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Twenty-First Century Skills: A Needs Assessment of School-Based Agricultural Education Teachers

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TWENTY-FIRST CENTURY SKILLS: A NEEDS ASSESSMENT OF SCHOOL-BASED AGRICULTURAL EDUCATION TEACHERS

by

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ABSTRACT

Twenty-First Century Skills: A Needs Assessment of School-Based Agricultural Education Teachers

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Research has shown 21st-century skills are essential to a student's success outside of the high school classroom. These 21st-century skills prepare students to enter the workforce or higher education with the ability to think critically and creatively, collaborate with others, take the initiative when approached with a task, and use technology to its fullest potential. If students are not learning the skills needed for success, it is because educators and schools are not teaching them. This study examined school-based agricultural education teachers' perceived knowledge, ability, and importance of implementing these 21st-century skills into the classroom. Upon identifying teachers perceived level of importance, knowledge, and ability results were analyzed to determine the professional development needs of school-based agriculture education teachers in regards to 21st-century skills. Results concluded professional development is needed to further educate and equip agriculture teachers with specific and

applicable ways to implement these skills into their classrooms. Upon identifying teachers perceived importance, knowledge, and ability, results were analyzed in relation to demographic characteristics to determine if significant correlations existed. Significant relationships existed between importance, ability, and knowledge when compared to gender, years teaching, and age.

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PUBLIC ABSTRACT

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Preparing students to be career and work ready is a concern of educators and schools nationwide. Twenty-first century skills prepare students to enter the workforce or higher education with the ability to think critically and creatively, collaborate with others, take the initiative when approached with a task, and use technology to its fullest potential. If students are not learning the skills needed for success, it is because educators and schools are not teaching them. When students possess these skills, they are prepared to work in teams, think critically and creatively about a problem, display leadership and social skills, and communicate effectively with others.

The research sought to identify school-based agriculture education teachers perceived knowledge, importance, and ability to teach these 21st-century skills in the classroom. Results showed that agriculture teachers nationwide find 21st-century skills to be important, but they are less knowledgeable and able to teach them. The research concluded that professional development is needed to increase teacher's knowledge of and ability to teach 21st-century skills. Professional development will allow school-based agricultural education teachers to gain specific and applicable strategies for implementation. With the application of 21st-century skills in the school-based agricultural education classroom, students will become better prepared to enter the workforce or higher education upon graduating high school.

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CHAPTER I

INTRODUCTION

Industry has recognized students need soft skills in today's workforce, otherwise known as 21st-century skills (National Research Council, 2012; Rotherham & Willingham, 2009). School-based agricultural education (SBAE) allows students to learn these 21st-century skills through the three-component model (Yoest & Kane, 2015). The three-component model of agricultural education consists of classroom/laboratory instruction including inquiry-based learning through interactive classroom and laboratory instruction; supervised agricultural experiences (SAE) consisting of experiential, service and/or work-based learning; and the National FFA Organization (FFA) including engagement of premier leadership, personal growth and career success (National FFA, 2018a). When all three components are implemented into school-based agricultural education (SBAE), it prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber, and natural resources systems (National FFA, 2018a) and may assist in the development of skills needed to be competitive and succeed in the 21st century. In the agricultural education classroom, students use knowledge learned and apply it in their daily lives, which develops them into productive and useful members of society (Dailey, Conroy, & Shelley-Tolbert, 2001).

Twenty-first-century teaching allows students to build the skills needed when entering higher education, the workforce, and life (Scott, 2017). Incorporating 21st-century skills into the classroom will engage students in the learning process and allow them to graduate being better prepared to succeed in a growing global economy

(Girlando, 2013). Skills such as collaboration, critical thinking, and problem-solving are crucial to ensuring the success of students (Girlando, 2013). Education as a whole must work to prepare future young adults to obtain these skills, which will lead them toward a better life after high school graduation (Symonds, Schwartz, & Ferguson 2011).

SBAE should prepare students for education beyond high school (Davis & Jayaratne, 2015) by teaching the essential skills needed to succeed in a globalizing workplace. Effective teaching strategized at education in the 21st-century will allow students to graduate being better prepared. It is important to incorporate the explicit teaching of 21st-century skills in the classroom in conjunction with teaching real-world scenarios to understand the importance of agriculture, core content, and 21st-century skills outside of the high school classroom. Incorporating technology, collaboration, and leadership into SBAE classes is necessary to prepare students to accept the challenge of feeding a growing global economy and to prepare them for the ever-growing globalization and technological advancements made in society (Davis & Jayaratne, 2015).

Statement of the Problem

Recently, educators, business leaders, and politicians have determined students need 21st-century skills to be successful in today's society (Rotherham, & Willingham, 2009), and those students who lack 21st-century skills will be at a disadvantage when pursuing careers or higher education (Girlando, 2013). High school students must have a concrete understanding of 21st-century skills to be successful adults in a constantly

evolving global society (Williams, 2017). Rotherham and Willingham stated,

> Many U.S. students are taught these skills - those who are fortunate enough to attend highly effective schools or at least encounter great teachers - but it's a matter of chance rather than the deliberate design of our school system. (p. 17)

Thoughtful Learning (n.d.) listed three broad constructs of skills considered 21st-century Skills, which are (1) learning, (2) literacy, and (3) life skills. Included within each of the areas are critical and creative thinking; collaborating and communicating; information, media, and technology literacy; and flexibility, initiative, social skills, productivity, and leadership.

The current assessment method used by U.S. schools has created a gap between the students' knowledge and skills gained from school and the knowledge and skills needed to be successful in the workforce (Battelle for Kids, 2009). Many have begun to notice the existing model of assessment in the United States and its inability to assess students' ability to think critically, problem solve, and collaborate (Rotherham & Willingham, 2009). To meet the ever-growing demand of today's society, the current assessment method used in education must shift to focus on measuring students' ability to think critically, apply what they know to real-world situations, examine real-world problems, gather useful information, and utilize technology rather than focusing on rote memorization and brief recalling.

While current trends in education point to teaching our students 21st-century skills, the question remains: do agriculture teachers possess these skills themselves? Saavedra and Opfer (2012) stand firm in the belief that if students are not learning the skills and knowledge needed for success, it is because schools are not teaching them. It is

the responsibility of the educator to prepare students for a prosperous future whether it be in higher education or the workforce (Girlando, 2013). When a school and educator build upon the foundation of applying content learned in core subjects, students become more engaged, take an active role in the learning process, and are prepared to thrive in a growing global economy (Battelle for Kids, 2009). While it is crucial for students to learn core academic content, they must also learn how to make use of the information they learn and apply it to the real-world (Girlando, 2013). The 21st-century classroom requires a shift in role for teachers: the teacher must go from an instructor of information to the facilitator of education (Girlando, 2013). A teacher who possesses 21st-century skills can educate their students through project-based learning, rewarding improvement, using performance criteria, honoring abstraction, and changing roles to encourage the learner to be the knowledge maker and the classroom to be a think-tank (Heick, 2018b).

Purpose and Research Objectives

The purpose of this study was to determine whether agriculture educators possess the skills needed to teach their students 21st-century skills effectively. Additionally, the descriptive study sought to determine SBAE teachers' professional development needs in regard to their knowledge and ability to teach 21st-century skills. The following research objectives guided this study.

1. Describe SBAE teachers' perceived level of importance of 21st-century learning skills.
2. Describe SBAE teachers' perceived ability to teach 21st-century learning skills.
3. Describe SBAE teachers' perceived knowledge level regarding teaching 21st-

century learning skills.

4. Identify and prioritize the professional development needs of SBAE teachers' 21st-century learning skills.
5. Describe the characteristics of SBAE teachers (i.e., gender, age, years of teaching).
6. Determine the relationship between teachers' perceived importance to teach 21st-century skills and their demographics (i.e., gender, age, years of teaching).
7. Determine the relationship between teachers' perceived ability to teach 21st-century skills and their demographics (i.e., gender, age, years of teaching).
8. Determine the relationship between teachers' perceived knowledge of 21st-century skills and their demographics (i.e., gender, age, years of teaching).

Definitions

Career and Technical Education (CTE): CTE is responsible for helping all students acquire challenging academic, technical, and employability skills to succeed in postsecondary education and in demand careers.

School-Based Agricultural Education (SBAE): SBAE is responsible for teaching 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.

Agriculture teacher: An educator who teaches at least one agriculture class.

Supervised agricultural experience (SAE): SAE is a student-led, instructor-supervised, work-based learning experience that results in measurable outcomes within a predefined, agreed upon set of Agriculture, Food and Natural Resources Technical Standards and Career Ready Practices.

Career development event (CDE): A competition in which FFA members study and practice to gain a complete and comprehensive knowledge of what it takes to succeed in a related career.

21st-century outcome: The skills, knowledge, and expertise in which a student should master to be successful in life and workforce in today's growing global economy.

Limitations of the Study

This research was conducted with the following limitations.

1. The instrument used in this study was an online survey platform, which allows participants to skip questions, which could potentially result in random errors of measurement.
2. Electronic communications sent via e-mail could have presented a barrier due to email blocking systems and incorrect email addresses.
3. The participants targeted as SBAE teachers were agriculture teachers identified by the National FFA Organization. The researchers assumed the frame and contact information were accurate. Agriculture teachers who were not known were not included as a part of the sample group.
4. The scope of the study was limited to 500 SBAE teachers nationwide that were identified by the National FFA Organization. Furthermore, with a response rate of 20%, results may not fully reflect that of the whole population.
5. The use of a quantitative questionnaire limits the data collected because it prohibits respondents from giving additional information that may explain their answers or preferences.
6. Because this study focused on SBAE teachers, it may not be generalizable to those teaching other subjects.

Basic Assumptions

For the purpose of this study, the following basic assumptions were made.

1. The perceptions of the SBAE teachers were a valid method of determining their professional development needs according to the Borich (1980) needs assessment model.
2. Participants completed the questionnaire with complete honesty.
3. Participants taught SBAE in the 2018-2019 school year.
4. Those in the sample group knew how to use the software for completing the questionnaire.

Significance of the Study

Numerous studies have identified the importance of exploring 21st-century skills in the classroom (Girlando, 2013; Rotherham, 2009; Saavedra, & Opfer, 2012; Scott, 2017; Yoest & Kane 2015). While few studies have included the SBAE teacher, career and technical educators have been teaching these skills for years (Symonds et al., 2011). A Career and Technical Education (CTE) classroom today vaguely resembles the old vocational education programs that consisted of students who were not college bound. The 21st-century CTE classroom has become a pocket of excellence, being the home for many students who strive to begin their careers directly out of high school as well as those who are planning on higher education (Symonds et al., 2011). CTE programs are critical in the growth and development of the future workforce (Hyslop, 2008). Because there is a difference in what industry professionals and graduates believe it means to be work-ready, it is essential CTE and SBAE programs gear up to fill that gap (Stripling & Rickets, 2016).

While the topic of 21st-century skills has been widely researched (Dailey et al., 2001; Girlando, 2013; Heick, 2018a; Rotherham & Willingham, 2009), far fewer studies

have reviewed SBAE teachers and the application of 21st-century skills in the agriculture education classroom. The importance of understanding SBAE teachers' ability to teach 21st-century skills can be critical in identifying the professional development needs of SBAE teachers. To complement existing research on 21st-century skills, this study examined participating agriculture teachers' competence in 21st-century skills, their ability to teach them, perceived importance, and knowledge of these skills in the 21st-century classroom.

The American Association of Agricultural Educators has identified seven research priority areas. Research Priority area 3 identifies a "sufficient scientific and professional workforce that addresses the challenges of the 21st-century" (Stripling & Ricketts, 2016, p. 30). This priority area indicates that the challenges of the 21st-century be a focus in every sector of the agriculture industry, including secondary agriculture education. Within the research priority are questions that guide the research needed within this topic, one of which is "What methods, models, and programs are effective in preparing people to work in global agriculture and natural resource workforce?" (Stripling & Rickets, 2016, p. 31). According to Stripling and Ricketts, there is a difference in what employers and students believe it means to be ready for success in the workforce, and because of that, it is crucial we prepare our SBAE programs to fill the gap.

This study may advance the professional development offered to preservice and inservice SBAE teachers by preparing them to teach 21st-century skills in the agricultural education classroom through workshops and undergraduate or graduate level courses. Consistent and timely inservice needs assessments can be a great resource when

determining and developing professional development topics for SBAE teachers (DiBenedetto, Willis, & Barrick, 2018). As seen in Figure 1, professional development is a key aspect of the P21 framework for 21st-century learning (Battelle for Kids, 2019) and is instrumental in giving students an ideal education. In order to prepare successful students, we must first invest in teachers to prepare them to teach in the constantly evolving 21st-century. Additionally, the data and information collected in this study will help to advance professional development with the National FFA Organization, state associations of agricultural education, and the National Association of Agricultural Educators by presenting the need for professional development in the area of 21st-century skills.

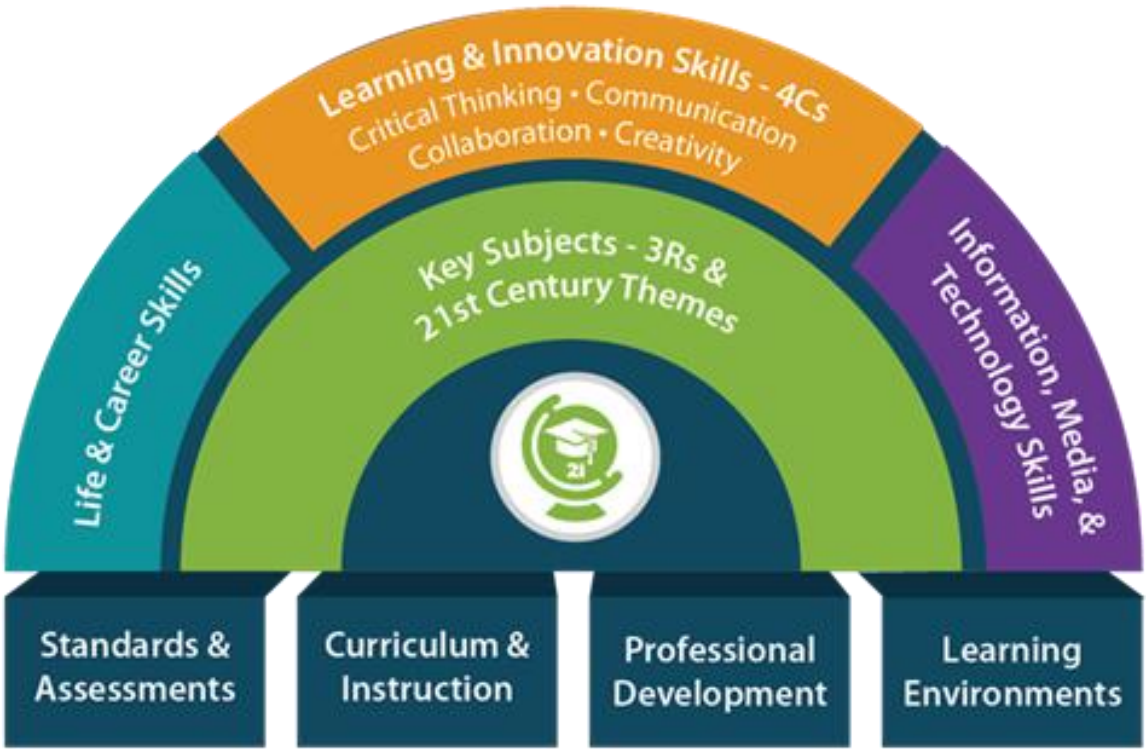

Figure 1. The Partnership for 21st-Century Learning Framework, 2019. Retrieved from www.battelleforkids.org/networks/p21

CHAPTER II

REVIEW OF LITERATURE

This chapter serves as a review of the literature on 21st-century skills in the agricultural education classroom. The following sections serve as guidelines for the literature review: (a) theoretical framework, (b) education in the U.S., (c) 21st-century skills, (d) career skills in the SBAE classroom, and (e) skills for tomorrow.

The "FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education" (National FFA Organization, 2018b, pp. 6-7). Agricultural education as a whole is made up of three interwoven circles that give students the ideal education. The three-component model consists of classroom/laboratory instruction, SAE, and the FFA, all of which generate the skills needed to succeed in the 21st-century (Yoest & Kane, 2015). When students have all three components of the three-component model, they are taught problem-solving through classroom/laboratory instruction, collaboration, leadership, and teamwork through involvement in the National FFA Organization; and critical thinking and responsibility through an active SAE project. It is crucial for students to learn core academic content; however, it is essential to teach students how to make use of the information they are using and apply it to the real-world (Girlando 2013). Education as a whole must focus on teaching current and future young adults these skills, which will prepare them to succeed in a growing global economy after graduation (Girlando, 2013; Symonds et al., 2011).

Teaching students 21st-century skills will allow students to adapt to changing

work environments, welcome new ideas, and embrace changing circumstances, which leads to success in the workforce (Kivunja, 2014). Students are expected to graduate being resilient, flexible, and adaptable (Kivunja, 2014) and according to Saavedra and Opfer (2012), if students are not learning the skills needed for success, it is because schools are not teaching them. When a school and educator build upon the foundation of applying content learned in core subjects, students are more engaged, take an active role in their education, and become prepared to thrive in the world after graduation (Battelle for Kids, 2009).

Theoretical Framework

John Dewey's (1944) theory of constructivism offers a theoretical viewpoint for understanding the importance of education adapting to the continuous changes of a growing society. He explained that people's surroundings are continually changing, and education needs to adapt to those changes. Dewey argued that for education to be effective, students should be given opportunities for learning that enable them to link content learned in school to previous and future experiences and knowledge. Developing skills for the future happens through real-world experiences and active participation in learning. Additionally, Dewey believed that education is conceived as a constant reconstruction of experience. Through the three-component model of agricultural education (Yoest & Kane, 2015), students have the opportunity to take a hands-on approach to their education through contextual and work-based learning (National FFA Organization, 2018b).

Borich Needs Assessment

The Borich needs assessment model (Borich, 1980) was used to conceptualize the data collection and analysis in this study. The model allows teachers to rate their perceived level of importance of a concept, perceived knowledge, and their perceived ability (self-efficacy). Results provide a more refined evaluation of training needs (Borich, 1980). Borich stated that a need is defined as a discrepancy between "what is" and "what should be." Scores are then compared, and a mean weighted discrepancy score is generated. When a discrepancy score is high, this is an area in which professional development and training is needed regarding the researched concept. Competencies are ranked in order from highest to lowest, with higher mean weighted discrepancy (MWDS) indicating a need for inservice. This allows researchers to purposefully prioritize competencies, so teachers can receive training in the most needed areas first (Yopp, McKim, Moore, Odom, & Hanagriff, 2017). Borich defines knowledge as the ability to accurately recall, paraphrase, or summarize the procedural mechanics of the behavior on a paper and pencil test. Ability, is defined as accurately executing the behavior in a real or simulated environment in the presence of an observer (Borich, 1980).

Framework for 21st-century Learning

The Partnership for 21st-century Learning organization (2017) designed a framework for learning and student success in the 21st-century. The Framework for 21st-century Learning was developed in collaboration with teachers, educational experts, and leaders in business to determine the skills and knowledge needed to succeed in work, life, and citizenship in the 21st-century (Partnership for 21st-century Learning, 2017). As

shown in Figure 1, the framework represents student outcomes as arches of the rainbow and the support systems associated as the blue pools below the rainbow arches. The student outcomes are made up of life and career skills; learning and innovation skills; information, media, and technology skills; and key subjects. The support systems associated with the Framework for 21st-century Learning (Partnership for 21st-century Learning, 2017) are standards and assessments, curriculum and instruction, professional development, and learning environments. According to the Partnership for 21st-century Learning (2017), the 21st-century outcomes (the skills, knowledge, and expertise) are those which a student should master to be successful in life and workforce in today's growing global economy. The partnership for 21st-century learning allows teachers, students, and administrators alike to think outside of the box of traditional education. This framework illustrates how learning environments, professional development, curriculum and instruction, and standards and assessments work together with life and career skills, learning and innovation skills, information, media, and technology skills, and content areas to give students the ideal education.

This framework provides an additional guide to this study, as it embraces 21st-century learning skills and serves as a foundation for this study (The Partnership for 21st-century Learning, 2017).

Education in the United States

Over the last several decades, demands in employment, business, and the growing global economy have changed. These changes require workers to be educated, flexible,

and have excellent communication skills. To succeed in a dynamic, growing global economy, every student deserves an education that prides itself in 21st-century learning for college and career readiness (Vockley, 2010). Globalization has caused many changes in the U.S. economy which in turn drives changes in the American education system (Shuman, Besterfield-Sacre, McGourty, 2005). According to Shuman et al., these changes are driven by rapid information technology, downsizing of corporations, sourcing outside of the U.S., and a growing global work environment. Because technology allows for greater collaboration globally, there are professionals overseas willing to do the same work for significantly less monetary compensation than the American workforce. To combat this issue, the American education system must begin to adapt to the growing global economy by preparing students to not only have the technical skills needed but also the soft skills (Jacobson-Lunddeberg, 2016).

While the education system has been altered, it is still not considerably different than it was in the 20th century (Girlando, 2013). Wagner (2008) claimed that while teachers are teaching students how to read, write, and calculate math problems, students are not processing the information and applying it to real-world situations, and students are unable to communicate their ideas orally or in writing. Students live in a technology-rich environment that allows for a wealth of information, constant innovations in technology, and the opportunity to collaborate and communicate with those around the world. Instead of being taught to make use of the information, students are trained to memorize information, which they do not retain for an extended period of time. Wagner stated that teachers are teaching students how to solve math problems and read, while

students are not internalizing the content and learning what to do with it. Education as a whole must shift from rote memorization and brief recalling to teach students how to think critically about the information gained (Wagner, 2008). With new information being created daily it has become increasingly important to teach students the ways of knowing information rather than the information itself (Rotherham & Willingham, 2009).

Rotherham and Willingham (2009) believe that for the adoption of 21st-century skills into the classroom to be successful better curriculum must be developed; there must be better teaching and the development of better curriculum. Better curriculum is needed because the content is plentiful and can be found nearly anywhere whereas thinking skills are dependent upon each student and are crucial for the actual application of the material. If skills lie independent from content learned, the skills can be developed through the use of any content in any discipline. Twenty-first century skills must be intertwined in the curriculum and thought of as equally important as the content being taught. The American education system must not focus on the debate between content versus skills, but instead, focus on meeting the challenges of educating diverse learners on both content and skills in an engaging way that sincerely improves student outcomes. While learning academic material is valuable, students must also learn to make innovative use of what they are learning and understand how to apply core content learned to real-world situations (Kay, 2009). Students must take the academic content acquired and apply, analyze, evaluate, and create new knowledge based on what they learned. Better teaching, as emphasized by Rotherham and Willingham is crucial and requires educators across all disciplines collaborate. In addition to better curriculum and better teaching, better

assessments are essential in successfully incorporating 21st-century skills into the classroom. The Partnership for 21st-century Learning (2007) validates the belief that assessments must be produced that evaluate content simultaneously with 21st-century skills. The Partnership for 21st-century Learning has identified four things that should be implemented to promote the adoption of 21st-century skills in the classroom. These are identified as (1) creating necessary standards, (2) developing, implementing, evaluating, and improving assessment methods, (3) aligning formative and summative assessments to curriculum and instruction, and finally (4) developing a professional development strategy (pp. 8-9). The past few decades have seen significant progress pertaining to the American education reform and has dramatically benefited students who are less advantaged, but additional change is still needed to ensure our students are prepared to succeed in a growing global economy (Rotherham & Willingham, 2009).

In 2015, President Obama signed the Every Student Succeeds Act (ESSA) that made a change in education. The ESSA mandates states adopt challenging academic standards, consider more than the test score when evaluating a school, and set ambitious achievement goals for students (U.S. Department of Education, 2018). The ESSA includes provisions that help to ensure success for both students and schools. The primary purpose of the ESSA is to ensure public schools provide a quality education for all students including students in poverty, minorities, students who receive special education, and students with limited English language skills. Similar to the No Child Left Behind Act (2001), the ESSA spotlights basic skills in reading, math, and science, leaving teachers to emphasize on simple skills rather than challenging students to

consider a deeper meaning. To make the needed changes in education, educators must teach students core content; however, 21st-century skills should be interlaced through the curriculum and daily lessons in every subject (Battelle for Kids, 2019).

According to the National Center for Education Statistics (NCES, 2018), approximately 69.2% of high school graduates enrolled in college immediately following graduation, leaving 30.8% of graduates to enter the workforce directly. Many students do not have the skills they need to flourish after high school, or they might be so disconnected in their education that they drop out early (Vockley, 2010). While the younger generation of students is excellent with technology, they lack the training or interest in careers aligned with designing, creating, refurbishing, or applying and handling many 21st-century technologies. With technology ever present in the 21st-century, education must adapt to the growing needs of skilled laborers in the workforce, which is where SBAE and CTE pick up the slack. The 21st-century classroom must teach proper utilization of technology used in the industry. Education must stay up-to-date with and significant to the culture of their students (Girlando, 2013). Because technology plays such an essential role in students' lives, it is necessary for teachers to integrate it into the classroom as a platform for 21st-century skills delivery.

Twenty-First Century Skills

All students, no matter the location, economic situation, or life outside of school, deserve an adequate education to prepare them with the skills needed to be successful in the future (Girlando, 2013). The Partnership for 21st-Century Learning (2017) defines

21st-century skills as the skills required to succeed in work and life in the 21st-century. These skills can be broken down into four categories and are (1) content knowledge, (2) learning and innovation skills, (3) information, media and technology skills, and (4) life and career skills (Partnership for 21st-Century learning, 2017). The first category, content knowledge, can be described as the mastery of core subjects such as English, reading, arts, world languages, mathematics, science, and history. The second framework, learning and innovation skills is broken down into creativity and innovation, critical thinking and problem-solving, communication, and collaboration. The third framework is described as information literacy, media literacy, and information and communication technologies. Finally, the fourth framework, life, and career skills can be broken down into flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility. Because students must be prepared with these skills to be successful in the future, teachers must be trained to be highly effective in teaching 21st-century skills (Girlando, 2013).

Theorists such as Dewey (1944) and Kolb (1984) suggested that learning is gained through experience-based settings with hands-on learning, which is not a new concept, but one that must be capitalized on. Larson and Miller (2011) suggested that teachers take advantage of the opportunity to engage students by creating lessons that enhance problem-solving, integrate technology, and stimulate critical thinking. Content knowledge is necessary but not nearly enough for success in the 21st-century. Students must have skills that enable them to apply their knowledge and continue learning. According to Vockley (2010), students learn more when their work is connected to their

interests, to problems they may face in the real world, and to work and college.

While the mastery of fundamental content knowledge is crucial, students must understand how to make use of the knowledge they are learning (Girlando, 2013). Rote memorization must become a thing of the past, and a new method of teaching and assessment must be adopted to continue developing students into contributing members of society. Students must be able to encounter and solve real-world problems while taking knowledge from the situation and applying it to others (Larson & Miller, 2011). For decades, students have thought of core content classes to be irrelevant in the real-world because they have not been asked to apply these concepts in real-world situations and critical skills have not been intertwined. As a result, students leave the knowledge learned in the classroom and rarely connect it to their personal lives (Girlando, 2013). Education as a whole must prepare for a growing global economy, and to do so, 21st-century skills must be incorporated into the classroom so teachers can continue to prepare students to be successful after high school graduation.

According to Saavedra and Opfer (2012) there are nine different strategies that can be used to implement 21st-century skills in the classroom and these strategies are (1) make curriculum relevant, (2) teach through the disciplines, (3) develop thinking skills, (4) encourage the transfer of learning, (5) teach students how to learn, (6) address misunderstanding directly, (7) treat teamwork like an outcome, (8) exploit technology to support learning, and finally, (9) foster creativity. When these strategies are used, educators are preparing students to solve the economic, civic, and global challenges the world faces today (Saavedra & Opfer, 2012).

Career Skills in the School-Based Agriculture Education Classroom

Today, industry seeks to employ graduates with a wide-ranging collection of knowledge and skills—not just particular content knowledge, but skills that transfer, such as critical thinking, problem-solving, and effective communication (Lumina Foundation, 2018). The Association of Career and Technical Education (2010) identifies 21st-century skills as well as academic and technical skills as crucial in preparing students to become career ready. Agricultural education as a whole must strive to create a pool of qualified candidates that have a developed set of skills qualifying them for jobs in the industry. Twenty-first-century skills have become increasingly important for students to possess due to the growing demand of a qualified candidate pool with a broad skill set – especially in technical professions because of the rising global competition and search for innovations related to profit and productivity (Bancino & Zevalkink, 2007). SBAE teachers must customize their program to prepare students to enter the workforce directly after high school or post-secondary education (Schneider, 2016).

Numerous pieces of literature throughout the years (Bloom, 1974; Carroll, 1989; Darling-Hammond & Falk, 1997; Glaser, 1963) have recommended experiential learning for enhancing student achievement and the teaching and learning implemented in many agricultural education classrooms. Students enroll in SBAE for experiential, hands-on learning (Swinehart, 2013). According to Roberts and Ball (2009), agricultural educators should use experiential learning to teach agriculture-based content as well as life lessons. Both Dewey (1944) and Kolb (1984) have reported the importance of experiential learning to a student's academic success.

Agricultural Education has a history of experiential education through SAEs; however, in the 21st-century, fewer students involved in SBAE live on a farm than FFA members in the 20th-century (Stone, 2014). In 2013, 35.0% of FFA members lived in small towns, suburban, and urban areas (National FFA Organization, 2013). SBAE has the advantage of access to authentic workplaces where students can apply the curriculum learned in the classroom. Not only are students taught the relevant curriculum, but they are also taught how to implement that curriculum through experience-based activities. Just as the National FFA motto says, which is supported by both Dewey (1944) and Kolb (1984), FFA members and SBAE students learn by doing.

According to the Lumina Foundation (2018), the workplace skills employers consider most important are critical thinking and problem-solving, collaboration and teamwork, communication, and the technical skills associated with the job. The skills reported by the Lumina Foundation (2018) coincide directly with the 21st-century skills reported by the Partnership for 21st-Century Learning (2017), all of which have been embraced in career and technical education (Clark, Threeton, & Ewing, 2010). Only 11% of industry leaders feel strongly that students are graduating from college with the skills necessary for success in the workplace (Lumina Foundation, 2018). The FFA and SBAE provide students with the opportunity to develop 21st-century skills through employing knowledge learned in the classroom to Career Development Events (CDEs), SAEs, leadership activities, trips, and other events (Swinehart, 2014).

Skills for Tomorrow

Mastering academics is no longer enough to prepare students to succeed in college, careers, and the workforce (George Lucas Educational Foundation, 2012). It is necessary for students to possess 21st-century skills to be able to solve complex problems in our constantly changing global society. While the mastery of content, reading, and writing is still crucial, students must be able to draw their own conclusions from what they are learning. Students must be able to work efficiently with diverse groups of people, generate creative ideas to solve complex problems, communicate effectively across various media platforms, and understand complex systems that apply strategies to solve problems (George Lucas Educational Foundation, 2012). Goal setting and preparing for life after high school is incredibly important and students must understand how to navigate the digital world to locate, evaluate, analyze, interpret, and create content.

According to Gray (2004), only 67% of high school graduates attended college, leaving 33% of graduates to enter the workforce. CTE is a route for ensuring students acquire challenging academics on top of technical skills that will prepare them for high-skill, high-wage, and high-demand occupations (Williams, 2017). Many high schools are prioritizing concurrent credits and accruing college credits rather than focusing on the development of crucial skills (Williams, 2017). When CTE is combined with relevant core content, it is one of the most important programs of study high school students can enroll in (Gray & Herr, 2006) because it allows the student to obtain a well-rounded education that is critical in preparing them with the skills needed for success in the

workforce or in higher education. CTE programs nationwide are increasing in relevance and improving graduation rates by helping students gain the necessary academic and technical skills needed to succeed in the workforce as well as higher education (Williams, 2017).

Learning should no longer stop with the ring of the bell at the end of the day, rather students should be applying the content learned in classes outside of the brick and mortar building. The deeper application of content is what transitions the student from the mindset of learning for high school exams to learning skills for tomorrow. According to the National Association of Colleges and Employers Job Outlook (2015) survey, more than 80% of employers look for leadership skills when seeking employees. Employers also want written communication skills, problem-solving skills, strong work ethic, and verbal communication skills. Students should be able emphasize their ability to work as a team player, to problem-solve, and to collaborate when searching for a job (National Association of Colleges and Employers, 2015). Twenty-first skills should be instilled into students before they ever graduate from high school. Teaching students to explicitly acknowledge and understand the use of 21st-century skills will allow them to convey a sense of preparedness. Teaching students these skills in high school sets them up for success in college, their career, and when entering the workforce.

According to McCarthy (2015), being intentional with the implementation and teaching of 21st-century skills is the key to learner growth. Being intentional is the only way students can consciously develop 21st-century skills. While 21st-century skills should not take center stage in the classroom, they should act as springboard that allows students

to dive deeper into the content. Educators have the responsibility of teaching students to master academic content, but also to acquire, recognize, and use the 21st-century skills which are necessary for success in a growing global economy (Girlando, 2013). Harnessing students interests and encouraging them to become actively invested in their education will allow for them to take complete ownership of the educational process.

When students take ownership of their education, they begin to take personal responsibility for their learning. By applying what students have learned inside of the classroom to their everyday lives they learn strategies like critical thinking, problem solving, and innovation, and create constant extensions of the content.

Summary

Teaching in the 21st-century requires SBAE teachers to evaluate their current teaching strategies and make a shift to meet the needs of 21st-century learners. With skills such as problem-solving, communication, and collaboration playing a significant role in the recruitment of industry professionals today, it is imperative for teachers to prepare students for what lies ahead. While learning core content is crucial for success, students must learn, and teachers must teach how to apply the material learned to be used in real-world situations. Teachers must examine the strategies and practices they use and update it to meet the needs of preparing students who are ready to enter the workforce. The teacher must shift from rote memorization and teacher-centered classrooms to student-centered classrooms and the practical application of content knowledge. Educators must become the facilitator of learning and encourage students to construct their education

through the experiences happening in their everyday lives.

A teacher must understand how to weave students outside experiences into the classroom, so students become motivated and recognize the value in the information they are learning. For teachers to successfully teach 21st-century skills to their students, one must possess those skills as well. Although 21st-century skills in the secondary education classroom are well represented in the literature, research on 21st-century skills in the agriculture education classroom is lacking. It is beneficial we look at SBAE teachers to determine what skills they possess and what skills they lack. This study should lead to the creation of a professional development series that will assist SBAE teachers in developing 21st-century thinking skills along with teaching these skills to their students.

CHAPTER III

METHODS AND PROCEDURES

The primary purpose of this study was to explore SBAE teachers' perceived level of ability, knowledge, and the importance of implementing 21st-century skills in the SBAE classroom. Additionally, this study identified professional development needs pertaining to 21st-century skills in the agricultural education classroom.

The specific research objectives were as follows.

1. Describe SBAE teachers' perceived level of importance of 21st-century learning skills.
2. Describe SBAE teachers' perceived ability to teach 21st-century learning skills.
3. Describe SBAE teachers' perceived knowledge level regarding teaching 21st-century learning skills.
4. Identify and prioritize the professional development needs of SBAE teachers' 21st-century learning skills.
5. Describe the characteristics of SBAE teachers' (i.e., gender, age, years of teaching).
6. Determine the relationship between teachers' perceived importance to teach 21st-century skills and their demographics (i.e., gender, age, years of teaching).
7. Determine the relationship between teachers' perceived ability to teach 21st-century skills and their demographics (i.e., gender, age, years of teaching).
8. Determine the relationship between teachers perceived knowledge of 21st-century skills and their demographics (i.e., gender, age, years of teaching).

Research Design

This research study is a quantitative assessment of educators perceived

knowledge, importance, and ability to teach 21st-century learning skills in the SBAE classroom. This study sought to answer the following questions: Do SBAE teachers find 21st-century learning skills essential? What skills do SBAE teachers possess based on years of teaching? Are SBAE teachers able to teach 21st-century skills? With this knowledge, the study should provide a framework for recommendations of professional development, inservice training, and preservice education.

This study utilizes an online survey administered through Qualtrics. Using Qualtrics and online survey research is effective for collecting, organizing, and analyzing the data (De Vaus, 2013). Using Qualtrics allows for easy survey completion by participants because of the lack of geographic limits, the ease of using technology, and the low cost to maintain.

Population and Sample

The approximate 12,000 SBAE teachers nationwide are the population for this needs assessment study (National Association of Agricultural Educators [NAAE], 2018). This population includes all SBAE teachers, with a systematic random sample of teachers nationwide who teach agriculture. The researcher obtained the frame for the population from the National FFA Organization. The National FFA Organization selected a systematic random sample based on population size (Krejcie & Morgan, 1970). According to Krejcie and Morgan, the sample size needed for this study was approximately 373 participants. The sample consisted of 560 SBAE teachers nationwide, representing all FFA regions. The researcher obtained an additional 127 participants due

to a low response rate in agriculture teachers when using E-mail and Web-based surveys (Fraze, Hardin, Brashears, Haygood, & Smith, 2003). The instrument did not collect identifiers and produced a response rate of 20%. Early and late responders produced no significant difference when responses to Likert-type questions were compared using *t* tests on their responses to perceived importance questions (Linder, Murphy, & Briers, 2001).

Instrumentation

An instrument previously developed by and adapted from Magno, Bardemorilla, and Pecson (2016) was administered through Qualtrics online web survey software. The researcher distributed personal survey invitations via email through Qualtrics. This was necessary to track respondents, provide personalized "thank you" and "reminder" emails, allowed the researcher to identify non-respondents, prevent data collection issues, and prevent an overabundance of emails to respondents. Once data collection was complete, the results were downloaded from Qualtrics. The respondent's emails were known to the investigators and were coded to a master list and kept separately from the data and results. Additionally, all respondent identifiers were removed before data analysis.

The surveys are located in Appendices A and B of this document. Both instruments included a letter of information detailing the purpose of the study, the procedures, risks, confidentiality, benefits, an explanation of questions, voluntary participation, IRB approval statement, and a researcher statement. The instruments were

modified to obtain demographic information and develop the needs assessment from the Magno et al. (2016) survey. The instruments focused on applying the principles of 21st-century learning in the SBAE classroom and asked teachers to self-report their level of importance, knowledge, and perceived ability to help their students learn in the following areas: critical thinking, creative thinking, collaborating, communicating, information literacy, media literacy, technology literacy, flexibility, initiative, social skills, productivity, and leadership. A 1-to-4 Likert-type scale was used, 1 = Not Important, 2 = Somewhat Important, 3 = Important, 4 = Very Important; 1 = Not Competent, 2 = Somewhat Competent, 3 = Competent, 4 = Very Competent; 1 = Not Knowledgeable, 2 = Somewhat Knowledgeable, 3 = Knowledgeable, 4 = Very Knowledgeable.

Assessing 21st-century skills using the Borich (1980) needs assessment model required each participant be asked their level of importance and perceived ability to teach each item. Initially, the pilot instrument was sent to 500 teachers, after three weeks of data collection following Dillman's (2014) Tailored Design method there was a 3.8% response rate. The length of this instrument resulted in an excess of questions, respondent fatigue, and item non-response. Respondent fatigue is caused by respondents being asked a large number of questions which in turn leads to disengaged respondents, inaccurate results and boredom (Dillman, Sinclair, & Clark, 1993; Hess, Hensher, & Daly, 2012). Bradley and Daly (1994) reported an effect of respondent fatigue; "…respondent 'fatigue' may cause people to make choices less carefully as the number of choices increases" (p. 171). Based on feedback from the pilot study, the instrument was condensed from a series of 12 constructs to three constructs. Therefore, two shorter forms

of the instrument were developed in which all respondents answered one set of identical questions regarding the level of importance and one section of unique questions regarding their perceived ability to teach each item or their knowledge of each item. The modification was made after assessing the pilot study to reduce the response time from twenty minutes to five minutes lessening the likelihood of respondent fatigue. After making the modification and redistributing the instrument the participants who responded to the initial survey were then excluded out of the final sample.

The Borich (1980) Needs Assessment model is frequently used in education to determine professional development needs of a group of teachers. However, after considering Borich's needs assessment model and the expansive nature of 21st-century skills, the instrument was broken into two different areas. When using the Borich model, each participant is asked importance, ability, and knowledge which would have likely ended in respondent fatigue and inaccurate responses. Two versions of the instrument were created to eliminate the issue of non-response. Participants got randomly assigned to two sub-groups through a systematic random sample. In group I, respondents selected an answer from a Likert-type scale (1 = Not Important to 4 = Very Important) regarding their perceived level of importance of the 21st-century skills in the SBAE classroom and their perceived knowledge of the 21st-century skills (1 = Not Knowledgeable to 4 = Very Knowledgeable). Group II selected their perceived importance and their perceived ability to teach the 21st-century skills (Not Competent to Very Competent). Both versions of the instrument asked gender, age, and years of teaching agriculture. Splitting the sample in half and asking each group a different form of the instrument reduced the length of the

needs assessment by 25%, ensuring respondents were less likely to experience respondent fatigue (Dillman, Sinclair, & Clark, 1993).

Figure 2 further explains the subgroups. The first section of each instrument was exactly the same; respondents indicated the importance of teaching each of the 12 identified 21st-century skills, using a 4-point Likert-type scale (1 = Not Important, 4 = Very Important). The second section of instrument differed: In group I, teachers indicated their level of knowledge for each of the identified 21st-century skills (1 = Not Knowledgeable, 4 = Very Knowledgeable). In group II, teachers indicated their ability to teach each of the identified 21st-century skills (1 = Not Competent, 4 = Very Competent). Both versions of the instrument included the demographics section which asked teachers to indicate their gender, age, and years of teaching.

Group	Importance	Knowledge	Ability	Demographics
Group I	Importance of 21st-century Skills (12 Items)	Knowledge of 21st-century Skills (12 Items)		Demographics
Group II	Importance of 21st-century Skills (12 Items)		Ability to Teach 21st-century Skills (12 Items)	Demographics

Figure 2. Two instruments were developed to measure teachers' perceived levels of competency of 21st-century skills. Each instrument consisted of 24 questions in total, 12 items measured the importance of 21st-century skills, and an additional 12 items measured knowledge (group I) or perceived ability (group II).

Data Collection

Dillman's (2014) Tailored Design Method (TDM) emphasizes effectiveness in achieving a high response rate with online surveys. The TDM includes contacting

participants multiple times, which consists of an introduction of the study and multiple follow up reminder emails (Dillman, 2014). As shown in Appendices C and D, the researcher contacted participants eight times, the first of which introduced the study (Appendix C), requested participation from recipients, explained how and why they were selected, how to access the survey, an explanation of the confidential nature of the research, voluntary participation, privacy rights, compensation, and thanking them for their time. Additionally, the email included the survey link. To remind participants of the study, request their participation, explain the voluntary nature, confidentiality, and compensation of the study the researcher sent a reminder email 1 week after the initial introduction (Appendix D). Again, the email included the survey link. Participants received email reminders a total of five times (Appendices EiI). The researcher sent a final thank you email one month after sending the initial introduction email. Respondents were offered an incentive as a giveaway drawing of an FFA backpack, drone, or a $25 Shop FFA gift card. A master list was created that contained all respondent emails and personal identifiers, this list was kept separately from data and removed before data analysis.

Validity and Reliability

The instrument developed by Magno et al. (2016) has been used on both preservice teachers and current teachers, but to further test the validity and reliability of the instrument a panel of experts comprised of faculty in career and technical education at Utah State University, faculty in agriculture education from three outside universities,

and a needs assessment expert have reviewed the instrument to determine face and content validity.

In addition, a Cronbach's alpha coefficient calculated reliability of the instrument after data collection had been completed. Table 1 illustrates the calculated Cronbach's alpha coefficient for importance, ability, and knowledge. An alpha over .70 is considered a good reliability, which indicated that the importance, ability, and knowledge constructs of the instrument were reliable (Cronbach, 1951).

Table 1

Cronbach's Alpha for 21st-Century Skill Items

Item	Cronbach's alpha
Importance	.85
Ability	.85
Knowledge	.88

Data Analysis

Designed after the Borich (1980) needs assessment model, the instrument collected data measuring SBAE teachers perceived importance, ability and knowledge of 21st-century skills. Previous literature determined the Borich needs assessment model to be the most appropriate means to evaluate agriculture teachers (Edwards & Briers, 1999; Joerger, 2002; Sorensen, Tarpley, & Warnick, 2010). To describe SBAE teachers' perceived level of importance, perceived knowledge, and perceived ability to teach 21st-century skills frequency and descriptive statistics determined a *SD*, Mean, and frequency count for research objectives one, two, and three. A MWDS calculated using the Excel-

based MWDS calculator (McKim & Saucier, 2011) identified and prioritized professional development needs of SBAE teachers' 21st-century learning skills.

The MWDS determined the discrepancy between the teachers perceived importance, knowledge, and ability levels regarding teaching 21st-century skills in the SBAE classroom. Additionally, for research objectives six, seven, and eight, comparing the 21st-century skill constructs of the instrument to years of teaching and age required a Pearson's Product Moment and gender required a point biserial correlation. These analyses determined the relationship between gender, age, years of teaching, and their perceived ability to teach 21st-century skills. Additionally, by using the Borich (1980) needs assessment model, each construct included a mean weighted discrepancy score (McKim & Saucier, 2011).

Summary

This study conducted a needs assessment to determine the perceived ability, perceived knowledge, and the perceived level of importance when implementing 21st-century skills into the 21st-century agricultural education classroom. A researcher-developed instrument created by Magno et al. (2016) was adapted and administered through Qualtrics and analyzed using SPSS and Excel.

CHAPTER IV

RESULTS AND FINDINGS

The purpose of this study was to examine the importance, knowledge and the perceived ability to teach 21st-century skills in the SBAE classroom nationwide. The results of this research will allow agricultural educators, teacher educators, and state leaders the information needed to develop 21st-century skills focused inservice training. The following information reflects responses from SBAE teachers nationwide and their perceptions regarding the importance of teaching 21st-century skills, their knowledge of these skills, and their perceived ability.

Eight objectives were identified to achieve the purpose of this study. Those objectives were to:

1. Describe SBAE teachers' perceived level of importance of 21st-century learning skills.
2. Describe SBAE teachers' perceived ability to teach 21st-century learning skills.
3. Describe SBAE teachers' perceived knowledge level regarding teaching 21st-century learning skills.
4. Identify and prioritize the professional development needs of SBAE teachers' 21st-century learning skills.
5. Describe the characteristics of SBAE teachers (i.e., gender, age, years of teaching).
6. Determine the relationship between teachers' perceived importance to teach 21st-century skills and their demographics (i.e., gender, age, years of teaching).
7. Determine the relationship between teachers' perceived ability to teach 21st-century skills and their demographics (i.e., gender, age, years of teaching).

8. Determine the relationship between teachers' perceived knowledge of 21st-century skills and their demographics (i.e., gender, age, years of teaching).

Objective One: Describe SBAE Teachers' Perceived Level of Importance of 21st-Century Learning Skills

Both subgroups received 12 questions regarding their perceived importance of 21st-century skills in the SBAE classroom. Teachers ranked their perceived importance of the incorporation of these skills in the classroom. The Likert type scale ranged from 1 "Not Important" to 4 "Very Important." Table 2 includes the data combined from both groups I and II. As shown in Table 2, the high mean scores for all 12 21st-century learning items indicates teachers believe the incorporation of these skills into their classrooms is critical.

As shown in Tables 2 and 3, the majority of respondents felt that the 12 identified 21st-century skills were important. Overall, respondents indicated on average each skill was "Important" or "Very Important." Out of the 12 identified 21st-century skills, the majority of respondents indicated collaborating (M = 3.66; SD = .50), communicating (M = 3.86; SD = .45), creative thinking (M = 3.49; SD = .61), critical thinking (M = 3.78; SD = .44), flexibility (M = 3.43; SD = .60), information literacy (M = 3.45; SD = .71), initiative (M = 3.65; SD = .52), leadership (M = 3.58; SD = .59), productivity (M = 3.58; SD = .59), social skills (M = 3.61; SD = .53), and technology literacy (M = 3.48; SD = .54) were "Very Important" skills to incorporate into the classroom.

While the majority of the 21st-century skills received high mean scores indicating a high importance, media literacy had a frequency count of 17 respondents indicating that

Table 2

School-Based Agricultural Education Teachers' Perceived Level of Importance Per 21st-Century Learning Skill Item

Item	*M*	*SD*	*N*
Communicating	3.86	.45	98
Critical Thinking	3.78	.44	98
Collaborating	3.66	.50	98
Initiative	3.65	.52	96
Social Skills	3.61	.53	96
Productivity	3.58	.59	96
Leadership	3.58	.59	96
Creative Thinking	3.49	.61	98
Technology Literacy	3.48	.54	97
Information Literacy	3.45	.60	97
Flexibility	3.43	.60	93
Media Literacy	3.18	.71	97

Scale: 1 = Not Important, 2 = Somewhat Important, 3 = Important, 4 = Very Important.

Table 3

School-Based Agricultural Education Teachers' Perceived Level of Importance Per 21st-Century Learning Skill Item

	Not important		Somewhat important		Important		Very important	
Item	*f*	%	*f*	%	*f*	%	*f*	%
Collaborating	0	0	1	1.0	31	31.6	66	67.3
Communicating	1	1.0	1	1.0	9	9.2	87	88.8
Creative thinking	0	0	6	5.1	38	32.2	54	45.8
Critical thinking	0	0	1	1.0	20	20.4	77	78.6
Flexibility	0	0	5	5.4	43	46.2	45	48.4
Information literacy	1	1.0	2	2.1	46	47.4	48	49.5
Initiative	0	0	2	2.1	30	25.4	64	54.2
Leadership	1	1.0	2	2.1	33	34.4	60	62.5
Media literacy	0	0	17	17.5	46	47.4	34	35.1
Productivity	0	0	5	5.2	30	31.3	61	63.5
Social skills	0	0	2	2.1	33	34.4	61	51.7
Technology literacy	0	0	2	2.1	46	47.4	49	50.5

media literacy was only "Somewhat Important." In addition, six respondents indicated that creative thinking was only "Somewhat Important" and five respondents indicated that flexibility is "Somewhat Important." While there were multiple respondents that did not perceive these skills as "Very Important," data shows a high mean score, which indicates that overall SBAE teachers perceive these skills as important to incorporate into the agriculture education classroom.

Objective Two: Describe SBAE Teachers' Perceived Ability to Teach 21st-Century Learning Skills

Group II responded to questions regarding both importance and ability. The SBAE teachers ranked their perceived ability to teach 21st-century learning skills on a Likert-type scale of 1-4. As shown in Table 4, the SBAE teachers involved in this study believed they were competent in terms of teaching leadership, social skills, flexibility, communicating, collaborating, initiative, and productivity. On average, teachers believed they were "Somewhat Competent" in terms of teaching critical thinking, information literacy, creative thinking, media literacy, and technology literacy. While none of the items received a mean score indicating no competence, the mean scores ranging between 2 and 3 show a need for more focused inservice and preservice training regarding critical thinking, information literacy, creative thinking, media literacy, and technology literacy.

While respondents indicated that 21st-century skills were important, they showed lower mean scores in terms of their actual ability level. Overall, the majority of respondents indicated that they were either "Competent" or "Very Competent"

Table 4

School-Based Agricultural Education Teachers' Perceived Level of Ability Per 21st-century Learning Skill Item

Item	Mean	*SD*	*n*
Leadership	3.35	.78	43
Social skills	3.30	.74	43
Flexibility	3.26	.73	42
Communicating	3.16	.61	44
Collaborating	3.11	.75	44
Initiative	3.09	.75	43
Productivity	3.02	.64	43
Critical thinking	2.98	.67	44
Information literacy	2.95	.62	43
Creative thinking	2.89	.69	44
Media literacy	2.60	.66	43
Technology literacy	2.60	.79	43

Scale: 1 = Not Competent, 2 = Somewhat Competent, 3 = Competent, 4 = Very Competent.

concerning their perceived ability to teach these skills. However, 51.2% of respondents indicated they were only "Somewhat Competent" in terms of technology literacy, 41.9% indicated they were "Somewhat Competent" in media literacy, and only 29.5% were "Somewhat Competent" in creative thinking. As shown in Table 5, while the mean for technology literacy, media literacy, and creative thinking indicated the majority of respondents were "Competent," the frequency count indicated there were multiple respondents who need professional development in these areas.

As shown in Table 5, out of the identified 21st-century skills, the majority of respondents indicated they were "Very Competent" in terms of flexibility (M = 3.26; SD = .73), leadership (M = 3.35; SD = .78), and social skills (M = 3.30; SD = .74). A high SD for each of the 12 items indicated there was a large range between the highest and lowest

Table 5

School-Based Agricultural Education Teachers' Perceived Level of Ability Per 21st-Century Learning Skill Item

	Not competent		Somewhat competent		Competent		Very competent	
Item	*f*	%	*f*	%	*f*	%	*f*	%
Collaborating	1	2.3	7	15.9	22	50.0	14	31.8
Communicating	0	0	5	11.4	27	61.4	12	27.3
Creative thinking	0	0	13	29.5	23	52.3	8	6.8
Critical thinking	0	0	10	22.7	25	56.8	9	20.5
Flexibility	0	0	7	16.7	17	40.5	18	42.9
Information literacy	0	0	9	20.9	27	62.8	7	16.3
Initiative	0	0	10	23.3	19	44.2	14	32.6
Leadership	1	2.3	5	11.6	15	34.9	22	51.2
Media literacy	1	2.3	18	41.9	21	48.8	3	7.0
Productivity	0	0	8	18.6	26	60.5	9	7.6
Social skills	0	0	7	16.3	16	37.2	20	46.5
Technology literacy	1	2.3	22	51.2	13	30.2	7	16.3

ability scores. While the mean scores were relatively high, a high *SD* shows that there were respondents on both ends of the competence scale, meaning there were respondents who felt they had low competence.

Objective Three: Describe SBAE teachers' Perceived Knowledge Level Regarding Teaching 21st-Century Learning Skills

The respondents in group I ranked their perceived level of knowledge in regards to 21st-century skills on a Likert-type scale of 1 to 4. On average, SBAE teachers indicated they were "Knowledgeable" about teaching leadership, communication, social skills, productivity, initiative, and collaborating. However, teachers indicated they were

only “Somewhat Knowledgeable” in regard to critical thinking, flexibility, creative thinking, information literacy, technology literacy, and media literacy. While none of the items received a mean score indicating no knowledge, the mean scores ranging between 2 and 3 show a need for more focused inservice and preservice training regarding critical thinking, flexibility, creative thinking, information literacy, technology literacy, and media literacy.

A high *SD* for each of the twelve items indicated there is a large range between the highest and lowest knowledge scores. While the mean scores were relatively high, a high *SD* showed that there were respondents on both ends of the knowledge scale, meaning there were respondents who felt they have low knowledge of the 21st-century skills. While respondents indicated a high level of importance in terms of 21st-century skills in the SBAE classroom, they indicated lower knowledge level. Overall, the mean scores as shown in Table 6, indicated that respondents were “Knowledgeable” about 21st-century skills. However, the mean scores ranging from 3.27 – 2.73 indicated there was room for professional development to increase SBAE teacher’s knowledge regarding 21st-century skills.

As shown in Table 7, over 50% of respondents indicated they were “Knowledgeable” about collaborating (*M* = 3.02; *SD* = .53), communicating (*M* = 3.17; *SD* = .67), creative thinking (*M* = 2.91; *SD* = .62), critical thinking (*M* = 2.98; *SD* = .60), flexibility (*M* = 2.94; *SD* = .60), information literacy (*M* = 2.84; *SD* = .66), initiative (*M* = 3.06; *SD* = .67), leadership (*M* = 3.27; *SD* = .64), media literacy (*M* = 2.73; *SD* = .67),

Table 6

School-Based Agricultural Education Teachers' Perceived Level of Knowledge Per 21st-century Learning Skill Item

Item	Mean	*SD*	*n*
Leadership	3.27	.64	48
Communicating	3.17	.67	47
Social Skills	3.15	.58	48
Productivity	3.06	.67	48
Initiative	3.06	.67	48
Collaborating	3.02	.53	47
Critical Thinking	2.98	.60	48
Flexibility	2.94	.60	48
Creative Thinking	2.91	.62	47
Information Literacy	2.84	.66	49
Technology Literacy	2.76	.75	49
Media Literacy	2.73	.67	49

Scale: 1 = Not Knowledgeable, 2 = Somewhat Knowledgeable, 3 = Knowledgeable, 4 = Very Knowledgeable.

Table 7

School-Based Agricultural Education Teachers' Perceived Level of Knowledge Per 21st-Century Learning Skill Item

	Not knowledgeable		Somewhat knowledgeable		Knowledgeable		Very knowledgeable	
Item	*f*	%	*f*	%	*f*	%	*f*	%
Collaborating	0	0	6	12.8	34	72.3	7	14.9
Communicating	1	2.1	4	8.5	28	59.6	14	29.8
Creative thinking	1	2.1	8	17.1	32	68.1	6	12.8
Critical thinking	1	2.1	6	12.5	34	70.8	7	14.6
Flexibility	0	0	10	20.8	31	64.6	7	14.6
Information literacy	0	0	15	30.6	27	55.1	7	14.3
Initiative	1	2.1	6	12.5	30	62.5	11	22.9
Leadership	0	0	5	10.4	25	52.1	18	37.5
Media literacy	2	4.1	13	26.5	30	61.2	4	8.2
Productivity	0	0	9	18.8	27	56.3	12	25.0
Social skills	0	0	5	10.4	31	64.6	12	25.0
Technology literacy	2	4.1	15	30.6	25	51.0	7	14.3

productivity (*M* = 3.06; *SD* = .67), social skills (*M* = 3.15; *SD* = .58), and technology literacy (*M* =2.76; *SD* = .75).

While the mean scores for the 21st-century skills indicated teachers are "Knowledgeable," the frequency count indicated a need for a knowledge increase in terms of all of the 12 indicated 21st-century skill items. As shown in Table 7, 30.6% of respondents indicated that they were only "Somewhat Knowledgeable" about information literacy and technology literacy while 26.5% of respondents indicated they were "Somewhat Knowledgeable" about media literacy. Respondents also indicated they were only "Somewhat Knowledgeable" about both productivity (18.8%) and creative thinking (17.1%).

Objective Four: Identify and Prioritize the Professional Development Needs of SBAE Teachers' 21st-Century Learning Skills

To identify and prioritize the professional development needs of SBAE teachers in regards to 21st-century learning skills a MWDS calculated the discrepancy between both importance and knowledge as well as importance and ability. A Borich Needs Assessment (Borich, 1980) determines professional development needs by determining the discrepancy between ability, importance, and knowledge. The discrepancy scores were weighted by multiplying each score by the mean of the importance scores which was then averaged to create a MWDS. The higher the MWDS, the more professional development is needed in that area.

Table 8 illustrates the findings that examined the discrepancy between importance

Table 8

Mean Weighted Discrepancy Score Between Importance and Ability (*n* = 48)

Item	Mean weighted discrepancy score
Critical thinking	3.47
Technology literacy	2.98
Communicating	2.52
Collaborating	2.24
Productivity	2.19
Creative thinking	1.96
Initiative	1.94
Information literacy	1.58
Social skills	1.27
Leadership	1.20
Media literacy	1.19
Flexibility	0.66

Scale: 1 = Not Important, 2 = Somewhat Important, 3 = Important, 4 = Very Important; 1 = Not Competent, 2 = Somewhat Competent, 3 = Competent, 4 = Very Competent.

and ability and Table 9 illustrates the findings which examined the discrepancy between importance and knowledge. Both groups indicated a discrepancy between the importance of 21st-century skills and their perceived knowledge and ability to teach the skills. Table 8, compared importance and ability, and the items that produced the highest discrepancy were critical thinking, technology literacy, and communicating, indicating that SBAE teachers found these items important but indicate a lower perceived ability to teach them.

Table 9, comparing importance and knowledge also identified communicating, critical thinking, and technology literacy as the highest discrepancy which indicated a need for professional development in these areas. While the majority of the MWDS showed a lower discrepancy between importance, ability, and knowledge, as Tables 8 and

Table 9

Mean Weighted Discrepancy Score Between Importance and Knowledge (*n* = 49)

Item	Mean weighted discrepancy score
Communicating	2.82
Critical Thinking	2.70
Technology Literacy	2.48
Information Literacy	2.19
Initiative	2.13
Creative Thinking	2.00
Media Literacy	1.89
Social Skills	1.74
Productivity	1.70
Collaborating	1.65
Flexibility	1.48
Leadership	1.20

Scale: 1 = Not Important, 2 = Somewhat Important, 3 = Important, 4 = Very Important; 1 = Not Knowledgeable, 2 = Somewhat Knowledgeable, 3 = Knowledgeable, 4 = Very Knowledgeable

9 showed both groups had a positive discrepancy score for all 12 of the 21st-century learning skill items, which indicates a need for professional development in each of the identified areas. Both Table 8 and 9 show that SBAE teachers feel 21st-century learning skills are important but lack the ability and the knowledge needed to teach them. Table 9 compared the discrepancy between SBAE teachers perceived ability and perceived knowledge of the identified 21st-century learning skills. The MWDS was higher when analyzing the discrepancy between importance and ability for the following items: critical thinking, collaborating, technology literacy, and productivity compared to the discrepancy between importance and knowledge. The higher MWDS indicated that teachers believed these skills were essential, they are "Knowledgeable" about the skills, but they displayed a lower ability to teach them.

Objective Five: Describe the Characteristics of SBAE Teachers' (Gender, Age, and Years of Teaching)

The average age of respondents was 36.86 (*SD* = 11.22) years old. In regard to gender, 49.50% of respondents were male, 50.50% female. In addition to gender and age, data was also collected regarding the number of years taught which averaged to be 11.17 years (*SD* = 9.42). Details of demographic characteristics are outlined in Table 10.

Table 10

Demographic Characteristics of Agriculture Teachers (*n* = 97)

Characteristics	*f*	%	*M*	*SD*	Range
Gender					
Male	48	49.50			
Female	49	50.50			
Years Teaching			11.17	9.42	42
1 - 5	37	38.10			
6 - 10	17	17.70			
11 - 15	17	17.60			
16 - 25	19	19.50			
26 +	7	7.00			
Age			36.86	11.22	42
20 - 29	32	33.40			
30 - 39	30	31.00			
40 - 49	16	16.50			
50 - 59	15	15.50			
60 +	3	3.00			

Objective Six: Determine the Relationship Between Teachers' Perceived Importance to Teach 21st-Century Skills and Their Demographics (Gender, Age, Years of Teaching)

To understand the magnitude of the correlation coefficients, the Davis (1971) conventions were used. Table 11 shows the correlation coefficient scale and corresponding convention. While the majority of the correlations between the demographic characteristics and the importance of 21st-century skills was calculated as low or negligible, there was a moderate correlation between years of teaching and communicating.

Table 11

Davis (1971) Conventions for Correlation Coefficient

Correlation coefficient	Convention
1.00	Perfect
.70 - .99	Very high
.50 - .69	Substantial
.30 - .49	Moderate
.10 - .29	Low
.01 - .09	Negligible

As shown in Table 12, there was a low negative correlation between communicating and age, indicating that the younger a teacher was, the more likely they were to perceive communicating as an important skill to possess in the 21st-century. Additionally, there was a low negative correlation between productivity and years teaching as well as productivity and age, indicating younger and less experienced

Table 12

Bivariate Correlation Between Importance and Selected Demographics (*n* = 97)

Demographics	*r*	Magnitude
Collaborating		
Gender	.11	Low
Years teaching	-.14	Low
Age	-.11	Low
Communicating		
Gender	.22	Low
ears teaching	-.31	Moderate
Age	-.24	Low
Creative thinking		
Gender	-.01	Negligible
Years teaching	-.10	Low
Age	-.11	Low
Critical thinking		
Gender	-.01	Negligible
Years teaching	-.10	Low
Age	-.06	Negligible
Flexibility		
Gender	.13	Low
Years teaching	-.23	Low
Age	-.16	Low
Information literacy		
Gender	.17	Low
Years teaching	-.15	Low
Age	-.12	Low
Initiative		
Gender	-.02	Negligible
Years teaching	.04	Negligible
Age	-.01	Negligible
Leadership		
Gender	.03	Negligible
Years teaching	-.12	Low
Age	-.12	Low

(*table continues*)

Demographics	*r*	Magnitude
Media literacy		
Gender	-.01	Negligible
Years teaching	-.14	Low
Age	-.18	Low
Productivity		
Gender	-.09	Negligible
Years teaching	-.23	Low
Age	-.22	Low
Social skills		
Gender	-.06	Negligible
Years teaching	-.19	Low
Age	-.12	Low
Technology literacy		
Gender	.16	Low
Years teaching	-.14	Low
Age	-.13	Low

Note. 1 = Male, 2 = Female

teachers found these skills more important. While gender consistently produced a negligible correlation, age and years teaching produced low negative correlations in multiple areas. As shown in Table 12, the less experienced teachers perceive collaborating, creative thinking, critical thinking, flexibility, information literacy, leadership, media literacy, productivity, social skills, and technology literacy to be important. Communicating produced a moderate negative correlation between importance and years teaching. Additionally, in comparison to age, collaborating, communicating, creative thinking, flexibility information literacy, leadership, media literacy, productivity, social skills, and technology literacy produced a low negative correlation.

Objective Seven: Determine the Relationship Between Teachers' Perceived Ability to Teach 21st-Century Skills and Their Demographics (Gender, Age, Years of Teaching)

As shown in Table 13, years teaching and respondents knowledge of collaboration produced a moderate negative correlation (r = -.41). Additionally, gender and respondents' knowledge of critical thinking produced a moderate negative correlation (r_{pb} = -.31). Respondents knowledge of media literacy produced a moderate negative correlation (r = -.39) with age. In addition to these significant figures, years teaching and creative thinking, critical thinking, flexibility, media literacy, productivity, social skills, and technology literacy produced low correlations with years teaching.

Objective Eight: Determine the Relationship Between Teachers' Perceived Knowledge Of 21st-Century Skills and Their Demographics (Gender, Age, Years of Teaching)

As shown in Table 14, critical thinking, collaborating, and leadership produced a significant correlation when compared to age and teachers' ability. In addition, years teaching and collaborating, communicating, critical thinking, and social skills produced a low correlation. When compared to age, collaborating, communicating, as shown in Table 14, the older and more experienced a teacher is the more knowledgeable, they were about collaborating, communicating, and critical thinking. The younger, and less experienced a teacher is the more they perceived to know about information literacy, initiative, and leadership.

Table 13

Bivariate Correlation Between Ability and Selected Demographics (*n* = 97)

Demographic	*r*	Magnitude
Collaborating		
Gender	.21	Low
Years teaching	-.41	Moderate
Age	-.21	Low
Communicating		
Gender	-.05	Negligible
Years teaching	-.08	Negligible
Age	-.20	Low
Creative thinking		
Gender	-.10	Low
Years teaching	.13	Low
Age	-.06	Negligible
Critical thinking		
Gender	-.31	Moderate
Years teaching	.22	Low
Age	.20	Low
Flexibility		
Gender	-.03	Negligible
Years teaching	-.17	Low
Age	-.14	Low
Information literacy		
Gender	.23	Low
Years teaching	.08	Negligible
Age	-.02	Negligible
Initiative		
Gender	.06	Negligible
Years teaching	.09	Negligible
Age	.03	Negligible
Leadership		
Gender	-.04	Negligible
Years teaching	-.01	Negligible
Age	-.16	Low
Media literacy		
Gender	.19	Low
Years teaching	-.23	Low
Age	-.39	Moderate

(*table continues*)

Demographic	*r*	Magnitude
Productivity		
Gender	-.04	Negligible
Years teaching	-.15	Low
Age	-.06	Negligible
Social skills		
Gender	.02	Negligible
Years teaching	.10	Low
Age	.03	Negligible
Technology literacy		
Gender	.10	Low
Years teaching	-.14	Low
Age	-.29	Low

Note. 1 = Male, 2 = Female.

Summary

The purpose of this study was to identify and describe the inservice needs of SBAE teachers nationwide in regard to 21st-century skills. Teachers' importance, perceived ability, and perceived level of knowledge were evaluated to determine areas in which professional development could be beneficial. This evaluation pinpointed some possible areas for professional development to aid in better preparing educators to teach 21st-century skills in the SBAE classroom, gathered basic demographics, and provided valuable insight regarding 21st-century skills in agriculture education. Overall, SBAE teachers nationwide reported that 21st-century skills are important to incorporate into the classroom. SBAE teachers recognize the importance of instilling these skills into their students to prepare them for success after high school but lack the ability and knowledge to teach them.

Table 14

Bivariate Correlation Between Knowledge and Selected Demographics (n = 97)

Demographic	*r*	Magnitude
Collaborating		
Gender	.04	Negligible
Years teaching	.14	Low
Age	.18	Low
Communicating		
Gender	-.04	Negligible
Years teaching	.16	Low
Age	.25	Low
Creative thinking		
Gender	.08	Negligible
Years teaching	.01	Negligible
Age	.14	Low
Critical thinking		
Gender	-.10	Low
Years teaching	.21	Low
Age	.31	Moderate
Flexibility		
Gender	.04	Negligible
Years teaching	-.08	Negligible
Age	.08	Negligible
Information literacy		
Gender	-.17	Low
Years teaching	-.16	Low
Age	-.08	Negligible
Initiative		
Gender	.15	Low
Years teaching	-.13	Low
Age	-.05	Negligible
Leadership		
Gender	.08	Negligible
Years teaching	-.16	Low
Age	-.19	Low
Media literacy		
Gender	-.13	Low
Years teaching	-.01	Negligible
Age	-.04	Negligible

(*table continues*)

Demographic	*r*	Magnitude
Productivity		
Gender	-.04	Negligible
Years teaching	-.11	Low
Age	-.09	Negligible
Social skills		
Gender	.03	Negligible
Years teaching	.11	Low
Age	.07	Negligible
Technology literacy		
Gender	.02	Negligible
Years teaching	-.05	Negligible
Age	-.04	Negligible

Note. r_{pb}; 1 = Male, 2 = Female.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Purpose and Objectives of the Study

The purpose of this study was to identify and describe the inservice needs of SBAE teachers nationwide in regard to 21st-century skills. The results of this study will allow teacher educators and state leaders the information needed to conduct focused professional development for 21st-century skill implementation. Results will also provide data for further research on the topic. To achieve the purpose of this study, the following statements served as objectives for the study.

1. Describe SBAE teachers' perceived level of importance of 21st-century learning skills.
2. Describe SBAE teachers' perceived ability to teach 21st-century learning skills.
3. Describe SBAE teachers' perceived knowledge level regarding teaching 21st-century learning skills.
4. Identify and prioritize the professional development needs of SBAE teachers' 21st-century learning skills.
5. Describe the characteristics of SBAE teachers (i.e., gender, age, years of teaching).
6. Determine the relationship between teachers' perceived importance to teach 21st-century skills and their demographics (i.e., gender, age, years of teaching).
7. Determine the relationship between teachers' perceived ability to teach 21st-century skills and their demographics (i.e., gender, age, years of teaching).
8. Determine the relationship between teachers' perceived knowledge of 21st-century skills and their demographics (i.e., gender, age, years of teaching).

Conclusions and Discussion

Based on the findings of this study, several conclusions can be made. SBAE teachers perceive 21st-century learning skills as important and they believe the implementation of these skills into the classroom is crucial. While respondents reported a high level of importance, it was found that there is a discrepancy between importance and knowledge as well as importance and ability indicating teachers lack the knowledge and ability needed to teach these skills. While teachers find these skills necessary, the question still remains: Are SBAE teachers explicitly teaching these skills in their classrooms? Industry leaders are adamant about the need for entry-level employees who are capable of collaborating, innovating, thinking critically, and creatively, so why are students not graduating prepared to fill that void (Hyslop, 2008)? The content taught in SBAE classrooms around the nation is essential, but students' ability to dissect and apply the information outside of the classroom is critical. When taught the crucial 21st-century skills, students should have the ability to apply this information across all disciplines and walks of life, allowing them to take the content learned in the traditional classroom and apply it in the workforce (Hysop, 2008).

The majority of respondents indicated they were "Knowledgeable" and "Competent" indicating they see the value in teaching 21st-century skills, they know what these skills are, and for the most part, are able to teach them. Although the majority of respondents indicated they were "Knowledgeable" and "Competent," data shows a *SD* ranging from .79 to .62, indicating respondents were on both ends of the spectrum. The MWDS of each item for the importance and ability as well as the importance and

knowledge supported the finding that professional development is needed. A high MWDS in critical thinking, communicating, and technology literacy correlated with literature which found that very few teachers actually teach critical thinking or even understand what it is (Paul & Elder, 2013). Researchers could use this preliminary data to further investigate the professional development needs of agriculture teachers in developing necessary competence to teach technology literacy, communicating, and critical thinking. Despite the average SBAE teacher being 'Knowledgeable" and "Competent," professional development is needed to further strengthen their ability to teach 21st-century skills. Professional development programs focused on technology literacy, communicating, and critical thinking would be beneficial for inservice teachers. Preservice programs and professional development programs must address the discrepancy between importance, ability, and knowledge in collaborating, communicating, and critical thinking.

In order for SBAE teachers to develop critical thinking skills, it must become standard that preservice preparation programs integrate these concepts into the curriculum (Abrami et al., 2008). Research and the findings of this study show that teachers must receive training to teach critical thinking. Abrami et al. believe students learn critical thinking only after teachers receive training on how to teach it and have the opportunity to design courses explicitly and intentionally to foster critical thinking skills. According to Kivunja (2015), teacher educators should consider providing preservice teachers with the opportunity to learn 21st-century skills and inservice teachers should focus on ways they can explicitly integrate these skills into their classrooms. Through

proper and applicable professional development, teachers will gain skills needed to implement 21st-century skills into the SBAE classroom more explicitly, which in turn will allow them to better educate their students. These findings are consistent with previous research (Billing, 2003; Robinson & Garton, 2008; Schmidt, 1999;) that have found problem solving, communicating, collaboration, and critical thinking to be important skills students must possess to be considered employable.

Demographically, for this study, the average age of the SBAE teacher was 38.86 (*SD* = 11.22) with 11.17 (*SD* = 9.42) average years of teaching experience. Productivity and communicating produced a low negative correlation, indicating the fewer years of experience and the younger a teacher is, the more important they find these skills. Findings support the notion that younger and less experienced teachers are more able to teach collaboration, media literacy, and technology. Based on the MWDS and correlations, there is a need for professional development targeting mid to late career teachers to ensure they are utilizing collaboration, multiple forms of media, and technology literacy within their classrooms. While the findings support younger teachers are more able to implement these skills into their classrooms, findings also support the older and more experienced teachers tend to be more knowledgeable about the 21st-century skills, with the exception of leadership and information literacy.

While agriculture teachers recognize the importance of 21st-century skills in the SBAE classroom, many find themselves only to be "Somewhat Knowledgeable" and "Somewhat Competent" in their ability to teach and knowledge of these skills. This discrepancy indicates a need for professional development educating SBAE teachers as

well as giving them practical and explicit ways to implement these skills into their classrooms. This highlights the need for additional teacher training to support student learning. Stripling and Ricketts (2016) found a discrepancy between what employers want and what students think it means to be work-ready. Therefore, it is essential that additional research is conducted to bridge that gap and give teachers practical strategies to prepare students to accurately understand what is needed and expected of them outside of the high school classroom (Stripling & Ricketts, 2016). Educators must teach students to make use of core academic content, apply the information they are learning, and use it in real-world settings (Girlando, 2013). When students are given the ideal education modeled off of the three-component model, students are taught problem-solving through classroom/laboratory instruction; collaboration, leadership, and teamwork through involvement in the National FFA Organization; and critical thinking and responsibility through an active SAE project. Because of this, 21st-century learning skills should be implemented into agriculture education curriculum through the National Council for Agricultural Education and state agriculture education frameworks. Without all circles of the three-component model, students are missing pieces that allow them to become better prepared to succeed after high school.

Twenty-first century skills are vital in a growing global economy because of the dynamics of the Information Age, coupled with the growing need for multitasking, versatility, and speed (Kivunja, 2015). Many studies show that the integration of technology in educational practice is a complex innovation for educators and that they may experience difficulty in integrating technology into their classroom and curriculum

(Voogt & McKenney, 2017). Olson (2000) argued that technology often does not fit into the existing culture of education and teaching and that it may undermine a teacher's sense of efficacy. Because of this, preservice and inservice teacher programs should focus on helping teachers evaluate technology applications that fit the context and content of what they are teaching. In addition, continued professional development to help preservice and inservice agriculture teachers is needed to aid in determining the benefits of technology integration. Further, flexibility, adaptability, initiative, and social skills have not been included in the core content taught to students in education (Kivunja, 2015). These 21st-century skills should be an essential part of preservice and inservice teacher development so educators can be prepared to effectively teach their students these skills to ensure they are competitive as they prepare to enter the workforce or higher education.

The Borich (1980) Needs Assessment Model allowed a MWDS to be calculated, that showed the discrepancy between what is and what should be. A positive MWDS in the 21st-century skills items indicates there was a difference in what is (importance) and what should be (knowledge and ability). Additional professional development for inservice teachers will allow for strengthening of teaching ability and a knowledge growth, which will in turn better prepare students to succeed in today's society. While students are the main focus in SBAE, it is important SBAE teachers have consistent and timely inservice professional development events (DiBenedetto et al., 2018) that allow for the advancement of teachers. As was shown in Figure 1, the Partnership for 21st-century Learning Framework (Battelle for Kids, 2019) identified the importance of professional development. In order for teachers to prepare students to be successful in the

future, teachers must be trained to be highly effective in teaching 21st-century skills (Girlando, 2013). While educating preservice and inservice teachers on these 21st-century skills is important, more research needs to be conducted. Sleeter (2014) has criticized teacher education research of not providing systematic evidence of the classroom impact of teacher education initiatives. With a lack of evidence and large-scale, mixed method studies in agriculture teacher education research on the impact of integrating 21st-century learning approaches is limited.

Recommendations and Implications

This study finds that agriculture teachers perceive 21st-century skills to be important. While SBAE teachers find these skills to be essential, they are less knowledgeable and able to teach them. Students cannot learn the skills and knowledge needed for success unless teachers and schools are teaching them (Saavedra & Opfer, 2012) and teachers are not able to teach students these skills unless they have received training on them (Abrami et al., 2008). Additional research can now be conducted to determine if SBAE teachers are explicitly teaching these skills and if so, how they are being taught. Because there is a discrepancy between importance and ability as well as importance and knowledge, professional development is needed to educate SBAE teachers on 21st-century skills as well as equip them with practical ways to implement these skills in their classrooms. Agriculture industry professionals have expressed an importance in students graduating with 21st-century skills (Easterly, Warner, Myers, Lamm, & Telg, 2017). Industry wants students who are proficient at problem solving,

taking initiative, flexibility, critical thinking, and communication, all of which support the findings of this study. In order to prepare students to fill this void and to be better prepared to seek out jobs, teachers must begin to explicitly incorporate these skills into their classrooms (Billing, 2003; Kivunja, 2015; Robinson & Garton, 2008; Schmidt, 1999).

Younger and less experienced teachers in this study were proficient in technology literacy, media literacy, and communicating, whereas older and more experienced teachers were proficient in critical thinking. Inservice and preservice teachers will benefit from a mentorship relationship between mid to late career teachers and early career teachers. Teachers in the early stages of their careers may benefit from mid to late career teachers who are very knowledgeable about critical thinking and collaborating. Older and more experienced teachers should take advantage of the relationship teachers who are younger and in the early stages of their career because they display a high ability to teach technology literacy, media literacy, and communication. Teachers in the mid to late years of their career should share their vast wealth of knowledge with younger teachers and teachers in the early stages of their career should take the opportunity to teach mid to late career teachers how to actively implement communication, technology, and media literacy skills into their classrooms.

The Partnership for 21st-century Learning (2017) identifies practical applications to incorporate these skills into the secondary education classroom. School-based agricultural education teachers should seek out practical and explicit ways to teach collaboration, communication, creative thinking, critical thinking, flexibility, information

literacy, initiative, leadership, media literacy, productivity, social skills, and technology literacy. Researchers consistently find that both teachers and industry professionals perceive these skills to be important (Easterly et al., 2017). As identified by Saavedra and Opfer (2012), there are nine strategies that can be used to implement 21st-century skills into the classroom. These strategies are (1) make curriculum relevant, (2) teach through the disciplines, (3) develop thinking skills, (4) encourage the transfer of learning, (5) teach students how to learn, (6) address misunderstandings directly, (7) treat teamwork like an outcome, (8) exploit technology to support learning, and finally (9) foster creativity. These strategies should be used to implement 21st-century skills into the SBAE classroom. Teacher preparation programs, state associations, and agriculture teacher associations, such as the NAAE and the American Association for Agricultural Education, should use this research to develop professional development which will allow teachers to develop the necessary competence to teach 21st-century skills in the SBAE classroom. Additional research could be used to evaluate agriculture teacher preparation programs and teacher professional development programs and their ability to prepare agriculture teachers in 21st-century skills. When used, SBAE will prepare students to solve important economic, civil, and global challenges the world is encountering today (Saavedra & Opfer, 2012).

Recommendations for Further Research

This assessment has gathered useful data that will be insightful when planning professional development, researching this topic further, and educating teachers. Based

on the findings of this study, it is suggested that:

1. Research should be conducted to determine the method and frequency SBAE teachers are explicitly teaching 21st-century skills.
2. Research should be conducted to examine in depth each of the 21st-century skills and SBAE teachers perceived importance, knowledge, and ability.
3. Research should be conducted to determine a streamlined method of implementing 21st-century skills in the SBAE classroom.
4. Research should be conducted to determine if teacher educators are teaching the importance of 21st-century skills in preservice agriculture education programs.
5. Research should be conducted to determine if agricultural businesses are seeing a gap in the skills needed versus the skills potential employees possess
6. Research should be conducted to determine a method of professional development targeting mid and late career teachers.
7. Professional development should be conducted to educate and equip teachers with practical ways to incorporate 21st-century skills into the SBAE classroom.
8. Evaluation of agriculture teacher preparation programs and teacher professional development programs and their ability to prepare agriculture teachers in 21st-century skills.
9. Evaluation of agriculture teacher educators to identify their importance, knowledge, and ability to teach 21st-century skills.

Final Statement

Overall, this study identified a focus area for professional development, identified the demographics of SBAE teachers nationwide, and determined the correlation between teachers' demographics and the importance of 21st-century skills. While SBAE teachers nationwide find 21st-century skills to be important and want to teach their students these skills, more focused professional development should be developed to educate teachers

on these skills and give practical ways for implementation. John Dewey's (1944) theory of constructivism emphasizes the need for education to adapt to society, and the implementation of 21st-century skills is one of those needed adaptions. Additionally, Dewey's theory explains the importance of making the learning experience a reconstruction of past and future experiences. More research should be conducted to determine if and how SBAE teachers are giving these experiences to their students.

The Partnership for 21st-century (2018) Learning along with SBAE teachers nationwide have identified the importance of incorporating 21st-century skills into a student's education. The development of 21st-century skills is crucial to student success in the 21st-century, and because of this, it is critical that teachers are adequately prepared to teach these skills in the classroom. Teachers are likely not teaching these skills unless they have previously received professional development with 21st-century skills as the topic, because of this professional develop employing teachers with practical skills and a larger knowledge base will better prepare teachers and students for success Abrami et al., 2008). The core content taught in agricultural education is essential, and it prepares students for careers directly in the agriculture industry, but it is equally as important to carefully weave 21st-century skills into the curriculum to ensure students are graduating prepared to succeed in higher education or the workforce. These 21st-century skills should be incorporated into curriculum through state agricultural education frameworks and the National Quality Program Standards (The Council, 2016).

These findings compare to Davis and Jayaratne (2015), who also found that SBAE should prepare students for life outside of high school. It is important to explicitly

teach creativity and innovation, critical thinking, problem-solving, and decision making. Equipping students with these skills will better prepare them to succeed in a growing global economy. Preparing teachers with the skills needed to teach 21st-century skills in their classroom is necessary, and due to this reason, teacher preparation programs should focus on 21st-century skills and professional development should focus on practical methods for implementing these skills into the SBAE classroom. CTE programs play an important role in helping students apply skills, by providing opportunities for workforce and higher education preparation, and connecting with industry (Hysop, 2008). Because of the fundamental nature of CTE and how well it prepares students for higher education and the workforce, SBAE teachers should work to explicitly teach 21st-century skills in the classroom to ensure students are prepared to meet the needs of a continuously growing global economy.

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APPENDICES

Appendix A

21st-Century Needs Assessment – Group I

	21st-century Skills NA – Group I
	Please select yes if you agree to participate in this survey
	o Yes
	o No
	Please Identify the level of importance (Not Important - Very Important) **AND** your knowledge (Not Knowledgeable - Very Knowledgeable) of each item by clicking on the corresponding bubble. For example... "It is somewhat important my students know how to think critically..." "I am very knowledgeable about critical thinking..."

	Level of Importance				Perceived Knowledge			
	Not Important	Somewhat Important	Important	Very Important	Not Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable
Critical Thinking (The focused, careful analysis of something to better understand it.)	o	o	o	o	o	o	o	o
Creative Thinking (The expansive, open-ended invention and discovery of possibilities.)	o	o	o	o	o	o	o	o
Collaborating (Expressed in allocating resources and responsibilities, brainstorming ideas, decision-making, delegating, evaluating the products, processes, and members of the group, goal setting, leading a group, managing time, resolving conflicts, and team building.)	o	o	o	o	o	o	o	o
Communicating (It is expressed in analyzing the situation, evaluating messages, following conventions, listening actively, reading, speaking, turn taking, using technology in communicating, and writing.)	o	o	o	o	o	o	o	o

	Level of Importance				Perceived Knowledge			
	Not Important	Somewhat Important	Important	Very Important	Not Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable
Information Literacy (It involves traditional skills such as reading, researching, and writing; but new ways to read and write have also introduced new skills such as consuming and producing information.)	o	o	o	o	o	o	o	o
Media Literacy (It involves understanding the many ways that information is produced and distributed.)	o	o	o	o	o	o	o	o
Technology Literacy (It involves the skills of the student in harnessing the power of new technology and being inspired to learn and evaluate this new information and how to use these tools to create effective, well-rounded communication.)	o	o	o	o	o	o	o	o
Flexibility (It involves the skills of students to learn to quickly analyze what is going on around them and make adjustments on the fly - all the while keeping their goals at the forefront of their minds.)	o	o	o	o	o	o	o	o
Initiative (It is the willingness to step forward with an idea and take the risk of bringing it to fruition.)	o	o	o	o	o	o	o	o
Social Skills (These involve students' collaboration with others by means of cooperation, compromise, decision making, communicating, using emotional intelligence, using constructive criticism, trusting others, delivering on promises, and coordinating work.)	o	o	o	o	o	o	o	o

	Level of Importance				Perceived Knowledge			
	Not Important	Somewhat Important	Important	Very Important	Not Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable
Productivity (It involves the skills of the students to produce more outputs by using the inquiry process and developing projects.)	o	o	o	o	o	o	o	o
Leadership (A suite of related skills that combine the other life skills like taking initiative, having strong social skills, flexibility, identifying goals, resolving conflict, and productivity.)	o	o	o	o	o	o	o	o

	Please select your gender
	o Male
	o Female
	What is your age?
	How many years have you been teaching agriculture?
	As a thank you for participating in this survey your name will be entered into a drawing for a Drone, Shop FFA|Gift Card, or FFA Backpack. Copy and paste this link into your browser to be taken to the page where you will enter your information https://usu.co1.qualtrics.com/jfe/form/SV_b738jFTZI3IHi3H

Appendix B

21st-Century Needs Assessment – Group II

	21st-century Skills NA – Group II
	Please select yes if you agree to participate in this survey
	o Yes
	o No
	Please Identify the level of importance (Not Important - Very Important) **AND** your knowledge (Not Knowledgeable - Very Knowledgeable) of each item by clicking on the corresponding bubble. For example... "It is somewhat important my students know how to think critically..." "I am very knowledgeable about critical thinking..."

	Level of Importance				Perceived Ability to Teach			
	Not Important	Somewhat Important	Important	Very Important	Not Competent	Somewhat Competent	Competent	Very Competent
Critical Thinking (The focused, careful analysis of something to better understand it.)	o	o	o	o	o	o	o	o
Creative Thinking (The expansive, open-ended invention and discovery of possibilities.)	o	o	o	o	o	o	o	o
Collaborating (Expressed in allocating resources and responsibilities, brainstorming ideas, decision-making, delegating, evaluating the products, processes, and members of the group, goal setting, leading a group, managing time, resolving conflicts, and team building.)	o	o	o	o	o	o	o	o
Communicating (It is expressed in analyzing the situation, evaluating messages, following conventions, listening actively, reading, speaking, turn taking, using technology in communicating, and writing.)	o	o	o	o	o	o	o	o
Information Literacy (It involves traditional skills such as reading, researching, and writing; but new ways to read and write have also introduced new skills such as consuming and producing	o	o	o	o	o	o	o	o

	Level of Importance				Perceived Ability to Teach			
	Not Important	Somewhat Important	Important	Very Important	Not Competent	Somewhat Competent	Competent	Very Competent
information.)								
Media Literacy (It involves understanding the many ways that information is produced and distributed.)	o	o	o	o	o	o	o	o
Technology Literacy (It involves the skills of the student in harnessing the power of new technology and being inspired to learn and evaluate this new information and how to use these tools to create effective, well-rounded communication.)	o	o	o	o	o	o	o	o
Flexibility (It involves the skills of students to learn to quickly analyze what is going on around them and make adjustments on the fly - all the while keeping their goals at the forefront of their minds.)	o	o	o	o	o	o	o	o
Initiative (It is the willingness to step forward with an idea and take the risk of bringing it to fruition.)	o	o	o	o	o	o	o	o
Social Skills (These involve students' collaboration with others by means of cooperation, compromise, decision making, communicating, using emotional intelligence, using constructive criticism, trusting others, delivering on promises, and coordinating work.)	o	o	o	o	o	o	o	o
Productivity (It involves the skills of the students to produce more outputs by using the inquiry process and developing projects.)	o	o	o	o	o	o	o	o
Leadership (A suite of related skills that combine the other life skills like taking initiative, having strong social skills, flexibility, identifying goals, resolving conflict, and productivity.)	o	o	o	o	o	o	o	o

Appendix C

Pre-Notice Electronic Letter

Good Afternoon,

My name is Kisia Weeks, I am a Masters graduate student at Utah State University working with Dr. Rebecca Lawver on a research project titled 21st-century Skills: A Needs Assessment of School-Based Agricultural Education Teachers.

The purpose of this study is to determine agriculture teachers' professional development needs in order to teach 21st-century skills in the agriculture classroom.

On Tuesday, December 4th, 2018 you will receive an email which will include a survey link asking you to complete the survey. I would greatly appreciate your time and assistance in helping me with my research.

If you have any questions or concerns, please feel free to contact Dr. Lawver at Rebecca.lawver@usu.edu or 435-797-1254.

If you would like to take the survey today follow the link listed below:
Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Because of agriculture teachers like you, this research will be successful.

Thanks in advance,

Kisia Weeks
Graduate Research Assistant
Utah State University

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix D

Instrument Link Electronic Letter

November 28th, 2018
Good Morning,

I am writing to follow up on the previous email I sent asking for your participation in a 21st-century skills needs assessment research survey. This survey will allow us to discover more about 21st-century learning in the school-based agriculture education classroom. Because we know agriculture teachers are very busy this time of year and we realize your time is valuable we have limited the survey to approximately 20 minutes. Your participation and answers in this survey will provide valuable insight that will aid in the advancement of agriculture education.
Please click on the link below to go to the survey website (or copy and paste the survey link into your internet browser)
Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Should you have any further questions or comments, please contact Dr. Rebecca Lawver at Rebecca.lawver@usu.edu or (435) 797-1254

Again, thank you for taking time out of your busy schedule to complete this survey. Through the insight of agriculture teachers like you, this research will be successful.

Thanks again,

Kisia Weeks
Graduate Research Assistant
Utah State University

Dr. Rebecca Lawver
Associate Professor, Agricultural Education
Utah State University

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix E

First Instrument Follow-Up Electronic Letter

January 14th, 2019

ENTER TO WIN: A DRONE OR FFA BACKPACK

Thank you in advance for your willingness. The purpose of this study is to explore 21st-century skills in the school-based agricultural education classroom and to determine the professional development needs of agriculture teachers. Based on feedback this survey has been shortened considerably to take **only 5 minutes**!

If you have any questions or concerns, please feel free to contact Dr. Lawver at rebecca.lawver@usu.edu or (435) 797-1254

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

After completing the survey you will be given a URL that will take you to the giveaway page!

Thanks in advance,

Kisia Weeks
Graduate Research Assistant
Utah State University

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix F

Second Instrument Follow-Up Electronic Letter

January 28th, 2019

Good Morning,

I am writing to follow up on the previous email I sent asking for your participation in a 21st-century skills needs assessment. As a reminder, you may still **enter to win a $25 Shop FFA Gift Card, a Drone, or FFA Backpack!** Your participation and answers in this survey will provide valuable insight that will aid in the advancement of agricultural education! Because of agriculture teachers like you, this research will be successful!

Please follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

After completing the survey you will be asked to copy and paste an additional link into your browser, this link will direct you to a giveaway page where you will be entered to win the shop FFA gift card, drone, or backpack!

Should you have any further questions or comments, please contact Dr. Rebecca Lawver at rebecca.lawver@usu.edu or (435) 797-1254.

Thanks in advance,

Kisia Weeks
Graduate Research Assistant
Utah State University

Dr. Rebecca Lawver
Associate Professor, Agricultural Education
Utah State University

Appendix G

Third Instrument Follow-Up Electronic Letter

February 4th, 2019

Good Morning,
Would you be willing to help contribute to research on 21st-century skills in the school-based agricultural education classroom? This survey can be done between classes and takes only 5 minutes!

To show appreciation for your willingness to participate in the survey you will be entered to win a **$25 shop FFA gift card, a drone, and an FFA backpack!**
Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}
Thanks in advance,
Rebecca Lawver
Associate Professor of Agricultural Education
Utah State University

Kisia Weeks
Graduate Research Assistant
Utah State University

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix H

Instrument Follow-Up Electronic Letter

February 12th, 2019

Good Morning,
Will you take 5 minutes and take this survey? We designed this with the busy ag teacher in mind, it takes only 5 short minutes, and can be done between classes! Your participation will help a future ag teacher finish her thesis and will contribute to research on 21st-century skills in the agriculture classroom.

To show our appreciation for your willingness to participate in this survey you will be entered to win a $25 shop FFA gift card, a drone, or an FFA backpack!
Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Thanks in advance,

Rebecca Lawver
Associate Professor of Agricultural Education
Utah State University

Kisia Weeks
Graduate Research Assistant
Utah State University
Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix I

Final Instrument Follow-Up Electronic Letter

February 19th, 2019

Good Morning,

Last chance to enter to win a $25 shop FFA gift card, drone, or FFA backpack!

We appreciate your help thus far in researching 21st-century skills in the agriculture classroom! This survey will close Monday, February 25th at 8 am MST. Upon closure of the survey three winners will be drawn and contacted via the email provided.
Please follow the link listed below to take the SHORT five-minute survey and enter to win!

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Thanks in advance,
Rebecca Lawver
Associate Professor of Agricultural Education
Utah State University

Kisia Weeks
Graduate Research Assistant
Utah State University

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix J

Thank You Electronic Letter

February 19th, 2019

Good Morning,

I am following up to **thank you** for taking the time out of your busy schedule to participate in the 21st-century skills needs assessment. Through the insight of agriculture teachers like you, this research will be successful!

If you are chosen for the $25 Shop FFA Gift Card, Drone, or FFA Backpack you will be notified via the email you listed in the giveaway.

Should you have any further questions or comments, please contact Dr. Rebecca Lawver at Rebecca.lawver@usu.edu or (435) 797-1254

Thanks again,

Kisia Weeks
Graduate Research Assistant
Utah State University

Dr. Rebecca Lawver
Associate Professor, Agricultural Education
Utah State University
Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}