and the meanings teachers and students assign to the events and processes that occur in the classrooms. One is even inclined to speculate, on the basis of an ecological analysis, that the teacher effectiveness question itself might best be changed from 'which instructional conditions are most effective?' to 'how do instructional effects occur?'. (p. 188)

Steele (2010) found effective teachers to be competent in three domains: (a) nonverbal communication, (b) self-efficacy, and (c) servant leadership. Nonverbal communication includes concepts such as proximity, classroom management, relationships, student feedback, and coverbal behaviors (Steele, 2010). Teacher self-efficacy is a term used widely that relates to "the beliefs a teacher holds regarding his or her own teaching ability" (Steele, 2010, p. 76). Finally, servant leadership focuses on developing a learning community, which fosters ideas, student desires, and potential, while holding students accountable to high standards (Steele, 2010). Unfortunately, "there is no definite formula for what makes an effective teacher" (Steele, 2010, p. 76).

Stronge et al. (2011) identified four dimensions associated with effective teaching, including instructional delivery, student assessment, learning environments, and personal

qualities of the teacher. A multidimensional construct (Farrell, 2015), effective teaching may even relate to the demographic and cultural differences between the teacher and the students (Hollins & Guzman, 2005). What is clear is effective teaching is "an elusive concept to define when we considered the complex task of teaching and the multitude of contexts in which teachers work" (Stronge et al., 2011, p. 340).

Although a substantial amount of the research on effective teaching is conducted in K-12 education settings, career and technical education (CTE) faces similar struggles regarding teacher effectiveness. Williams, Cannon, and Campbell (2018) used the term *high-quality* to discuss desirable characteristics of effective CTE teachers.

> CTE encompasses a wide range of activities intended to simultaneously provide students with skills demanded in the labor market while preparing them for post-secondary degrees in technical fields. Activities include not only specific career-oriented classes, but also internships, apprenticeships and in-school programs designed to foster work readiness. (Jacob, 2017, p. 1)

Williams et al. (2018) considered knowledge, skills, beliefs, attitudes, and practice to lead to a high-quality CTE teacher. Within those categories, they identified the importance of education and experience, professional development, and attitudes essential for high-quality CTE teachers (see Figure 1). More specifically, 17 characteristics were included as essential knowledge and skills through 10 statements related to education and experiences, and seven items regarding professional development. Five statements reflected beliefs of high-quality CTE teachers, and nine statements were used as considerations for practice. The most prominent characteristics in the model were related to the 36 personal attributes related to attitudes of great teachers (see Figure 1).

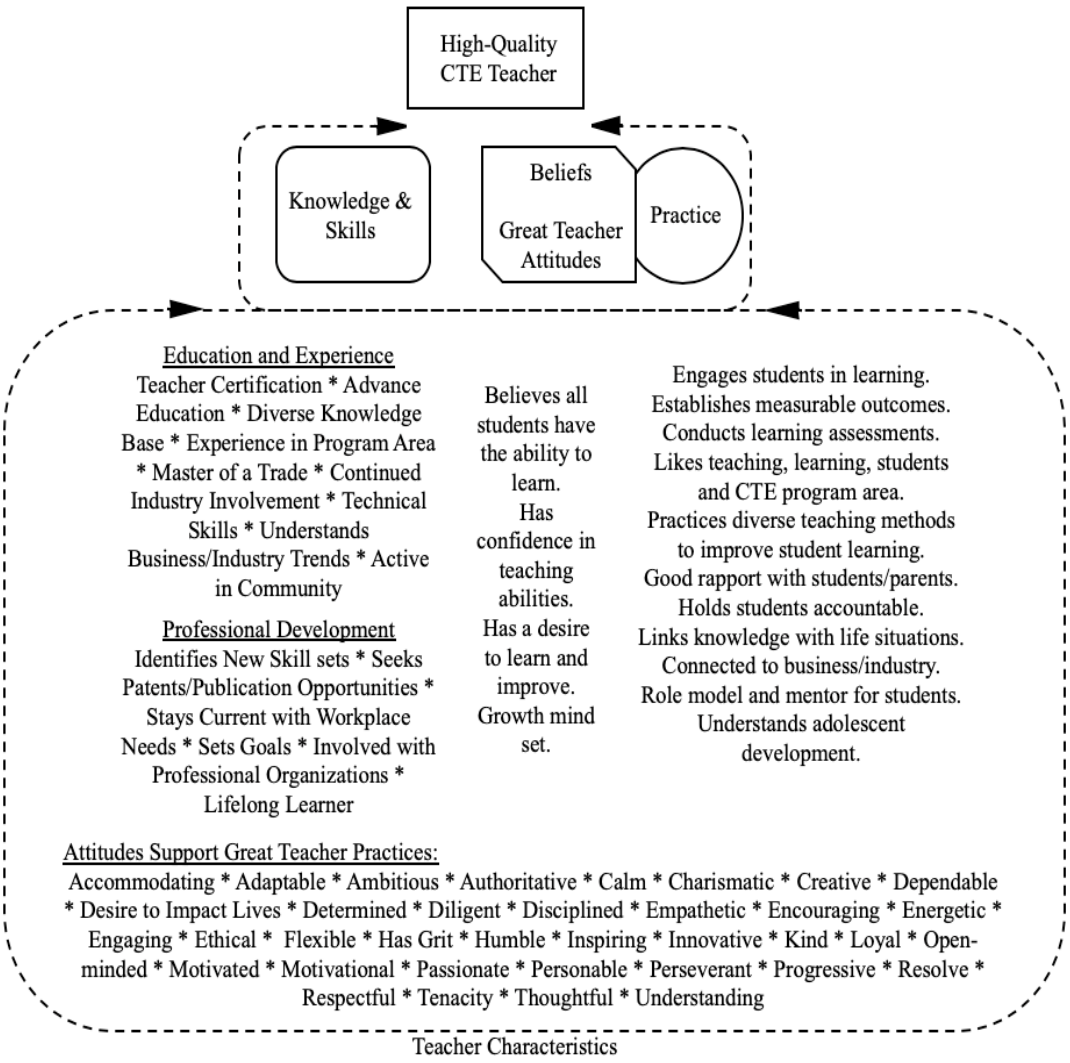

Figure 1. Characteristics of a high-quality CTE teacher. Adapted from Williams et al.'s (2018). CTE-TCI Framework: Characteristics of a High-Quality CTE Teacher.

SBAE Roles and Responsibilities

Before understanding what it means to be an effective SBAE teacher, it is important to address the demands placed on a SBAE teacher. "Agricultural education instruction is provided at the local level through the nation's schools" (National Council for Agricultural Education, 2012, para. 6), by SBAE teachers. The NAAE (2019) defined agricultural education as one that "teaches students about agriculture, food and natural resources. Through these subjects,

agricultural educators teach students a wide variety of skills, including science, math, communications, leadership, management and technology" (para. 1). These skills are taught through the three components of agricultural education (National FFA, 2015), i.e., classroom/laboratory instruction, FFA, and SAE. Additionally, Terry and Briers (2010) discussed 21 roles of a SBAE teacher, as being a(n): 1) traditional classroom teacher, 2) laboratory instructor, 3) field instructor, 4) motivator, 5) disciplinarian, 6) adult educator, 7) agricultural literacy consultant, 8) FFA chapter advisor, 9) coach of students in competitive activities, 10) leadership development expert, 11) supervisor of experiential learning (SAE) activities, 12) experiential learning specialist, 13) program manager, 14) accountant, 15) public relations agent, 16) event organizer, 17) volunteer coordinator, 18) counselor, 19) professional, 20) lifelong learner, and 21) well-balanced, total person (p. 97). SBAE teachers are required to invest additional time and resources not required of a traditional classroom teacher. Torres, Ulmer, and Aschenbrener (2008) found experienced teachers dedicate 29% of their time preparing for instruction, 32% teaching in the classroom/laboratory, 2% for laboratory preparation/maintenance, 6% grading/scoring student work, 2% for administrative duties/program management, 3% for professional activities, 5% on local FFA activities, 8% on FFA activities above the local level (i.e., area, district, and/or state), 10% to CDE preparation, and less than 1% to adult education. Understanding the additional roles and responsibilities of a SBAE teacher helps to frame the characteristics necessary for a SBAE teacher to be effective.

Additional considerations related to the roles and responsibilities of SBAE teachers include the structure of the program. SBAE programs are systematic instructional programs that have been part of the public education system since the passage of the Smith-Hughes Act in 1917 (National FFA Organization, 2015). Additionally, SBAE is part of Career and Technical Education (CTE), as one of the 16 nationally recognized career clusters (CTE, 2019), making it an elective for students. Although, SBAE is often considered an integral part of science,

technology, engineering, and math (STEM) education (Scales, Terry, Jr., & Torres, 2009; Stubbs & Myers, 2016; Swafford, 2018), influencing STEM education, it is still considered an elective. Further, the FFA component is an intracurricular student organization for those enrolled in a SBAE class (National FFA Organization, 2015). All of which lead to framing of those characteristics specific to an effective SBAE teacher.

Effective Teaching Characteristics in SBAE

Effective teaching is a multidimensional (Farrell, 2015) and elusive concept. However, being an effective teacher is imperative to student success (Kane & Staiger, 2008; Stronge et al., 2011). Research has shown that effective teachers have "fewer classroom disruptions, better classroom management skills, and better relationships with their students (Stronge et al., 2011, p. 349).

The model needed to evaluate the effectiveness of a SBAE teacher differs from that of a classroom teacher in other subject areas as the workload and position demands are unique and domain specific. Generally, the workload of SBAE teachers is depicted by the National FFA Organization's (2015) three-component model of agricultural education (see Figure 3). The model highlights three components: classroom and laboratory instruction, FFA, and SAE. The latter two are a unique and integral aspect of a SBAE program and included in the job description and expectation of most SBAE programs. These components differ from teachers who serve as a club advisor and sports coach, as these components within SBAE are an integral portion of the complete SBAE program (National FFA Organization, 2015). Hughes and Barrick (1993) developed a model to include leadership development and personal improvement activities in addition to the components of the three-component model (National FFA, 2015). These components of a program ultimately lead students to employment or higher education after high school, preparing them for a sustainable career (Hughes & Barrick, 1993). Unfortunately, the

time commitment associated with these additional tasks of a SBAE teacher often becomes daunting and all-consuming (Torres et al., 2008).

SBAE teachers struggle to balance the time they devote to each component of the model, which leads to an imbalance of work and personal life (Boone & Boone, 2009; Lambert, Ball, & Tummons, 2011; Torres et al., 2008). In addition, beginning SBAE teachers struggle with self-confidence, class preparation, and overcoming the reputation of their predecessor, while also being concerned with student discipline and facilities management (Boone & Boone, 2007). The workload and differentiation between SBAE teachers and other secondary school teachers (Harper et al., 1990) points to the need to establish criteria for what constitutes and effective SBAE teacher.

DiBenedetto, Willis, and Barrick (2018) conducted a needs assessment of SBAE teachers over a 32-year period, using published research in SBAE. The four overarching categories of their work included FFA, program, SAE, and skill, "which included FFA program management, developing public relations programs, program administration/general administrative tasks, SAE development/supervision, managing student behavior, and computer technology" (p. 67). In addition, preparing degree applications, developing instructional materials, teaching core content, managing and balancing time, fundraising, establishing advisory committees, working with special needs students, and teaching 21st century skills were all identified as needs for SBAE teachers (DiBenedetto et al., 2018). Although numerous studies identify balance (Edwards & Briers, 1999; Murray, Flowers, Croom, & Wilson, 2011; Myers, Dyer, & Washburn, 2005; Torres, Lawver, & Lambert, 2009) as an area of concern for SBAE teachers, Blackburn, Bunch, and Haynes (2017) found teachers perceive themselves as leading a balanced life, and are generally satisfied with their chosen career, which results in high levels of self-efficacy.

The areas of need and concern within SBAE are culminated by the finding of Roberts and Dyer (2004) who identified 40 characteristics in eight categories required of an effective SBAE teacher in Florida. Those categories included instruction, FFA, SAE, community relations, marketing, professionalism/professional growth, program planning/management, and personal qualities (Roberts & Dyer, 2004). Eck et al. (2019) replicated the study on a national scale and identified 58 characteristics in eight categories. Those categories included instruction, FFA, SAE, program planning, balance, diversity and inclusion, professionalism, and personal dispositions. Balance and Diversity and Inclusion were the two new emerging categories from Eck et al. (2019), aligning with the needs of SBAE teachers established by DiBenedetto et al. (2018). Additionally, effective SBAE "teachers must establish a positive, well-managed learning environment in which students take an active role in making choices about their learning" (Phipps, Osborne, Dyer, & Ball, 2008). The American Association for Agricultural Education (2017) endorsed six competency standards for SBAE teacher preparation programs, including pedagogical content knowledge, technical content knowledge, program planning, diversity, professionalism, and personal dispositions. These standards were not intended to be requirements for teacher preparation programs, but instead serve as a guide for enhancing potential competencies of 21st century SBAE teacher candidates. The vast array of SBAE teacher needs and roles associated with the career, require a deeper look into the way they are evaluated. SBAE teachers. Although there are numerous differences associated with teacher effectiveness between K-12, CTE, and SBAE teachers, some factors remain consistent.

> Parents, practitioners, and policymakers agree that the key to improving public education in America is placing highly skilled and effective teachers in all classrooms. Yet the nation still lacks a practical set of standards and assessments that can guarantee that teachers, particularly new teachers, are well prepared and ready to teach. (Darling-Hammond, 2010, p.1)

"At the heart of this line of inquiry is the core belief that teachers make a difference" (Wright et al., 1997, p. 57), all of which aligns with the need of a multidimensional (Farrell, 2015; Norris, 1980) and comprehensive evaluation tool for effective SBAE teachers.

Teaching Evaluations

Numerous teaching evaluation systems exist currently and are being used to measure teaching effectiveness on a variety of levels. "Traditionally, measurement of teacher performance has been difficult at best. In fact, there is a lack of consensus about how teachers can and should be measured" (Pembroke & Goedert, 1982, p. 29). Roehrig and Christesen (2010) developed an instrument to assess the atmosphere, instruction, management, and student engagement (AIMS) of K-12 teachers, which sought "to capture the complexity of the practices characterizing effective teaching" (p. 23) through classroom observations.

Lavely, Berger, Blackman, Follman, and McCarthy (1994) identified other evaluations, such as the teacher performance assessment instrument (TPAI), the teacher assessment and development system-meritorious teacher form (TADS-MTP), and the Florida performance measurement system (FPMS). These measurements have been developed and are "viewed as promising instruments for use with pre-service, beginning, in-service, and also meritorious, teachers" (Lavely et al., 1994, p. 1). Although some instruments are designed to fit the needs of in-service teachers, the classroom observation and assessment scale for teaching candidates (COAST) was developed to be "a generic observation instrument that can be used across subject areas and grade levels . . . with a high degree of accuracy and consistency" (Cloud-Silva & Denton, 1988, p .36). More recent models include the Marzano model, which was "the first of its kind" to "*correlate* instructional strategies to student achievement" and "is also grounded on experimental/control studies that establish a *direct causal link between elements of the model and student results*" (Marzano, 2019, para. 2). The Marzano model was created to provide "teachers

and observers a streamlined, student evidence-based system that ensures standards alignment and helps promote growth in each student and teacher" (Marzano, 2018, p. 2). According to Carbaugh, Marzano, and Toth (2017), the Marzano model was developed to create an evaluation system based on research and classroom observations from over one-half of a decade to meet the challenges of the current educational system. These models were developed and implemented on a state by state basis beginning in the late 2000's as the federal government provided incentives to those that adopted teacher evaluations that included measures of student growth (Croft & Buddin, 2015). More recently, legislation related to the Every Child Succeeds Act, that required student performance be included in teacher evaluations has been revoked (U.S. Department of Education, 2015).

Although there are a wide variety of models available for school districts and teacher preparation programs to implement, research has shown that the majority of these models are ineffective (Papay, 2012). In addition, "practitioners, researchers, and policy makers agree that most current teacher evaluation systems do little to help teachers improve or to support personnel decision making" (Darling-Hammond, Amerin-Beardsley, Haertel, & Rothstein, 2012, p. 8).

Goe et al. (2008) concluded, "there are many different purposes for evaluating teacher effectiveness; a key reason is to identify weaknesses in instruction and develop ways to address them . . . that will be useful in designing appropriate strategies to improve instruction" (p. 50). Goe et al. (2008) recommended six key considerations for evaluating teaching.

> Considering how to best measure teacher effectiveness: Resist pressures to reduce the definition of teacher effectiveness to a single score obtained with an observation instrument . . . . Consider the purpose for the evaluation of teacher effectiveness . . . . In considering the validity of various ways of measuring teacher effectiveness, keep in mind that the validity does not lie solely with the quality of the instrument or model but also

> with how well the instrument measures the construct and how the instrument is used in practice . . . . Seek other measures, or create appropriate measures, to capture important information about teachers' contributions that go beyond student achievement . . . . Include education stakeholders in decisions about what is important to measure . . . Ensuring that data is complete and accurate and that raters are trained and calibrated is essential in order to ensure validity. (p. 52)

King (1978) determined teacher performance evaluations to only be as effective as the feedback provided to the teachers. Regardless of the metric used to evaluate teachers, the system should relate to accountability and teacher development (Kyriakides, Demetriou, & Charalambous, 2006). Accountability speaks to the need for effective teachers, of which the teacher needs a metric which provides an opportunity to reflect and improve one's competence (Kyriakides et al., 2006). "Student achievement [is] to be only one among many element[s] of 'good teaching', not the primary and indispensable outcome" (Stronge & Tucker, 2000, p. 1). Taylor and Tyler (2012) noted that teacher evaluations can have a positive impact on the development and implementation of new skills. Unfortunately, even with the intended impact of teacher evaluations, most suffer from the widget effect (Weisberg, Sexton, Mulhern, & Keeling, 2009). Unfortunately, the widget effect magnifies the lack of variation in teacher effectiveness based on teacher evaluation systems (Weisberg et al., 2009). Among those variations are all teachers being rated *good* or *great*, resulting in unrecognized excellence, leading to a lack of purposeful professional development with no attention directed at novice teachers, where poor performing teachers go unaddressed (Weisberg et al., 2009). To offset this effect, Weisberg et al. (2009) recommended the adoption of a comprehensive evaluation model that provides teachers an opportunity to be evaluated appropriately, based on their differences related to teaching strengths and areas of needed improvement. Without proper evaluation of teachers, the widget effect overtakes the system, "so

long as there is an accredited teacher – any teacher – in front of the classroom, students are being served adequately" (Weisberg et al., 2009, p. 9).

Evaluation Perceptions

"All teachers deserve the opportunity to be evaluated utilizing objective data" (Hopkins, 2016, p. 21). When teachers are not evaluated objectively, they lose the opportunity to grow and develop, ultimately leading to less effective teachers (Hopkins, 2016). Teachers desire meaningful professional development based on evaluation and performance data (Hopkins, 2016). Multiple studies identified teachers wanting student performance data to be included in evaluations, as this allows them to be recognized for their efforts (Hopkins, 2016; Weisberg et al., 2009), while others have found teachers less enthusiastic about the inclusion of such data (Jiang, Sporte, & Luppescu, 2015). Blecke (1982) explained, "when a teacher evaluation process is not achieving its goals, it's time to develop a new program" (p. 16). As such, Blecke (1982) designed an evaluation system that utilized observations from administrators along with follow-up meetings to set goals and hold the teachers accountable for professional growth (Blecke, 1982). Seven key successes arose from this program, of which three are specific to teachers' perceptions, including a mutual bond between teachers and administrators, improved teacher effectiveness, and increased student performance (Blecke, 1982). Overall, teachers tend to have a positive perception of evaluation systems when they are implemented effectively (Hopkins, 2016; Jiang et al., 2015; Tuytens & Devos, 2009).

"It is now recognized that there are almost as many learning styles as there are learners. Today's teacher is faced with the difficult task of developing a multidimensional system to evaluate [their] teaching effectiveness" (Marks, 1976, p. 1). Darling-Hammond (2010) discussed the growing interest in advancing beyond traditional measures of teacher quality, i.e., certification, preparation program, experience, to develop a comprehensive evaluation system that

can be used to evaluate teacher effectiveness for educational stakeholders. Although developing a nationwide evaluation structure for all teachers could be beneficial, the demands placed on SBAE teachers vary greatly due to the demands of the job (Roberts & Dyer, 2004), resulting in the need for specific evaluation metrics appropriate for SBAE teachers.

Theoretical Framework

The study was undergirded in the human capital theory. Human capital is defined as "the collective skills, knowledge, or other intangible assets of individuals that can be used to create economic value for the individuals, their employers, or their community" (Dictionary.com, 2012, para. 1). Human capital evaluates the stock an individual takes in his or her own education, skills, experiences, and training (Becker, 1964; Little, 2003; Schultz, 1971; Smith, 2010; Smylie, 1996) with the goal of becoming gainfully employed (Becker, 1964). Human capital can be general or specific, and is advantageous on numerous levels in various sectors of particular industries (Smith, 2010). SBAE teachers are working to increase their own human capital, while also striving to foster the development of human capital within their students. When furthering their own personal human capital, they are improving personal competence as it relates to their specific vocation (Heckman, 2000), in this case, as SBAE teachers. The human capital needed by individuals differs based on that person's profession of choice (Lepak & Snell, 1999). For traditionally certified SBAE teachers, it begins with the skill set learned through a teacher preparation program, followed by a student teaching internship (on-the-job training), and finally through professional development in-service or continued education. Alternatively certified SBAE teachers, however, are charged with developing their human capital while teaching. Although, both groups are developing human capital, the timing and route to develop such can look very different. Therefore, it is imperative that an assessment tool be developed to address the human capital (i.e., education, skills, training, and experiences) needs of SBAE teachers (Smith, 2010), as the current literature related to such ". . . is lacking" (Robinson & Baker, 2013, p. 141).

The development of human capital begins as potential SBAE teachers enter an agricultural education teacher preparation program. Schultz (1971) stated education is "an investment activity undertaken for the purpose of acquiring capabilities that render future satisfaction or that enhance future earnings of the person as a productive agent" (p. 78). Smith (2010) stated that individuals begin life "with the same innate characteristics" (p. 37); although, they have the opportunity to choose the amount of development they receive over their lifetime (Smith, 2010). Even in those whose abilities are innate, they still require specialized training to become productive in a chosen skilled sector (Smith, 2010).

The development of human capital starts much earlier for traditionally certified teachers as they begin during their undergraduate or graduate education before entering the workforce, unlike the majority of alternatively or emergency certified teachers who tend to be mid-career changers (Darling-Hammond & Bransford, 2005). An impactful portion of traditional teacher preparation includes a student teaching internship, which serves as a vast development in human capital. Schultz (1971) stated,

> Although it is obvious that people acquire useful skills and knowledge, it is not obvious that these skills and knowledge are a form of capital, that this capital is in substantial part a product of deliberate investment . . . and that its growth may well be the most distinctive feature of the economic system. (p. 24)

This development of knowledge and skills comes at a cost but is purposeful in pursuing a desirable or better job (Schultz, 1961). Unfortunately, due to the current climate related to the supply and demand of SBAE teachers, with approximately 6-in-10 prepared to teach SBAE actually entering the profession (Eck & Edwards, 2018), school administrators are forced to fill the void with alternatively, emergency, or non-certified teachers. Although the leading cause is undetermined, Schultz (1961) discussed the idea that a

> failure to treat human resources explicitly as a form of capital, as a produced means of

> production, as the product of investment, has fostered the retention of the classical notion of labor as a capacity to do manual work requiring little knowledge and skill, a capacity with which, according to this notion, laborers are endowed about equally. (p. 3)

One of the five major categories for developing human capital according to Schultz (1961), includes "on-the-job training, including old-style apprenticeship" (p. 9), which traditionally certified SBAE teachers are afforded through their student teaching internship. Sweetland (1996) discussed the need "to measure two major types of training, formal and informal" (p. 345). The evaluation of human capital within SBAE teachers is to include these measures as educational background, years of teaching in SBAE, and other relevant work experience will be evaluated. In addition to developing human capital within each individual, SBAE teachers are charged with the development of human capital in their students.

This development of human capital within students is "to include the knowledge, skills, dispositions, and social resources of adults in schools that can be applied to promote children's learning and development" (Smylie, 1996, p. 10). Through the lens of SBAE, the knowledge, skills, dispositions, and social resources developed can be framed around the National FFA Organization's (2015) three-component model of agricultural education (see Figure 2).

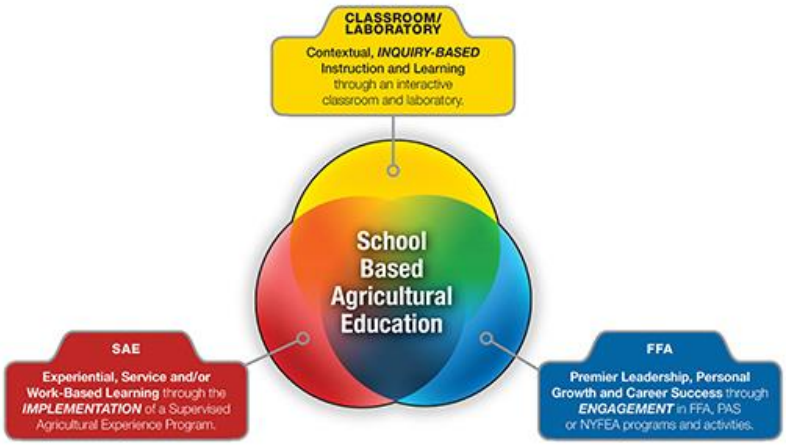

Figure 2. National FFA Organization's (2015) three-component model of agricultural education. Reprinted with permission.

The three-component model allows SBAE teachers to develop students through classroom and laboratory instruction, while offering supervised agricultural experiences (SAE), and the application of learned concepts through the FFA (National FFA Organization, 2015). Although the development of human capital within students is of great importance, it has not come without challenges.

> [The] pursuit of education leads to individual and national economic growth. Especially where school children are concerned, this paradigm of thinking has placed local educators and education policy makers under considerable pressures from the voting public. Parents want local educators to provide children with diplomas, if not specific job skills, that will ensure fruitful participation in the economy. Industrialists want educators at local levels as well as the education system at large to graduate young people who are ready to function productively in a competitive workforce. (Sweetland, 1996, p. 356)

Fortunately, SBAE programs seek to prepare students for college and careers by developing the human capital for both simultaneously (Roberts & Ball, 2009). Overall, SBAE teachers should

consider their own skillset and further develop their human capital, to improve their teaching effectiveness (Eck et al., 2019).

Conceptual Framework

Considering the potential factors impacting the effectiveness of SBAE teachers, a conceptual framework was developed to visually depict the conceptual framework of the study. Figure 3 represents the conceptual factors impacting teaching effectiveness for SBAE teachers, including the characteristics of effective SBAE teachers (Eck et al., 2019) and the personal and professional characteristics identified within this study. The factors can be encompassed within the development of human capital, supporting the personal and professional characteristics of effective SBAE teachers (Eck et al., 2019). The development of human capital for SBAE teachers includes the education, skills, experiences, and training (Becker, 1964; Little, 2003; Schultz, 1971; Smith, 2010; Smylie, 1996) necessary for gainful employment (Becker, 1964) as an effective SBAE teacher.

Eck et al. (2019) identified 58 items across seven categories that were deemed to be essential to the development of effective SBAE teachers. Those categories included classroom instruction, FFA/SAE, program planning, work/life balance, diversity and inclusion, professionalism, and personal dispositions. The personal and professional characteristics of SBAE teachers also impact teaching effectiveness and include the following: career tenure (Barrick, Ladewig, & Hedges, 1983; Layfield & Dobbins, 2002; Roberts & Dyer, 2004; Washburn, King, Garton, & Harbstreit, 2001), i.e., number of years teaching SBAE, number years in current position, and intent to retire as a SBAE teacher; program size (McKim, Velez, & Clement, 2017; Wheeler & Knobloch, 2006; Whittington, McConnell, & Knobloch, 2006), i.e., number of SBAE teachers and number of students in the SBAE program; certification pathway (Darling-Hammond, Chung, & Frelow, 2002; National Council for Accreditation of Teacher

Education, 2010; Robinson & Edwards, 2012), i.e., traditional, alternative, or emergency certification; and personal attributes (Birkenholz & Harbstreit, 1987; McKim et al., 2017; Rodriguez, 1997; Washburn et al., 2001; Wolf, 2011), i.e., age, sex highest degree earned, and geographical location. Not only does the development of effective teaching characteristics and personal and professional characteristics enhance an individual's human capital, but they also have implications on one another (see Figure 3). Increasing a pre-service or in-service SBAE teacher's human capital will ultimately improve his or her teaching effectiveness (see Figure 3). Additionally, effective SBAE teachers work continually to improve themselves through professional development opportunities and prevent teacher burnout (Roberts & Dyer, 2004). Therefore, effective teaching in SBAE plays a role in the continual development of human capital (see Figure 3).

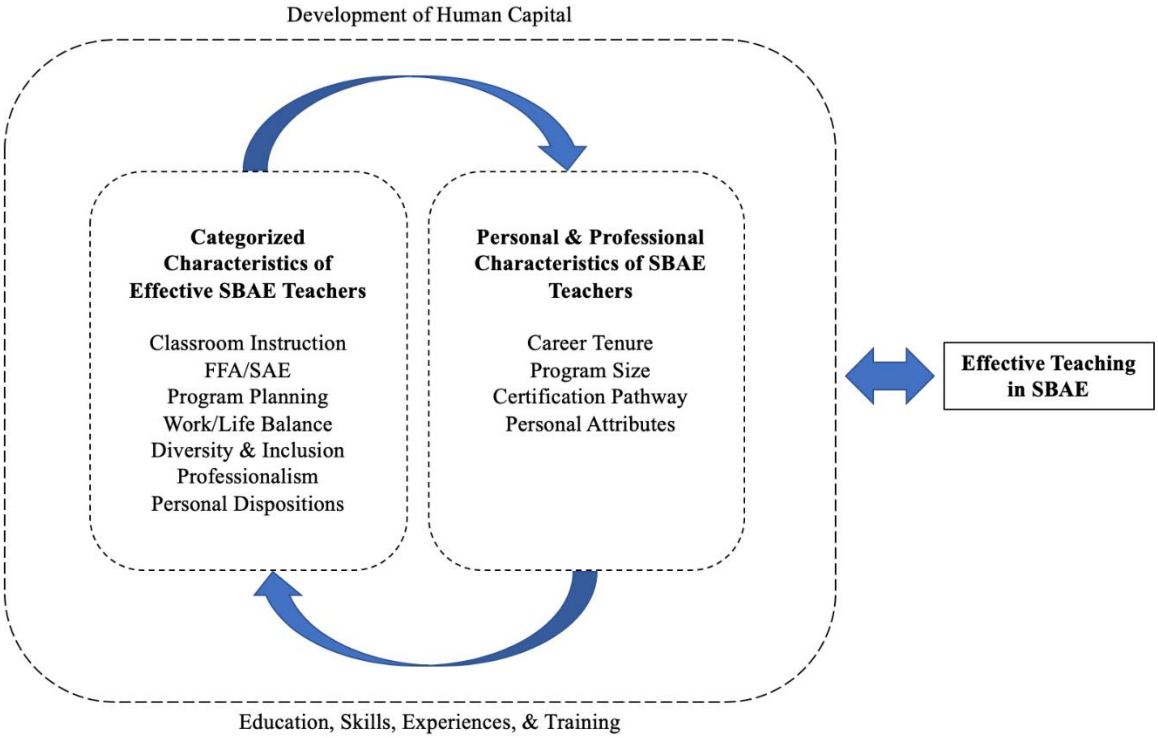

Figure 3. Conceptual model of effective teaching for SBAE teachers derived from Nationwide Delphi Study (Eck et al., 2019).

Recruitment and Retention of Effective Teachers

The American Association of Colleges for Teacher Education (1984) posed the question, "How do we continue the process of raising standards for entry and retention in the profession at a time when the short supply of teachers in some areas puts extreme pressure on the system to employ personnel with substandard qualification?" (p. 21). It is recommended that an investment in teacher recruitment and preparation can serve "policy makers interested in simultaneously improving teachers' instructional quality, commitment to underserved settings, and retention" (Ronfeldt, Reininger, & Kwok, 2013, p. 333). Boyd et al. (2012) stated, "recruiting and preparing high-quality teachers to meet the demand of K-12 schools is a massive undertaking, and many high needs schools have found it very difficult to recruit and retain effective teachers" (p. 1043).

> [T]he No Child Left Behind Act's requirement that schools staff all classrooms with 'highly qualified teachers'. . . . The problem does not lie in the numbers of teachers available; we produce many more qualified teachers than we hire. The hard part is keeping the teachers we prepare. (Darling-Hammond, 2003, p. 2)

Teachers leaving the classroom has a negative impact on students' performance, and it places a financial burden on the school (Darling-Hammond, 2003). "Four major factors strongly influence whether and when teachers leave specific schools or the education profession entirely: salaries, working conditions, preparation, and mentoring support in the early years" (Darling-Hammond, 2003, p. 3). The first factor of salaries plagues the education profession nationwide, although, anecdotally numerous SBAE teachers benefit from Perkins funding, extended contracts, and FFA stipends to help offset the salary factor. Working conditions often play a role in a teacher's decision to leave the profession (Darling-Hammond, 2003), which is elevated in SBAE with the extended work hours and position responsibilities (Lambert et al., 2011; Torres et al., 2008). Darling-Hammond (2003) linked teachers leaving the profession early as commonly not having adequate preparation, aligning with the findings of Stronge and Hindman (2003) who concluded

the first step to an effective teacher in every classroom begins with a school hiring the best qualified candidate.

The final piece of retaining teachers is within the mentoring of early career teachers (Darling-Hammond, 2003). Roughly 65% of SBAE teacher preparation programs nationwide provide some form of a teacher induction program for early career teachers (Franklin & Molina, 2012). Research studies have indicated that the majority of SBAE teachers are satisfied with their career, regardless of sex, age, years teaching, or degree (Cano & Miller, 1992; Tippens, Ricketts, Morgan, Navarro, & Flanders, 2013). Contrary to these findings, "approximately 50% of agriculture teachers leave within the first six years of teaching" (Clark, Kelsey, & Brown, 2014, p. 43). As for the 50% who remain, Clark et al. (2014) found four emerging themes leading to career sustainability, including career teachers experiencing:

> (1) certain thorn pricks, causing a transformative shift in their career, leading to career sustainability, (2) an abundance of support from students, parents, administrators, and community members, (3) a positive life balance between work and family, and (4) a reduction in workload later in their careers. (pp. 48-51)

Additional factors also can increase the risk of teachers exiting the profession before retirement, including certification path and the evaluation system utilized. Redding and Smith (2016) found those prepared through an alternative certification path to be slightly more likely to leave the teaching profession than those prepared traditionally. Robertson-Kraft and Zhang (2018) found minimal differences between teachers leaving the profession based on the evaluation system implemented, although they suggest "that the introduction of a new evaluation system does not guarantee a consistent and desired impact on teacher retention" (p. 387). Henry, Bastian, and Fortner (2011) evaluated early-career teacher effectiveness and attrition which resulted in three overarching conclusions: 1) early-career teachers could have quicker effectiveness gains if professional development and evaluations were used as purposeful improvement strategies,

ultimately leading to increased teacher retention; 2) these increases were substantial in the first couple of years, although there was a lack of effectiveness increase in year three, which needs to be investigated further to increase long-term teacher development; 3) teachers who leave the profession after three or four years were found to be less effective than those who remained (Henry et al., 2011).

Teacher Shortage

The shortage of teachers nationwide is a constant topic of concern in education. The United State Department of Education (Cross, 2017) outlined the teacher shortages or high need areas by state in the *Teacher Shortage Areas Nationwide Listing 1990-1991 through 2017-2018.* The listing, provided by Cross (2017), identified the need for teachers in a variety of subject areas in each state, dating back to 1990 and continuing into 2018. This need is due to the demand the enrollment trend in post-secondary teacher preparation programs and the continual growth in K-12 student enrollment (U.S. Department of Education, 2015).

> The need for teachers has outpaced the supply in most geographic regions in the United States, although the severity varies. Three frequently cited causes of teacher shortages include the increasing student population, the aging teacher workforce, and the 2002 legislation mandating highly qualified teachers in all public schools' core content courses. (Ludlow, 2011, p. 442)

Although a national teacher shortage exists in pre-K through 12th grade across subject areas (i.e., math, science, history, English/language arts, performing arts, special education, career and technical education), it is becoming a growing concern with SBAE (Cross, 2017; Smith, Lawver, & Foster, 2017).

Teacher Shortage in SBAE

Although the shortage of qualified teachers is not a new problem (Hillison, 1987), it is a growing concern based on recent trends (Smith et al., 2017). Agricultural education has been recognized as a high need subject area dating back to 1997 and continuing in various states through 2018 (Cross, 2017). Eck and Edwards (2018) developed a 52-year trend line of traditionally certified SBAE teachers prepared to teach versus those who enter the SBAE teaching profession, utilizing the nationwide supply and demand studies for SBAE (see Figure 4). As Figure 4 displays, there is an approximate 6-in-10 trend of qualified graduates entering the profession, even though the supply and demand studies identify a need for SBAE teachers. This gap of entrants causes part of the shortage of SBAE teachers nationwide. Thus, secondary school principals and administrators have no choice but to hire alternative or emergency certified SBAE teachers, leading to the growing increase of those entering the profession (Camp, 2000; Foster, Lawver, & Smith, 2016; Smith et al., 2017, 2018).

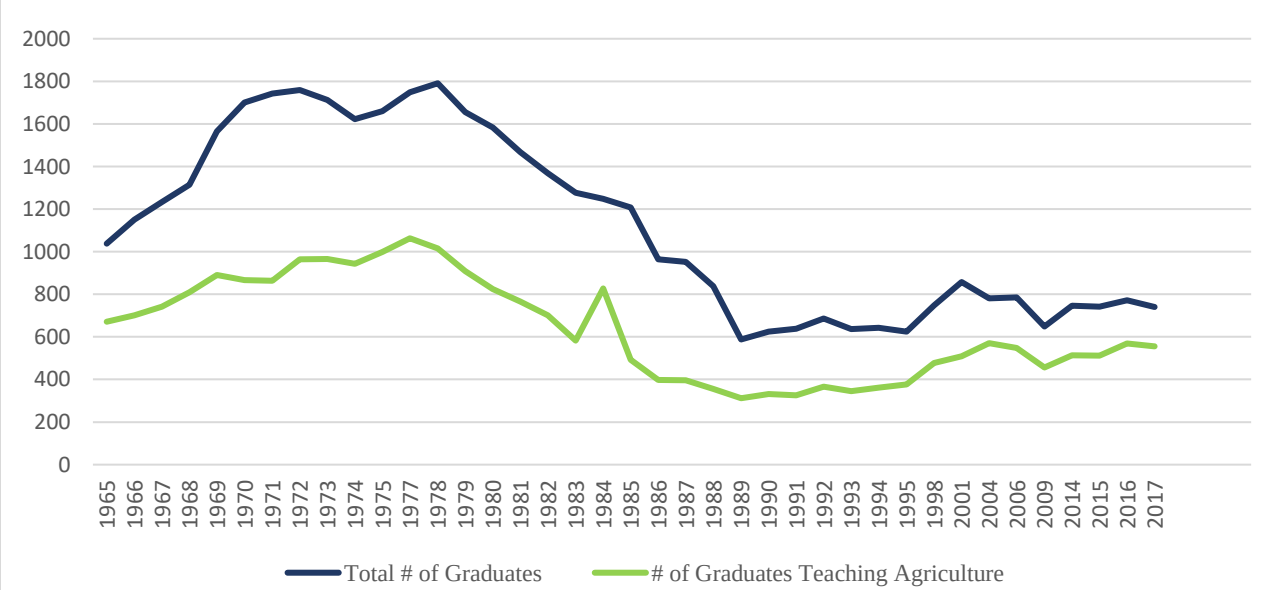

Figure 4. Comparison of agricultural education graduates to the number who began teaching SBAE from 1965 to 2017. Adapted from "Teacher shortage in school-based, agricultural education (SBAE): A historical review," by C. J. Eck, C. J., and M. C. Edwards, 2018, Paper

presented at the meeting of the Association for Career and Technical Education Research Conference, San Antonio. TX. Reprinted with permission.

In the *2017 Agriculture Teacher Supply and Demand Overview*, there were 216 new positions added, 189 new programs started, 158 SBAE teachers who retired, and 510 SBAE teachers who left the profession before retirement (Smith et al., 2018). Unfortunately, only 556 agricultural education graduates accepted teaching positions, which is an all-time high of 75%, but one that still created a gap of teachers necessary to fill all available positions (Smith et al., 2018). As such, 356 alternatively certified teachers and 106 non-licensed or emergency certified teachers were hired (Smith et al., 2018). "The demand for agriculture teachers continues due to program growth, expansion, retirements and openings" (Smith et al., 2018, p. 1). In addition, 51 SBAE programs closed resulting in a loss of 71.7 teaching positions, along with an additional 76 positions nationwide going unfilled at the start of the 2017-2018 school year (Smith et al., 2018). The National FFA Organization (2017) identified the greatest challenging facing SBAE to be the shortage of qualified teachers, which is echoed by the *Teacher Shortage Areas Nationwide Listing 1990-1991 through 2017-2018* from the U.S. Department of Education (Cross, 2017). This listing identified 21 states as having a high need for SBAE teachers beginning in 1997.

Pathways to Teacher Certification

"Teacher-credentialing policy debates often center on questions of whether traditional or alternative pathways to teacher certification better position future teacher for success" (West & Frey-Clark, 2018, p. 1). With a shortage of traditionally prepared and certified teachers to fill the vacancies nationwide, school administrators have no choice but to look for alternative means of certification. Ludlow (2011) identified individual states using alternative certification pathways for over three decades. In addition, Ludlow (2011) concluded:

Alternative pathways to certification are organizationally different in each state and

> represent each state's educational policy directives. No statistically significant difference in student academic achievement exists between traditionally and alternatively certified teachers. Research is inconclusive in alternative pathway's enrollment of higher quality teachers. Alternative pathways to certification program participants are more diverse and alternative pathway teachers have a higher probability to teach in high-minority schools. (p. 454)

Since pathways to certification vary by state and may be referred to by different names, for this study, we will consider these pathways to be traditional certification (via a teacher preparation program through a bachelors or master's degree), alternative certification, and emergency certification. If teachers are teaching without any certification, they will be deemed not certified.

According to the *National Supply and Demand Study* (Smith et al., 2018) there is an increasing number of teachers entering the profession through alternative certification routes. Darling-Hammond et al. (2002) asked, "Does teacher education influence what teachers feel prepared to do when they enter the classroom?" (p. 286). Their study found traditionally prepared teachers had the highest reported readiness for teaching when compared to their alternative certification counterparts. Traditionally certified teachers also had the least amount of variability between them as a group (Darling-Hammond et al., 2002). Additionally, traditionally certified teachers rated themselves to be better prepared when entering the profession when compared to alternatively certified teachers, and they remained aware of their need for additional training in certain areas related to the curriculum (Darling-Hammond et al., 2002). In contrast, "alternate route recruits and those with no prior experience had significantly lower ratings within a narrower range" (Darling-Hammond et al., 2002, p. 290). Those with the greatest challenge when entering the classroom were those with no training or experience. These individuals "reported feeling poorly prepared for many tasks of teaching and less adequately prepared overall" (Darling-

Hammond et al., 2002, p. 295). Not only does the preparation of teachers play a role in teacher effectiveness, but the way they are evaluated also is key.

"Teachers make a difference. The success of any plan for improving educational outcomes depends on the teachers who carry it out and thus the abilities of those attracted to the field and their preparation" (National Research Council, 2010, p.1). In excess of 200,000 students complete a traditional teacher preparation program annually in the U.S., and of those, the majority are white females (National Research Council, 2010). Traditional teacher preparation programs at secondary institutions are governed by a multitude of mandated and voluntary programs, i.e., program accreditation standards, individual state certification, and state licensure requirements for teacher certification (National Research Council, 2010). "With authority over licensure, states have been able to establish policies and regulations governing eligibility to teach in public education. Teacher licensure, also known as certification and credentialing, is regulated by state legislatures and boards of education" (Ludlow, 2011, pp. 440-441). Findings from the National Research Council (2010) supports the evidence related to personal characteristics of a quality teacher, although the question of how teacher preparation programs can develop those characteristics still remains. Teacher preparation programs are one of the most demanding, in terms of professional preparation, ultimately developing a connection between theory and practice for the teacher candidate (Darling-Hammond & Bransford, 2005).

One of the greatest benefits of traditional certification is the opportunity of a student teaching internship, which has been considered the most impactful phase of the teacher preparation program and provides the greatest preparedness for establishing teaching effectiveness (National Council for Accreditation of Teacher Education, 2010). Student teaching serves as a culminating experience for all of the didactic and clinical curriculum included in a teacher preparation program (Darling-Hammond, 2010). Multiple studies have considered this capstone experience a necessity to prepare future teachers, helping them to establish their

teaching identity (Borne & Moss, 1990; Edgar, Roberts, & Murphy, 2011; Edwards & Briers, 2001). Beyond just a culminating experience for classroom instruction, future SBAE teachers are afforded the opportunity to further their understanding related to FFA advisement and SAE supervision during the student teaching internship (Torres et al., 2008). Further, related to student teaching, the American Association of Colleges for Teacher Education (1984) found "evidence showing that individuals who are fully certified [traditional] are more effective teachers and more satisfied employees than those who are not fully certified" (p. 21). In 1984, the American Association of Colleges for Teacher Education recommended that "until a certified teacher can be placed in a particular position, the school district should simply suspend classes for which that teacher is necessary" (p. 24).

Suspending classes is not an option in today's educational setting; therefore, school administrators are forced to consider alternative routes to certification. The National Research Council (2010) identified an estimated 130 alternative certification routes nationwide. "Alternative pathways toward certification have been used by states, formally and informally, for more than three decades" (Ludlow, 2011, p. 446). These models allow individuals who are alternatively certified to secure a teaching position and become the instructor of record, while obtaining on-the-job training and receiving the full salary of a licensed teacher (Birkeland & Peske, 2004). Feistritzer (2005) explained that alternative certification programs are "designed to recruit, prepare and license talented individuals who already had at least a bachelor's degree" (p. 3), which is typically in a discipline outside of education. Originally, alternative certification was established to largely accommodate older, mid-career individuals seeking a change of lifestyle (Darling-Hammond & Bransford, 2005; Robinson & Edwards, 2012). Entering one's career at a later stage in life puts that person at a "juncture of making permanent career and family decisions" (Crutchfield, Ritz, & Burris, 2013, p. 9).

Research has suggested individuals who attain alternative certification are valuable to school systems because they bring extensive professional experience into the classroom (Ballou, & Podgursky, 1998; Johnson, Birkeland, & Peske, 2005). However, Cohen-Vogel and Smith (2007) found a large percentage of alternatively certified teachers "came to teaching directly from college, challenging the argument that [alternatively certified] teachers bring to the classroom a rich professional experience" (p. 748). The greatest concern of alternatively certified teachers, however, is their lack of preparedness, commonly leading to turn over, and resulting in reduced investment and support from educational stakeholders (Nagy & Wang, 2007; Redding & Smith, 2016).

Depending on the state, some standards have been implemented to pre-screen individuals entering the profession through an alternative pathway, providing relevant professional education training and mentoring to help prepare them for completion of alternative certification (Feistritzer, 2005). Ludlow (2013) concluded, vast differences exist between states related to alternative certification of teachers, based on states educational policies. Leading to inconclusive research on the effectiveness of teachers entering through alternative pathways (Ludlow, 2013). West and Frey-Clark (2018) concluded that alternative certification pathways are a valuable addition to diversifying the teacher pool and helping to offset teacher shortages. Others validate the importance of teacher selection, regardless of the student achievement results, indicating there is no difference between certification pathway (Kane, Rockoff, & Staiger, 2007). Although pathways to teacher certification are of concern to education writ large, SBAE is not immune to the concerns. The National Council for Agricultural Education (2000) set a goal of having "an abundant supply of highly motivated well-educated teachers in all disciplines, pre-kindergarten through adult, provide agriculture, food, fiber and natural resources systems education," to "develop and encourage alternative procedures for certifying teachers" (p. 7).

According to the national supply and demand studies for agricultural education, the majority of SBAE teachers complete agricultural education teacher preparation programs at either the bachelor's or master's degree level (Camp, Broyels, & Skelton, 2002; Foster, Lawver, & Smith, 2015, 2016; Kantrovich, 2007, 2010; Smith et al., 2017, 2018; Woodin, 1970). However, as the "approximate 6-in-10 trend of entrants-versus-graduates persists" (Eck & Edwards, 2018, p. 12), the question becomes, where are the other teachers emerging to cover the shortage? Camp (2000) identified six sources of SBAE teachers to fill vacant positions nationwide (see Figure 5). According to Camp (2000) the majority of SBAE teaching positions are filled by new graduates of an agricultural education teacher preparation program, while new graduates with a master's degree in agricultural education make up a small portion, as to agricultural education graduates from previous years, who had not yet accepted a teaching position (see Figure 5). In addition, a large portion of vacancies are filled by teachers transferring between schools, leaving a vacancy in another school. A small portion of vacancies are filled by SBAE teachers who reenter the profession after previously leaving (Camp, 2000). The final group is categorized by Camp (2000) as other sources, of which he elaborated on as representing non-traditional or alternative routes to certification (personal communication, December 18, 2017).

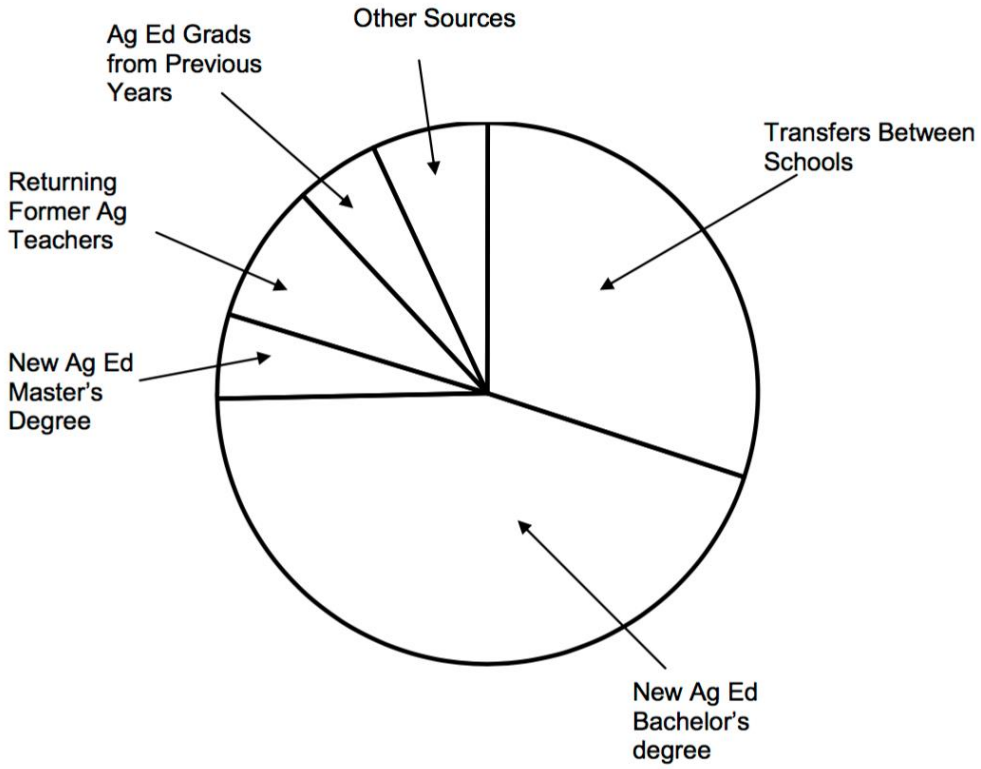

Figure 5. Sources of new SBAE teachers, as identified by Camp, W. G., 2000, in *A national study of the supply and demand for teachers of agricultural education in 1996-1998.* Reprinted with permission.

With multiple pathways to teacher certification, the National Research Council (2010) identified the need for high-priority research questions "that establishes links between teacher preparation and learning" (p. 6). The learning is associated with measurable outcomes of potential teacher growth throughout a teacher preparation program (National Research Council, 2010). Darling-Hammond, Berry, and Thoreson (2001) concluded,

> The field [of education] would be well served by thoughtful, well designed and adequately nuanced studies of how different kinds of knowledge matter for teaching, how these can be acquired in various types of preparation programs, and how their acquisition can be represented by state certification policies that provide both useful leverage on training and good information for schools. (p. 72)

Personal and Professional Characteristics of Effective SBAE Teachers

SBAE Career Tenure

The number of years teaching SBAE, number of years in current position, and intent to retire as a SBAE teacher are potential factors impacting teacher effectiveness, as their efficacious and training needs vary based on experience (Barrick, Ladewig, & Hedges, 1983; Layfield & Dobbins, 2002; Roberts & Dyer, 2004; Rocca & Washburn, 2006; Washburn, King, Garton, & Harbstreit. 2001). Generally speaking, SBAE teachers are satisfied with their career choice (Clark et al., 2014; Kitchel et al., 2012; Walker, Garton, & Kitchel, 2004). SBAE teachers commonly choose to remain in the profession past retirement eligibility, further identifying their satisfaction with the career (Clark et al., 2014). One hundred-fifty-eight SBAE teachers retired in 2017, and an additional 510 left the teaching profession prior to retirement eligibility that same year (Smith et al., 2018). More broadly, K-12 teachers nationwide are comprised of teachers with varying levels of teaching experience, as 9.9% of teachers have less than three years, 28.3% have three to nine years, 39.3% have 10 to 20 years, and 22.5% have in excess of 20 years of teaching experience in the classroom. Retaining SBAE teachers continues to be a challenge facing the profession (Tippens et al., 2013). Digging deeper into career tenure and the intention of SBAE teachers to remain in the profession, Tippens et al. (2013) found SBAE teachers who are satisfied with their career are unlikely to leave the classroom within the next five years, regardless of sex. The number one indicator of SBAE career satisfaction was a self-perception of being an effective SBAE teacher (Tippens et al., 2013). The mid-career phase is the pivotal point where SBAE teachers choose to either continue to engage or disengage from the profession (Day, 2008). Career tenure and future intentions related to a career in SBAE can potentially impact the effectiveness of the SBAE teacher.

Program Size

The number of teachers in a SBAE program have the potential to play a role in the type and delivery of the program related to the three-component model of agricultural education (National FFA Organization, 2015). For example, multiple teacher departments were found to have a more positive perception related to SAE programs than did single teacher programs (Swortzel, 1996). In addition to the number of teachers in a SBAE program, the number of students can play a role. SBAE programs vary in size from small rural schools with less than 20 students in the program to large multiple teacher departments with over 1000 students enrolled in SBAE (National Association of Agricultural Educators, 2019). The size of the SBAE program has the potential to impact SBAE teacher effectiveness (McKim et al., 2017; Wheeler & Knobloch, 2006; Whittington et al., 2006).

Personal Attributes

Personal attributes of SBAE teachers include age, sex (Rodriguez, 1997; Wolf, 2011), highest degree earned (McKim et al., 2017), and their geographical location (Birkenholz & Harbstreit, 1987; Washburn et al., 2001). The average age of teachers nationwide is 42.4 years old, with 15% of teachers under the age of 30, 29% form 30 to 39 years old, 27% between 40 and 49 years of age, 22% from 50 to 59, and the remaining 8% being 60 and older (SASS, 2017). Nationwide, only 23% of K-12 teachers are male, with the remaining 77% being female (SASS, 2017). When considering secondary schools only across the nation, the percentage of males teaching increases to 36% (SASS, 2017).

SBAE specifically is a much different climate with 12,690 teachers (44% female, 56% male) (Smith et al., 2018), aligning with additional studies which found the majority of SBAE teachers to be white males (Lawerence, Rayfield, Moore, & Outley, 2013; Talbert & Larke, 1995). Additionally, teachers nationwide are traditionally educated, as only 2.4% have less than a

bachelor's degree, while 40.5% of teachers have a bachelor's degree, 47.4% have a master's degree, and 9.7% have earned a terminal degree (SASS, 2017). Geographically, there are differences amongst SBAE teachers across the six regions, as identified by Smith et al. (2018) (see Figure 6). Region 1 has 1872 SBAE teachers, Region 2 has 3879 SBAE teachers, Region 3 has 1224 SBAE teachers, Region 4 has 2059 SBAE teachers, Region 5 has 2358 SBAE teachers, and Region 6 has 1298 SBAE teachers (Smith et al., 2018).

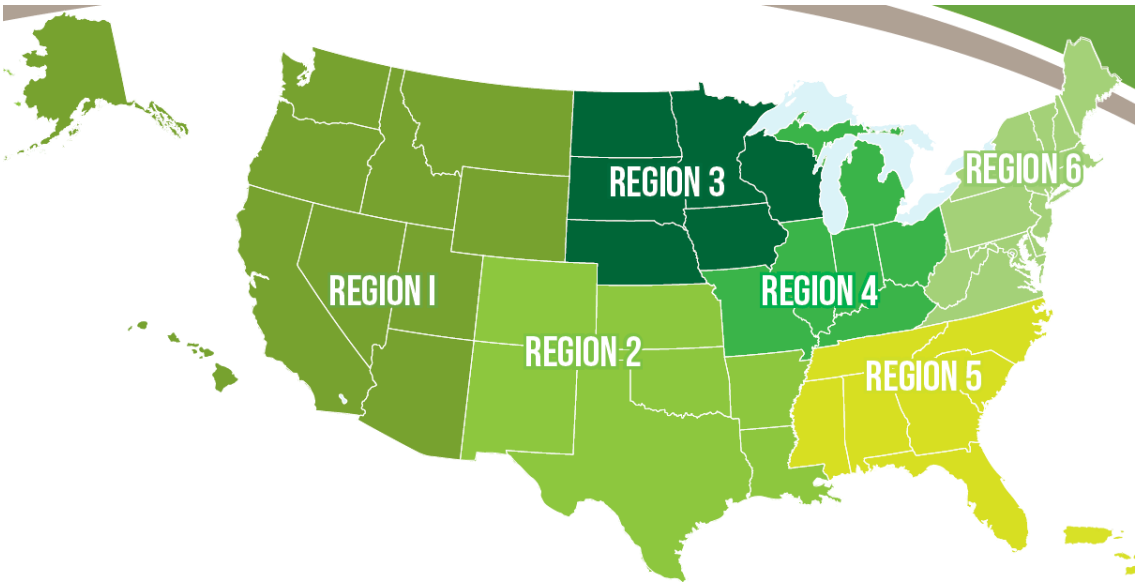

Figure 6. Regional breakdown of SBAE teachers nationwide, as identified by Smith et al., 2018, in the *National agricultural education supply and demand study, 2017 executive summary.* Reprinted with permission.

Differences also exist regionally based on production agriculture in specific areas, as SBAE programs exist in small rural programs as well as inner city schools in 11 of the 20 largest cities in the U.S., including Philadelphia, Chicago, and New York City (National FFA Organization, 2017). Figure 7 depicts the number of farms across the U.S. based on census data from the U.S. Department of Agriculture, National Agricultural Statistics Service [USDA] (2019), where one dot represents 200 farms. Since individual SBAE programs are delivered on the local level (National Council for Agricultural Education, 2012), the local agricultural community can have

an impact on the local SBAE program. Therefore, personal attributes can play a pivotal role in the effectiveness of a SBAE teacher.

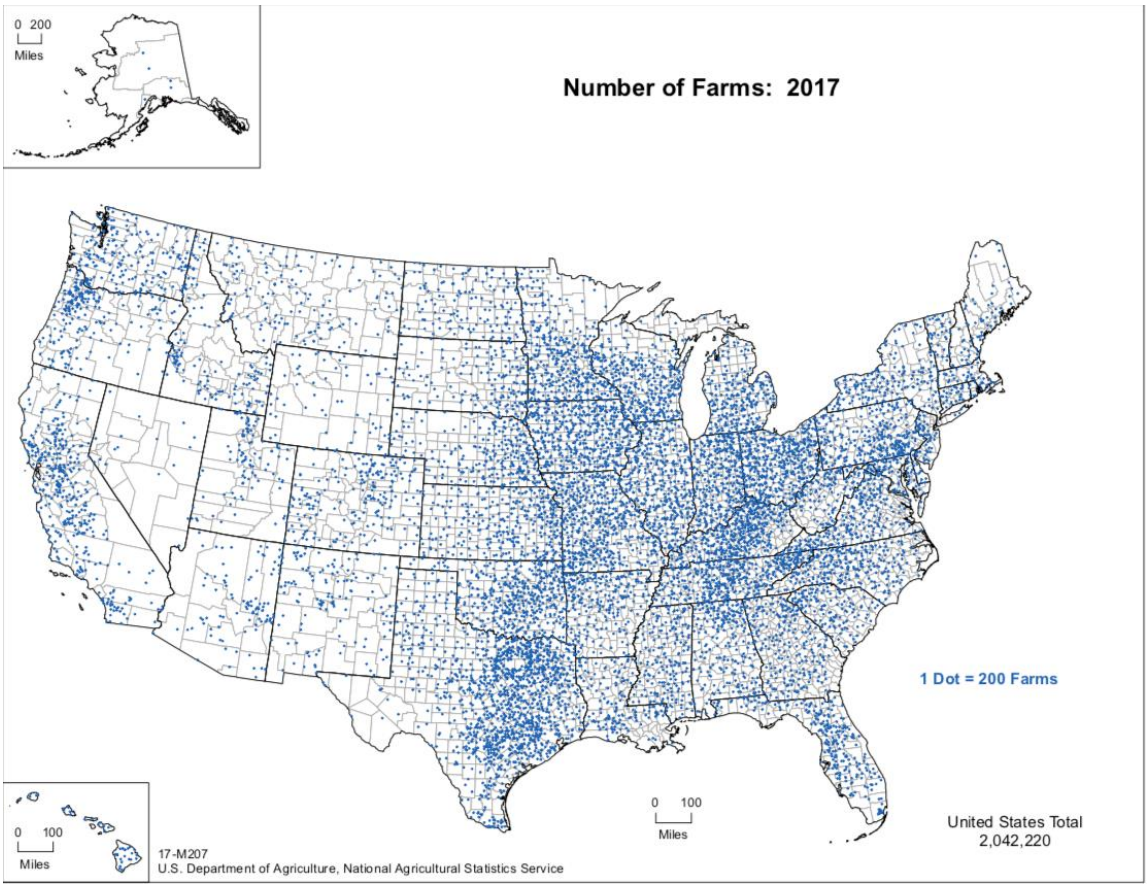

Figure 7. Number of farms in the U.S., as identified by the U.S. Department of Agriculture, National Agricultural Statistics Service, 2019, in the *2017 Census of agriculture*. Reprinted with permission.

Training Needs of SBAE Teachers

Understanding the training needs of teachers is critical, as "researchers and policymakers agree that providing all K-12 students a quality education depends largely upon our capacity to staff schools with highly effective teachers" (Ronfeldt, 2012, p. 3). The Council of Chief State School Officer's (CCSSO) Interstate Teacher Assessment and Support Consortium (InTASC) (2013) highlighted the need for teachers to better understand the needs of their students, allowing

for the customizing of instruction to meet learners individual differences (i.e., students with disabilities or students performing above their grade level). Davis and Jayaratne (2015) found in-service SBAE teachers need training on 21st century skills, including math, reading, and writing in agricultural curriculum, student leadership development to foster problem solving skills, and higher-order and critical thinking skills. The needs established by Davis and Jayaratne (2015) are echoed by the National Strategic Plan and Action Agenda for Agricultural Education (National Council for Agricultural Education, 2000) as "they challenged agricultural education to engage in a new global social contract to serve the needs of society, improve the quality of the environment, build leadership, increase collaboration and develop new approaches to new challenges" (p. 2). While Layfield and Dobbins (2002) identified 10 competencies related to technology integration and youth development activities as the primary needs of South Carolina SBAE teachers. Similarly, Garton and Chung (1996) evaluated the training needs of in-service SBAE teachers, some of which included needs related to state report filing, student motivation, FFA advisement, SAE supervision, and classroom technology usage. Although the needs of SBAE teachers vary nationwide, the identification of these needs early and often can help not only improve the capacity of in-service teachers, but also the preparation of future SBAE teachers (National Council for the Accreditation of Teacher Education [NCATE], 2010).

Summary

Chapter two provided an overview of the literature on effective teaching characteristics, teaching evaluations, the use of the human capital theory as the theoretical framework (Becker, 1964; Little, 2003; Schultz, 1971; Smith, 2010; Smylie, 1996), recruitment and retention of teachers, certification pathways, and personal and professional characteristics germane to effective teaching. Evaluating the effectiveness of SBAE teachers, beginning in teacher preparation programs and continuing throughout their career is an imperative task, of which the development of an instrument to perform such tasks is the starting point.

CHAPTER III

METHODOLOGY

Chapters I and II outlined the need for the study through the identification of gaps in research related to characteristics of effective SBAE teachers. The literature led to the need to understand those characteristics associated with the effectiveness of a teacher within a complete SBAE program. Given this need, Chapter III explains the methods and procedures used to conduct the study, including instrument development, research design, census frame design, and data analysis. A census approach was the target for data collection, although participation was denied from certain states. The OSU Institutional Review Board (IRB protocol AG-18-56) approved the research and data collection procedures for this study.

Purpose of the Study

There are various factors that contribute to student success and achievement, but none more crucial than that of teacher effectiveness (Stronge & Tucker, 2000; Wright et al., 1997). The purpose of this study was two-fold: 1) to validate the effective teaching instrument for SBAE teachers, as identified by Eck et al. (2019), and 2) to identify the characteristics of effectiveness of SBAE teachers nationwide, based on the identified items.

Research Objectives

Five research objectives guided the study.

1. Determine the primary components of an effective SBAE teacher.

2. Validate the effective teaching instrument for SBAE teachers.
3. Determine the internal consistency reliability of the components of the effective teaching instrument for SBAE teachers.
4. Describe the personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings) of the participants.
5. Compare the effectiveness of SBAE teachers based on personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings).

Research Design

This non-experimental study implemented a descriptive survey research design. A non-experimental research design is one in which the procedures used to measure variables associated with the research problem that do not involve any manipulation of circumstances revolving around the study (Gay, Mills, & Airasian, 2012). To answer the established research questions, an instrument was developed, resulting in a survey research design.

Population

The population of interest was all SBAE teachers across the United States of America (N = 12,690) in 2017 (Smith et al., 2018). A distribution frame was constructed for 48 states, including 9121 individual email address, along with agricultural education email listservs for 15 states. Four U.S. states/territories (Hawaii, Michigan, Puerto Rico, and the U.S. Virgin Islands) refused to participate.

Instruments were received from 3339 individuals in 45 states, resulting in a 28.2% response rate. After excluding incomplete instruments, the sample was reduced to 2807 valid responses for a rate of 23.7%.

For the principal component analysis (PCA), the usable response was 2454, as respondents had to be removed who were not current SBAE teachers or did not respond to all 58 items being analyzed (Eck et al., 2019). Although the response rate was not ideal, Krejcie and Morgan (1970) recommended a population of interest with 15,000 people should have a minimum sample size of 375 participants. Not only did we exceed the minimal number of respondents, as recommended by Krejcie and Morgan (1970), we also surpassed the 510 participants needed for the 10:1 ratio of participants to items for conducting a PCA, as recommended by Comrey and Lee (1992).

Procedure

The procedure began with the development of a sample frame to reach the population of interest. After the frame was established, the effective teaching instrument was submitted to SBAE teachers using electronic mail. Specifically, a Qualtrics Survey link was sent to 9121 individual email addresses and listservs from 15 states on December 17, 2018. The email followed the Tailored Design Method (Dillman, Smyth, & Christian, 2014) ensuring it addressed the usefulness of the study and included the limited response time, a cash incentive drawing for participants, the Oklahoma State University logo, and the researcher's pertinent contact information. In addition, the email participation request was submitted to each state individually to "personalize all contacts, to the extent possible" (Dillman et al., 2014, pp. 332-333). After initial distribution responses were received (n = 2061), a follow-up email was submitted on January 7, 2019 to the sample frame, which resulted in an additional 437 responses. A final reminder email was sent out February 1, 2019, resulting in 837 questionnaires being received before the closure of the Qualtrics link on February 15, 2019. All correspondence after the initial contact followed the same recommendations and protocol to optimize response rate (Dillman et al., 2014).

Instrument Distribution

Individual state FFA webpages were accessed to obtain current SBAE teacher contact lists. In cases where states did not have such a list available on their state FFA webpage, an email was then sent to the state FFA executive secretary or state supervisor of agricultural education requesting a current list of their state's SBAE teacher email addresses. Various states provided an individualized list of SBAE teacher email addresses resulting in 9121 email addresses for the frame. Other states (n = 15 states) chose not to provide an individualized list, but offered access to the state agricultural education teacher listserv. Two states and two territories – Hawaii, Michigan, Puerto Rico, and the U.S. Virgin Islands – refused to participate in the study and did not provide email addresses or listserv access. The sample frame developed included 48 of the potential 52 states and territories with SBAE programs (National FFA Organization, 2017). Responses were obtained from 45 of the 48 states included in the frame. No responses were received from Alaska, Vermont, or Virginia. Alaska was part of the individual list of email addresses, whereas Vermont and Virginia were states in which only listserv access was provided. In addition to those states not participating, the sample frame had additional limitations, as it failed to reach all members of the population. People who were not of interest to the study were also potentially contacted through development of the sample frame, i.e., past/retired SBAE teachers, SBAE teacher preparation faculty, state agricultural education supervisors, state FFA staff, and technical center agriculture teachers. the recommendations of Dillman et al. (2014) were followed to develop the most reliable sample frame possible. Although the potential exists for these unwanted responses, the first question in the instrument was designed to reduce the responses from unwanted participants. It asked: Are you currently a school-based agricultural education teacher?

Instrumentation and Data Collection

The study's instrument was developed based on the findings of Eck et al. (2019), which was a nationwide replication of a study conducted originally in Florida by Roberts and Dyer (2004). The study

identified characteristics essential for an effective SBAE teacher. The study employed a Delphi approach consisting of 35 panelists from 25 states involved in the agricultural education profession, spanning from California to New York (Eck et al., 2019). The study employed three rounds of data collection, with the first round asking, the open-ended question: What are the characteristics of an effective agricultural education teacher? (Eck et al., 2019, p. 4). The following two rounds aimed to reach consensus on 121 statements identified in Round One, with Round Three resulting in 58 items across eight categories. The 58 items reaching consensus were used to create the SBAE teacher effectiveness instrument. Each item was rated on a 4-point, Likert-type scale of personal strengths and weaknesses: 1 (*Very Weak*), 2 (*Weak*), 3 (*Strong*), and 4 (*Very Strong*) and included a *Not Applicable* option. Survey design features in Qualtrics were utilized to optimize the instrument for mobile devices. Participants were allowed to proceed forward and backward within the instrument, were not forced to respond, and could start and stop the instrument as needed to allow for ease of use (Dillman et al., 2014). Face and content validity were evaluated by four faculty members in agricultural education, along with a faculty member from the Research, Evaluation, Measurement, and Statistics (REMS) department, meeting the recommendations of Salkind (2012). The faculty members were deemed experts in their areas based on their faculty appointment, time in their discipline, and past experiences. The agricultural education faculty all served as SBAE teachers before completing a terminal degree and taking faculty positions. Now, each of these faculty prepare SBAE teachers and have worked in that capacity for more than 15 years. Their expertise provided validation of content related to effective characteristics and the evaluation of SBAE teachers. The addition of a REMS faculty member, of which has extensive experience through research and teaching in research design, instrument development, and statistics, served as the expert for instrument development, while also evaluating the face and content validity of the instrument.

Effective Teaching in SBAE

Dillman et al. (2014) recommended grouping of related questions. The 58 effective teaching items developed from Eck et al. (2019) organized in eight categories: classroom instruction, FFA, SAE,

program planning, diversity and inclusion, work-life balance, professionalism, and personal dispositions. were evaluated to determine groupings. For this administration of the instrument, the items were organized in the following seven categories: classroom instruction, FFA/SAE, program planning, diversity and inclusion, work-life balance, professionalism, and personal dispositions. The original FFA and SAE categories were combined due to their relationship and number of items in each category (Dillman et al., 2014). Although reduced to seven categories, all 58 items were retained for the effective teaching instrument based on the recommendations from Eck et al. (2019). The grouping of items is listed in Table 1 with their corresponding item numbers for data analysis.

Table 1

Categorized Characteristics of Effective SBAE Teachers

Category	Identified Characteristic	Item Number
Instruction	I am passionate about education.	I_1
	I provide a variety of learning opportunities to meet the needs of all students.	I_2
	I guide students to grow personally.	I_3
	I am a leader for students.	I_4
	I demonstrate pedagogical knowledge.	I_5
	I am a good communicator.	I_6
	I demonstrate sound educational practices.	I_7
	I am prepared for every class.	I_8
	I demonstrate classroom management.	I_9
	I understand the experiential learning theory.	I_10
	I am motivated for student success.	I_11
	I am knowledgeable about agriculture.	I_12
	I am first and foremost a classroom teacher.	I_13

	I am innovative.	I_14
	I am engaging.	I_15
FFA/SAE	I advise the FFA chapter.	F_1
	I am not just a facilitator of record keeping for degrees and awards.	F_2
	I instruct students through FFA.	F_3
	I am passionate about FFA.	F_4
	I advise the FFA officers.	F_5
	I prepare students to be leaders.	F_6
	I instruct students through supervised agricultural experiences.	F_7
Program Planning	I use the complete agricultural education model as a guide to programmatic decisions and practices.	PP_1
	I am resourceful as an administrator of my program.	PP_2
Balance	I lead a balanced life.	B_1
	I have the ability to say no.	B_2
	I am never afraid to ask for help.	B_3
	I demonstrate a willingness to put in extra hours.	B_4
Diversity and Inclusion	I understand student needs.	D_1
	I am an advocate for all students.	D_2
	I value students regardless of sex.	D_3
	I value students regardless of economic status.	D_4
	I value students from all ethnic/racial groups.	D_5
	I understand diversity.	D_6
	I am culturally relevant.	D_7

	I care about all students.	D_8
	I understand there is not an award for all students, but that does not mean they are not valuable.	D_9
Professionalism	I am a purposeful lifelong learner.	P_1
	I demonstrate adaptability.	P_2
	I am a dedicated professional.	P_3
	I am an advocate for public education.	P_4
	I am engaged in an appropriate professional organization.	P_5
Personal Dispositions	I am fair.	PD_1
	I am student focused.	PD_2
	I am trustworthy.	PD_3
	I am honest.	PD_4
	I am passionate about agriculture.	PD_5
	I am respectful.	PD_6
	I show empathy.	PD_7
	I am dependable.	PD_8
	I am responsible.	PD_9
	I am relatable.	PD_10
	I am genuine.	PD_11
	I am a hard worker.	PD_12
	I am organized.	PD_13
	I am helpful.	PD_14
	I have patience.	PD_15
	I show integrity.	PD_16

Selected Professional Characteristics and Demographics

The instrument included 12 items inquiring about pertinent personal and professional characteristics of the subjects. The independent variables for this study included: number of years teaching SBAE, number of years in the current position, intentions to retire as a SBAE teacher, path to certification, highest degree earned, number of students enrolled in the SBAE program, number of teachers in the SBAE program, sex, age, state of employment, and personal competence rankings of a complete SBAE program.

Number of years teaching SBAE. One item asked the participants to indicate the number of years (including the current one) they have been teaching SBAE.

Number of years in current position. One item asked the participants to indicate the number of years (including the current one) they have been employed in their current position as a SBAE teacher.

Intentions to retire as a SBAE teacher. Two items sought to measure participants' intention to retire as a SBAE teacher. The first item asked: Do you intend to retire as a school-based agricultural education teacher? Response options for this item were *yes*, *no*, or *undecided*. If the subject responded in the negative, they were prompted to explain why they did not plan to retire as a SBAE teacher.

Path to certification. One question addressed the topic of certification pathway, and required respondents to select from one of five options: (a) traditional path through agricultural education bachelor's degree with student teaching, (b) traditional path through agricultural education master's degree with student teaching, (c) alternative certification, (d) emergency certification, or (e) not certified. If the first option was selected, respondents were then asked if they hold a master's degree. If respondents selected second option, they were asked to identify the area of their bachelor's degree. The remaining options prompted the participants to identify what degree they held and any relevant work experience they had.

Highest degree earned. Respondents were asked to identify their highest degree earned: bachelor's, master's, or doctoral. These were the only options, as a minimum of a bachelor's degree, regardless of degree area, is the requirement nationwide to teach at the K-12 level (Feistritzer, 2005; National Research Council, 2010).

Number of students enrolled in the SBAE program. One item asked the participants to indicate the number of students enrolled currently in their SBAE program.

Number of teachers in the SBAE program. One question asked the participants to indicate the number of teachers (including themselves) in their school's SBAE program.

Sex. Participants were prompted to identify their sex, with options consisting of: male, female, other, or prefer not to respond.

Age. Respondents were asked to enter a numeric value for their age.

State of employment. A dropdown list was available for participants to select the state in which they teach. All 50 state and two territories were made available as options.

Personal competence rankings of a complete SBAE program. On a scale of zero to 100 with zero being totally incompetent and 100 being totally competent, respondents were asked to rank their competency as a SBAE teacher on the three components of the agricultural education three-circle model, which consists of classroom/laboratory instruction, FFA, and SAE (National FFA Organization, 2015).

Data Analysis

The Statistical Program for Social Sciences (SPSS), Version 23, was used for data analysis, and included descriptive and inferential statistics, reliability estimations, and principal component analysis. The variables used and the corresponding statistical techniques for each research question are shown in Table 2.

Table 2

The Study's Research Questions, Variables, and Corresponding Data Analyses

Research Objectives	IV[a]	DV[b]	Analysis
1. Determine the primary components of an effective SBAE teacher.	N/A	N/A	Principal Component Analysis of with a Varimax rotation; correlations; and reliability estimates
2. Validation of the effective teaching instrument for SBAE teachers.	N/A	N/A	Principal Component Analysis; Cronbach Alpha Reliability estimates
3. Determine the internal consistency reliability of the components of the effective teaching instrument for SBAE teachers.	N/A	N/A	Cronbach Alpha Reliability estimates
4. Describe the personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program,	N/A	N/A	Descriptive statistics

sex, age, state of employment, personal competency rankings) of the participants.			
5. Compare the effectiveness of SBAE teachers based on personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings).	Number of years teaching SBAE Number of years in current position Intention to retire as an SBAE teacher Certification Pathway Highest degree earned Number of students enrolled in SBAE program Number of teachers in SBAE program	Effectiveness composite score	Composite Score Calculations; Factorial Analysis of Variance; Post-Hoc Analysis

	Sex
	Age
	State of employment
	Personal competence rankings of a complete SBAE program

Note. [a]IV = independent variable; [b]DV = dependent variable.

Principal Component Analysis

Principal Component Analysis (PCA) was employed to answer Research Question 1 and 2. PCA is used to reduce the number of items currently present (Costello & Osborne, 2005). The usable sample size in this study exceeded the 10:1 recommended participant-to-item ratio as recommended by Comrey and Lee (1992). The initial analysis evaluated all 58 items using factor analysis with a principal component extraction, and a Varimax rotation, with any items loading lower than a 0.3 not being displayed. The output was then evaluated beginning with the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, with a minimum acceptable value of 0.6, and an ideal value closer to 1.0 (Beavers et al., 2013; Cerny & Kaiser, 1977).

Eigenvalues greater than 1.0 identified potential components, which were then evaluated against eigenvalues obtained through parallel analysis. Any observed eigenvalues greater than those obtained through parallel analysis were retained as established components. Parallel analysis is a "recommended procedure for deciding on the number of components involve[ing] extracting eigenvalues from random data sets that parallel the actual data set with regard to the number of cases and variables" (O'Connor, 2000, p. 397). SPSS was utilized to employ a simulation of 1000 matrices to mimic the 2442 cases and 58 uncorrelated variables. Eigenvalues of the uncorrelated dataset provide a minimum benchmark of observed eigenvalues to the true data. In addition to eigenvalues, the cumulative percentage of total explained variance was evaluated, along with communalities, identifying all communality extractions for items greater than 0.5. Utilizing the number of statistically significant components identified by the parallel analysis, the PCA was re-run fitting the model to a given number of components. The new output was then analyzed, assessing communalities and rotated factor loadings to determine which items (i.e., those with a value greater than 0.6) to retain. The retained components were inputted into another PCA, limiting the number of components, but still using SPSS, with Eigen rotation, principal component extraction, and a Varimax rotation. A Varimax rotation developed originally

by Kaiser (1958) was chosen based on the instrument design, with the assumption that the seven components would be correlated since they all are related with effective teaching in SBAE (Eck et al., 2019). With the assumption of seven independent components, an orthogonal rotation was needed (Field, 2009), in which case a Varimax rotation is most common (Abdi, 2003).

Output was then compared to a new parallel analysis, updated to reflect the reduced number of variables. Using the parallel analysis to determine the number of statistically significant variables, a final PCA was run based on the retained items and the reduced number of components. Any items loading at a 0.6 or higher on a single component were retained for inclusion on the final instrument.

Validity

"The validity of a measurement is the extent to which a measurement for a variable or construct measures what it is purported or intended to measure" (Privitera, 2017, p. 113). The instrument being validated in this study was developed through a nationwide Delphi study, where panelists reached consensus on 58 items vital for an effective SBAE teacher (Eck et al., 2019). The initial instrument was developed to measure effective teaching principles of SBAE teachers, of which this study aimed to validate, based on the findings of Eck et al. (2019) it can be confirmed that the instrument is indeed measuring effective teaching principles of SBAE teachers. With the complete 58-item instrument being deemed valid (Eck et al., 2019), the reduction of any items through a PCA will result in a valid instrument, as those items are part of the complete construct (Privitera, 2017) of effective teaching in SBAE. In addition to face and content validity established through the initial instrument development, the PCA serves as an opportunity to further the construct validity of the instrument (Privitera, 2017). The retained items in the PCA measure the emerging components identified, operationalizing those components (Privitera, 2017). Furthering the validity of the instrument, the overall reliability will be

established through a Cronbach's alpha, which will provide an overall reliability measure of the complete effective teaching instrument for SBAE teachers. Together, the initial Delphi design, with the implementation of a PCA, and an overall acceptable Cronbach's alpha level can produce a valid instrument.

Reliability Estimation

"Reliability is the consistency, stability, or repeatability of one or more measures or observations" (Privitera, 2017, p. 109). Reliability of an instrument is extremely valuable; therefore, the retained items were checked for reliability as a complete instrument and within each of the statistically significant components to answer the second and third research questions. Specifically, the reliability measure focused on the internal consistency of the instrument to determine the relationship between the items (Privitera, 2017) measuring teaching effectiveness in SBAE. SPSS was employed to analyze the reliability statistics. First, the Cronbach's alpha based on the items was utilized to determine the overall reliability of the instrument. "Cronbach's alpha measures the internal consistency of a group of items by measuring the homogeneity of the group of items" (BrckaLorenz, Chiang, & Nelson Laird, 2013, para. 3). To verify the overall Cronbach alpha value, the item-total statistics were analyzed to determine if deleting any item would increase the Cronbach alpha level. Cronbach's alpha ranges from zero to one, and any value greater than or equal to 0.7 is considered reliable (BrckaLorenz et al., 2013). An overall item reliability score was established before moving into component-specific item reliability. Each of the validated components were checked for reliability statistics considering their corresponding items. The Cronbach alpha values for the items were considered along with the evaluation of the alpha level if an item was removed to establish reliability of each of the components.

Personal and Professional Characteristics

Personal and professional characteristics were analyzed using descriptive statistics to explain the composition of participants from the sample frame and answer the fourth research question. The personal and professional characteristics included number of years teaching SBAE, number of years in the current position, intention to retire as a teacher of SBAE, highest degree earned, certification path, and size of program.

Teacher Effectiveness Based on Personal and Professional Characteristics

A composite score of effectiveness based on a sum of the responses to the items found to be valid and reliable from the first three research questions was for calculated each participant. Microsoft Excel was used to assess the self-reported rankings from the participants, 1 through 4, by calculating the total effectiveness sum score for each participant. Each of the items had scores ranging from 1 (very weak) to 4 (very strong), which was summed up to determine the overall effectiveness score of the participant. The effectiveness score was weighted equally across all items, as McDonald (1997) determined summative scores that are equally weighted to be optimal when analyzing components because no weighted method can provide a better estimate.

The composite sum scores were analyzed to determine the impact of personal and professional characteristics including, number of years teaching SBAE, number of years in the current position, intention to retire as a teacher of SBAE, highest degree earned, certification path, and size of program on teacher effectiveness. With 1 dependent variable and 13 independent variables, a factorial analysis of variance (ANOVA) was implemented using SPSS (Field, 2009). The independent variables were the personal and professional characteristics collected (i.e., number of years teaching SBAE, number of years in the current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, number of students enrolled in SBAE program, number of teachers in SBAE program, sex, age, state of employment, and personal

competency rankings) with the dependent variable being the calculated composite sum score for effectiveness. The SPSS output from the factorial ANOVA was analyzed to identify interactions, potential main effects, and simple main effects of the data (Field, 2014). Additionally, post hoc analysis were evaluated to further interpret the statistically significant main effects (Field, 2014).

Controlling Threats to Validity and Reliability

Researchers face constant threats to validity and reliability within a study (Dillman et al., 2014). Survey error, including sampling error, coverage error, measurement error, and non-response error tends to be the most persistent threat (Dillman et al., 2014). To help overcome this common threat, the Tailored Design Method (TDM) was employed, which often leads to higher response rates with lower error rates (Dillman et al., 2014). A $100 cash incentive for ten randomly drawn participants who completed the study and provided a valid school issued email address was used to encourage response rate.

Sampling error becomes an issue when data are collected only from a small portion or subset of the established sample frame (Dillman et al., 2014). To offset this issue, the sample developed included all states willing to participate. As such, email requests for participation were sent to 9121 individual email addresses and 15 state agricultural education listservs. Based on the entire population (N = 12,690) of SBAE teachers according to Smith et al. (2018), over 90% of the population was included in the sample frame, resulting in minimum sampling error.

Dillman et al. (2014) identified coverage error as members of the population not having an equal and independent chance of being selected to participate. Every SBAE teacher in the 9121 email addresses and 15 listservs had an equal opportunity to participate, as they all received the participation request.

During instrument development, I utilized conventions from Dillman et al. (2014) to develop a quality questionnaire with the incorporation of: (a) ensuring the questions displayed

across multiple devices and platforms, such as mobile devices; (b) creating welcome and closing screens that were informative and interesting; (c) using consistent page layouts optimized by Qualtrics; (d) allowing the respondents to go back or start and stop the questionnaire; (e) forgoing the use of a progress indicator; and (f) utilizing personalized correspondence specific to each state. Multiple items were included for the targeted constructs, which is found to be more reliable than single-item constructs (Dillman et al., 2014). Following these recommendations helped reduce measurement error by producing more accurate data that can be interpreted appropriately (Dillman et al., 2014).

In a study of this magnitude, non-response error is one of the greatest concerns, especially given the 28.2% response rate. Non-response error begs the question: Is the 71.8% of the sample frame who did not respond different than the 28.2% who did? Lindner, Murphy, and Briers (2001) discussed the potential for non-response error to be present anytime the response rate is less than 100%. To address the issue of non-respondents, the recommendation of Miller and Smith (1983) was used to compare data from non-respondents to those who responded. Gall, Borg, and Gall (1996) recommended contacting at least 20 non-respondents anytime a response rate falls below 80%. In this case, I randomly selected 30 non-respondents to send an additional email requesting participation one-week after the close of the data collection period. This effort to collect data from non-respondents resulted in an additional response from 20 of the 30 individuals contacted. The data collected from the non-respondents were then compared to those of the respondents to compare the two groups. The non-respondents included 45% male and 50% female ranging in experience from first-year teachers to those with 23 years of experience. The group included both traditionally certified teachers through either a bachelor's degree or master's degree program and alternatively certified teachers from 11 different states. The demographic data represented a very similar profile to those of the initial sample (see Table 3). In addition to demographics, composite sum effectiveness scores for the non-respondents were analyzed using

an independent samples *t*-test. Due to the difference in sample size between the respondents' group and the non-respondents' group, only descriptive statistics were used to compare the differences. Therefore, the sample of respondents was considered to be a valid representation of the nationwide population of SBAE teachers (see Table 3).

Table 3

Comparison of Demographics between Respondents (n = 2807) and Non- Respondents (n = 20)

Characteristic	Category	R[a] (%)	NR[b] (%)
Sex	Male	44.1	45.0
	Female	51.2	50.0
	Other	0.2	-
	Prefer not to respond	0.3	-
	Did not respond	4.2	5.0
Age	21 to 29	29.5	30.0
	30 to 39	26.5	25.0
	40 to 49	18.4	20.0
	50 to 59	15.4	15.0
	60 to 69	5.1	5.0
	70 +	0.1	-
	Did not respond	5.0	5.0

Note. [a]R= Respondents; [b]NR = Responses from Non-Respondents.

CHAPTER IV

FINDINGS

Chapter IV presents the findings of the study by validating the instrument, determining its reliability, describing the personal and professional characteristics of the participants, and determining the impact of certification pathways on SBAE teacher effectiveness. A quantitative approach guided the data collection from current SBAE teachers nationwide.

Purpose of the Study

The purpose of this study was two-fold: 1) to validate the effective teaching instrument for SBAE teachers, as identified by Eck et al. (2019), and 2) to identify the characteristics of effectiveness of SBAE teachers nationwide, based on the identified items.

Research Objectives

Five research objectives guided the study.

1. Determine the primary components of an effective SBAE teacher.
2. Validate the effective teaching instrument for SBAE teachers.
3. Determine the internal consistency reliability of the components of the effective teaching instrument for SBAE teachers.

4. Describe the personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings) of the participants.

5. Compare the effectiveness of SBAE teachers based on personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings).

Findings for Research Question One:

Determine the Primary Components of an Effective SBAE Teacher

The 58-item instrument (see Table 1) was analyzed using a principal component analysis (PCA) to determine the primary components of a SBAE teacher and reduce the instrument into components accounting for maximum variance. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy equaled 0.94, which was deemed acceptable (Cerny & Kaiser, 1977). In addition, the initial analysis resulted in 10 components with eigenvalues greater than 1.0, resulting in 10 potential components. Table 4 identifies the eigenvalues, variance explained, and their comparison to parallel analysis for the 58 items.

Table 4

Initial PCA (n = 2442)

Component	Eigenvalue	Cumulative %	Parallel Eigenvalues
1	13.58	8.96	1.31
2	3.96	17.65	1.29

3	3.19	24.96	1.27
4	2.66	2.72	1.25
5	1.78	37.21	1.23
6	1.67	42.06	1.22
7	1.56	46.59	1.21
8	1.26	50.27	1.19
9	1.13	52.85	1.83
10	1.06	54.90	1.17

Note. Parallel eigenvalues determined based on 2442 cases with 58 items. Cumulative % based on rotated sums of squares loadings.

Based on the results of the PCA comparison to parallel analysis, eight components were chosen, as they were above the output of parallel analysis (see Table 4). The analysis was then re-analyzed fitting the 58-items to eight components. Table 5 displays the eigenvalues and explained variance when limited to eight components., with an acceptable KMO (0.94).

Table 5

PCA Specified to Eight Components (n = 2442)

Component	Eigenvalue	Cumulative %
1	13.58	8.95
2	3.96	17.50
3	3.19	24.85
4	2.66	30.92
5	1.78	36.75
6	1.67	42.55

7	1.56	47.43
8	1.26	51.12

Note. Cumulative % based on rotated sums of squares loadings.

The communalities and the component loadings of the rotated component matrix, based on a Varimax rotation, of all 58-items were analyzed to determine which items to retain (see Table 6). Thirty (of 58) items were retained from a Varimax rotated PCA fixed to eight components, based on component loadings greater than or equal to 0.6 on at least one component. The 28 items that were not retained included characteristics such as, *I am willing to put in extra hours, I am passionate about education, I demonstrate pedagogical content knowledge, I am first and foremost a classroom teacher, I am engaging, I am passionate about agriculture, I am fair, I am an advocate for all students*, and *I am knowledgeable about agriculture*.

Table 6

PCA Communalities and Component Loadings with a Varimax Rotation (n = 2442)

	Component								
Items	1	2	3	4	5	6	7	8	Communality
PD_3	.782								.67
PD_9	.749								.63
PD_4	.744								.62
PD_8	.726								.60
PD_16	.654								.55
PD_12	.623								.48
~~PD_6~~	.556				.342				.47
~~PD_11~~	.523				.382				.49

~~PD_5~~	.480						.44
~~PD_1~~	.353				.327		.37
F_3		.816					.71
F_5		.769					.66
F_2		.765					.64
F_1		.754					.60
F_4		.689					.56
F_7		.683					.55
PP_1		.633				.314	.53
~~F_6~~		.599		.351			.56
~~PP_2~~		.431				.311	.42
D_4			.857				.79
D_5			.851				.77
D_3			.816				.74
D_8			.629				.48
D_9			.600				.46
~~D_6~~			.584		.387		.53
~~D_2~~			.434		.364		.47
I_3				.660			.52
I_4				.606			.50
~~I_15~~				.518			.49
~~I_2~~				.517		.364	.44
~~I_11~~				.493			.42
~~I_12~~				.403			.28
~~I_14~~				.398			.41
PD_7					.628		.50
PD_15					.621		.47
~~PD_10~~	.304				.586		.50

~~D_7~~			.418		.513				.52
~~PD_14~~	.448				.492				.52
~~D_1~~				.392	.405				.46
~~PD_2~~	.343				.363				.43
I_8						.686			.54
I_7				.338		.606			.55
I_9				.322		.605			.51
~~I_5~~				.376		.544			.48
~~I_13~~						.461	.312		.33
~~I_10~~						.456			.35
~~PD_13~~					.328	.451			.45
~~I_6~~				.327		.354			.35
P_1							.623		.47
P_4							.608		.46
~~P_3~~							.583		.54
~~P_5~~		.302					.533		.40
~~P_2~~					.364		.513		.48
~~I_1~~				.369			.379		.31
~~B_4~~							.357		.28
B_2								.841	.74
B_1								.774	.65
B_3								.669	.52

Note. Component loading below .300 are not displayed; Extraction values are based on communalities. I = Instruction, F = FFA/SAE, PP = Program Planning, B = Balance, D = Diversity, P = Professionalism, PD = Personal Dispositions. Items with a strikethrough were not retained.

The 30 retained items were then re-analyzed using an additional PCA (without specifying a specific number of components). Table 7 identifies the eigenvalues, variance explained, and

their comparison to parallel analysis. The resulting analysis had a KMO measure of 0.89. Seven components had initial eigenvalues greater than one. Together, the seven components explain 61.66% of the variance; although, only six components had initial eigenvalues above parallel, resulting in the need to re-run the factor analysis limiting the items to fit within six components.

Table 7

PCA of 30 Retained Items (n = 2442)

Component	Eigenvalue	Cumulative %	Parallel Eigenvalues
1	7.05	13.63	1.21
2	3.39	25.94	1.18
3	2.39	37.26	1.16
4	2.03	44.35	1.14
5	1.37	51.05	1.13
6	1.20	56.91	1.11
7	1.06	61.66	1.10

Note. Parallel eigenvalues determined based on 2442 cases with 58 items.; Cumulative % based on rotated sums of squares loadings.

Table 8 displays the eigenvalues and explained variance when limited to six components.

Table 8

Retained Item PCA Limited to Six Components (n = 2442)

Component	Eigenvalue	Cumulative %
1	7.05	13.75

2	3.39	25.91
3	2.39	37.09
4	2.03	45.20
5	1.37	52.03
6	1.20	58.11

Note. Cumulative % based on Varimax rotated sums of squares loadings.

Communalities and the component loadings of the rotated component matrix were analyzed, based on a Varimax rotation, of the retained 30 items (see Table 9) to determine the final component structure of the items resulting from the six components.

Table 9

Retained PCA Communalities and Component Loadings (30 items, n = 2442)

	Component						
Items	1	2	3	4	5	6	Communality
F_3	.835						.73
F_5	.794						.66
F_1	.781						.62
F_2	.759						.60
F_4	.722						.55
F_7	.676						.53
PP_1	.636						.49
PD_3		.799					.69
PD_9		.787					.66
PD_8		.765					.64
PD_4		.765					.65

PD_16	.674					.56
PD_12	.619					.46
D_4		.889				.83
D_5		.874				.80
D_3		.856				.78
D_8		.621			.340	.51
D_9		.618				.50
I_9			.743			.60
I_7			.695			.56
I_8			.630			.51
~~I_4~~			.567			.45
~~I_3~~			.522			.37
B_2				.852		.74
B_1				.782		.64
B_3				.695		.74
PD_15					.725	.58
PD_7					.684	.55
~~P_1~~					.476	.32
~~P_4~~					.459	.32

Note. Component loading below .300 are not displayed; Extraction values are based on communalities. I = Instruction, F = FFA/SAE, PP = Program Planning, B = Balance, D = Diversity, P = Professionalism, PD = Personal Dispositions. Items with a strikethrough were not retained.

The PCA fixed to six components resulted in 26 (of 30) items loading at or above a 0.6, accounting for 58.1% of the explained variance. The six components are outlined in Table 10 with the corresponding items and the updated item numbers to represent the complete effective teaching instrument for SBAE. The four items that did not fit the six-component model (see Table

9) included: *I am a leader for students*, *I guide students to grow personally*, *I am a purposeful lifelong learner*, and *I am an advocate for public education*.

Table 10

Retained Items and Emerging Components (26 items)

Component Title	Item	Corresponding Item Description
1. Intracurricular Engagement	IE_1	I instruct students through FFA.
	IE_2	I advise the FFA officers.
	IE_3	I advise the FFA chapter.
	IE_4	I facilitate record keeping for degrees and awards.
	IE_5	I am passionate about FFA.
	IE_6	I instruct students through SAEs.
	IE_7	I use the complete agricultural education 3-component model as a guide to programmatic decisions.
2. Personal Dispositions	PD_1	I am trustworthy.
	PD_2	I am responsible.
	PD_3	I am dependable.
	PD_4	I am honest.
	PD_5	I show integrity.
	PD_6	I am a hard worker.
3. Appreciation for diversity and Inclusion	AD_1	I value students regardless of economic status.
	AD_2	I value students of all ethnic/racial groups.
	AD_3	I value students regardless of sex.
	AD_4	I care about all students.

	AD_5	I understand there is not an award for all students, but that does not mean they are not valuable.
4. Pedagogical Preparedness	PP_1	I demonstrate classroom management.
	PP_2	I demonstrate sound educational practices.
	PP_3	I am prepared for every class.
5. Work-Life Balance	B_1	I have the ability to say no.
	B_2	I lead a balanced life.
	B_3	I am never afraid to ask for help.
6. Professionalism	P_1	I have patience.
	P_2	I show empathy.

Note. IE = Intracurricular Engagement, PD = Personal Dispositions, AD = Appreciation for Diversity and Inclusion, PP = Pedagogical Preparedness, B = Work-Life Balance, P = Professionalism. Item numbers presented in this table will be used from this point forward.

Through previous research, the instrument was believed to measure eight constructs or components including instruction, FFA, SAE, program planning, balance, diversity and inclusion, professionalism, and personal dispositions (Eck et al., 2019). However, the PCA resulted in only six components. Although the resulting PCA consisted of only six components, it still represented items from all eight of the initial constructs, as FFA, SAE, and program planning collapsed into one component.

Findings for Research Question Two:

Validation of the Effective Teaching Instrument for SBAE Teachers

The validated instrument resulted in 26 items loading on 6 components. All 26 items loaded at a value greater than .60 (Guadagonli & Velicer, 1988) and have communality extractions at an acceptable level (see Table 9) according to Hair, Black, Babin, and Anderson (2010). Instrumentation began with a 58-item instrument that was validated through a nationwide Delphi study (Eck et al., 2019), of which 17 panelists reached consensus of 58 items at an a priori rate of 85% agreement. Those 58 items were reduced through three systematic rounds of a Delphi study where 121 initial statements originated in Round One (Eck et al., 2019). The resulting 26 items are considered valid based on the PCA results measuring the construct (Privitera, 2017) of effective teaching in SBAE.

In addition to validity of the previously developed items, a reliability estimate based on 26 items resulted in an acceptable Cronbach's alpha of 0.87 (Nunnally, 1978). We evaluated the deletion of any item which may have increased the total Cronbach's alpha score. After analysis of the item-total statistics, it was determined that the removal of any item would actually lower the total Cronbach's alpha level instead of raising it (see Table 11), resulting in the retention of all 26 items.

Table 11

Item Means and Adjusted Cronbach Alpha Levels for the Complete Instrument ($\alpha = 0.87$, $n = 2454$)

Item	*Mean*	*SD*	Cronbach's alpha if item deleted

IE_1	3.56	.65	.83
IE_2	3.65	.63	.83
IE_3	3.72	.58	.83
IE_4	3.13	.88	.83
IE_5	3.72	.57	.83
IE_6	3.27	.85	.83
IE_7	3.26	.78	.83
PD_1	3.93	.27	.83
PD_2	3.89	.32	.83
PD_3	3.88	.34	.83
PD_4	3.93	.27	.83
PD_5	3.89	.33	.83
PD_6	3.90	.30	.83
AD_1	3.93	.27	.84
AD_2	3.92	.28	.83
AD_3	3.92	.27	.84
AD_4	3.89	.34	.83
AD_5	3.89	.33	.83
PP_1	3.40	.65	.83
PP_2	3.49	.57	.83
PP_3	3.03	.67	.83
B_1	2.58	.90	.84
B_2	2.74	.85	.84
B_3	2.89	.86	.84
P_1	3.34	.70	.83
P_2	3.61	.61	.83

Note. Items were on a 4-point scale of agreement, where 1 = Very weak, 2 = Weak, 3 = Strong, 4 = Very strong. IE = Intracurricular Engagement, PD = Personal Dispositions, AD = Appreciation

for Diversity and Inclusion, PP = Pedagogical Preparedness, B = Work-Life Balance, P = Professionalism.

Findings for Research Question Three:

Determine the Internal Consistency Reliability of the Components of the Instrument

Although the 26-item instrument was deemed valid through a PCA loading on 6 components, with a Cronbach's alpha of 0.87, reliability estimations were analyzed for the corresponding items in each of the 6 components. The first construct included FFA and SAE, two of the three parts of the complete three-component model of agricultural education (National FFA Organization, 2015). The Intracurricular Engagement construct resulted in a Cronbach's alpha of 0.88 based on seven items. Table 12 displays the mean and standard deviation of each item, along with the adjusted Cronbach's alpha, if an item was deleted.

Table 12

Item Means and Adjusted Cronbach Alpha Levels for Intracurricular Engagement ($\alpha = 0.88$, $n = 2634$)

Item	*Mean*[a]	*SD*	Cronbach's alpha if item deleted
IE_1	3.56	.66	.83
IE_2	3.64	.63	.85
IE_3	3.72	.58	.85
IE_4	3.13	.89	.85
IE_5	3.71	.58	.86
IE_6	3.28	.84	.86
IE_7	3.25	.79	.86

Note. IE = Intracurricular Engagement. [a]Mean response ranges from 3.13 to 3.72, where 1 = Very weak, 2 = Weak, 3 = Strong, 4 = Very strong.

As indicated in Table 12, the removal of any of the seven items would result in a lower Cronbach alpha for the component; therefore, all items were retained for the first component. A correlation matrix for inter-item correlations for Intracurricular Engagement component are displayed in Table 13. The seven items have moderate to substantial positive correlations (Davis, 1971), demonstrating interrelated items measuring Intracurricular Engagement (Field, 2013).

Table 13

Correlation Matrix for Intracurricular Engagement (n = 2634)

Items	IE_1	IE_2	IE_3	IE_4	IE_5	IE_6	IE_7
IE_1	-						
IE_2	.63	-					
IE_3	.60	.52	-				
IE_4	.62	.67	.51	-			
IE_5	.59	.59	.40	.52	-		
IE_6	.53	.41	.60	.37	.34	-	
IE_7	.50	.39	.51	.37	.36	.57	-

Note. IE = Intracurricular Engagement. Magnitude: $.01 \geq r \geq .09$ = Negligible, $.10 \geq r \geq .29$ = Low, $.30 \geq r \geq .49$ = Moderate, $.50 \geq r \geq .69$ = Substantial, $r \geq .70$ = Very Strong (Davis, 1971).

The second component centered on personal dispositions of SBAE teachers. The Personal Dispositions component had a Cronbach's alpha level of 0.86 based on six items. The mean and

standard deviation of each item, along with the adjusted Cronbach alpha if an item was deleted, is displayed in Table 14.

Table 14

Item Means and Adjusted Cronbach Alpha Levels for Personal Dispositions ($\alpha = 0.86$, $n = 2688$)

Items	*Mean*[a]	*SD*	Cronbach's alpha if item deleted
PD_1	3.93	.26	.83
PD_2	3.90	.32	.83
PD_3	3.88	.34	.84
PD_4	3.93	.27	.83
PD_5	3.90	.32	.84
PD_6	3.91	.30	.85

Note. PD = Personal Dispositions. [a]Mean response ranges from 3.88 to 3.93, where 1 = Very weak, 2 = Weak, 3 = Strong, 4 = Very strong.

The Personal Dispositions component was composed of six items with strong reliability coefficients, as represented in Table 14; therefore, all six items were retained. Table 15 displays the inter-item correlations for personal dispositions as a component. According to Davis (1971), the six items measuring Personal Dispositions are interrelated with moderate to very strong positive correlations (see Table 15).

Table 15

Correlation Matrix for Personal Dispositions (n = 2688)

Items	PD_1	PD_2	PD_3	PD_4	PD_5	PD_6
PD_1	-					
PD_2	.73	-				
PD_3	.52	.48	-			
PD_4	.57	.52	.67	-		
PD_5	.43	.39	.46	.46	-	
PD_6	.52	.55	.47	.49	.45	-

Note. PD = Personal Dispositions. Magnitude: $.01 \geq r \geq .09$ = Negligible, $.10 \geq r \geq .29$ = Low, $.30 \geq r \geq .49$ = Moderate, $.50 \geq r \geq .69$ = Substantial, $r \geq .70$ = Very Strong (Davis, 1971).

The third component was labeled Appreciation for Diversity and Inclusion and was composed of five items with a Cronbach's alpha level of 0.87. The mean and standard deviation of each item, along with the adjusted Cronbach alpha if an item was deleted, is displayed in Table 16.

Table 16

Item Means and Adjusted Cronbach Alpha Levels for Appreciation for Diversity and Inclusion (*α = 0.87, n = 2727)*

Items	*Mean*[a]	*SD*	Cronbach's alpha if item deleted
AD_1	3.92	.27	.82
AD_2	3.93	.27	.81
AD_3	3.92	.28	.81
AD_4	3.90	.34	.86

AD_5	3.89	.33	.86

Note. AD = Appreciation for Diversity and inclusion. [a]Mean response ranges from 3.89 to 3.93, where 1 = Very weak, 2 = Weak, 3 = Strong, 4 = Very strong.

Five items were retained with strong reliability coefficients representing the component Appreciation for Diversity and Inclusion (see Table 16). The inter-item correlations for diversity are displayed in Table 17. Moderate to very strong positive correlations (Davis, 1971) are displayed in Table 17, showing the intercorrelation of the items within the Appreciation for Diversity and Inclusion component (Field, 2013).

Table 17

Correlation Matrix for Appreciation for Diversity and Inclusion (n = 2727)

Items	AD_1	AD_2	AD_3	AD_4	AD_5
AD_1	-				
AD_2	.77	-			
AD_3	.75	.81	-		
AD_4	.48	.50	.48	-	
AD_5	.45	.50	.47	.52	-

Note. AD = Appreciation for Diversity and inclusion. Magnitude: $.01 \geq r \geq .09$ = Negligible, $.10 \geq r \geq .29$ = Low, $.30 \geq r \geq .49$ = Moderate, $.50 \geq r \geq .69$ = Substantial, $r \geq .70$ = Very Strong (Davis, 1971).

The component, Pedagogical Preparedness, resulted in a Cronbach's alpha of 0.71 and was composed of three items. The mean and standard deviation of each item, along with the adjusted Cronbach alpha for deletion of an item, is displayed in Table 18.

Table 18

Item Means and Adjusted Cronbach Alpha Levels for Pedagogical Preparedness ($\alpha = 0.71$, $n = 2766$)

Items	*Mean*[a]	*SD*	Cronbach's alpha if item deleted
PP_1	3.50	.57	.63
PP_2	3.04	.67	.62
PP_3	3.40	.66	.61

Note. PP = Pedagogical Preparedness. [a]Mean response ranges from 3.04 to 3.50, where 1 = Very weak, 2 = Weak, 3 = Strong, 4 = Very strong.

All three items were retained for this component, as the deletion of any item would result in a reduced Cronbach alpha. According to Davis (1971), the inter-item correlations for the three items measuring Pedagogical Preparedness were moderately positively correlated (see Table 19).

Table 19

Correlation Matrix for Pedagogical Preparedness (n = 2766)

Items	PP_1	PP_2	PP_3
PP_1	-		
PP_2	.44	-	
PP_3	.45	.46	-

Note. PP = Pedagogical Preparedness. Magnitude: $.01 \geq r \geq .09$ = Negligible, $.10 \geq r \geq .29$ = Low, $.30 \geq r \geq .49$ = Moderate, $.50 \geq r \geq .69$ = Substantial, $r \geq .70$ = Very Strong (Davis, 1971).

The component, *Work-Life Balance*, was composed of three items, for which the Cronbach alpha was 0.73. Table 20 provides the mean, standard deviation, and adjusted Cronbach alpha for deleted items for this component.

Table 20

Item Means and Adjusted Cronbach Alpha Levels for Work-Life Balance (*α = 0.73, n = 2775)*

Items	*Mean*[a]	*SD*	Cronbach's alpha if item deleted
B_1	2.75	.85	.63
B_2	2.59	.90	.54
B_3	2.91	.86	.74

Note. B = Work-Life Balance. [a]Mean response ranges from 2.59 to 2.91, where 1 = Very weak, 2 = Weak, 3 = Strong, 4 = Very strong.

Although, removal of one of the items (B_3) increased the Cronbach alpha for this component, I retained the item on the basis of Yang and Green's (2011) assertion that "items that are eliminated based on their effect on coefficient alpha [alone] can [still] contribute substantially to the overall psychometric quality of a scale" (p. 389). In addition, the correlation matrix (see Table 21) identifies moderate to substantial positive correlations (Davis, 1971) between the three items, identifying the items as measuring an interrelated component (Field, 2013).

Table 21

Correlation Matrix for Work-Life Balance (n = 2775)

Items	B_1	B_2	B_3
B_1	-		
B_2	.59	-	
B_3	.37	.46	-

Note. B = Work-Life Balance. Magnitude: $.01 \geq r \geq .09$ = Negligible, $.10 \geq r \geq .29$ = Low, $.30 \geq r \geq .49$ = Moderate, $.50 \geq r \geq .69$ = Substantial, $r \geq .70$ = Very Strong (Davis, 1971).

Each of the previous five components have Cronbach's alpha levels greater than 0.70, which is considered to be acceptable (Nunnally, 1978). The alpha for the sixth component was below the *acceptable* threshold with a Cronbach's alpha of 0.58 based on two items. Research suggests a coefficient alpha is a meaningless measure when dealing with two-item scales, and recommend reporting the Spearman-Brown reliability indicator (Eisinga, Grotenhuis, & Pelzer, 2013). The Spearman-Brown formula resulted in a reliability estimate of 0.58. A two-item component is problematic (Yang & Green, 2011). However, because this component was associated with *Professionalism* and was part of the total 26-item reliable instrument, with a Cronbach's alpha of 0.87, the items were retained. Table 22 provides the means and standard deviation for the Professionalism component.

Table 22

Item Means and Standard Deviation for Professionalism (n = 2706)

Items	*Mean*[a]	*SD*
P_1	3.62	.61
P_2	3.35	.69

Note. P = Professionalism. [a]Mean response ranges from 3.35 to 3.62, where 1 = Very weak, 2 = Weak, 3 = Strong, 4 = Very strong.

In addition to the two items being a part of the greater reliable instrument, the inter-item correlation matrix provided rationale to retaining the items as they displayed a moderate positive correlation for the component (Davis, 1971) (see Table 23).

Table 23

Correlation Matrix for Professionalism (n = 2706)

Items	P_1	P_2
P_1	-	
P_2	.41	-

Note. P = Professionalism. Magnitude: $.01 \geq r \geq .09$ = Negligible, $.10 \geq r \geq .29$ = Low, $.30 \geq r \geq .49$ = Moderate, $.50 \geq r \geq .69$ = Substantial, $r \geq .70$ = Very Strong (Davis, 1971).

Findings for Research Question Four:

Describe the Personal and Professional Characteristics of the Participants

This nationwide study resulted in responses from 2807 SBAE teachers ranging in age from 21 to 72 years old, with 51.2% female and 44.1% being male (see Table 24). These SBAE teachers represented 45 states and ranged in program size from eight students in a single teacher program to 1502 students in a 13-teacher program. Table 24 outlines the personal and professional characteristics of SBAE teachers nationwide.

Table 24

Personal and Professional Characteristics of Participants (n = 2807)

Characteristic		*n*	%
Sex	Male	1239	44.1
	Female	1436	51.2
	Other	6	0.2
	Prefer to not respond	8	0.3
	Did not respond	118	4.2
Age	21 to 29	829	29.5
	30 to 39	743	26.5
	40 to 49	516	18.4
	50 to 59	434	15.4
	60 to 69	142	5.1
	70 +	4	0.1
	Did not respond	139	5.0
Certification Pathway	AgEd BS	1750	62.4
	AgEd MS	366	13.0
	Alternatively Certified	548	19.5
	Emergency Certified	24	0.9
	Not Certified	17	0.6
	Did not respond	102	3.6
Highest Degree Earned	Bachelor's Degree	1417	50.5
	Master's Degree	1244	44.3

	Doctoral Degree	35	1.2
	Did not respond	111	4.0
State	Alabama	46	1.6
	Arizona	50	1.8
	Arkansas	52	1.9
	California	206	7.3
	Colorado	59	2.1
	Connecticut	21	0.7
	Delaware	18	0.6
	Florida	77	2.7
	Georgia	38	1.4
	Idaho	28	1.0
	Illinois	123	4.4
	Indiana	71	2.5
	Iowa	61	2.2
	Kansas	99	3.5
	Kentucky	52	1.9
	Louisiana	49	1.7
	Maine	6	0.2
	Maryland	17	0.6
	Massachusetts	19	0.7
	Minnesota	85	3.0
	Mississippi	27	1.0
	Missouri	133	4.7
	Montana	26	0.9
	Nebraska	47	1.7
	Nevada	23	0.8

	New Hampshire	7	0.2
	New Jersey	10	0.4
	New Mexico	33	1.2
	New York	57	2.0
	North Carolina	131	4.7
	North Dakota	20	0.7
	Ohio	111	4.0
	Oklahoma	181	6.4
	Oregon	47	1.7
	Pennsylvania	1	0.1
	Rhode Island	2	0.1
	South Carolina	35	1.2
	South Dakota	27	1.0
	Tennessee	20	0.7
	Texas	417	14.9
	Utah	34	1.2
	Washington	20	0.7
	West Virginia	22	0.8
	Wisconsin	56	2.0
	Wyoming	17	0.6
	Did not respond	126	4.5
Program Size (# of Students)	1 to 20	60	2.1
	21 to 40	208	7.4
	41 to 60	293	10.4
	61 to 80	291	10.3
	81 to 100	274	9.8
	101 to 150	530	18.9

	151 to 200	251	8.9
	201 to 250	193	6.9
	251 to 300	141	5.0
	301 to 400	142	5.1
	401 to 500	97	3.5
	501 to 600	42	1.5
	601 to 700	23	0.8
	701 to 800	13	0.5
	801 to 900	6	0.2
	Greater than 900	22	0.8
	No Response	221	7.9
SBAE Teacher(s) / Program	1	1269	45.2
	2	726	25.8
	3	302	10.8
	4	168	6.0
	5	67	2.4
	6	29	1.0
	7	29	1.0
	8	10	0.4
	9	5	0.2
	10 or more	10	0.4
	No Response	192	6.8
Years Teaching SBAE	1	236	8.4
	2	235	8.4
	3	171	6.1
	4	181	6.4

	5	151	5.4
	6 to 10	547	19.5
	11 to 15	326	11.6
	16 to 20	291	10.4
	21 to 25	179	6.4
	26 to 30	155	5.5
	31 to 35	105	3.7
	More than 36	75	2.7
	No Response	155	5.5
Years in Current Position	1	431	15.4
	2	373	13.3
	3	262	9.3
	4	232	8.3
	5	179	6.4
	6 to 10	468	16.7
	11 to 15	260	9.2
	16 to 20	192	6.8
	21 to 25	107	3.8
	26 to 30	85	3.0
	31 to 35	44	1.6
	More than 36	34	1.2
	No Response	140	5.0
Intent to Retire in SBAE	Yes	1690	60.2
	No	215	7.7
	Undecided	808	28.8
	No Response	94	3.3

Personal competency rankings of SBAE teachers

Participants were asked to rank their personal competence as a SBAE teacher on the three components of a complete agricultural education program (i.e., classroom/laboratory, FFA, and SAE) using a scale of 0 to 100, where a higher value corresponds to a higher level of competence. Table 25 shows the overall mean personal competency ranking for each of the three components, with classroom/laboratory resulting in the highest mean score of the three components.

Table 25

Descriptive Statistics for Personal Competency Rankings

Component	*n*	*Mean*	*SD*	Min	Max
Classroom/Laboratory	2686	85.54	11.05	0.00	100.00
FFA	2671	82.95	16.40	0.00	100.00
SAE	2669	75.01	20.77	0.00	100.00

Findings for Research Question Five:

Compare the Effectiveness of SBAE Teachers Based on Personal and Professional Characteristics

Within the instrument, respondents were asked to identify their personal and professional characteristics, i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, highest degree earned, certification path, number of

students, number of SBAE teachers, age, sex, state of employment, and personal competency rankings. These characteristics were then used to compare against the composite sum effectiveness score, based on the 26-item validated instrument. The maximum possible effectiveness score was 104 points, as the instrument allowed respondents to select a value on a 4-point, Likert-type scale of personal strengths and weaknesses ranging from 1 (*Very Weak*) to 4 (*Very Strong*).

Normality was assessed, with all responses being normally distributed. Levene's test statistic for homogeneity of variance was not statistically significant ($p > .05$) indicating that the assumption of homogeneity of variance was met; therefore, a factorial ANOVA was run using SPSS, with the composite sum effectiveness score as the dependent variable and the 13 personal and professional characteristics as independent variables. No statistically significant interactions were present within the factorial Analysis of Variance (ANOVA). However, five statistically significant main effects did emerge: (1) SBAE teachers intent to retire F (4, 2253) = 17.13, $p <$ .01; (2) State of SBAE employment F (42, 2253) = 1.68, $p < .01$; (3) Classroom/Laboratory personal competency F (4, 2253) = 9.56, $p < .01$; (4) FFA personal competency F (4, 2253) = 45.27, $p < .01$; and (5) SAE personal competency F (4, 2253) = 23.43, $p < .01$. The additional eight personal and professional characteristics yielded non statistically significant main effects; (1) Sex F (3, 2253) = 2.66, $p = .05$; (2) Age F (5, 2253) = 0.82, $p = .54$; (3) Years teaching SBAE F (11, 2253) = 0.56, $p = .86$; (4) Years in current position F (11, 2253) = 0.93, $p = .51$; (5) Highest degree earned F (2, 2253) = 0.65, $p = .53$; (6) Certification pathway F (4, 2253) = 1.01, $p = .40$; (7) Number of students F (15, 2253) = 1.35, $p = .17$; (8) Number of SBAE teachers F (9, 2253) = 1.13, $p = .34$. To further understand the statistically significant main effects, post-hoc analyses were conducted. A Bonferroni post-hoc analysis was utilized as it is known to be effective in controlling Type I error (Field, 2009). The post-hoc analysis with a 95% confidence

interval resulted in a statistically significant difference based on the SBAE teachers' intent to retire (see Table 26).

Table 26

Multiple Comparisons Mean Differences of Teacher Effectiveness Based on Intent to Retire (n = 2370)

Intent to Retire	Yes	No	Undecided
Yes	-		
No	-2.49**	-	
Undecided	-2.41**	0.08	-

Note. * = $p < .05$; ** = $p < .01$. Values identify the mean difference between groups.

SBAE teachers who intended to remain in the profession through retirement were statistically significantly more effective than those who did not intend to retire or were still undecided, based on their composite sum effectiveness score.

When considering the effects the state in which the SBAE teacher is employed, there was a statically significant main effect F (42, 2253) = 1.68, $p < .01$, resulting in a post-hoc analysis with a 95% confidence interval. Three states resulted in statistically significant differences with other states. As shown in Table 27, Massachusetts teachers were statistically significantly ($p < .05$) less effective based on the composite sum effectiveness scores than SBAE teachers in 18 other states (Alabama, Arizona, Arkansas, California, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Missouri, Nebraska, North Carolina, Ohio, Oklahoma, South Carolina, Texas, and West Virginia. In addition, the composite sum effectiveness scores from Oklahoma and Texas teachers were statically significantly higher than eight other states, including Iowa, Kansas,

Massachusetts, Minnesota, New York, North Dakota, South Dakota, and Wisconsin (see Table 28).

Table 27

Multiple Comparisons Mean Differences of Teacher Effectiveness Based on SBAE Teachers from Massachusetts (n = 2370)

Comparison State	Massachusetts
Alabama	8.02**
Arizona	8.24**
Arkansas	9.42**
California	7.95**
Delaware	9.92*
Florida	7.37*
Georgia	9.00**
Illinois	8.07**
Indiana	7.02*
Kentucky	8.18**
Missouri	7.91**
Nebraska	7.93**
North Carolina	7.65**
Ohio	8.09**
Oklahoma	9.76**
South Carolina	9.97**
Texas	9.49**
West Virginia	8.42*

Note. . * = $p < .05$; ** = $p < .01$. Table only shows comparison of states statistically significantly more effective than Massachusetts based on composite sum effectiveness scores.

Table 28

Multiple Comparisons Mean Differences of Teacher Effectiveness Based on SBAE Teachers from Oklahoma and Texas (n = 2370)

Comparison State	Oklahoma	Texas
Iowa	-4.26**	-3.99**
Kansas	-3.35*	-3.07*
Massachusetts	-9.76**	-9.49**
Minnesota	-4.46**	-4.18**
New York	-3.94*	-3.66*
North Dakota	-6.55**	-6.28*
South Dakota	5.85*	5.58*
Wisconsin	4.09*	3.81*

Note. . * = $p < .05$; ** = $p < .01$. Table only shows comparison of states statistically significantly less effective than Oklahoma and Texas based on composite sum effectiveness scores.

The final three statistically significant main effects were based on the SBAE teachers' personal competency ranking on each of the three-components of a complete SBAE program (National FFA Organization, 2015), all of which were analyzed with a post-hoc analysis at a 95% confidence interval. Classroom/Laboratory instruction F (4, 2253) = 9.56, $p < .01$ resulted in a statically significant difference between the group of SBAE teachers ranking themselves from 90 to 100 on the sliding scale and the remaining four other groups, i.e., 80 to 89, 70 to 79, 60 to 69, and 0 to 59 (see Table 29).

Table 29

Multiple Comparisons Mean Differences of Teacher Effectiveness Based on Personal Competency Rankings for Classroom/Laboratory (n = 2370)

Competency Scores	0 to 59	60 to 69	70 to 79	80 to 89	90 to 100
0 to 59	-				
60 to 69	-3.12*	-			
70 to 79	0.09	3.21**	-		
80 to 89	1.22	4.34**	1.12	-	
90 to 100	4.37**	7.49**	4.28**	3.15**	-

Note. * = $p < .05$; ** = $p < .01$. Values identify the mean difference between groups.

FFA personal competency rankings F (4, 2253) = 45.27, $p < .01$ were found to have statistical significance between all groups, except between the 0 to 59 group and the 60 to 69 group (see Table 30).

Table 30

Multiple Comparisons Mean Differences of Teacher Effectiveness Based on Personal Competency Rankings for FFA (n = 2370)

Competency Scores	0 to 59	60 to 69	70 to 79	80 to 89	90 to 100
0 to 59	-				
60 to 69	1.98	-			
70 to 79	4.75**	2.77**	-		
80 to 89	6.84**	4.86**	2.09**	-	
90 to 100	10.50**	8.52**	5.75**	3.66**	-

Note. ** = $p < .01$. Values identify the mean difference between groups.

SAE personal competency F (4, 2253) = 23.43, $p < .01$ rankings were found to be statistically significant between all but one group. The mean difference between SBAE teachers in the 60 to 69 and the 70 to 79 groups were not statically significant (see Table 31).

Table 31

Multiple Comparisons Mean Differences of Teacher Effectiveness Based on Personal Competency Rankings for SAE (n = 2370)

Competency Scores	0 to 59	60 to 69	70 to 79	80 to 89	90 to 100
0 to 59	-				
60 to 69	3.10**	-			
70 to 79	3.98**	0.87	-		
80 to 89	6.50**	3.40**	2.52**	-	
90 to 100	8.98**	5.87**	5.00**	2.48**	-

Note. ** = $p < .01$. Values identify the mean difference between groups.

Summary

Chapter four provided a detailed account of the findings answering the five research questions. The results from the findings are summarized below:

- In response to research question one, six components emerged with 26 items measuring the primary components of an effective SBAE teacher.

- In response to research question two, 26 items were retained after the reliability estimate resulted in an acceptable Cronbach's alpha (α = 0.87) for the complete instrument.

- In response to research question three, each of the six components resulted in moderate to very strong inter-relations within the component and deleting any item within the component would result in a lower Cronbach's alpha; therefore, the six components were deemed reliable.

- In response to research question four, 2807 SBAE (51.2% female; 44.1% male) teachers ranging from 21 to 72 years old represented 45 states ranging in program size from eight students in a single teacher program to 1502 students in a multi-teacher program. Responses were received from traditionally certified teachers through both a bachelor's and master's agricultural education degree program with student teaching, along with alternatively, emergency, and not certified teachers. Additionally, SBAE teachers were most competent in their classroom/laboratory instruction, followed by FFA and SAE based on their personal competency rankings.

- In response to research question five, although there were no statistically significant interactions present through the factorial ANOVA, there were statistically significant main effects for SBAE teachers' intent to retire, current state of employment, classroom/Laboratory personal competency, FFA personal competency, and SAE personal competency based on composite sum effectiveness scores. Post-hoc analyses resulted in statically significant differences between groups for all statistically significant main effects.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS, AND DISCUSSION

Chapter V provides an overview of the methods used, a summary of the findings related to validating the instrument and determining its reliability and validity, while also describing the personal and professional characteristics of the participants, and the impact of personal and professional characteristics on SBAE teacher effectiveness. The summary is followed by the conclusions, implications, recommendations, and discussion sections.

Research Objectives

Five research objectives guided the study.

1. Determine the primary components of an effective SBAE teacher.
2. Validate the effective teaching instrument for SBAE teachers.
3. Determine the internal consistency reliability of the components of the effective teaching instrument for SBAE teachers.
4. Describe the personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings) of the participants.

5. Compare the effectiveness of SBAE teachers based on personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, personal competency rankings).

Methods

This non-experimental study employed a descriptive survey research design. The population of interest included all SBAE teachers across the country (N = 12690) (Smith, et al., 2018). A distribution frame was designed for 48 States including 9121 individual email address, along with State Agricultural Education listservs for 15 States. Four U.S. States/Territories refused to participate. Three thousand, three hundred and thirty-nine instruments were returned, resulting in a 28.2% response rate. After excluding incomplete instruments, the sample size was reduced to a valid response rate of 2807 (23.7%). For the principal component analysis (PCA), the usable response rate for this analysis was 2454, as respondents had to be removed that were not current SBAE teachers or did not respond to all 58 items being analyzed. The participants (44% Male; 51% Female; .5% Other; .5% Preferred to not respond; 4% No response) were solicited via electronic mail through the study's frame developed to represent SBAE teachers nationwide. Respondents ranged in age from 21 to 72 years and represented 45 *different* states.

The instrument for the study was developed based on the original findings of Eck et al. (2019). The 58 items reaching consensus through a nationwide Delphi Study (Eck et al., 2019) were used to create the SBAE effective teacher instrument. Each item was rated on a 4-point, Likert-type scale of personal strengths and weaknesses ranging from 1 (*Very Weak*) to 4 (*Very Strong*). In total, 70 items made up the distributed instrument, including the 58 characteristics of an effective SBAE teacher (Eck et al., 2019) and 12 questions related to personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position,

intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, and personal competency rankings). Data were analyzed using SPSS Version 23, including descriptive and inferential statistics, reliability estimations, and exploratory factor analysis using principal component analysis. In a study of this magnitude, non-response error is one of the greatest concerns with only a 28.2% response rate. To address this issue, 30 randomly selected non-respondents were sent an additional email requesting participation one week after the close of the data collection period. This effort to collect data from non-respondents resulted in an additional response from 20 of the 30 who were contacted. The data collected from the non-respondents were then compared to those of the respondents to compare the two groups for potential differences (Miller & Smith, 1983). No statistically significant differences existed between the two groups (i.e., non-respondents and respondents) based on age and sex (see Table 3). Therefore, the data collected in the study are deemed representative of SBAE teachers nationwide.

Summary of Findings

This section provides an overview of the study's key findings. The findings are summarized by each research question, followed by conclusions, implications, recommendations for practice, recommendations for future research, and a discussion section.

Research Question One

Research question one sought to determine the primary components of a SBAE teacher. A PCA was implemented on the 58-item instrument (Eck et al., 2019), of which, six components emerged with 26 items measuring the primary components of an effective SBAE teacher based on PCA communalities, component loadings, and a comparison to parallel analysis. The six emerging components were: intracurricular engagement, personal dispositions, appreciation for diversity and inclusion, pedagogical preparedness, work-life balance, and professionalism.

Research Question Two

Research question two sought to validate the effective teaching instrument for SBAE teachers. To accomplish this goal, instrumentation began with 58 validated items through a nationwide Delphi Study (Eck et al., 2019). The reduction of items through a PCA resulted in 26 items loading at a value greater than .60 (Guadagonli & Velicer, 1988) with communality extractions at an acceptable level (see Table 9) according to Hair et al. (2010). Additionally, a reliability estimation was utilized to determine a Cronbach alpha level for the complete 26-item instrument. The reliability estimate resulted in a 0.87 Cronbach's alpha and was deemed acceptable (Nunnally, 1978). Therefore, all 26 items comprising the six components were retained for the effective teaching instrument for SBAE teachers (see Table 10).

Research Question Three

Research question three sought to determine the internal consistency reliability of the six components of the effective teaching instrument for SBAE teachers. Each of the six components were analyzed individually for reliability. All six components resulted in moderate to very strong inter-relations (Davis, 1971) within the component. Deleting any item within the given component would result in a lower Cronbach's alpha score; therefore, the six components consisting of 26 items were deemed reliable and were ultimately retained for the final effective teaching instrument for SBAE teachers. The Cronbach's alpha levels for each component were as follows: FFA/SAE (α = .88), personal dispositions (α = .86), diversity and inclusion (α = .87), classroom instruction (α = .71), work-life balance (α = .73), and professionalism (α = .58). Although the professionalism component resulted in a Cronbach's alpha lower than .70 it was part of the total 26-item reliable instrument, with a Cronbach's alpha of .87; therefore, the items were retained even though a two-item component can be problematic (Yang & Green, 2011).

Research Question Four

Research question four sought to describe the personal and professional characteristics (i.e., number of years teaching SBAE, number of years in current position, intent to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, state of employment, and personal competency rankings) of SBAE teachers. The study resulted in responses from 2807 SBAE (44.1% male; 51.2% female) teachers ranging from 21 to 72 years of age. These teachers represented 45 states and taught in programs ranging from a single teacher program of eight students to a multi-teacher program of 1502 (see Table 23). Responses were received from traditionally certified teachers through both a bachelor's (n = 1750) and master's degree (n = 366) in an agricultural education program that included a student teaching internship, along with alternatively (n = 548), emergency (n = 24), and not certified (n = 17) teachers (see Table 23). Additionally, SBAE teachers self-perceived themselves to be most competent in classroom/laboratory instruction, followed by FFA, and then SAE.

Research Question Five

Research question five sought to compare the effectiveness of SBAE teachers based on personal and professional characteristics. Although there were no statistically significant interactions present through the factorial ANOVA, there were statistically significant main effects present for SBAE teachers' intent to retire F (4, 2253) = 17.13, $p < .01$, current state of employment F (42, 2253) = 1.68, $p < .01$, classroom/Laboratory personal competency F (4, 2253) = 9.56, $p < .01$, FFA personal competency F (4, 2253) = 45.27, $p < .01$, and SAE personal competency F (4, 2253) = 23.43, $p < .01$, based on composite sum effectiveness scores. The additional eight personal and professional characteristics (i.e., number of years teaching, number of years in current position, certification pathway, highest degree earned, age, sex, number of SBAE teachers, and number of SBAE students) resulted in no statistically significant differences. Post-

hoc analysis resulted in statically significant differences between at least two groups for all statistically significant main effects. SBAE teachers who intended to remain in the profession through retirement were statistically significantly more effective than those who did not intend to retire or were still undecided, based on their composite sum effectiveness score. Massachusetts, Oklahoma, and Texas resulted in statistically significant differences when compared to other states. The final three statistically significant main effects were based on the SBAE teachers' personal competency, of which participants whose self-perceived personal competency was between 90 and 100 were statically significantly more effective than teachers in other competency ranges for a complete SBAE program.

Conclusions

The findings of this study resulted in six conclusions. These conclusions are outlined and then discussed further below.

1. The effective teaching instrument is an appropriate tool for measuring SBAE teacher effectiveness.

2. Personal dispositions comprise the largest single component related to SBAE teacher effectiveness.

3. SBAE teachers nationwide represent a wide range of personal and professional characteristics, i.e., number of years teaching SBAE, number of years in current position, intention to retire as a teacher of SBAE, certification path, highest degree earned, size of program, sex, age, and state of employment.

4. SBAE teachers deem themselves to be most competent in classroom/laboratory instruction and least competent in SAE supervision.

5. SBAE teachers' intent to retire from the profession plays a substantial role in their teaching effectiveness.

6. Elevated personal competency of SBAE teachers results in higher teaching effectiveness scores.

Conclusion 1: The Effective Teaching Instrument is an Appropriate Tool for Measuring SBAE Teacher Effectiveness

This study validated the instrument for effective teaching in SBAE (Eck et al., 2019). The nationwide Delphi study (Eck et al., 2019) identified eight categories of effective SBAE teachers, including: instruction, FFA, SAE, program planning, balance, diversity and inclusion, professionalism, and personal dispositions. Through conducting a PCA, the findings of this study generated six components including: Intracurricular Engagement, Personal Dispositions, Appreciation for Diversity and Inclusion, Pedagogical Preparedness, Work-Life Balance, and Professionalism. Although only six components emerged, they encompassed all eight categories identified by Eck et al. (2019). The emerging intracurricular engagement category included items related to FFA, SAE, and program planning, condensing three categories into one component. This combination of items aligns with standard four from the American Association for Agricultural Education (2017) of program planning, which encompasses FFA and SAE responsibilities, with the addition of publicizing the SBAE program to key stakeholders (i.e., parents, students, and community members). The remaining five categories identified by Eck et al. (2019) each emerged as an independent component in the PCA of this study. Similarly, the emerging six components aligned with six of the eight factors identified by Roberts and Dyer (2004), with marketing and community relations being the two categories not identified in this study.

The six components spanned 26 items, which were validated as a complete instrument, resulting in an acceptable Cronbach's alpha of 0.87 (Nunnally, 1978). Additionally, the reliability of the instrument was established by analyzing each of the six individual constructs identified from the PCA (i.e., intracurricular engagement, personal dispositions, appreciation for diversity and inclusion, pedagogical preparedness, work-life balance, and professionalism). Each of the constructs resulted in moderate to very strong correlations between items (Davis, 1971), and exhibited acceptable Cronbach's alpha levels according to Nunnally (1978) (see Tables 12, 14, 16, 18, 20, 22). It was determined that the removal of any items from the constructs would result in lower Cronbach's alpha levels; so, all 26 items were retained for the complete, validated effective teaching instrument for SBAE. Therefore, it is concluded that the effective teaching instrument for SBAE (ETI-SBAE) teachers is an appropriate instrument for measuring SBAE teacher effectiveness.

Conclusion 2: Personal dispositions comprise the largest single component related to SBAE teacher effectiveness.

The personal dispositions component corresponded to six items which included: being trustworthy, responsible, dependable, honest, maintaining integrity, and being a hard worker. The need for personal dispositions for high-quality and effective SBAE teachers has been identified in multiple studies (Eck et al., 2019; Goe & Stickler, 2008; Mitchell et al., 2001; Roberts & Dyer, 2004; Steele, 2010; Stronge et al., 2011; Williams et al., 2018) in addition to being recognized by the American Association for Agricultural Education (2017) as one of the six standards for SBAE teacher preparation. Teacher preparation programs accredited by the Council for the Accreditation of Educator Preparation (CAEP) (2015) are charged with developing and assessing professional dispositions per Standard 1 of their teacher candidates. Therefore, personal dispositions is an area of importance for effective teachers due to the frequency and consistency of items related to that construct. Therefore, investing in and evaluating an individual's human

capital assets and needs (Becker, 1964; Little, 2003; Schultz, 1971; Smith, 2010; Smylie, 1996) are vital to the development of SBAE teachers regarding their teaching effectiveness and employability (Becker, 1964; Robinson & Baker, 2013).

Conclusion 3: SBAE teachers across the country are diverse and have a variety of needs.

With 2807 SBAE teachers responding to this nationwide census study, a wide range of personal and professional characteristics were identified. Diversity is evident regarding the respondents' age, sex, certification status, and program size. Respondents ranged in age from 21 to 72 years old, with over one-half (51.2%) being female. The slightly higher percentage of females aligns with Smith et al.'s (2018) finding that "the majority of new agricultural education majors [are] Caucasian female" (p. 1). The highest percentage (29.5%) of respondents were between 21 to 29 years of age range. Additionally, 34.7% (n = 974) of the respondents were within their first five years of teaching SBAE. The conversion rate of graduates from SBAE teacher preparation programs entering the SBAE profession was at an all-time high for 2017 at 75% (Smith et al., 2018). In addition, research shows that the greatest turnover of SBAE teachers occurs within the first five years in the profession (Tippens et al., 2013). Both potential factors result in a much younger age range in the SBAE teaching profession. This phenomenon fails to align with the nationwide average of teachers, as only 14.9% are less than 30 years of age (SASS, 2017).

Although, a high percentage of respondents were under the age of 40, the overwhelming majority (60.2%) intend to retire as a SBAE teacher. This is promising news for the SBAE profession, as numerous studies have found a high percentage of teachers leave the profession prior to retirement (Day, 2008; Tippens et al., 2013)

Nearly three-quarters (72%) of respondents received their certification through a traditional route. Although the greatest source of new SBAE teachers continues to be through the

traditional certification route, alternative routes to certification have been and are trending upward (Camp et al., 2002; Smith et al., 2018). This growing percentage can help fill a void and offset the nationwide teacher shortage (Eck & Edwards, 2018; West & Frey-Clark, 2018). Although the majority (62.4%) of SBAE teacher respondents have earned only a bachelor's degree, 44% have obtained a master's and approximately 1% have a terminal degree. This conclusion compares similarly to national data, as over 40% of teachers nationwide hold a bachelor's degree, while 47.4% have earned a master's degree, with less than 10% having a terminal degree (SASS, 2017).

SBAE programs vary in program areas and size across the nation, with programs ranging from small, rural schools with a single SBAE teacher, to large, urban schools in 11 of the 20 largest cities in the United States (National FFA Organization, 2017). This study identified similar diversity amongst program size, with SBAE programs ranging from one teacher with fewer than 20 students to 10 or more teachers in a program exceeding 1500 students. The identification of personal and professional characteristics of respondents nationwide provides a broad view of the differences found across the country.

Conclusion 4: SBAE teachers deem themselves to be most competent in classroom/laboratory instruction and least competent in SAE supervision.

Based on self-perceived personal competency rankings of the respondents related to a complete SBAE program (i.e., classroom/laboratory, FFA, and SAE), SBAE teachers are most competent in classroom/laboratory instruction. The self-perceived mean score for classroom/laboratory instruction was 85.54 on a 100-point scale. The self-perceived mean score for FFA was slightly lower at 82.95, and SAE was the lowest at 75.01. This conclusion supports research by Wolf (2011) who found the highest perceived level of self-efficacy for SBAE teachers to be in the classroom, while the lowest self-efficacy was related to SAE. Similarly,

Clemons, Heidenrich, and Linder (2018) found the greatest need of in-service SBAE teachers to be related to FFA/Leadership Development/SAE, with the major focus related to SAEs. The needs of SBAE teachers differ greatly, and understanding their competencies provides valuable insight into their particular in-service needs (Layfield & Dobbins, 2002; Roberts & Dyer, 2002). This conclusion resonates with Terry and Briers (2010) who emphasized the need for SBAE teachers to focus on being effective in the classroom and laboratory. Likewise, Torres et al. (2008) found experienced SBAE teachers dedicate the majority of their time (61%) to preparing for and delivering classroom/laboratory instruction.

SBAE teachers perceived themselves to be least competent in SAE. This conclusion is supported in the literature, as previous research has identified SAE as the weakest component and the one in which teachers are least proficient (Clemons et al., 2018; Phipps et al., 2008; Rubenstein, Thoron, & Estepp, 2014).

Conclusion 5: SBAE teacher's intent to retire from the profession plays a substantial role in their self-perceived teaching effectiveness.

A statically significant main effect existed between SBAE teachers' intent to retire and their composite sum effectiveness score F (4, 2253) = 17.13, $p < .01$. More specifically, those who intend to retire as a SBAE teacher had higher mean effectiveness scores when compared to those who do not intend to retire or were undecided. Thus, teachers who intend to retire as a SBAE teacher considered themselves to be effective teachers, which can be an indicator of career satisfaction (Clark et al., 2014; Kitchel et al., 2012; Walker et al., 2004) and longevity in the profession (Tippens et al., 2013). Additionally, SBAE teachers who remain in the profession tend to find themselves having a positive work-life balance, while also employing support structures (i.e., parents, administrators, community members, and students), which leads to their sustained careers (Clark et al., 2014). It is likely that these factors not only play a role in career

sustainability, but based on the findings of this study, they lead to increased teacher effectiveness. This conclusion aligns with previous studies linking teacher self-efficacy with career satisfaction (Blackburn & Robinson, 2008; Blackburn et al., 2017).

Conclusion 6: Elevated personal competency of SBAE teachers results in higher teaching effectiveness scores.

SBAE teachers who ranked their personal competency between 90 and 100 for any of the three components of agricultural education (National FFA Organization, 2015) had statistically significantly higher composite sum scores regarding their level of perceived effectiveness. Self-competence refers to the individual's self-perceived ability in a given subject area (Wilkinson, 2004). Steele (2010) found effective teachers to be competent among three domains, one of which is self-efficacy. The various roles SBAE teachers assume (Terry & Briers, 2010) can potentially impact their self-perceived competency and efficacy either positively or negatively (Robinson & Edwards, 2012).

Implications

Based on the conclusions of this study, seven implications for SBAE teacher preparation programs and stakeholders are outlined below.

1. Perhaps the ETI-SBAE can be used by agricultural education faculty to develop relevant professional development to determine areas of needed improvement for in-service teachers targeting their individual needs. School administrators may desire to implement the instrument in conjunction with current evaluation models (i.e., COAST, FPMS, Marzano, TADS-MTP, TPAI) to fully evaluate the effectiveness of the SBAE teacher. Perhaps in agricultural education, the ETI-SBAE could be administered evaluate and track the growth and continued needs of pre-service SBAE teachers enrolled in teacher preparation programs. This implication aligns with the findings of Birkenholz and Harbstreit (1987) who determined

new and early-career SBAE teachers needed to be evaluated regularly to identify and support their ongoing professional development needs.

2. The conclusions of this study suggests personal dispositions are an integral part of a complete, effective SBAE teacher. This study validated six items associated with personal dispositions (i.e., trustworthiness, responsibility, dependability, honesty, integrity, and work ethic). Personal dispositions have been found to be a key component in multiple studies related to SBAE teacher effectiveness (Eck et al., 2019; Roberts & Dyer, 2004), CAEP accreditation (2015), and the American Association for Agricultural Education (2017) endorsed personal dispositions as a component in preparing a complete SBAE teacher to be effective. Should personal dispositions be highlighted when identifying, or even screening, effective SBAE teachers? Oftentimes, students enter the university campus with a well-developed and fixed set of human capital, especially as it relates to their personal dispositions. Perhaps such a screening tool to identify students' personal dispositions should be a major point of emphasis when recruiting and admitting them into a SBAE teacher preparation program.
3. The findings of this study seem to imply that multiple personal and professional characteristics do not play a statistically significant role in teacher effectiveness, including number of years teaching, number of years in current position, pathway to certification, highest degree earned, age of the teacher, sex, and size of the program. Although these characteristics were not statistically significant indicators of SBAE teacher effectiveness in this study, previous research supports a traditional pathway to certification and career tenure as important components of a quality teacher (Cohhen-Vogel & Smith, 2007; Darling-Hammond, 2003). Further, studies specifically in SBAE have found the majority of teachers to be satisfied with their career regardless of age, sex, years teaching, or highest degree earned (Cano & Miller, 1992; Tippens et al., 2013), which align with the findings of this

study. Perhaps there is more to consider related to improving SBAE teacher quality and effectiveness than this study revealed.

4. Being able to prepare future SBAE teachers to be competent and efficacious can ultimately lead to increased levels of teaching effectiveness. Perhaps, purposeful human capital development throughout a person's college education (Becker, 1964; Schultz, 1971; Smylie, 1996) could enhance this initiative.
5. Certain personal and professional characteristics were found to be statistically significant in the effectiveness of SBAE teachers, i.e., intent to retire, state of employment, and perceived self-competency related to the three-component model of agricultural education (National FFA Organization, 2015). Potentially, SBAE teachers who are satisfied with their career intend to retire from the profession instead of exiting before retirement. Perhaps teachers who plan to remain in the profession also have a higher level of self-efficacy, ultimately leading to increased teacher effectiveness when compared to those who do not intend to remain in the profession or are undecided. It is possible that the same could be said for state of employment. Potentially, the states that have better support structures (i.e., SBAE program specialists, SBAE teacher induction programs, and SBAE teacher professional development and mentoring programs) in place for their SBAE teachers may result in increased teacher effectiveness and career satisfaction. Both of these factors are supported by SBAE teachers' self-competency ratings, as those who deemed themselves more competent achieved a higher sum composite effectiveness score.
6. Classroom/laboratory instruction received the highest mean score related to SBAE teachers' self-competence. Perhaps this stems from the largest, most consistent portion of a SBAE teacher's position being the instruction of agricultural education courses during the school day, leading to more preparation and repetition of this phenomenon.
7. Although the three-component model of agricultural education (National FFA Organization, 2015) portrays the three components (i.e., classroom/laboratory instruction, FFA, and SAE)

as being equal in size, most SBAE programs have a greater emphasis on the classroom/laboratory component. Maybe it is time to reevaluate the three-component model. Perhaps the findings of this study could provide insight into the characteristics an effective SBAE teacher must possess, potentially leading to a model that accurately depicts a complete SBAE program.

Recommendations for Practice

Based on the findings of this study, ten recommendations for practice are offered.

1. The ETI-SBAE is useful in determining components related to effective teaching in SBAE. Faculty members in SBAE teacher preparation programs should use this instrument to measure growth and development of future teachers related to the effective characteristics a SBAE teacher should possess. The instrument should be administered at key points throughout a student's undergraduate program to determine his or her preparedness to enter the SBAE classroom. These key points for evaluation should include the beginning and end of each semester in the SBAE teacher preparation program. Allowing teacher preparation faculty to establish a baseline and then evaluate the growth in human capital of future SBAE teachers throughout the program might assist university supervisors in placing student teachers in their internships.
2. SBAE teacher preparation faculty need to implement the validated ETI-SBAE to identify the human capital needs of pre-service SBAE teachers. The implementation of the ETI-SBAE could result in optimizing purposeful, pointed, individualized plans of study for pre-service teachers who wish to increase the human capital necessary for becoming effective in their specific vocation (Smith, 2010).
3. With self-perceived competency being an indicator of teacher effectiveness, SBAE teacher preparation programs should consider the strengths developed through content-specific

coursework to promote self-efficacy amongst future teachers, ultimately leading to greater effectiveness in the classroom. This can be accomplished through purposeful student teaching placements, allowing pre-service teachers the opportunity to utilize their strength. Additionally, the ETI-SBAE should serve as the evaluation metric during the student teaching experience.

4. Long-standing SBAE teachers need to mentor aspiring and early-career SBAE teachers on the benefits of their chosen career, providing an enhanced outlook on SBAE as a career choice instead of a short-term job. The promotion of SBAE as a lifelong career could play a positive role in the effectiveness and longevity of future SBAE teachers. As this study found, teachers who intend to retire from the profession were more effective than those who did not or were undecided.
5. Teacher preparation programs need to emphasize FFA and SAE throughout the program to further develop areas of weakness in potential SBAE teachers. The majority of in-service SBAE teachers in this study identified themselves as being more efficacious in classroom/laboratory instruction than FFA and SAE. Emphasizing the development of human capital in areas of perceived weakness could lead to improved career sustainability.
6. As the number of alternative and emergency certified teachers continues to increase (Smith et al., 2018), SBAE stakeholders should consider ways to provide purposeful professional development based on SBAE teacher needs. Therefore, the findings of this study should be used to develop pertinent professional development programs for in-service SBAE teachers.
7. School administrators should use the validated ETI-SBAE to evaluate their SBAE teachers, and they should use the results of their evaluations to provide or support sustained, prolonged, and intense professional development for their teachers.
8. Pairing the ETI-SBAE with the current program evaluations used by state program specialist, would provide another metric to determine overall program quality. Additionally, this metric

could be used for purposeful coaching for SBAE teachers, helping them develop human capital in areas that are identified as lacking.

9. Other CTE programs with student organizations should adapt the ETI-SBAE by aligning the intracuricular engagement component items with their specific student organization. The remaining five components are appropriate as a metric for effective teaching in their discipline, as various similarities exist across CTE programs. Once used, the adapted instrument should be referred to as the ETI-(insert program acronym).
10. Extension educators and 4-H leaders need to consider the application of the ETI-SBAE for evaluation of their educators and student development programs. The only change necessary is to update FFA with 4-H within the intracurricular engagement component. The extension education instrument should be referred to as the ETI-EXT.

Recommendations for Future Research

Based on the findings of this study, six recommendations for future research are offered.

1. Although this study was a national census, replication on the state level could provide a more detailed overview of SBAE teachers for interested parties (i.e., teacher preparation programs and CTE staff). Providing an opportunity for increased participation from each state, could lead to an increased understanding of SBAE teachers' needs on a state level.
2. Examination of key components within SBAE teacher preparation programs impacting teacher effectiveness is necessary. The ETI-SBAE provides insight into the specific human capital being developed in program specific courses (Smith, 2010), allowing program improvement to prepare SBAE teachers with increased teaching effectiveness. Therefore, the ETI-SBAE should serve as an evaluation metric in agricultural education teacher preparation programs nationwide.

3. Determine if differences exist related to effectiveness factors of future SBAE teachers based on high school experiences, ethnicity, and race. The ETI-SBAE can serve as a needs assessment for incoming students of SBAE teacher preparation programs to determine specific training needs based on background and experiences.
4. Identify effectiveness needs of early-career SBAE teachers to provide targeted professional development. Allowing early-career SBAE teachers an opportunity to self-assess their teaching effectiveness based on the ETI-SBAE, provides SBAE teacher preparation faculty an opportunity to identify pertinent training needs.
5. Examine growth of future SBAE teachers within teacher preparation programs at pivotal stages using the ETI-SBAE. After the initial evaluation of future SBAE teachers when entering the program, additional evaluation is recommended at the end of each semester to determine the growth in human capital related to effective teaching in SBAE.
6. Considering the findings from the current and former studies, perhaps it is time to rethink the roles of a SBAE teacher, leading to a new model for agricultural education.

Discussion

The agricultural industry is rapidly changing to meet consumer demands (McCalla et al., 2010), while adjusting to changing climate patterns (Gornall et al., 2010) and the introduction of new technologies (Percy, 2018). Similarly, the educational system is in a state of flux attempting to meet various challenges of the 21st century (Bar-Yam et al., 2002; Filippousis, 2019). Therefore, SBAE must constantly adapt to meet the changes associated with agriculture, the educational system, and the learning needs of students. Part of meeting the need of 21st century students is adjusting to a new kind of learning. Students today prefer to receive information through technology and learn at their own pace (Marx, 2014; Winthrop & McGivney, 2016). With the ongoing changes facing SBAE, the demand for high-quality, effective teachers is perhaps greater now than ever before (Smith et al., 2018).

This demand continues as new SBAE programs are being added, teachers from the baby boomer generation are retiring in masses, and young, early-career teachers are exiting the profession prior to retirement (Smith et al., 2018). Although the demand is evident, the knowledge, roles, and requirements of a SBAE teacher today continue to evolve. The knowledge needed by a SBAE teacher today includes agricultural content knowledge (Doerfort, 2011), an understanding of natural and social sciences (National Research Council, 2009), the ability to teach mathematics, science, leadership, communications, technology, and management (National Association of Agricultural Educators, 2019), and the ability to inform an agriculturally illiterate society (Dale et al., 2017). The roles and requirements of 21st century SBAE teachers continues to grow beyond the three components identified by the National FFA Organization (2015). Due to continuous changes in agriculture and education, the way SBAE teachers are prepared, supported, and evaluated needs to be reconsidered based on the findings of this study.

The validated ETI-SBAE is comprised of six constructs measuring 26 items, including intracurricular activities, personal dispositions, appreciation for diversity and inclusion, pedagogical preparedness, work-life balance, and professionalism. The validated ETI-SBAE supports the knowledge, roles, dispositions, and responsibilities of a complete SBAE teacher and supports the findings of multiple studies in the agricultural education literature (Blackburn et al., 2017; DiBenedetto et al., 2018; Eck et al., 2019; Roberts & Dyer, 2004; Terry & Briers, 2010; Torres et al., 2008). However, it does not include an assessment of a person's content knowledge. Specifically, the nationwide Delphi study (Eck et al., 2019) did not include items related to agricultural content knowledge; therefore, the inclusion of related items was not an option within the complete instrument. Although the ETI-SBAE does not include agricultural content knowledge as a construct, we recognize content knowledge is vital to being an effective teacher. Therefore, a complementary assessment that evaluates aspiring SBAE teachers' content knowledge may be important to include along with the ETI-SBAE.

SBAE teacher preparation programs should evaluate their pre-service SBAE teachers at key points in their academic career based on the program's structure and needs. Potentially, these evaluations can be used to identify areas for personal improvement in addition to tracking growth throughout the program. This ultimately culminates with increased effectiveness in the clinical teaching internship, as the ETI-SBAE considers the multidimensional nature of teaching effectiveness (Farrell, 2015).

Finally, there is no direct formula to prepare, support, and evaluate effective teachers (Steele, 2010), especially considering the diverse landscape of SBAE teachers nationwide. The effective teaching instrument for SBAE teachers, developed by Eck et al. (2019) and validated within this study, provides a starting point to allow stakeholders of SBAE nationwide an opportunity to prepare, support, and evaluate its teachers on what is often considered an elusive concept (Stronge et al., 2011) through the use of the ETI-SBAE. To help facilitate this opportunity the conceptual model developed within Chapter 2 was updated to reflect the key findings within this study (see Figure 8). These updates included the alignment of the identified components of effective SBAE teachers with the six components which emerged through the validation of the ETI-SBAE. Additionally, environmental was added as a factor with personal and professional factors as the necessary human capital development needed by SBAE teachers can depend on their specific teaching environment (see Figure 8). Understanding of the conceptual frame will provide guidance to human capital development of SBAE teachers through the use of the ETI-SBAE.

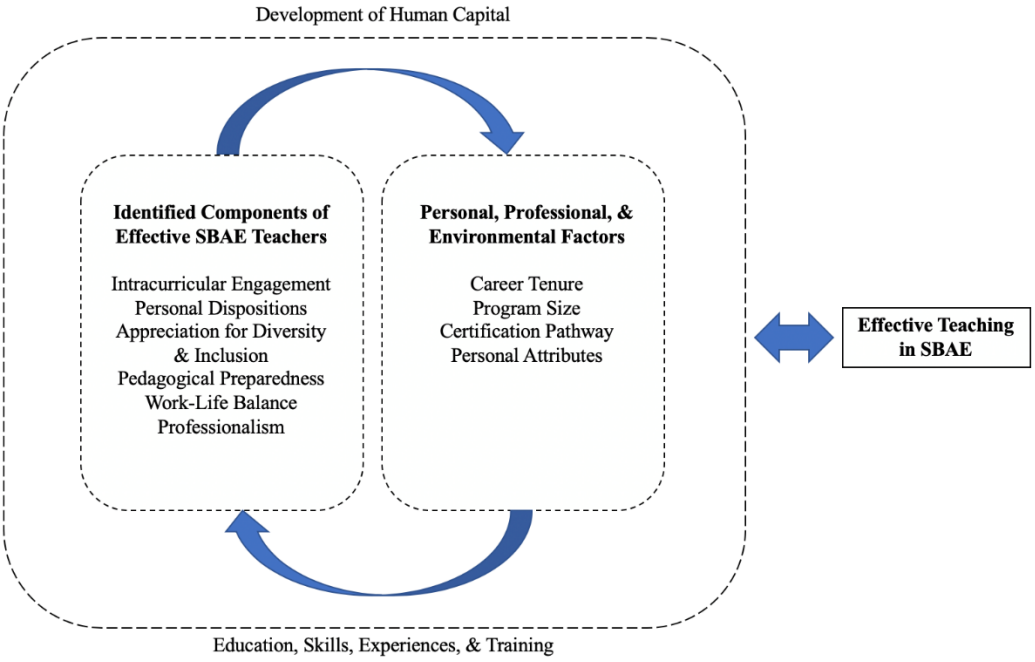

Figure 8. Updated conceptual model of effective teaching for SBAE teachers

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APPENDICES

APPENDIX A

INITIAL INSTRUMENT

Effective Teaching Instrument for School-Based Agricultural Education Teachers (Eck et al., 2019)

Block 1

The purpose of the study is to identify characteristics you perceive yourself to exhibit relative to potential qualities of an effective agricultural education teacher. Although your participation in this study is voluntary, it will be very helpful in informing agricultural teacher preparation programs.

By moving forward, you are agreeing to participate in this study where you will be asked to rate each of the identified characteristics on a four-point scale of agreement, in addition, personal and professional characteristics will be collected and analyzed.

Thank you, in advance, for your participation!

Are you currently a school-based agricultural education (SBAE) teacher?

- ○ Yes
- ○ No

Block 2

Evaluate each characteristic related to instruction as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I am passionate about education.	○	○	○	○	○
I provide a variety of learning opportunities to meet the needs of all my students.	○	○	○	○	○
I guide students to grow personally.	○	○	○	○	○
I am a leader for students.	○	○	○	○	○
I demonstrate pedagogical (i.e., teaching) knowledge.	○	○	○	○	○
I am a good communicator.	○	○	○	○	○
I demonstrate sound educational practices.	○	○	○	○	○
I am prepared for every class.	○	○	○	○	○
I demonstrate classroom management.	○	○	○	○	○
I understand the experiential learning theory.	○	○	○	○	○
I am motivated for student success.	○	○	○	○	○
I am knowledgeable about agriculture.	○	○	○	○	○
I am a classroom teacher first and foremost.	○	○	○	○	○
I am innovative.	○	○	○	○	○
I am engaging.	○	○	○	○	○

Block 3

Evaluate each characteristic related to FFA and SAE as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I advise the FFA chapter.	○	○	○	○	○
I facilitate record keeping for degrees and awards.	○	○	○	○	○
I instruct students through FFA.	○	○	○	○	○
I am passionate about FFA.	○	○	○	○	○
I advise the FFA officers.	○	○	○	○	○
I prepare students to be leaders.	○	○	○	○	○
I instruct students through supervised agricultural experiences (SAE).	○	○	○	○	○

Block 4

Evaluate each characteristic related to program planning as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I use the complete agricultural education 3-circle model as a guide to programmatic decisions and practices.	○	○	○	○	○
I am resourceful as an administrator of my program.	○	○	○	○	○

Block 5

Evaluate each characteristic related to work-life balance as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I lead a balanced life.	○	○	○	○	○
I have the ability to say no.	○	○	○	○	○
I am never afraid to ask for help.	○	○	○	○	○
I demonstrate a willingness to put in extra hours.	○	○	○	○	○

Block 6

Evaluate each characteristic related to diversity as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable

I understand student needs.					
I am an advocate for all students.					
I value students regardless of gender.					
I value students regardless of economic status.					
I value students of all ethnic/racial groups.					
I understand diversity.					
I am culturally relevant.					
I care about all students.					
I understand there is not an award for all students, but that does not mean they are not valuable.					

Block 7

Evaluate each characteristic related to professionalism as a personal strength or weakness as it relates to your profession as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I am a purposeful lifelong learner.					
I demonstrate adaptability.					
I am a dedicated professional.					
I am an advocate for public education.					
I am engaged in an appropriate professional organization.					

Block 8

Evaluate each characteristic related to personal dispositions as a personal strength or weakness as it relates to your profession as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I am fair.					
I am student focused.					
I am trustworthy.					
I am honest.					
I am passionate about agriculture.					
I am respectful.					
I show empathy.					
I am dependable.					
I am responsible.					

I am relatable.	○	○	○	○	○
I am genuine.	○	○	○	○	○
I am a hard worker.	○	○	○	○	○
I am organized.	○	○	○	○	○
I am helpful.	○	○	○	○	○
I have patience.	○	○	○	○	○
I show integrity.	○	○	○	○	○

Default Question Block

How many years (including the current one) have you been teaching school-based agricultural education?

How many years (including the current one) have you been in your current position?

Do you intend to retire as a school-based agricultural education teacher?

- ○ Yes
- ○ No
- ○ Undecided

Why do you not plan to retire as a school-based agricultural education teacher?

Select your highest degree earned?

- ○ Bachelor's degree
- ○ Master's degree
- ○ Doctoral degree

Select your path to teacher certification?

- ○ Traditional path through agricultural education bachelor's degree with student teaching
- ○ Traditional path through agricultural education master's degree with student teaching
- ○ Alternatively certified

- ◯ Emergency certified
- ◯ Not certified

What was your bachelor's degree in?

Please identify what degree you hold and your relevant work experience?

Do you hold a master's degree?

- ◯ Yes, in agricultural education
- ◯ Yes, not in agricultural education
- ◯ I don't have a master's degree

How many students are currently enrolled in your agricultural education program?

How many teachers (including yourself) are in your school's agricultural education department?

What is your gender?

- ◯ Male
- ◯ Female
- ◯ Other
- ◯ Prefer not to respond

What is your age?

In what state do you currently teach?

On a scale of zero to 100 with zero being totally incompetent and 100 being totally competent, please rank your competency as a school-based agricultural education teacher on the following components of the three-circle model.

	0	10	20	30	40	50	60	70	80	90	100
Classroom/Laboratory Instructor											
FFA Advisor											
Supervisor of Agricultural Experiences											

To be included in the drawing for one of the the 10 $100 Amazon gift cards, please provide your school-issued email address.

APPENDIX B

ETI-SBAE INSTRUMENT

ETI-SBAE for Teacher Self-Assessment

Introduction

The purpose of the study is to identify characteristics you perceive yourself to exhibit relative to qualities of an effective agricultural education teacher. Although your participation in this study is voluntary, it will be very helpful in informing agricultural teacher preparation programs.

By moving forward, you are agreeing to participate in this study where you will be asked
to rate each of the identified characteristics on a four-point scale of agreement, in addition, personal and professional characteristics will be collected and analyzed.

Thank you, in advance, for your participation!

Are you currently a school-based agricultural education (SBAE) teacher?

- ◯ Yes
- ◯ No

Intracurricular Engagement

Evaluate each characteristic related to intracurricular engagement as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I instruct students through FFA.	◯	◯	◯	◯	◯
I advise the FFA officers.	◯	◯	◯	◯	◯
I advise the FFA chapter.	◯	◯	◯	◯	◯
I facilitate record keeping for degrees and awards.	◯	◯	◯	◯	◯
I am passionate about FFA.	◯	◯	◯	◯	◯
I instruct students through SAEs.	◯	◯	◯	◯	◯
I use the complete agricultural education 3-component model as a guide to programmatic decisions.	◯	◯	◯	◯	◯

Personal Dispositions

Evaluate each characteristic related to personal dispositions as a personal strength or weakness as it relates to your profession as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I am trustworthy.	◯	◯	◯	◯	◯
I am responsible.	◯	◯	◯	◯	◯
I am dependable.	◯	◯	◯	◯	◯
I am honest.	◯	◯	◯	◯	◯
I show integrity.	◯	◯	◯	◯	◯

I am a hard worker.	○	○	○	○	○

Appreciation for Diversity and Inclusion

Evaluate each characteristic related to diversity and inclusion as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I value students regardless of economic status.	○	○	○	○	○
I value students of all ethnic/racial groups.	○	○	○	○	○
I value students regardless of sex.	○	○	○	○	○
I care about all students.	○	○	○	○	○
I understand there is not an award for all students, but that does not mean they are not valuable.	○	○	○	○	○

Pedagogical Preparedness

Evaluate each characteristic related to your pedagogical preparedness as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I demonstrate classroom management.	○	○	○	○	○
I demonstrate sound educational practices.	○	○	○	○	○
I am prepared for every class.	○	○	○	○	○

Work-Life Balance

Evaluate each characteristic related to work-life balance as a personal strength or weakness regarding your practice as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I have the ability to say no.	○	○	○	○	○
I lead a balanced life.	○	○	○	○	○
I am never afraid to ask for help.	○	○	○	○	○

Professionalism

Evaluate each characteristic related to professionalism as a personal strength or weakness as it relates to your profession as a school-based agricultural education teacher.

	Very Weak	Somewhat Weak	Somewhat Strong	Very Strong	Not Applicable
I have patience.	○	○	○	○	○
I show empathy.	○	○	○	○	○

Personal and Professional Characteristics

How many years (including the current one) have you been teaching school-based agricultural education?

How many years (including the current one) have you been in your current position?

Do you intend to retire as a school-based agricultural education teacher?

- Yes
- No
- Undecided

Why do you not plan to retire as a school-based agricultural education teacher?

Select your highest degree earned?

- Bachelor's degree
- Master's degree
- Doctoral degree

Select your path to teacher certification?

- Traditional path through agricultural education bachelor's degree with student teaching
- Traditional path through agricultural education master's degree with student teaching
- Alternatively certified
- Emergency certified
- Not certified

What was your bachelor's degree in?

Please identify what degree you hold and your relevant work experience?

How many students are currently enrolled in your agricultural education program?

How many teachers (including yourself) are in your school's agricultural education department?

What is your gender?

- Male
- Female
- Other
- Prefer not to respond

What is your ethnicity?

- White
- Black or African American
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Other

What is your age?

In what state do you currently teach?

APPENDIX C

IRB APPROVAL LETTER

Oklahoma State University Institutional Review Board

Date:	12/13/2018
Application Number:	AG-18-56
Proposal Title:	Validation of an Effective Teaching Instrument for School-Based Agricultural Education Teachers
Principal Investigator:	Chris Eck
Co-Investigator(s):	
Faculty Adviser:	Shane Robinson
Project Coordinator:	
Research Assistant(s):	

Status Recommended by Reviewer(s): Approved
Approval Date: **11/28/2018**
Expiration Date:

The requested modification to this IRB protocol has been approved. Please note that the original expiration date of the protocol has not changed.

Modifications Approved:
Modifications Approved: Two questions were added to the survey instrument.

The IRB office MUST be notified when a project is complete or you are no longer affiliated with Oklahoma State University.

All approved projects are subject to monitoring by the IRB.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are attached. These are the versions that must be used during the study.

Sincerely,
Oklahoma State University IRB

APPENDIX D

INFORMED CONSENT SHEET

You have been identified as an integral part of school-based agricultural education (SBAE) programs. We appreciate everything you do helping to prepare the next generation for careers in agriculture through your SBAE programs and the FFA. We are conducting a nationwide study looking into the strengths and weaknesses of effective agriculture teachers in today's workforce. The data collected from the study will be used to influence university teacher preparation programs, in-service teacher professional development, and new teacher recruitment for SBAE programs. The study includes participation in completing a 58-item instrument where you self-evaluate your strengths and weaknesses related to teaching agricultural education, along with demographic questions. We understand your time is valuable and we would greatly appreciate your involvement in this study, if you have any questions or concerns please feel free to contact us. If you are willing to participate in the study please follow the link attached to begin the study, the study is estimated to take 15 minutes, if you choose not to participate, we appreciate your time.

Thank you,

Christopher J. Eck
Graduate Teaching Assistant
Agricultural Education
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Shane Robinson
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The Institutional Review Board (IRB) for the protection of human research participants at Oklahoma State University has reviewed and approved this study. If you have questions about the research study itself, please contact the Principal Investigators at 405-744-5130, or by email at Chris.Eck@okstate.edu or Shane.Robinson@okstate.edu. If you have questions about your rights as a research volunteer or would simply like to speak with someone other than the research team about concerns regarding this study, please contact the IRB at (405) 744-3377 or irb@okstate.edu. All reports or correspondence will be kept confidential.

Approved: 11/28/2018
Protocol #: AG-18-56

VITA

Christopher J. Eck

Candidate for the Degree of

Doctor of Philosophy

Dissertation: VALIDATING AND APPLYING THE EFFECTIVE TEACHING INSTRUMENT FOR SCHOOL-BASED AGRICULTURAL EDUCATION TEACHERS

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Biographical:

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Graduate Research Associate, Oklahoma Water Resources Center, Oklahoma State University, 2018 to Current.

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