Impact of Online Learning on High School Agricultural Education Courses in Alabama

by

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Abstract

The proliferation of online learning during the past decade is believed to have addressed multiple challenges facing secondary and post-secondary educators, yet outcomes are still being weighed. This study of Alabama Agricultural Educators provided insights to the potential practice of online learning in agriculture education courses. Apart from demographics and general background information, this instrument is divided into three scales. The instrument was adapted from Chang and Fisher (1998) WEBLEI. The instrument looked at access of online learning, interaction of online learning, and the perception of online learning in agriculture education courses. The content of this instrument was validated with inter rater reliability by a graduate Agricultural Education Survey Design Course.

This dissertation reports on research involving a random sampling of Agricultural Educators in Alabama. This dissertation provides a statistical analysis of Alabama Agricultural Education teachers' perceptions of an online learning environment reporting frequencies, percentages, means, standard deviations, Pearson's coefficient, and linear regressions. The conclusions, implications, and resulting recommendations focused on the themes of online learning in agriculture education as well as descriptive and correlation results focusing on statistical significance with the correlation of the dependent variables. Initial findings with the linear regression found no statistical significance.

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List of Abbreviations

AAAE	American Association of Ag Ed
CCRS	College & Career Ready Standards
CTE	Career & Technical Education
ELL	English Language Learners
ESSA	Every Student Succeeds Act
IDEA	Individuals with Disabilities Education Act
NCLB	No Child Left Behind
UDL	Universal Design for Learning
WIOA	Workforce Innovation & Opportunity Act

CHAPTER 1
INTRODUCTION

Agricultural education in public schools formally began with federal financial support in 1917 with the passage of the Smith-Hughes Act (Stephens, 1994). Barrick (1989) defines agricultural education by intertwining agriculture and education:

> “Education is a field of study that concerns itself with the principles and methods of teaching and learning. Agriculture is the science or art of production of plants and animals useful to mankind and the preparation of these products for mankind’s use and their disposal… The community of scholarship between the two is agricultural education: the scientific study of the principles and methods of teaching and learning as they pertain to agriculture.” (p. 3)

The curriculum developed early in the 1900s, prepared agricultural education students with hands-on skills needed to be successful in the farming profession (Barrick, 1989; Stephens, 1994, Talbert et al., 2014). Over time, the economy changed. This opened a need for a broader spectrum of higher-order learning within the agriculture industry. This addition includes horticulture, wildlife, natural resources, agriculture sales and services, engineering, and other non-farm agriculture occupations. Changes in the workforce and economy lead to the Smith-Hughes Act modified as the Vocational Education Act of 1963 (Stephens, 1994; Talbert et al., 2014). The public school’s scope of agriculture education now provided instruction in these broader agriculture areas and the importance of agriculture literacy (Talbert et al., 2014). The Vocational Education Act of 19063 modified instructional requirements from “farm-project” to “field, shop, laboratory, cooperative work, apprenticeship or other occupational experiences” (Smith & Rayfield, 2016, p. 148). Improvements continued increasing the experiential learning of agriculture education on the secondary and post-secondary levels.

Vocational education, currently known as Career and Technical Education (CTE), began with the philosophical theories of Charles Sanders Pierce, William James, and John Dewey constructing means of pragmatism and progressivism through the thought-out process of understanding, characterizing, and applying concepts in creative and relevant manners (Talbert et al., 2014). Each one of these beliefs discuss the nature of reality. Pragmatism, as known through the works of American philosopher Charles Sanders Pierce, followed the belief that only those who are experienced or observed are real while progressivism, as is known by American philosopher John Dewey, advocated for being creative by using problem solving during realistic application (Talbert, et. al, 2014, 52-55).

The principles that formed the agricultural education foundation many years ago still hold true in the agricultural education teaching profession. These principles include, but are not limited to, "providing up-to-date technical skills and knowledge, conducting experiential learning activities, and involving students in leadership and personal development activities" (Campbell & Martin, 2018, p. 8). State and local educational systems across the nation modified CTE curriculum to provide more rigorous standards, higher academic standards, and related general knowledge (Lynch, 2000, p. 172). The modern emphasis on agricultural education has drawn from the philosophers of the past, the changes in technology, and the economy stressing the importance on preparing or building students with not only the skill and knowledge but also the ability to be flexible and communicate with people (Talbert et al., 2014). "Today, over 800,000 students participate in formal agricultural education instructional programs offered in grades seven to adult throughout the 50 states and three U.S territories," (National FFA Organization, 2018).

Times have changed to where entering the agriculture industry no longer means becoming a farmer. In 2017, over 2.4 million people were employed in the agriculture industry with an expected growth of nearly 5% between 2015 and 2020 (Kattenburg, 2018). With the growth and creation of new career opportunities in the agriculture industry, the number of people seeking career opportunities in the field of agriculture education has decreased (Kattenburg, 2018). Each year 6.3% of agricultural education teachers leave the profession, retire, or relocate (Kantrovich, 2010; Wirt, et al., 2005) while 25% fail to enter the secondary classroom from post-secondary institutions (Blackburn & Robinson, 2008). "As of September 15, 2018, state supervisors reported 11.5% teachers were considered new hires in school-based agricultural education (Smith, Lawver, & Foster, 2019, p. 2). Virginia Tech's study on students seeking a major in Agricultural Education showed 59.4% of the students graduating with a degree in Agricultural Education entered the teaching field (AG Talk, 2009). Dr. Robert Torres of the University of Arizona and the 2017 president-elect of the American Association for Agricultural Education discussed in Fristoe (2017) how Arizona and the nation is facing a shortage of qualified and certified agricultural education teachers. He explained how the shortage has negatively affected agricultural education with schools being unable to add programs or are forced to close existing programs (Fristoe, 2017; Lobeck, 2020). Teacher shortages in agricultural education have a devastating effect on the education of students and the stability of secondary agricultural education programs across the nation.

National FFA Organization (2016) statistics state more than 13,000 FFA advisors and agricultural education teachers deliver instruction across the United States, and 23% of these teachers have five or less years of teaching experience. The National Agricultural Education Supply and Demand 2018 Executive Summary reported 247 new positions and 140 new programs added with 23 states loosing 88 positions and closing 45 programs (Smith, Lawver, & Foster, 2019). Agricultural education programs are preparing students for the workforce. In the

United States, approximately 20% of the workforce deals with agricultural systems (Talbert et al., 2014).

Online learning has become an integral part within the educational environment in the United States (Alliance for Excellent Education, 2010). Through their research, Alliance for Excellent Education (2010) determined accepting and “embracing online learning opportunities for students and teachers will strengthen the supply and quality of teachers, improve efficiency, and increase students’ college and career readiness” (p.2). Online learning environments continue to grow and be utilized as fundamental educational environments for higher education through its flexibility and accessibility. This study looked at the perceptions of offering online learning for agricultural education courses.

Purpose and Objectives

The purpose of this study was to examine agricultural education teachers’ perspectives on the relevance of online learning in agricultural education courses. Six objectives were addressed in this research.

1. Describe the personal characteristics of agricultural education teachers in the State of Alabama.
2. Describe agricultural education teacher’s perception of the accessibility of online learning.
3. Describe agricultural education teacher’s perception of the interaction between teacher-to-student and student-to-student in an online learning environment.
4. Describe agricultural education teacher’s perception of the relevance of online learning environments in agriculture education courses.

5. Describe the connection between the access to online learning, interaction with online learning, and online learning within agricultural education courses.
6. Describe the significance between personal characteristics of teachers' perceptions towards online learning in agricultural education.

Traditional agriculture classroom environments provide opportunities for students to receive one-on-one learning with immediate feedback and encouragement but is instructor centered (Schweltzer, 2019). Online learning environments are learner centered with opportunities for students to work at their own pace on their own time with virtual resources at their fingertips but can potentially provide more confusion with lack of immediate feedback and motivation from the instructor. These two learning environments have advantages and disadvantages, used together; these two learning environments could benefit both the instructor and students within the high school agriculture education classroom. The number of students participating in online learning environments is rising yearly with more than a fourth of the undergraduate students across the United States in 2013 registered in at least one online learning course (Allen & Seaman, 2015). National Center for Education Statistics (2019) found approximately 21% of public schools and 13% of private schools offered online courses during the 2017-2018 academic year.

Problem Statement

Little research has been conducted on the effects of online learning on students and teachers. Agricultural education teacher perceptions regarding the impact of online learning with agriculture courses on the high school level is limited.

Significance of the Study

Today's agricultural education programs focus on more than agricultural production and mechanics. Agricultural education has expanded to fields of study including "horticulture, forestry, conservation, natural resources, agricultural products and processing, production of food and fiber, aquaculture, agricultural sales and services, agricultural marketing and economics, and leadership development" (Campbell & Martin, 2018). Through agricultural education, students have the opportunity to be informed and skillfully prepared for more than 300 careers in the science, business and technology of agriculture which provided 11% of jobs in America and employed 21.6 million Americans in 2017 (Painter, 2020). Agriculture is the nation's largest industry with 21.6 million Americans employed, but the knowledge and skills are lacking (Painter, 2020). High schools are the foundation of preparing students for the workforce (Jimenez, 2020). When the secondary schools have qualified instructors, they provide students with the adequate knowledge, skills and technology needed to succeed in life after high school. Demonstrating the importance of agricultural literacy and developing strategies for instructing agricultural literacy are two of the many roles of an agricultural educator.

The increased availability of online learning environments enables new opportunities for education in the realm of sustainable agriculture and other fields of agriculture. Online learning environments are used as an umbrella term for all associated principles utilized to describe learning employing the internet (Moore & Kearsley, 2011). Terms and concepts used interchangeably at times that fall under online learning environments include distance learning, online learning, web-based learning, e-learning, cyber learning, and computer-based learning (Moore & Kearsley, 2011).

The continual emergence of technology continually magnifies the opportunities and prospects for online learning and constantly provides fuel for online learning environments (Johnson & Aragon, 2003). Allen and Seaman (2013) tracked the opinion of academic leaders from over 2,800 colleges and universities on online education in the United States for a ten-year period to answer essential questions regarding the nature and magnitude of online learning in education. Over the ten-year period, 69.1 percent of the chief academic advisors believed online learning in education was crucial to their long-term strategy, and the proportion of all students in the study taking at least one online course increased to 32.0 percent or 6.7 million students (Allen & Seaman, 2013). "A survey of 2,462 Advanced Placement and National Writing Project teachers finds that digital technologies have helped the in teaching" secondary students (Purcell, Buchanan, & Friedrich, 2013, p. 1) From Purcell, Buchanan and Friedrich's research (2013) 45% of the teacher respondents reported they or their students use e-readers and 43% use tablet computers in the classroom or to complete assignments (2013). The teachers also reported having students access (79%) and submit (76%) assignments online (Purcell, Buchanan & Friedrich, 2013). This growth of online courses and shortage of agricultural educators creates a demand for research pursuing agricultural education in online learning. ACCESS virtual learning in Alabama has certified teachers instructing courses online to assist those schools who have limited course offerings (Alabama Department of Education, 2016).

Online learning environments support an infrastructure essential to assist with the delivery of learning theories and resources and are a compliment to traditional face-to-face classroom environments (Hustad & Arntzen, 20136). The intent of this study was not to encourage school systems to change their teaching methodologies, but to make both school systems and teachers aware of the opportunities available with student learning in agricultural education through online learning environments.

Definition of Terms

1. Agricultural Educator: A qualified teacher of Agricultural Education at the high, middle, or elementary school level.
2. Agricultural Education: A program of instruction regarding agriculture and related subjects normally taught in secondary schools (Talbert, 2014).
3. American Association of Agricultural Education (AAAE): The AAAE is a professional association for faculty and graduate students who have interest in agricultural communications, education, extension, and leadership. The AAAE members work closely together to solve challenges related to sustainability, build human and institutional capacity, and provide leadership within communities (Roberts, Harder, & Brashears, 2016).
4. Blended learning which is most used in secondary education traditionally combines traditional student instruction along with computer-based, internet-based, or remote teacher online instruction. (Beck, 2011)
5. Alabama College and Career Ready Standards (CCRS) – The Alabama State Board of Education adopted a combination of the international benchmarked Common Core State Standards along with Alabama standards ensuring students are prepared for successful future.
6. Curriculum: A set of experiences, courses of study, and activities outlined by a specific educational program that students must engage in to achieve the desired objectives of the educational program (Von Crowder, 1997).
7. Computer-based learning is delivered by software installed on a computer that can be customized to fit the needs of the student. (Beck, 2011)

8. Every Student Succeeds Act (ESSA), up-dated version of the No Child Left Behind Act, contains conditions that will improve achievement for all students and schools through advanced equity, students taught to high academic standards, and helps support and grow local innovations.

9. High School Agricultural Education: Educational instruction in the field of agriculture, food and natural resources that provides students with knowledge and skills of the agriculture industry for student enrolled in grades 9-12.

10. Inquiry-based Learning: Approach to learning that accentuates the student's role in the learning process.

11. Internet-based is like computer-based, but the software is delivered through the internet and stored on a remote server. (Beck, 2011)

12. Online Learning: Distance or correspondence courses that are offered over the internet (Moore & Kearsley, 2011). Online learning is any style of instruction delivered through the internet including internet-based, remote teacher online, blended learning, and facilitated virtual learning. (Beck, 2011)

13. Full-time online learning has no face-to-face instruction and is provided solely through internet-based and remote teacher online learning. (Beck, 2011)

14. Perkins V is the Strengthening Career and Technical Education for the 21st Century Act reauthorizing Perkins IV and continued Congress' commitment in federal financial provisions.

15. Remote Learning: Moving content designed for face-to-face instruction online for a limited time due to a temporary separation of teacher and students.

16. Alabama Course of Study: Agriculture, Food, and Natural Resources: Educational instruction in the field of agriculture, food and natural resources intended to promote students' career awareness through engaging career explorations and development activities. (Mackey, 2020).

17. Smith-Hughes Act (1917): The Act established the teaching of vocational agriculture in public high schools (National FFA Organization, 1998).

18. Virtual learning is sometime grouped into broader categories of online learning and full-time learning. (Beck, 2011)

19. Vocational Act (1963): Act that broadened agricultural education; revised the Smith-Hughes Act of 10917 by expanding agricultural education in the secondary schools to include a wide range of non-production agriculture (Talbert, 2014).

20. Career and Technical Education: Responsible for helping all students acquire challenging academic, technical and employability skills to be successful in post-secondary education and careers.

Limitations of Study

Limitations are generally areas over which the researcher has no control. This study had specific limitations that have the potential to limit the study and the ability to generalize findings to the target population. Many factors can limit a study utilizing a questionnaire; however, the following were determined to be possible limitations that specifically pertain to this study.

Non-response error could limit the study by negatively affecting the internal validity of the questionnaire. This study was limited to selected agricultural educators in the state of Alabama; therefore, the study was limited by the overall sample size. As stated earlier, possible limitations occurred if less than 50% of the teachers did not respond or not enough teachers responded from the three districts for an accurate, diverse balance. With a survey research, limitations include low response rates and time constraint of data collection (Mertler, 2019). Low response rates are a potential concern when administering surveys especially when sent through email for a web-based questionnaire. This limitation was addressed by presenting a clear rationale of the study for participants to participate and reminders used as needed to encourage all members of the sample to participate.

Data were limited to those Alabama Agricultural Education teachers who voluntarily chose to participate in the study by completing the survey. Teachers not being accessible during the survey period or had experienced conditions or factors where they work also limited the study. Another limitation with survey research is the reliance on self-reported data (Mertler, 2019). The research gathered data based on participants perceptions on what they believe and their experiences. Other threats to internal validity included the assumption that participants provided accurate answers; sometimes the participant may alter their response to be the perceived answer or socially acceptable response (Mertler, 2019). Although results of the study are intriguing and constructive for program expansions at the local level, the findings may not be generalized to online learning in agricultural education programs in other states. This limits the findings of this study to agricultural education teachers within the State of Alabama; however, the same methods and instrument design can be used to draw data in other states.

It is critical to understand the role of limitations and how that can affect the data collected. The limitations outlined are intrinsic to the problem and population under study. Each limitation was carefully evaluated and discussed to ensure the data collected represents the target population correctly and contributes to the solution of the research problem.

Basic Assumptions

In the SAGE Dictionary of Statistics and Methodology (2016), Vogt and Johnson defined an assumption as (a) A statement that is believed to be true, often temporarily or for a specific objective; (b) terms under which statistical methods produce valid results. The assumptions of this study are like quantitative studies that employ a survey to gather data on a specific population.

It is assumed the participants answered the interview questions in an honest and candid manner. The researcher addressed this by providing a clear foundation of the study for participants to contribute and reminders used as needed to encourage all members of the sample to provide their perception. It is also assumed that the sample, Alabama Agricultural Educators, have all experienced the same or comparable encounters with online learning environments, and these participants have a genuine interest in contributing to the study. The researcher assumed the sample size drawn for the study was a reliable indication of the entire population under review. This was addressed by using a simple random sampling method, which was calculated using Cochran's (1977) sample size formula for continuous data and minimum return sample size. The assumptions outlined are underlying to the study's problem and population, but each have been carefully examined and addressed to guarantee that data gathered are a correct reflection of the population.

CHAPTER 2
LITERATURE REVIEW

This literature review covers the historical events and research surrounding the online learning environment experiences and agricultural education instruction, which are the foundation principles to one of the study's conceptual underpinnings: the theory of diffusion and innovation. Two additional theories support this study: social learning theory and theory of transactional distance. This chapter presents: (1) AAAE Research Agenda Research Priority, (2) agricultural education, (3) basic philosophical framework, (4) online learning environments, and (5) summary. By presenting a critical examination of online learning environments, which has given rise in the educational and training fields over the past decades, in relation to agricultural education, this literature review stands apart from others and reinforces the importance of this study.

AAAE Research Agenda Research Priority

Agricultural Education is a broad discipline comprising of approximately 829 members (American Association for Agricultural Education, 2020) in agricultural communications, extension, leadership, and teacher education. Agricultural education spans across the original six research priority areas of the AAAE Research Agenda: public and policy-maker understanding of agriculture and natural resources, professional and scientific workforce for the 21st century, new technologies, practices, products and adoption decisions, meaningful engaged learning, efficient and effective agricultural education programs, and vibrant resilient communities (Doerfert, 2011). The American Association for Agricultural Education (AAAE) is an organization of those professionals who recognized a great potential to solve current and developing challenges with research in their field (Roberts, Harder, & Brashears, 2016). In 2006, the AAAE chose to create a set of research priorities, the original six listed above, to facilitate, support and inspire professionals across the food and agricultural systems in a national research agenda (Osborne, 2007). The National Research Agenda organized professional development sessions on the national level geared towards advancing quality in research manuscripts and research reviews. A second national research agenda in collaboration within disciplines was established in 2011 addressing social needs reported by the Association of Public and Land-grant Universities' Experiment Station Committee on Organization and Policy, Science and Technology Committee (Doerfert). With a consistent change in science and technology, societal needs and behaviors, budgetary environment, and global economic and environmental interdependence, a new and third research agenda was established in 2015 (Roberts, Harder, & Brashears, 2016).

The National Research Agenda Committee for the years 2016-2020 utilized a four-stage Delphi method to detect, enhance, compartmentalize, and highlight research questions. The Delphi team consisted of ten active AAAE researches and nine engaged stakeholders who identified twenty-five priority research questions and organized them into seven research priorities. Six of the priorities were maintained from the second AAAE National Research Agenda. The panel then ranked the twenty-five research questions and listed the ten highest priority research questions for 2016-2020 under the seven research areas. The AAAE National Research Agenda delineates research priorities and provides an outline for research to enhance practice (Roberts, Harder, & Brashears, 2011).

The AAAE National Research Agenda for 2016 to 2020 notified in Research Priority Area 2: New Technologies, Practices, and Products Adoption Decisions that additional research on new technologies, practices and products will assist the "agricultural educators develop and implement agricultural teaching and learning processes contributing to the development of sustainable agricultural systems needed in the future" including secondary schools and their students and teachers (Lindner, et al, 2016). Though an original teaching discipline, agricultural education has set a focus on improvement through quality research. Agricultural education research is comprehensive and comprises a range of technologies, practices, and products. Modern agricultural education research from the late 1990s through early 2000s has focused on studying inspired authors from previous decades (Radhakrishna & Jackson, 1995), creating a research plan in agricultural education (Williams, 1997), proper forms of analysis (Miller, 1998), areas of research investigation (Radhakrishna & Xu, 1997), and utilization of conceptual and theoretical frameworks in research (Dyer, et al, 2003). The National Research Agenda encourages researchers to match the proper theory with the study.

Research priority #2, which served as the guiding priority for this study, is focused on sound literature showing its importance in the context of new technologies, practices and products in teaching and learning. It is essential for educators to identify the best methods of teaching and distributing agricultural information to students required for retention and application (Pense & Leising, 2004). As stated earlier in the introduction, the historical significance of agricultural education is to be appreciated with curriculum focused on preparing students with hands-on, technical skills to be successful in the farming profession which modified to a broader agricultural field in the early 1960s with the Vocational Education Act. Education during these times was mainly within a classroom setting; however, the Smith-Hughes Act of 1917 required "schools to provide directed or supervised practice in agriculture either on a farm provided by the school or other farm, for at least 6 months per year" as project-based learning (Smith & Rayfield, 2016, p. 147). The use of learning outside of the classroom was taking shape. By 1970, education outside of the classroom had been in practice for almost a hundred years, beginning as a correspondence study by mail and later complemented by radio and television programs and early computers (Moore, 1973). In modern times, agricultural education instruction and methods include “face-to-face instruction, lecture, demonstration, experiential learning, simulations, web-based instruction, flipped classroom instruction, farmer field schools and professional learning networks” (Lindner, et al, 2016, p. 20). This study seeks to broaden education outside of the normal agricultural classroom environment and view innovations of instructing agricultural students through online learning environments.

Agricultural Education

The No Child Left Behind Act of 2001 (NCLB) required that all students be technologically knowledgeable prior to secondary education. In 2015, the NCLB was replaced with Every Student Succeeds Act (ESSA). The ESSA focuses more on technology-related requirements to reach educational objectives and opportunities for all students. It indicates dedication to the incorporation of technology and services that can strengthen teaching and learning for all students and supporting the Universal Design for Learning (UDL) in instruction and assessment, with a focus on those with disabilities and English language learners (ELLs) (Reynolds, et al, 2016). Technology is a broad theme across the ESSA and funds are allocated to provide tools and resources to do the following: (1) implement technology based professional development; (2) build district capacity; (3) improve the use of technology for academic achievement; (4) ensure personalized learning supports through technology; (5) develop and improve assessment instruments; (6) support family engagement; and (7) advance student achievement through telecommunications (Reynolds, et al, 2016). The pertinent use of technology is a priority in ESSA despite the challenges including the assortment of options, decisions, and cost.

The ESSA has another feature of preparing students to achieve educational objectives and opportunities through the path to college and career readiness (CCR). ESSA, Perkins V, Individuals with Disabilities Education Act (IDEA) and Workforce Innovation and Opportunity Act (WIOA) provide a policy framework to assist states with alignment and funding for CCR. ESSA is a federal act that allows states to develop personal CCR definitions including academic and nonacademic student outcomes in the areas of knowledge, critical thinking and problem solving skills, social and emotional traits, interpersonal skills, citizenship and community involvement and other employability skills (English, et. al, 2016). The state vision of CCR must inform and align with a well-rounded education, purposeful assessment and multiple-measure accountability as shown in Figure 1.

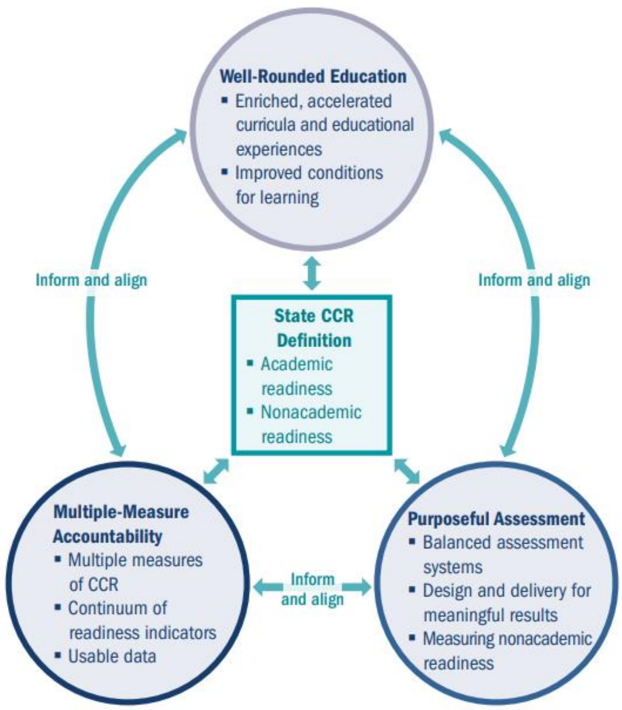

FIGURE 1. "State Vision for College and Career Readiness as Expressed by State CCR Definition and Aligned Policies Under ESSA." (English, et. al, 2016, p. 2)

The state of Alabama through the Alabama Department of Education (2012) defines college and career readiness as:

> Being college and career ready means that a high school graduate has the English and mathematics knowledge and skills necessary to either (1) qualify for and succeed in entry-level, credit-bearing college courses without the need for remedial coursework, or (2) qualify for and succeed in the post-secondary job training and/or education necessary for their chosen career (i.e. technical/vocational program, community college, apprenticeship or significant on-the-job training) (College & Career Readiness & Success Center, 2019).

Through Alabama's CCR strategic plan, career technical education programs utilize the Career Clusters agenda and applies programs of study across all 16 Career Clusters including agricultural education (National Association of State Directors of Career Technical Education Consortium, n.d.). CTE programs follow structured pathways where students are gaining more depth of knowledge in a specific area within a field rather than broad knowledge in several areas within the field creating more hands-on, visual learning approaches for students. These audible and visual learning environments assist all students, especially ELL and students with disabilities, with learning by doing in a real-world setup within the classroom. Education Corner (2020) expressed an increase retention rate in students through hands-on learning methods versus other presentation styles; learners retained only 10% of material presented through lecture and books, 20% of material taught through audio-visual methods, and 90% material through hands-on participation. According to Alabama public high schools in 2016-2017 academic year, there were 361 public high schools with 163,631 high school students enrolled in CTE programs with a CTE concentrator graduation rate of 90% (Advance CTE, 2020). 91% of those CTE concentrators in Alabama attend post-secondary or advanced training, military service, or employment within six months of their departure from high school (Advance CTE, 2020).

Agricultural education is one of the 16 Career Clusters taught in CTE programs. These courses provide a learning environment for students like the official workplace. To assure that students have a true understanding and familiarity of the agriculture industries environment, the agricultural educator is responsible for establishing a comparable model of the working situations for all courses taught. However, there was a recent transition to not only assist students with developing skills needed for the workforce, but also focus on students becoming more knowledgeable regarding agricultural practices and terminology. The teacher is responsible for inspiring the students' interest and providing general knowledge of the specified agriculture course or career opportunity, while assisting with students developing mental, physical, and emotional skills through curriculum design. Curriculum design describes the purposeful, deliberate, and systematic organization of curriculum within a course. The goal of curriculum design is to improve student learning while also assisting with alignment of learning goals for each phase. There are three basic types of curriculum design commonly used in agricultural education consisting of subject-centered design, learner-centered design, and problem-centered design.

Subject-centered curriculum design focuses on a specific subject or discipline. It describes what needs to be taught and how it should be applied. The National Governors Association released the *Common Core State Standards* in 2010, subject-centered curriculum, making sure students are college and career ready concentrating on English-Language Arts and Mathematics (Talbert et al, 2014, 288).   In standardized core curriculum, a pre-determined list of learning objectives is provided for teachers to follow and develop lesson plans around. Core curriculum can be regulated across schools, states, and the country. "The primary drawback of subject-centered curriculum design is that it is not student-centered," (Schweltzer, 2019, p. 2).

This design of curriculum does not consider student learning styles and may cause problems with student engagement.

Learner-centered curriculum design concentrates on the needs, desires, and aspirations of the student to empower learners and create a choice for the students. This design curriculum considers student learning styles and aspirations. A common instructional method that follows learner-centered curriculum design is differentiated instruction. "Differentiating instruction means that you observe and understand the differences and similarities among students and use this information to plan instruction," (Robb, 2019, p. 1). Differentiated learning allows students the opportunity to choose assignments, learning experiences or activities that suits their interest in learning. The foundation of differentiated instruction is built on the principles of ongoing, formative assessments, recognition of diverse learners, group work, problem solving and choice (Robb, 2019). All students should be taught basic communication and thinking skills. To meet all student's needs, learner-centered curriculum should be incorporated within the lesson plans. The drawback to learner-centered design is it is labor intensive and time consuming for the teacher. Teachers must determine a method to reach a balance with student interests and the required learning outcomes.

Problem-centered curriculum design is a student-centered design, like the learner-centered design, however, problem-centered gives students a task that they must construct a solution for. Problem-centered curriculum highlights the relationship between the classroom lessons with real-world situations to develop skills that may be transferred to the workplace. "Problem-centered curriculum design increases the relevance of the curriculum and allows students to be creative and innovative as they are learning," (Schweltzer, 2019, p. 2). The drawback to problem-center design is the same as subject-centered design where student learning styles are not always considered.

Using curriculum design, agricultural education courses provide students with learning experiences to meet the demands of the agriculture industry market. Educators can manage these three designs through identifying the needs of stakeholders and creating clear and precise learning goals and objectives. Many agricultural careers require post-secondary education training. To assure a smoother transition and qualified applicants, secondary and post-secondary instruction should also coincide to better prepare students. Easterly III and colleagues (2017) present a study addressing the competences of undergraduate agricultural education programs. In their review of literature, a previous research through Hurst, 2015, looked at the components leading to the industrious agricultural workforce in the developing countries of Trindad and Tobago expressing the importance of an inclusive agricultural education system with generating skilled workers (Easterly III et al, 2017).

> "The study suggested the development of a program which is effective and efficient at creating a well-trained and competent work force extends beyond competency and skill development alone. Effective program development should encompass a broader view of the program curricula, facilities, pedagogical approaches, teacher education, agricultural organizations, student/instructor relationships, connections between the schools and communities, globalization of the curricula, and entry into agricultural careers on the development of a trained and efficient agrarian workforce." (Easterly III et al, 2017, 227-228)

In order to prepare students for the workforce or prepare agricultural education teachers for the classroom, the instructions should encompass a broader spectrum of the career expectations. Undergraduate agricultural education students should be informed of design theory where it is not just taught but reinforced by the instructor and implemented by the students.

Agricultural education courses must be flexible with the curriculum and have a viable plan to accomplish change. From late 1800s through 1960s, agricultural education was developed with public school classroom. These courses had a more specific purpose focusing on agricultural production aspects of farming and mechanics. Through each Perkins Act, vocational education has been modified to adapt to the changing world. Agricultural classes have become more supple and open to evolving trends including teaching non-farming areas of agriculture, special student populations, advancement in technology, curriculum integration and articulation between secondary and post-secondary institutions, and increased emphasis on academic achievement (Talbert et al, 2014).

Theory

Often the *Journal of Agricultural Education* and other journals in the field of agricultural education utilizes a recognized view of the innovation process, Rogers' theory of diffusion and innovations. In Rogers' Diffusion of Innovations Theory, the factors influencing diffusion were discussed in terms of the views of individuals and how those technologies were approached through communicative processes within the social system (Rogers, 2003). Rogers (2003) recommended four components that influence the circulation of a new concept: "the innovation, communication channels, time and a social system" (p. 12), and he suggested "individuals progress through five stages: knowledge, persuasion, decision, implementation and confirmation" (p. 172). If innovation is implemented, it circulates through numerous communication networks where the "idea is rarely evaluated from a scientific standpoint; rather, subjective perceptions of the innovation influence diffusion" (Rogers, 2003, p. 177). The method occurs over a period until social systems verify diffusion. A social system is characterized as a collection of interrelated units engaged in joint problem solving to achieve a common objective (Singer, 2016). The members of a social system may consist of individuals, informal groups, organizations, or subsystems.

Social systems are an integral component of the adoption process; however, an innovation can be impeded by the social system. There are two dominant approaches on how people learn: behavioral leaning theory and cognitive learning theory. Behavioral learning focuses on observable changes in external behavior and how outward stimuli affect change including use of positive reinforcement, student praise, and providing a safe, inviting classroom; Jean Piaget's theory of cognitive learning focuses on the internal process, how mental process changes, and how the external behavior changes due to internal mental process including classroom use of clear, precise objectives, graphic organizers, guided practice, and hands-on experiences (Talbert et al, 2014). Bandura's (1971) social learning theory argued that cognitive and environmental factors play a strong role in shaping behavior. Bandura (1977) states:

> "Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, an on later occasions this coded information serves as a guide for action" (p. 22).

The creation of self-regulated abilities and techniques for learning within the framework of Bandura's social cognitive theory (1971, 1977) is a feature of collaboration between "personal, behavioral, and environmental factors" (Schunk, 2012, p. 123). Social learning theory describes human behavior in terms of constant mutual interaction between social, behavioral, and environmental influences spanning both cognitive and behavioral frameworks. This is a theoretical basis for the behavior analysis approach which is commonly used in classrooms. Individuals are more likely to adopt a modeled behavior if it results in outcomes they value. Valente (1996) observed that the behaviors of others effects a person's choice to accept. Not everyone will immediately adopt an innovation despite obvious benefits. According to Roger's (2003) theory, there are five segments of adoption, as shown in Figure 1: innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%), and laggards (16%) as shown in Figure 2 (p. 281).

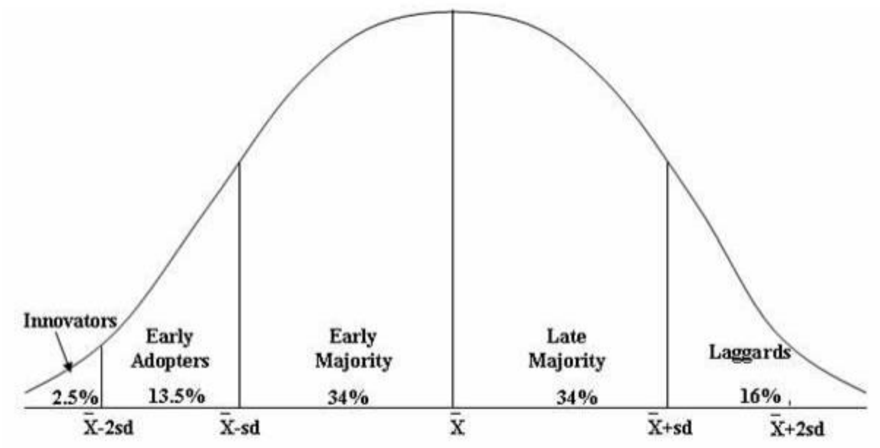

FIGURE 2 "Adopter Categorization on the Basis of Innovation" (Rogers, 2003, p. 281)

The methods of introducing inventions are difficult. The innovators are the first to adopt and utilize new technology and generally can identify and apply challenging technical knowledge (Rogers, 2003; & Geohagan, 1994). The second group of early adopters are visionaries and risk takers looking for breakthroughs in instructional methods or learning efficiency that new technology applications will allow (Rogers, 2003; & Geohagan,1994). The late majority are skeptical and peer-motivated while the final group of laggards are the last to adopt because they are suspicious and hesitant about innovations and change (Rogers, 2003; & Geohagan, 1994).

The theory of diffusion of innovation is a theoretical method dealing with how a new technical concept, product, technique, or new use of an old one passes from production to use. There is doubt as to the magnitude to which the theory can give rise to easily questionable hypotheses. Nonetheless, it provides a valuable base. The theoretical basis for understanding adoption and dissemination is well developed in agricultural education. Agricultural educators should further contribute the growth and development of agricultural systems to increase the efficacy and awareness of the effects of educational technology on teaching and learning processes in the classroom.

Humanist psychologists were responsible for the development of the concept of learner autonomy which showed students can create a personal learning plan in different stages to find resources for studying in their environments and to assess themselves (Keegan, 1993). Learner autonomy recognizes that students can reflect on one's own experiences and create personal meanings when instructors promote the use of student-direct learning. Different learning environments suggest a demand for greater or limited exercise of learner autonomy when appropriate. Learning may also be structured not only according to the curriculum, but also according to the level of self-management allowed by the learning environment. This concept gave way to Moore's (1973) establishment of the Theory of Transactional Distance articulating distance is not only a geographical divide between learners and teachers, but a pedagogical concept that is more significant. Transactional distance is a way of analyzing the interactions between both the learner and instructor with potential misunderstandings due to psychological and communications distance.

Online Learning Environments

Student learning has slowly transformed over the past generations with the consistent changes in technology. "Technology is changing more rapidly than ever before, causing more and more confusion about the best way to use it in schools" (Bailey, 1997, p. 57). It has been generally accepted that the incorporation of technology in the classroom environment would benefit from enhanced learning and academic achievement (Brode, 2005). Distance education began in the 1970's with documentation of Hiltz and Turoff's (1978) book titled The Network Nation where the writers use computer tools to discuss pilots in progress in higher education classes in Sweden on the secondary and post-secondary levels, but online learning is better documented in the 1980's through journals with an emphasis on investigating students and teachers who were distanced with a portion or all of the course utilizing online learning. Hiltz (1988) assessed the effectiveness of online learning, and later Hiltz and Meinke (1989) compared courses with online learning to traditional face-to-face learning reporting increased access and improved learning in the online learning environment.

According to Allen and colleagues (2004), distance education is "a course in which the expectation is that the student and instructor will not be physically present in the same location" (p. 403). A few years later, Moore and Kearsley (2011) describe distance education similarly as "…teaching and planned learning in which teaching normally occurs in a different place from learning, requiring communication through technologies as well as special institutional organization" (p. 2). Moore and Kearsley (2011) go on to indicate that other terms used for this form of distance learning include e-Learning and online learning, and note these terms focus on both learning and teaching in an online environment. Means and colleagues (2009) define online learning "as learning that takes place partially or entirely over the internet whereas Allen and Seaman (2013) describe online learning environments as "those in which at least 80 percent of the course content is delivered online" (p. 7). Online courses can also be described as fully online courses were the course is 100% online (Rovai & Jordan, 2004).

In the 1980's and 1990's when distance education became more widespread due to broadcasting technology, several researchers conducted these comparative studies examining mainly television or video and audio instruction broadcasting compared to a conventional face-to-face classroom (Ritchie & Newby, 1989; Biner, Dean, & Mellinger, 1994). In the 1990's and 2000's, many distance education courses used computer and the internet, especially email, asynchronous communication, or websites, to promote activities or courses. Allen and colleagues (2004) highlighted "systematic comparisons of factors that can differentiate traditional classroom and distance learning outcomes" are deficient while "the comparison of distance learning with other formats for education involves a number of potential outcomes" (p. 403).

There has been a collaborative shift in recent years with higher education institutions to offer courses and qualifications through remote learning and an expanding emphasis on extending courses through online distance learning utilizing the internet (Snyder, et al, 2006). Traditionally, these online learning outlets have delivered course materials and course-related communication and interaction through learning management systems that may provide digital content. The use of asynchronous and synchronous communication systems should be encouraged (for example, Canvas, Blackboard, WebCT, Moodle, Schoology). Such courses may also include the potential to perform tests or gather student work recording their learning, including tasks and overall grades. The use of such procedures necessitates students to access the website on a regular basis and download relevant documents, review audio-visual presentations, and contribute to discussions connected to the topic. Schools have made significant progress in implementing technology and assisting teachers with the use of basic technological tools, but instructors are challenged with appropriate integration into the curriculum, according to the Office of Technology Assessment's 1995 report on teachers and technology.

Beck (2011) states that virtual learning is a developing education model with technology using computer software and internet to deliver student instruction. Virtual learning, often called online learning, E-Learning or digital learning, is a potential means improving student performance, access to education and the cost-effectiveness of schools through use of technology such as computer-based, internet-based, remote teacher online, blended learning, and facilitated learning. Research indicates modest variation in student satisfaction (Allen et al., 2002; Castle & McGuire, 2010; Lim, Morris, & Kupritz, 2006) and learning (Allen et al., 2004; Parker & Gemino, 2001). Dziuban and Picciano (2015) examine the "no significant difference phenomenon" referring to Roberts (2007) where research in online learning is viewed as a "collective amnesia [that] surrounds changes that happened in a more distant time frame" (p. 13). Roberts (2007) continued to allude that individuals prefer to believe what they see for themselves, and therefore ignore incidents that took place in the more distant past. Some researchers in newer to online learning disciplines need to look more closely at process variables and draw on past decades of research to better understand online learning. Willis (1997) recommended using technology to counteract a contemporary, engaging issue within curriculum development to assist learners with a more concrete, educational outcome. Progression of research began addressing the dispersion of findings on the effect on student learning of interactivity and interaction (Chickering & Gamson, 1987; Kuh, 2001; Picciano, 2002).

Online learning has been hailed as the greatest development in education since the printing press; it has also been candidly criticized. Confusion surrounds many aspects of online learning because technology, policy and strategy are not evolved at the same rate (Piskurich, 2004). Personal learner advantages include, but are not limited to, self-paced learning whereby learners can control their schedules to an extent, convenience of any time and any place, self-responsibility, opportunity for repeated practice, and an opportunity to apply critical thinking (Piskurich, 2004). Most online learning is asynchronous meaning it is pre-recorded or available at any time of day from any location (Welsh, 2003). Online learning allows students to work at their own pace with monetary deadlines for assignments and quizzes. Secondary students will have a course time to access computers to work on their online courses, but students are not necessarily restricted to the classroom environment. Depending on the school and learning management system, students can work through their online course outside of school on weeknights and weekends. A flexibility of structure adds freedom for the student to be more self-responsible with his or her learning. Virtual reality-based programs offer computer software training programs that typically allow students several opportunities to practice the learning objectives prior to evaluation of the topic (Sawyer, 1997). This opportunity gives students a chance for repeated practice prior to testing to ensure a higher chance of comprehension. Online courses promote active, engaged learners through discussions. Students are not taken off guard when answering questions. Through online learning, students are given a chance to process and think about questions prior to answering using critical thinking skills with their response (Piskurich, 2004). Because of this flexibility and independence with learning, students need to manage their autonomy as learners and exercise individual responsibility (Andrade & Bunker, 2009; Harrell, 2008). Students who do not apply self-accountability and who fail in accomplishing their educational aspirations risk getting lost in online learning (Hart, 2012).

These potential advantages make online learning interesting; however, drawbacks are possible and significant preparation and commitment are needed for effective implementation (Welsh, 2003). If self-regulation skills are to be learned unconventionally, most students may not excel in an online learning environment, and lack of adequate training may have a detrimental effect on student retention and academic performance (Artino, 2009; Harrell, 2008; Bol & Garner, 2011). Students need to move from passive learning to be effective in the online learning environment, where the teacher is the primary delivery method, to active learning, where the student applies prior knowledge through a constructivist approach (Green & Azevedo, 2007; Smart, Witt, & Scott, 2012; Prince & Felder, 2006). Newman (2000) declared that information technology cannot produce comprehension and learning if the instructional environment fails to provide opportunities for problem-solving, decision-making, and communication. She claimed that the discussion of advantages and disadvantages of using technology in the teaching and learning process is a misleading issue. "In effect… technology is a means to an end" (Kotrlik, Redmann, & Douglas, 2003, p. 64).

Students' perception of taking courses within an online learning environment was viewed when Frank, Kassake, and Suhl (2002) acquired a qualitative, empirical research method with group discussion then used this data to develop a questionnaire to validate the quantitative data collected for the purpose of addressing student's needs and expectations within a virtual learning classroom. The sample consists of university students who specialize on operations research. After group discussion, eight categories were deciphered through the questionnaire to determine students' expectations in the online learning environment. These categories were divided into two broader areas for the questionnaire. Work independently included: installation, user-orientation, software-ergonomics, content, and internet functions while self-assessment focused on learning assessment, help functions, examples, and feedback (Frank, Kassake, & Suhl, 2002). Both the qualitative and quantitative aspects of the research support the students strongly express a want to work independently. Students wanted to customize learning materials by incorporating common features including highlighters, comments, and bookmarks. "60% of the men and 50% of the women find it necessary to be able to customize their learning material" (Frank, Kassake, and Suhl, 2002, 4). Students who control and adjust their learning know where and how to obtain the skills required to excel in an online learning environment (Chumbley et al., 2018).

"Technology can play a vital role in helping students meet higher standards and perform at increased levels by promoting alternative, innovative approaches to teaching and learning"

(George, 2000, p. 57). Zimmerman's model of self-regulated learning suggests there must be involvement of psychological, developmental, or environmental influences before an individual can improve and develop learning skills (Zimmerman, 1998). By engaging with these factors, people may improve their abilities and strategies for self-regulated learning (Barnard-Brak, Lan & Paton, 2010). "E-learning requires more maturity and self-discipline from students than traditional classroom education, which may explain the higher dropout rates in e-learning programs compared to conventional programs" (Zhang et al, 2004, p. 78) Traits demonstrated by learners involve critical thinking, accountability for their own learning, and active involvement in the learning process. Zhang and colleagues (2004) address advantages and disadvantages and compare the effectiveness in a traditional classroom learning environment versus an e-learning environment. Each group was allotted the same time frame for lectures and accessed the same experimental procedures. The learning efficiency was collected with unbiased procedures observed through pre-lecture and post-lecture test grades and subjective measures viewed through perceived satisfaction in a questionnaire after the experiments following a 7-point Likert scale. Results were constant showing assessment grades of students in an E-learning classroom were considerably higher than a traditional classroom. The perceived satisfaction level between E- learning and traditional classroom was not significant; most students in E-learning classroom were satisfied with self-controlled learning environment that processed enough interactivity and flexibility for a virtual learning environment (Zhang et al, 2004).

Roberts and Dyer (2005) showed data recommends online learning courses are universal in some agricultural education programs. In a research on self-perceived awareness of the importance of teaching skills, Stedman and colleagues (2011) noticed that the faculty of College of Agricultural and Life Sciences were less acquainted with the essentials of online learning. Yu and colleagues (2010) saw how online learning instruction in agriculture science would improve agricultural production. The results indicated that technology in virtual reality can increase the productivity of agricultural production and the proposed virtual reality can stimulate agricultural education, training, and research (Yu et al., 2010).

Agarwal and Kumar (2013) researched e-learning in agricultural education in India to determine the possibility of increase yields in agricultural production. Online courses are an outlet for students to expand their scope. Online learning programs provide open training for learners with common interests (McDonald, 2002). The purpose of Agarwal and Kumar's (2013) study was to see if e-learning was more superior than traditional education system within agricultural education to reach more students. They took a qualitative approach to observe basic principles, benefits, and application of e-learning in agriculture education training. Results showed e-learning supports widespread use of educational training in the development of agriculture education by assisting with new techniques of increasing crop yields and methods of agriculture productivity in a limited time via internet-based learning. (Agarwal and Kumar, 2013). However, when viewing the benefits, drawbacks, conveniences, and limitations of applying e-learning to Iranian student in Agricultural Higher Education, Talebian, Mohammadi, and Rezvanfar (2014) found opposite results. Results showed online learning has many possibilities in the stated areas, but infrastructural and teaching problems caused incorporation of online learning environments into the agriculture teaching and training field to be forfeited (Talebian, et al., 2014). Online learning removes the constraints of conventional curriculum with time and place, resources, direct access to other forms of instruction, enhancing the international dimension of educational services and evaluating the rate of improvement in courses;

unfortunately online learning suffered from a shortage of instructors, access to unsupportive information and restriction of evaluation and input from students (Talebian et al., 2014).

Erickson and colleagues (2020) explored the perceptions of high school students and teachers involved in an online integrated science, technology, engineering, and math (STEM) learning experience within the poultry science curriculum. The online learning modules incorporated STEM with laying hen management challenges. Learning in framework of an online learning environment can improve knowledge retention and transferability (Driscoll, 2005; Hmelo-Silver, 2004). Robinson and colleagues (2018) suggested that technology be incorporated with STEM teaching in terms of both instruction and delivery. Erickson and colleagues' (2020) program highlighted technologies utilized within facility management including climate control, manure management, egg collection and egg processing. Students confronted lessons predominantly through the program's online platform requiring high school students to interact with simulations. In several cases, high school students and teachers involved in the study commented the program helped them better understand both STEM and agriculture as disciplines, and students stated the integrated learning experience aided in the connection of learning with realistic problems (Erickson et al., 2020).

Online learning has experienced rapid growth over the past decades. While online learning is not new, research regarding teacher perceptions of online courses in agricultural education is limited. The National Research Council (2012) challenged instructors to switch to more active learning environments as opposed to the passive learning environments (Michael, 2006). Recent technical advances, social media connections, vast online courses and improvement in critical thinking and problem-solving skills have had a considerable effect on the growth and layout of online courses (Martin, 2012).

CHAPTER 3
METHODOLOGY

People are encouraged to use technology and online learning opportunities to develop knowledge and professional skills far more than before (Reeves, 2009). The goal of this study was to examine agriculture education teachers' view of incorporating online learning into agriculture education courses. To accomplish this purpose, this study modified an instrument (Chang & Fisher, 1998 & 2003) to measure perceptions of agriculturalists towards online educational experiences in coursework, learning management system software, and best practices for online agriculture education instruction and learning to accomplish the stated study's research objectives.

Objectives

The purpose of this study was to examine agricultural education teachers' perspectives on the relevance of online learning in agriculture education courses. Six objectives were addressed in this research.

1. Describe the personal characteristics of agricultural education teachers in the State of Alabama.
2. Describe agricultural education teacher's perception of the accessibility of an online learning environment.
3. Describe agricultural education teacher's perception of the interaction between teacher-to-student and student-to-student in an online learning environment.
4. Describe agricultural education teacher's perception of the relevance of online learning environments in agriculture education courses.

5. Describe the connection between the access to online learning, interaction with online learning, and online learning within agricultural education courses.
6. Describe the significance between personal characteristics of teachers' perceptions towards online learning in agricultural education.

Research Design

The study examined the online learning environment and its relationship with secondary agricultural education courses. SPSS was used to examine the relationship between teachers' perception of online learning and its impact on agricultural education courses. A descriptive and correlational study was undertaken with a quantitative non-experimental survey research design, (Ary, Jacobs, & Sorensen, 2010). The variables within the study were not manipulated and only observed for relationships and discrepancies (Ary, Jacobs, & Sorensen, 2010).

Population

The population for this descriptive and correlational research study included all agricultural education teachers in Alabama (*N*=309) instructing grades 9-12 during the 2019-2020 school year. A sample (*n*=165) of the populations was selected using the Cochran's (1977) formula for continuous variables and minimum return sample size. A benefit of quantitative methods was the ability to use smaller groups of people in the research to conclude about the larger population (Holton & Burnett, 1997).

Bluman (2004) argues that samples should not be haphazardly chosen because the information collected might be biased. To obtain samples that give each subject of the population an equal chance of selection, random sampling was used. The researcher compiled a list of all high school agricultural education teachers in Alabama (*N* = 309) by a search of the Alabama

State Department of Education website. From this search, the researcher created a spreadsheet with teacher name, school, region, and email address. Upon completion of the spreadsheet, a stratified representative sample was drawn (*n* = 165) from the population using Cochran's (1977) formula for continuous data and minimum return sample size.

Cochran (1977) provides a two-factor method for evaluating sample size, (1) the chance of error that the investigator is willing to accept called the margin of error, and (2) the amount of reasonable risk that the investigator is prepared to agree that the actual margin and error exceeds the acceptable error margin known as the alpha level. The alpha level ($\alpha = .05$) applied in regulating sample size followed most educational research studies. For continuous data, 5% margin of error is acceptable (Krejcie & Morgan, 1970).

Allowing for the purposeful representation of each of the three regions of Alabama agricultural education, the sample was purposively stratified based on these regions. The three regions of Alabama agricultural education are Northern (n=71, 43%), Central (n=49, 30%) and Southern (n=45, 27%). Once the proper size was determined, the researcher divided that sample size into the three representative groups based on regional percentage of the total population. Once calculated, the sample size of each region in Alabama was determined through random selection.

A pilot study was conducted with a representative group of the participants of the study that were not part of the investigation. Participants were notified of the study through Qualtrics explaining the purpose and informed consent for participation. An invitational email was provided to participants from the random sampling which contained a web-based link for the survey and email reminders were delivered to stimulate an increased response rate: 90 participants started the questionnaire (54.5%), 78 participants completed some questions

(47.2%), and 71 participants finished the entire instrument (43%). The number of respondents that are appropriate for a study depends on the type of research implicated, according to Gay and Diehl (1992). The sample size recommended is 10% of the population for descriptive research where this study received 23% response from the Alabama Agricultural Educator population for 2019-2020 academic year (*N*=309) (Gay & Diehl, 1992). One of the concerns with administering web-based surveys is non-response bias (Lindner, Murphy & Briers, 2001) however web-based surveys have shown more expression of views (Scott, et al., 2011; Wells, et al., 2011). The length, complexity, and validity of the questionnaire may have negatively impacted response rates, according to Dillman, Smyth, and Christian (2014). A combination of these features may have given rise to hesitation to start or complete this questionnaire. Non-respondents were sent 20 email reminders emanated through Qualtrics with the hyperlink of the survey. Caution is warranted against generalizing the results of this study except to those who participated.

Internal Validity and Reliability

Validity is characterized as the degree to which a tool measures what it claims to measure (Croker & Algina, 1986) or does what it is supposed to do (Salkind, 2017). Two primary types of validity were addressed within this study, content validity and face validity. Content validity describes how well the instrument measure what it intends to measure (Salkind, 2017). This was addressed by ensuring the items on the questionnaire reflected the Alabama agricultural education courses and online learning standards. Face validity refers to the magnitude an instrument appears to measure the intended variables (Salkind, 2017). To assess content and face validity a committee of professionals was used as suggested by an Auburn University Professor of Curriculum and Teaching. The panel consisted of post-secondary agricultural graduate students previously or currently enrolled in at least one online course at Auburn University in the

College of Agricultural Sciences to assist with validity. The instrument was tested utilizing the graduate students in the blended learning course of Survey Design. The population consisted of 10 enrolled students and one faculty. A consensus within and among the panel of experts was reached and panelist were given ample opportunity to provide alternate wording and additional feedback.

According to Salkind (2017) reliability is whether a test or measurement tool measures consistently. Thanasegaran (2009) explains reliability as the degree which measures are free from error yielding consistent results on multiple attempts in the same population. A test is considered reliable if the test procedure consistently yields the same results. The WEBLEI instrument having known reliability used and tested in an area of online learning environment and found to be a reliable instrument (Chang & Fisher, 1998). A Cronbach's alpha coefficient was calculated for the pilot study to measure internal consistency. Cronbach's alpha ranges from 0 to 1 the closer to 1. The greater the internal consistency. According to Gliem and Gliem (2003), a coefficient greater than .7 is considered an acceptable level of reliability. The alpha coefficient was calculated to determine the reliability of access to online learning (a=0.716), interaction with online learning (a=0.767), and online learning in agricultural education scales (a=0.932). The entire pilot study yielded a Cronbach's alpha coefficient of (a=.921). Based on recommendations by Gliem and Gliem, this was determined to be adequate to proceed.

Instrumentation

The primary focus of this study was to examine agricultural education teachers' perspectives on the relevance of online learning in agricultural education courses. Through a review of literature, a reliable instrument was found. Chang and Fisher (1998, 2003) created the WEBLEI for measuring the perceptions of students in tertiary institutions concerning their web-learning environment. In this study, data on teachers' perception were collected by using an altered version of the WEBLEI.

WEBLEI followed the *Learning Environment Inventory* (LEI) process with the creation of four scales design (Chang and Fisher,1998). The LEI measures student perception of dimensions of the social climate of high school classrooms (Fraser, Anderson, & Walberg, 1982; Chandra, 2004). The first three scales of WEBLEI were tailored from Tobin's (1998) work on *Connecting Communities of Learning* (CCL) (Chandra, 2004). Tobin (1998) created the CCL to examine the experiences of students enrolled in an asynchronous style of math and science education and studied the perceptions of teachers participating in a distance-learning program taught over the Internet. He used a relational explicative approach that considers the principles, interests, and needs of the students when identifying learning environment variables.

The researcher divided the instrument into three scales: Access to Online Learning, Interaction with Online Learning, Agriculture Education and Online Learning. The first part of the questionnaire was designed to collect data on the teachers' perception on accessibility of online learning for teachers and students. The ten items associated with the Access scale are listed in table 1.

Table1
Modified Items of WEBLEI (Scale One – Access Scale)

Scale I – Access of Online Learning: Looking at each statement, decide the level of agreement the statement currently has in relation to working in an accessible, online learning environment.
1. Online learning environments are an effective time management tool.
2. Students can access lessons on the internet at times convenient to them.
3. Students can access lessons on the internet on days when he/she is not in class or absent from school.
4. Lessons on the internet allow students to work at their own pace to achieve learning objectives.
5. In an online learning environment, the students have to be self-disciplined in order to learn.
6. Lessons on the internet enable the students to decide how much they want to learn in a given period.
7. Students are more likely to cheat in an online learning environment.
8. The flexibility of lessons on the internet allow students to explore their own interests.
9. The flexibility of lessons on the internet allows students to meet their learning goals.
10. I feel online learning is the wave of the future.

The second part of the questionnaire was designed to collect data on the teachers' perception of interaction within online learning environments among teacher and student and student to student. The ten items associated with the Interaction Scale are listed in table 2. In this study, teacher perceptions were measured based on personal experiences and communication with students in online learning environments on the high school level while all participants were university level students in the WEBLEI (Chang and Fisher, 2003). In this research, we took interaction a step further then accessibility of online learning and viewed teacher perception of collaboration among students within the online learning environment.

Table 2
Modified Items of WEBLEI (Scale Two – Interaction Scale)

Scale II – Interaction between teacher-student and student-student: Looking at each statement, describe the level of agreement the statement currently has in relation to the interaction between teacher to student and student to student in an online learning environment.
1. The teacher is able to interact with students in an online learning environment.
2. Online learning environments force the instructor to be more sequential.
3. Students have the option of asking the teacher what he/she does not understand by sending an email.
4. Students receive feedback when communicating with the teacher electronically via email.
5. Students feel comfortable contacting the teacher via email.
6. Students are able to ask other students questions during computer lessons.
7. Online learning environments teach students to be precise in answering questions directly.
8. Students respond positively to questions in relation to Internet lessons.
9. Students are more open to communicate in online learning environments.
10. The online learning environment holds students' interest in the subject throughout the term.

The third part of the questionnaire was designed to collect data on the teachers' perception on the relevance of online learning in specific agricultural education courses. The last scale focused on the purpose of the study observing if agricultural education courses are relevant with being used in an online learning environment: agribusiness systems, agriconstruction, agriculture communication, animal systems, aquaculture, environmental and natural resources, floral design, general agriscience, plant systems, and power mechanics. By responding to the items in this scale, teachers were offering an indication of how applicable an online learning environment would be in specific agricultural education courses. This subject modified scale determines the potential relevance of online learning in the state agricultural education courses followed by the Alabama State Department of Education list of approved Agricultural Education courses. The final part of the questionnaire was designed to collect data on the personal and program characteristics of the participants.

The researcher used a small-group analysis with pilot testing to improve clarity in the relationship between Likert scale statements and statistical significance for study objectives. The instrument employed a Likert scale on a five-point scale, 1 = strongly agree, 2 = agree, 3 = neither agree or disagree, 4 = disagree, and 5 = strongly disagree (Rayfield & Croom, 2011). Graduate students were asked to provide feedback during a zoom meeting for the revision of test objects, suggesting vague sentences, phrases that are grammatically complicated, or that may show bias or leading. The instrument was initially provided to students through the course instructor with a one-week return window. After the physical class discussion of the survey, and final pilot test was administered. All completed pilot instruments were returned directly to the researcher anonymously through the online survey platform. Using SPSS, Version 26, the Cronbach-alpha was utilized to determine the degree of internal consistency for the post-secondary student pilot study and indicated a .921 measure of internal consistency. Cronbach-alpha was also utilized to determine inter rater reliability and indicated .917 measure.

Data Collection

Upon the successful completion of the pilot test and the subsequent changes to the instrument, data were collected using the Qualtrics online system. Participants were contacted via the embedded system. The collection followed Dillman's Tailored Design Method (Dillman et al., 2014). In this method it is suggested that a questionnaire be preceded by an invitation letter which clearly outlines the goals of the research and sets a tone of appreciation for the subject's involvement with the research. This research utilized twenty reminder emails all emanating from the Qualtrics system. These reminder emails were sent on a weekly basis to all those who had not responded. It was determined a priori that a 50% response rate would be the cutoff and once that level was reached data could be analyzed. One of the threats to any survey research is the existence of error. That error can be in the form of an invalid instrument (Sullivan, 2011), unreliable instrument (Sullivan, 2011), or survey measurement error (Dillman et al, 2014; Lindner, Murphy, & Briers, 2001). Lindner, Murphy, and Briers (2001) describes the methods to determine if the non-respondents present error would cause an increased chance for committing error in the analysis. The Dillman's Tailored Design Method assisted with the non-response error mitigation (Dillman et al., 2014). Following recommendations by Lindner, Murphy, and Briers (2001) first and second wave respondents were compared and determined to not be statistically different. The data were then considered to be free of non-response error and analysis could proceed.

Data Analysis

The instrument employed a Likert scale on a five-point scale, 1 = strongly agree, 2 = agree, 3 = neither agree or disagree, 4 = disagree, and 5 = strongly disagree (Rayfield & Croom, 2011). The respondents were asked about the availability of access and interaction with online learning and applicability of online learning in agriculture education on the high school level along with multiple choice demographic questions. From these individual items a grand mean score was calculated for each scale and used for further analysis. The grand mean scores were utilized as the dependent variables, access of online learning, interaction with online learning, and relevance of online learning in agricultural education. The independent variables studied were the personal and program demographics.

The dependent variables were tested against the independent variables using Analysis of Variance (ANOVA), t-testing and simple linear regression to discuss the research objectives. A *priori* determination of significance at an alpha level of (a=.05) was set. Data was downloaded from the Qualtrics online platform into Excel where it was placed in a usable form. A 50% completion threshold was set and all respondents who did not reach the level were disregarded. Data were then imported to the SPSS 26 program for analysis.

Each objective was analyzed and reported with the most appropriate method based on the type of data collected. Objective one, two, three, and four were analyzed and reported using frequencies, percentages, means and standard deviations. Objective five was analyzed and reported using frequencies, percentages, means and standard deviations. ANOVA and t-tests were also conducted to determine if there were any statistically significant differences between the means of access, interaction, and agricultural education scale scores. Objective six was analyzed and reported by calculating linear regression.

CHAPTER 4
FINDINGS

In order to better understand the relationship online learning has with agricultural education, this study recorded the agriculture teacher's understanding of availability and communication approaches within an online learning environment as well as the teacher's opinion on the relevance of using online learning in specified agricultural course pathways approved under Alabama State Department of Education. Analysis was undertaken to provide a description in which agriculture education teachers could potentially utilize online learning environments with agriculture education courses.

1. Describe the personal characteristics of agricultural education teachers in the State of Alabama.
2. Describe agricultural education teacher's perception of the accessibility of an online learning environment.
3. Describe agricultural education teacher's perception of the interaction between teacher-to-student and student-to-student in an online learning environment.
4. Describe agricultural education teacher's perception of the relevance of online learning environments in agriculture education courses.
5. Describe the connection between the access to online learning, interaction with online learning, and online learning within agricultural education courses.
6. Describe the significance between personal characteristics of teachers' perceptions towards online learning in agricultural education.

Objective One: Describe the personal characteristics of agricultural education teachers in the State of Alabama.

The population for this descriptive and correlational research study included all secondary agricultural education teachers in Alabama (*N*=309) instructing grades 9-12 during the 2019-2020 school year. A sample (*n*=165) of the populations was selected using the Cochran's (1977) formula for continuous variables and minimum return sample size.

Demographic information from this study is presented in Table 3 & 4. Personal and program characteristics of the sample indicates consistency with the population in Alabama at the time of the questionnaire.

Male teachers comprised the largest gender group of participants 70.4 % (*f* =50). Female teachers represented 29.6% (*f* =21). Respondents reported the year they were born which was then categorized with the highest being 31-40 at 28.2% (*f* =20). Age categories less than 30 reported 23.9% (*f* =17), 41-50 reported 16.9% (*f* =12), 51-60 reported 22.5% (*f* =16), and the remaining category 61 or above reported 8.5% (*f* =6). Respondents reported the ethnicity with the highest being white 88.7% (*f* =63). Ethnicity categories black or African American reported 4.3% (*f* =3), Native American or American Indian reported 5.6% (*f* =4), and the prefer not to say category reported 1.4% (*f* =1). The educational level of respondents was majority master's degree 46.5% (*f* =33). The education level of respondents was bachelor's reported 40.8% (*f* =29), education specialist reported 8.5% (*f* =6), and doctorate reported 3% (*f* =3). Most participants have entered the agriculture education field through traditional undergraduate program with certification 59.1% (*f* =42). Those through graduate program and teacher certification reported 8.5% (*f* =6), combined undergraduate and graduate program with teacher certification reported 1.4% (*f* =1), and alternative teacher certification reported 31% (*f* =22). Respondents reported the years taught with the highest less than 10 years 59.4% (*f* =42). Years taught 11-20 years reported 16.9% (*f* =12), and greater than 20 years reported 23.9% (*f* =17).

Table 3

Personal Demographics of Agricultural Education Participants

		f	%
Gender	Female	21	29.6
	Male	50	70.4
Age	Less than 30	17	23.9
	31-40	20	28.2
	41-50	12	16.9
	51-60	16	22.5
	61 or above	6	8.5
Ethnicity	White	63	88.7
	Black or African American	3	4.3
	Native American or American Indian	4	5.6
	Prefer not to say	1	1.4
Degree Earned	Bachelor's	29	40.8
	Master's	33	46.5
	Education Specialist	6	8.5
	Doctorate	3	4.2
Teacher Preparation	Undergraduate program	42	59.2
	Graduate program	6	8.5
	Combined Undergraduate and Graduate program	1	1.4
	Alternate Teacher Certification	22	31
Year Taught	Less than 10	42	59.1
	11-20	12	16.9
	Greater than 20	17	23.9

Note. N=71

Under the program characteristics of the sample, the survey asked teachers which form of learning environment was more beneficial for high school agricultural education courses in addition to face-to-face learning? Remote instruction comprised the largest group 83.1% (*f* =59) while online learning reported 16.9% (*f* =12). More respondents have taught agricultural education curricula using online learning or remote instruction 81.7% (*f* =58). The respondents reported 18.3% not currently teaching or have not taught agricultural education curricula using online learning and remote instruction (*f* =13). The type of school respondents currently teach at was reported with the highest category being high school 60.5% (*f* =43). Middle school reported 8.5% (*f* =6), and middle and high school reported 31% (*f* =22). The overall size of schools based upon number of students in the agriculture education program were represented across the study participants. Greater than 100 students reported 59.2% (*f* = 42), and less than 100 students reported 40.9% (*f* =29). An online platform is a program using internet technology for the development of instruction. Respondents were asked to list an online learning platform currently teaching or have taught with for agricultural education instruction. Most participants utilized google classroom as an online learning platform 35.2% (*f* =25). Schoology reported 25.4% (*f* =18), iCEV reported 23.9% (*f* =17), and other reported 9.9% (*f* =7).

Table 4

Program Demographics of Agricultural Education Participants

		f	%
Learning Environment	Online Learning	12	16.9
	Remote Learning	59	83.1
Taught Online Learning	Yes	58	81.7
	No	13	18.3
Type of School	Middle School	6	8.5
	High School	43	60.5
	Both Middle & High	22	31
Student Population	Less than 100	29	40.8
	Greater than 100	42	59.2
Online learning platform	Schoology	18	25.4
	Google Classroom	25	35.2
	iCEV	17	22.9
	Other	7	9.9
	No response	4	5.6

Note. N=71

Objective Two: Describe agricultural education teacher's perception on the accessibility of an online learning environment.

In scale one of the questionnaires, teachers were asked to determine the level of agreement the statements currently have to working in accessible, online learning environments for students and teachers. Teachers were asked to rate ten statements related to the accessibility of online learning using a Likert-type scale on a five-point scale, 1=strongly agree, 2=agree, 3=neither agree or disagree, 4=disagree, and 5=strongly disagree. The level of accessibility for teachers was viewed by the effectiveness of online learning environments as a time management tool, lessons allow students to work at their own pace and how much they want to learn in a given time period, lesson allow for flexibility for student to explore their own interests and meet their learning goals, as well as the teacher's perception with online learning being the wave of the future. The level of accessibility for students was viewed by the students being able to work in the online environment at times convenient to them, the level of self-discipline a student needs to learn in online environments, and the capability of students cheating in an online environment. Grand means and grand standard deviation were reported. Table 5 reports level for access of online learning in relation to working in an accessible, online learning environment.

Table 5
Access of Online Learning

	Strongly Disagree		Disagree		Neither Agree nor Disagree		Agree		Strongly Agree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Online learning environments are an effective time management tool.	2	2.8	16	22.6	23	32.4	28	39.4	2	2.8
Students can access lessons on the internet at times convenient to them.	0	0	2	2.8	4	5.6	46	64.8	19	26.8
Students can access lessons on the internet on days when he/she is not in class or absent from school.	0	0	0	0	1	1.4	45	63.4	25	35.2
Lessons on the internet allow students to work at their own pace to achieve learning objectives.	0	0	0	0	8	11.3	48	67.6	15	21.1
In an online learning environment, the students have to be self-disciplined in order to learn.	1	1.4	1	1.4	3	4.2	10	14.1	56	78.9
Lessons on the internet enable the students to decide how much they want to learn in a given period.	1	1.4	4	5.5	18	25.4	42	59.2	6	8.5
Students are more likely to cheat in an online learning environment.	0	0	4	5.6	7	9.9	26	36.6	34	47.9
The flexibility of lessons on the internet allow students to explore their own interests.	1	1.4	2	2.8	23	32.4	39	54.9	6	8.5
The flexibility of lessons on the internet allows students to meet their learning goals	1	1.4	8	11.3	33	46.5	26	36.6	3	4.2
I feel online learning is the wave of the future.	8	11.3	30	42.3	17	23.9	11	15.5	5	7

Note. Grand M = 2.2, Grand SD = 0.686

The respondents mostly agreed with research statements #1 through #9 on access of online learning reporting a grand mean of 2.2. The respondents reported strongly agreeing on research statements #5 78.9% (f =56) and #7 47.9% (f =34) where students have to self-disciplined and are more likely to cheat in an online learning environment. The respondents disagreed with the final research statement under Access scale suggesting online learning is not the wave of the future 42.3% (f =30).

Objective Three: Describe agricultural education teacher's perception on the interaction between teacher-to-student and student-to-student in an online learning environment.

In scale two of the questionnaire, teachers were asked to decide the level of agreement each statement currently had in relation to the interaction between teacher-to-student and student-to-student in an online learning environment. Teachers were asked to rate ten statements related to the interaction available with online learning using a Likert-type scale on a five-point scale, 1=strongly agree, 2=agree, 3=neither agree or disagree, 4=disagree, and 5=strongly disagree. The level of interaction was viewed through the methods of communication and chances of feedback available between teacher and students as well as students and classmates in an online learning environment. Grand means were reported. Table 6 reported levels for interaction between teacher and student as well as student to student in an online learning environment.

Table 6
Interaction between teacher-student and student-student

	Strongly Disagree		Disagree		Neither Agree nor Disagree		Agree		Strongly Agree	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
The teacher is able to interact with students in an online learning environment.	1	1.4	25	35.2	11	15.5	29	40.9	5	7
Online learning environments force the instructor to be more sequential.	1	1.4	3	4.2	19	26.8	44	62	4	5.6
Students have the option of asking the teacher what he/she does not understand by sending an email.	0	0	0	0	4	5.6	56	78.9	11	15.5
Students receive feedback when communicating with the teacher electronically via email.	0	0	2	2.8	6	8.5	59	83.1	4	5.6
Students feel comfortable contacting the teacher via email.	1	1.4	12	16.9	25	35.2	27	38.0	6	8.5
Students are able to ask other students questions during computer lessons.	0	0	10	14.1	25	35.2	35	49.3	1	1.4
Online learning environments teach students to be precise in answering questions directly.	3	4.2	19	26.8	27	38	20	28.2	2	2.8
Students respond positively to questions in relation to Internet lessons.	2	2.8	11	15.5	45	63.4	12	16.9	1	1.4
Students are more open to communicate in online learning environments.	3	4.2	25	35.2	23	32.5	17	23.9	3	4.2
The online learning environment holds students' interest in the subject throughout the term.	7	9.9	32	45	25	35.2	6	8.5	1	1.4

Note. Grand M = 2.71, Grand SD = 0.780

The grand means of the Interaction scale reported 2.71 with a grand standard deviation of 0.780 showing the respondents mostly agreed with statements #1 through #6 where #1 through #5 focused on teacher communication with students. The respondents reported neither agree nor disagree on research statements #7 38% (f =27) and #8 63.4% (f =45) asking if online learning environments teach students to be precise in answering questions or if students respond positively to questions in relation to Internet lessons. The respondents reported disagree for research statements #9 35.2% (f =25) and #10 45.1% (f =32). The respondents suggested students are not more open to communicate in online learning environments and the online learning environment does not hold the students' interest in the subject throughout the term.

Objective Four: Describe agricultural education teacher's perception on the relevance of online learning environments in agricultural education courses.

In scale three of the questionnaire, teachers were asked to decide the level of relevance online learning has in agricultural education courses. Teachers were asked to rate ten statements related to the relevance of online learning in specified agriculture course pathways approved under Alabama State Department of Education using a Likert-type scale on a five-point scale, 1=strongly agree, 2=agree, 3=neither agree or disagree, 4=disagree, and 5=strongly disagree. The level of applicability was viewed for the courses of Agribusiness systems, Agriconstruction, Agriculture communication, Animal Systems, Aquaculture, Environmental and Natural Resources, Floral Design, General Agriscience, Plant Systems, and Power Mechanics. Grand means were reported for each course pathway.

Table 7 reported teachers' perception on levels of relevance online learning has in specific agricultural education courses as determined by the Alabama State Department of Education Career and Technical Education Course of Study for 2019-2020 academic year.

Table 7
Agricultural Education Online Learning

	Strongly Disagree		Disagree		Neither Agree nor Disagree		Agree		Strongly Agree	
	f	*%*	*F*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Agribusiness systems courses are relevant to be used in an online learning environment.	2	2.8	5	7.0	14	19.7	46	64.9	4	5.6
Agriconstruction courses are relevant to be used in an online learning environment.	17	23.9	31	43.7	13	18.3	9	12.7	1	1.4
Agriculture communication courses are relevant to be used in an online learning environment.	2	2.8	2	2.8	9	12.7	50	70.4	8	11.3
Animal systems courses are relevant to be used in an online learning environment.	7	9.9	15	21.1	19	26.8	28	39.4	2	2.8
Aquaculture courses are relevant to be used in an online learning environment.	8	11.3	23	32.4	14	19.7	25	35.2	1	1.4
Environmental and Natural Resources Systems courses are relevant to be used in an online learning environment.	5	7.0	13	18.3	16	22.6	36	50.7	1	1.4
Floral Design courses are relevant to be used in an online learning environment.	6	8.5	25	35.2	21	29.6	17	23.9	2	2.8
General Agriscience courses are relevant to be used in an online learning environment.	5	7.0	19	26.8	14	19.7	28	39.4	5	7.0
Plant Systems courses are relevant to be used in an online learning environment.	10	14.1	21	29.6	12	16.9	25	35.2	3	4.2
Power Mechanics courses are relevant to be used in an online learning environment.	17	23.9	32	45.1	13	18.3	8	11.3	1	1.4

Note. Grand M = 3.02, Grand SD = 0.892

The respondents reported a grand mean of 3.02 and grand standard deviation of 0.892.The respondents agreed Agribusiness courses 64.8% (*f* =46), Agriculture Communication courses 70.4% (*f* =50), Animal Systems courses 39.4% (*f* =28), Aquaculture courses 35.2% (*f* =25), Environmental and Natural Resources Systems courses 50.7% (*f* =36), General Agriscience courses 39.4% (*f* =28), and Plant Systems courses 35.2% (*f* =25) are relevant to be used in an online learning environment. The respondents disagreed Agriconstruction courses 43.7% (*f* =31), Floral Design courses 35.2% (*f* =25), and Power Mechanics courses 45.1% (*f* =32) are relevant to be used in an online learning environment.

Objective Five: Describe a correlation between the selected dependent variables: access to online learning, interaction with online learning, and online learning within agricultural education courses.

The Pearson Product Moment correlation coefficient was conducted between dependent variables with perception of agricultural teachers. The Pearson Product Moment correlation coefficient determines the degree and directions of relatedness between continuous variables (Ross & Shannon, 2008). The possible values of the correlation coefficient range from -1 to +1, and the closer the number is to an absolute value of 1, the greater the degree of relatedness (Ross & Shannon, 2008). The strength and direction of the linear relationship between respondents' characteristics with perception of agricultural education teachers regarding online learning is presented in Table 8. The direction and strength of the relationship assessed was a positive, increasing linear relationship with moderate correlation in access to online learning (r=0.39) and interaction within online learning (r=0.48). Online learning with agricultural education assessed a positive, increasing linear relationship with a substantial correlation (r=0.61). There was a statistically significant relationship found between access to online learning, interaction with online learning, and online learning within agricultural education courses ($p \leq 0.00$).

Table 8
Correlation between selected dependent variables with perception of agriculture education teachers regarding online learning

Variables	***r***	*p*	**Magnitude**
Access to online learning	0.39	.00	Moderate
Interaction within online learning	0.48	.00	Moderate
Online learning within agriculture education courses	0.61	.00	Substantial

*Note. *Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed). Magnitude: .01 ≥ r ≥ .09 = Negligible, .10 ≥ r ≥ .29 = Low, .30 ≥ r ≥ .49 = Moderate, .50 ≥ r ≥ .69 = Substantial, r ≥ .70 = Very Strong (Davis, 1971).*

Objective Six: Describe the significance between personal characteristics of teachers' perceptions towards online learning in agricultural education

A linear regression was used for prediction of changes in perception of agricultural education teachers regarding the relevance of online learning in agriculture education courses. The grand mean of online learning in agricultural education scale was used as the dependent variable in this analysis. Five variables were used as potential explanatory variables: years taught in agriculture education, education level (dummy coded as 1=bachelors, 2=masters, 3=education specialist, 4=doctorate), ethnicity (dummy coded as 1=white, 2=Hispanic or Latino, 3=Black or African American, 4=Native American or American Indian, 5=Asian/Pacific Islander, 6=Other, 7=Prefer not to say), gender (dummy coded as 1=female, 2=male), age. The R^2 (0.05) represented the full amount of nonredundant overlap between the dependent variable and the independent variables.

The model summary in table 9 shows the correlation between teachers' perceptions of online learning within agriculture education by personal characteristics (R=0.23). The R^2 column states the measure in variability in the relationship with predictors. The regression analysis indicated that 5.2% of the variation in teachers' perceptions of online learning within agricultural education was determined by personal characteristics: years taught, education level, ethnicity, gender, and age. This determined a small effect size according to Cohen's (1988) f^2 method of effect size. No statistical significance was noted. The relationship is described in the following formula:

$$Y=3.53 + 0.004X2 - 0.12X3 - 0.25X4 + 0.09X5 + 0.01X6$$

Table 9
Model Summary: Linear Regression for prediction of changes in personal characteristics in perception of teachers regarding online learning in agricultural education

Model	*R*	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.22	0.05	-0.02	0.80

[a]Predictors: (Constant), Grouped Years Taught, Education Level, Ethnicity, Gender, Age

An ANOVA in table 10 was conducted along with the linear regression to accurately assess whether there were differences in the online learning within agricultural education mean reported among personal characteristics of agricultural education respondents. A regression analysis ANOVA contains estimations that present information on the level of variability inside a regression model and test for significance. The results show there is no statistically significant difference among online learning with agricultural education and personal characteristics of respondents.

Table 10
ANOVA: Linear Regression for prediction of changes in personal characteristics in perception of teachers regarding online learning in agricultural education

	Sum of Squares	*df*	Mean Squares	*F*	*p*
Regression	2.30	5	0.46	0.72	0.61
Residual	42.69	65	0.64		
Total	43.98	70			

Dependent Variable: Agricultural Education Online Learning Grand Mean

[a]Predictors: (Constant), Grouped Years Taught, Education Level, Ethnicity, Gender, Age

The researcher then looked at the individual agricultural education courses for statistical significance. Table 11 through 20 reported the regressions for online learning within each agricultural education course, which revealed non-statistically significant findings based on the personal characteristics. However, findings for animal systems and power mechanics reported statistically significant coefficients in gender (p=0.03) and ethnicity (p=0.05). The regression for ethnicity in relation to power mechanics accounted for the highest amount of variance with an R^2 of 0.06.

Table 11

Regression Models of Online Learning with Agribusiness Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Agribusiness	0.01 (0.82)	0.08 (0.82)	0.15 (0.81)	0.03 (0.82)	0.04 (0.82)	0.14 (0.81)
Sample Size	71	71	71	71	71	71
R^2	.00	.00	.02	.00	.00	.02

*$p \leq .05$
Parentheses represents the Standard Error of the Estimate

Table 12

Regression Models of Online Learning with Agriconstruction Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Agriconstruction	0.11 (1.01)	0.07 (1.01)	0.14 (1.00)	0.12 (1.01)	0.07 (1.01)	0.10 (1.01)
Sample Size	71	71	71	71	71	71
R^2	.01	.01	0.02	0.02	0.01	0.01

*$p\leq.05$

Parentheses represents the Standard Error of the Estimate

Table 13

Regression Models of Online Learning with Agriculture Communications Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Agriculture communications	0.05 (0.77)	0.00 (0.77)	0.10 (0.77)	0.03 (0.77)	0.16 (0.76)	0.03 (0.77)
Sample Size	71	71	71	71	71	71
R^2	0.00	0.00	0.01	0.00	0.03	0.00

*$p\leq.05$

Parentheses represents the Standard Error of the Estimate

Table 14

Regression Models of Online Learning with Animal Systems Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Animal Systems	0.15 (1.06)	0.05 (1.07)	0.17 (1.05)	0.26* (1.03)	0.16 (1.06)	0.168 (1.06)
Sample Size	71	71	71	71	71	71
R^2	0.02	0.00	0.03	0.07	0.03	0.03

*$p\leq.05$

Parentheses represents the Standard Error of the Estimate

Table 15

Regression Models of Online Learning with Aquaculture Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Aquaculture	0.01 (1.09)	0.03 (1.09)	0.08 (1.09)	0.21 (1.07)	0.13 (1.08)	0.01 (1.09)
Sample Size	71	71	71	71	71	71
R^2	0.00	0.00	0.01	0.05	0.02	0.00

*$p \leq .05$
Parentheses represents the Standard Error of the Estimate

Table 16

Regression Models of Online Learning with Environmental & Natural Resources Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Environmental & Natural Resources	0.03 (1.01)	0.13 (1.00)	0.18 (0.99)	0.08 (1.00)	0.05 (1.01)	0.11 (1.00)
Sample Size	71	71	71	71	71	71
R^2	0.00	0.02	0.03	0.01	0.00	0.01

*$p \leq .05$
Parentheses represents the Standard Error of the Estimate

Table 17

Regression Models of Online Learning with Floral Design Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Floral Design	0.07 (1.01)	0.05 (1.01)	0.16 (1.00)	0.04 (1.01)	0.12 (1.00)	0.06 (1.01)
Sample Size	71	71	71	71	71	71
R^2	0.01	0.00	0.02	0.00	0.02	0.00

*$p \leq .05$
Parentheses represents the Standard Error of the Estimate

Table 18

Regression Models of Online Learning with General Agriscience Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
General Agriscience	0.01 (1.12)	0.08 (1.11)	0.10 (1.11)	0.10 (1.11)	0.04 (1.12)	0.06 (1.11)
Sample Size	71	71	71	71	71	71
R^2	0.00	0.00	0.01	0.01	0.00	0.00

*$p \leq .05$

Parentheses represents the Standard Error of the Estimate

Table 19

Regression Models of Online Learning with Plant Systems Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Plant Systems	0.06 (1.18)	0.10 (1.18)	0.06 (1.18)	0.11 (1.18)	0.07 (1.18)	0.05 (1.18)
Sample Size	71	71	71	71	71	71
R^2	0.00	0.01	0.00	0.01	0.01	0.00

*$p \leq .05$

Parentheses represents the Standard Error of the Estimate

Table 20

Regression Models of Online Learning with Power Mechanics Course

	Taught Online Learning	Age	Ethnicity	Gender	Degree	Years Taught
Power Mechanics	0.10 (0.99)	0.05 (0.99)	0.24* (0.96)	0.11 (0.99)	0.16 (0.98)	0.13 (0.98)
Sample Size	71	71	71	71	71	71
R^2	0.01	0.00	0.06	0.01	0.02	0.02

*$p \leq .05$

Parentheses represents the Standard Error of the Estimate

CHAPTER 5
CONCLUSION

Summary

Agricultural education programs around the nation are closing, student numbers in the FFA chapter and agricultural education are declining, and students are not actively participating in one of the country's biggest, most important industries. Traditional agricultural classroom environments provide opportunities for students to receive one-on-one learning with immediate feedback and encouragement but is instructor centered. Online learning environments are learner centered with opportunities for students to work at their own pace on their own time with virtual resources at their fingertips but can potentially provide more confusion with lack of immediate feedback and motivation from the instructor. Divided, these two learning environments have contradicting advantages and disadvantages, but together, these two learning environments could benefit both the instructor and students within the high school agricultural education classroom. The number of students participating in online learning environments is rising yearly with more than a fourth of the undergraduate students across the United States in 2013 enrolled in at least one online course (Allen & Seaman, 2015).

This study was designed to determine if online learning environments are relevant in agricultural education courses according to teacher perception. The AAAE National Research Agenda for agricultural education served as a guide for the research objective and methodology for this study. This study assisted in the research effort with demonstrating potential relevance in the context of modern teaching and learning technologies, practices, and products. The best methods of teaching and transmitting agricultural knowledge to students needed for retention and implementation are critical for educators to recognize (Pense & Leising, 2004). This investigation assisted in the research effort to “develop and implement agricultural teaching and learning processes contributing to the development of sustainable agricultural systems needed in the near future” including secondary schools and their students and teachers (Lindner, et al, 2016, 20). The importance of this analysis was this research’s priority because it was designed to determine the impact of online learning in agriculture education courses.

Summary of Purpose and Objectives

The purpose of this study was to examine agriculture education teachers’ perspectives on the relevance of online learning in agriculture education courses. Six objectives were addressed in this research.

1. Describe the personal characteristics of agricultural education teachers in the State of Alabama.
2. Describe agricultural education teacher’s perception of the accessibility of an online learning environment.
3. Describe agricultural education teacher’s perception of the interaction between teacher-to-student and student-to-student in an online learning environment.
4. Describe agricultural education teacher’s perception of the relevance of online learning environments in agriculture education courses.
5. Describe the connection between the access to online learning, interaction with online learning, and online learning within agricultural education courses.
6. Describe the significance between personal characteristics of teachers’ perceptions towards online learning in agricultural education.

Summary of Methods

A review of pertinent literature in relation to online learning environments led to several studies regarding online learning within agricultural education. Studies exist considering the specific concepts of online learning within the agriculture industry and on the collegiate level. However, the problem remains there is limited current research combining the factors: online learning and high school agricultural education. We must understand the importance of continuous change in technology within the agriculture industry and utilize it when applicable and essential within agricultural education to have a successful, modern classroom for everyone. This descriptive and correlational study utilized a quantitative survey research design. Participants completed a web-based questionnaire used to determine perceptions of agricultural education teachers on the relevance of utilizing online learning in specified agricultural education courses chosen from the 2019-2020 ALSDE CTE Course of Study. A random sample (*n*=165) of the population was calculated using Cochran's (1977) sample size formula for continuous data. The voluntary sampling method was a non-probability sampling method consisting of people who "self-select" into the survey (Stat Trek, 2019, 1).

An online survey was emailed to each participant. Data was collected through a Likert-type scale on a five-point scale, 1=strongly agree, 2=agree, 3=neither agree or disagree, 4=disagree, and 5=strongly disagree (Rayfield and Croom, 2011). The survey was devised with an introduction (4 questions including agreement to participate), access scale statements (ten statements), interaction scale statements (10 statements), agriculture education scale statements (10 statements), and demographic questions (8 questions). The three divisions consisted of 30 Likert Scale statements on the respondents' perceptions of accessibility and communication abilities within an online learning environment as well as the significance of online learning in agricultural education courses. Multiple choice demographic questions were requested at the end of the survey. The quantitative survey was administered through Qualtrics and provided to agricultural education teachers in Alabama via email. Data from the respondents were analyzed and reported by specific research objectives. Statistical information reported were frequencies, percentages, means, standard deviations, Pearson's coefficient, and multiple regressions.

The dependent variables in this study were access of online learning scale scores, interaction with online learning scale scores, and relevance of online learning in agricultural education scale scores. The independent variables in this study were the personal and program demographics.

Conclusion, Implications, and Recommendations

Objective One Conclusions

Objective one was based upon the personal and program characteristics of the participants. Most of the respondents were male and most of the respondents' ethnicity was white. Most of the sample earned a graduate program degree (master's) and received teacher certification through an undergraduate program. It is interesting to see most of the respondents fell in the age range of 31-40 years and 51-60 years, but most of the level of teaching experience was less than 10 years.

The respondents mostly taught in a program with a student population greater than 100. The respondents preferred the addition of a remote learning environment to an online learning environment along with the traditional face-to-face classroom. Most of the sample had taught or is currently teaching online learning in agricultural education. These respondents are utilizing various online learning platforms but relying mostly on google classroom, schoology, and iCEV multimedia programs with their student population.

Objective One Implications

Data reported that the agriculture education field in Alabama follows a traditional route of being male dominated. However, the female respondents made up almost half of the male population. The growth in the number of female agriculture teachers over the past 50 years has been a positive development. Kantrovich (2010) reported that females represented the majority of newly qualified agriculture teachers in 2009, though males still dominated the category of actual teachers with a ratio of 2:1. The 2017 Agriculture Teacher Supply and Demand Overview Nationwide reports region 5 (Mississippi, Alabama, Georgia, Florida, Tennessee, South Carolina and North Carolina) reported 1,322 male ag teachers and 1,036 female ag teachers (Smith, Lawyer, & Foster, 2018).

Many of the teachers have less than ten years' experience in agriculture education. This number coincides with national statistics. National FFA states "the shortage of qualified agriculture teachers is the greatest challenge facing FFA and agriculture education" (National FFA, 2016, p 2). National FFA Organization (2016) statistics state more than 13,000 FFA advisors and agriculture teachers delivered instruction across the United States, and 23% of these teachers have five or less years of teaching experience. The 2017 Agriculture Teacher Supply and Demand Overview Nationwide reported 5.3% of the nation's agriculture education teachers leaving the workforce with 4.8% of Region 5's agriculture education teachers leaving (Smith, Lawyer, & Foster, 2018). That results in a shortage between 200 and 400 agriculture teachers a year that impacts tens of thousands of students nationwide (Smith, Lawyer, & Foster, 2018). Ellen Thompson, National Teach Ag Campaign project director, stated the teacher shortage is a case of supply and demand; programs are being expanded and news ones opened for growing student interest, but the teachers are not there (Lobeck, 2020). Kevin Rogers, president of the

Arizona Farm Bureau, reported the shortage places the future of the agriculture industry at risk and encouraged others to join Farm Bureau in tackling the problem (Lobeck, 2020). The teacher shortage issue could be assisted with online learning in agricultural education.

Objective One Recommendations

Agriculture education is and has been experiencing a shortage of teachers in a male dominated field. The traditional route through undergraduate and graduate programs was reported as the most used route in this study, but the path of alternate teacher certification could assist with numbers and potential teachers with experience in the field. Preparation services of incorporating online learning into agriculture education courses could assist with those shortages. Further research is needed on the retention of agricultural education teachers and the possibility of incorporating online learning into agricultural education courses to assist with those shortages.

Objective Two Conclusions

The respondents agreed with many of the statements under the access of online learning scale. The results expressed online learning environments are: (1) effective time management tool, (2) accessible by students at times convenient to them, (3) accessible when the student is absent from class, (4) convenient with providing lessons and learning objectives to students, (5) promotors of self-discipline, (6) enabling students flexibility to determine how much they can/need to learn in a given period, (7) uncontrollable in some aspects of cheating, (8) allowing students to explore their own interest, and (9) permitting students to meet their learning goals. Most of the respondents disagreed with the final research statement suggesting online learning is the wave of the future agreeing with Newman (2000) and Kotrlik, Redmann, and Douglas (2003) that technology is a means to an end.

Objective Two Implications

Online learning environments are currently being examined as methods of providing education instruction in teacher prepared learning management systems. One of the sections of this study viewed the effectiveness of accessibility to online learning environments as a teacher or student. Results of the study revealed a significance between accessibility and gender. The nine statements directly related to the teacher or student's ability to manage and maneuver through an online learning environment were all agreed upon. Based on the participants of this study, accessing online learning is not a barrier.

Objective Two Recommendations

The study shows that online learning environments are open resources for emerging technology to be implemented and autonomous, self-regulated learning to be encouraged. Some of the obstacles associated with online learning environments, including possible student disengagements, school-life balance problems, and technical difficulties for both students and teachers, need to be considered. It is imperative students' needs are monitored and met in online learning environments. Further study is needed to understand how to best prepare students and teachers for success in an online learning environment.

Objective Three Conclusions

The respondents continued a similar response under the interaction scale where results mostly agreed with the statements. The respondents agreed that online learning environments offer the ability for (1) teachers to interact with students, (2) teachers to be more sequential with lessons, (3) students to communicate with questions/concerns with teacher, (4) teachers to send students feedback, (5) students to feel comfortable in communication options with teachers, and (6) students are able to interact with other online classmates. The respondents were neutral regarding online learning environments teaching students to be precise in answering questions directly or to respond positively to questions. The respondents mostly disagreed that students are more open to communicate or that students' interest are held throughout the term in online learning environments.

Objective Three Implications

Dewey (1938) and Freire (1970) acknowledged and highlighted in their studies the vital importance of the social experiences in education. This interaction is more critical when approached within online learning environments. The use of discussion boards, synchronous chat environments, email and other online application must be incorporated. Derek Powazek (2002) depicted how various tools encourage different methods of interaction online and specifically how those tools have considerable impact on the types of interactions that take place within them in his study *Design for Community*. This study on the impact of online learning in agriculture education revealed interaction between teacher and student and student to student was achievable in an online learning environment. Alston and English's (2007) research agreed with this study's results that online learning was a valuable means of interaction, between teacher and students, and student to student. It is essential effective facilitation and feedback be employed when appropriate and necessary within online learning.

Objective Three Recommendations

In an online learning environment, a versatile and sensitive approach to all activities is important. Understanding key content and successfully completing assessments is highly important. Future research will benefit from recognizing special factors relating to the preparation of students and teachers, so embracing online learning environments will provide both students and teachers with a good experience.

Objective Four Conclusions

The purpose of the study was to see if a statistical significance is present with incorporating online learning in agriculture education. The agriculture education scale results showed some agriculture education courses could apply online learning environments within the traditional classroom. Those courses, according to the study's participants, were Agribusiness, Agriculture Communications, Animal Systems, Aquaculture, Environmental and Natural Resources Systems, General Agriscience, and Plant Systems. The respondents did not feel Agriconstruction, Floral Design, or Power Mechanics courses were feasible for utilizing online learning environments.

Objective Four Implications

Results reported 81.7% of the studies participants are teaching or have already taught agriculture education in an online learning environment. Today's classrooms must prepare students for careers and challenges that do not yet exist. Education is evolving at a faster pace than any other time in recent history. There is an increasing awareness among educators that the curriculum needs to progress to meet tomorrow's outlook. Students need to learn new skills to solve difficult problems, communicate effectively and express ideas in new ways. "The technological capabilities of an online-learning environment allow an instructor to make an online class better than a face-to-face class by providing students with learning activities that are individualized to meet their needs and characteristics" (Roberts & Dyer, 2005, 12). If it is applicable for university agricultural education to instruct in remote learning and distance education environments (Roberts & Dyer, 2003), this type of learning could potentially be utilized in secondary education with further research.

In an online learning environment, it can take various methods to deliver content and use different learning activities to meet the needs of the student. An example of a learning activity available in an online learning environment is an illustrated web lecture (Simonson, et. al., 2003). The asynchronous learning imitates the conventional lecture consisting of a text-based lecture with an audio recording of the instructor providing the lesson. The illustrated web lecture can also be presented live remotely as well as recorded. Other forms of audio and video communication tools are available for online delivery. As demand for online learning and delivery increases, it is essential that the courses still possess rigor and higher order learning.

Objective Four Recommendations

While the researcher still agrees that quantitative research was the right choice for this study, more credibility could be given to this study if coupled with qualitative research tools, such as interviews. For example, an interview or short-answer discussion questions designed for qualitative research may offer more evidence to strengthen the data discovered using a survey designed for quantitative research. The qualitative aspect could assist with expressing pertinent reasoning for the relevance or insignificance of online learning in specific agriculture education courses. Further research is needed of a quantitative study coupled with qualitative research to assist with expressing pertinent reasoning for the teachers' perception of relevance or insignificance of online learning in specific agricultural education courses.

Objective Five Conclusions

Objective five reported a moderate to substantial connection between access to online learning, interaction within online learning, and online learning within agricultural education courses using Pearson correlation coefficient. The data shows 15% of the variance with access to online learning, 23% of the variance with interaction to online learning, and 37% of the variance with online learning within agricultural education courses can be explained. The higher the percentage shows the more the variables have in common (Salkind, 2017) resulting in an association between the study's dependent variables.

Objective Five Implications

Over the past few years, the educational field has seen many theoretical changes. Traditional education has emphasized a teacher-centered environment (Simonson & Thompson, 1997). Educators and other related professionals across the nation have debated the past several decades on the newer educational models of delivery that have been impacted by the ever-changing world of technology. According to Wingard (2004) the advantages of online learning for higher learning institutions provide a broader assortment of course offerings in addition to flexibility over time and location. Kahn (2000) found that online learning includes two concepts: productivity of student management and a compliant, diverse learning environment. Murphy and Boyd's (2000) research expressed computer-based instruction has been used to teach farm safety, landscape design and construction.

The results from this study revealed courses in Agribusiness, Agriculture Communications, Animal Systems, Aquaculture, Environmental and Natural Resources Systems, General Agriscience, and Plant Systems were relevant to be taught in a secondary, online learning environment. The agriculture education teachers did not perceive Agriconstruction, Floral Design, or Power Mechanics courses were feasible for teaching in a secondary, online learning environment. These results are beneficially to potentially encourage online learning environments in the proposed agricultural education courses, but these results are limited to the participants. Without any responses or connection with the participants regarding reasoning for their choice, it is difficult to explain logistics of offering online learning environments in agriculture education courses. Murphy and Terry's (1998) study that recruited agricultural educators in a Delphi panel determined the use of electronic communication, information, and imaging technologies would enhance instruction; however, the lack of training time for preparation, dedication, support, and funding was a challenge for technology integration.

Objective Five Recommendations

This seems to be an exceptional opportunity to develop and incorporate change. Processes of transition will have an impact on technology integration. This development would involve stakeholders at all levels. Additional research on factors relating to online learning integration in the agriculture education courses is warranted. This certainly includes research to adequately prepare teacher education institutions to integrate online learning in the teaching and learning process in the agriculture education courses. Further research is needed on factors relating the online learning integration in the agricultural education courses.

Objective Six Conclusions

Linear regression was used to evaluate predictors for continuously distributed outcome variables. Coefficients for each independent variable (predictors) were calculated to determine if any observable significance was in the sample data. Linear regression enabled for each coefficient for the independent variable to be adjusted for confounding by all variables in the model, potential predictable values from the model to be interpreted, and outcomes of relative importance of the independent variables (Ross &Shannon, 2008). Linear relationships were observed through SPSS data results and scatter plots between the independent and dependent variables. No statistical significance was reported in the linear regression with online learning in agricultural education grand mean reporting no effect. The agricultural education teachers' perceptions were similar in thought process for the relevance on online learning environments in agricultural education courses.

Objective Six Implications

The study has implications on teacher acceptance on new technology and usage within agricultural education courses. The study reported teachers viewed online learning environments as a relevant teaching tool or learning environment within some of the agricultural education courses.

Objective Six Recommendations

Technology has greatly impacted our nation and the world. Agriculture education should adapt to the advancements in technology within the classroom environment to prepare the future leaders in the agriculture industry. The conclusions of this study reveal more needs to be done to determine the relevance of integrating online learning environments in agriculture education programs. Just as course delivery at universities continues to change to remote learning and other technology based formats, secondary education leaders should look into online learning models that will result in faster and clearer integration of technology in the teaching and learning process. The conclusions show teachers view an application of online learning approachable in some agriculture education courses where technology could improve the quality of instruction and ultimately student learning. The next step may be to address student perception of online learning in proposed agriculture education courses. Kotrlick and Redmon (2009) stated research is also needed from the learner's perspective to establish how technology can be used to enhance learning and the learning environment.

The abundance of online learning during the past decade is believed to have addressed multiple challenges facing secondary and post-secondary educators, yet outcomes are still being weighed. This study of Alabama Agriculture Educators provided insights to the teachers' perception of online learning in agriculture education courses. Results showed the teachers reported the application of online learning in certain agriculture education courses was academically relevant. Further research is needed to determine the relevance of integrating online learning in agricultural education programs. Utilizing this research will allow the agriculture education profession to view the positive aspects online learning may have in enrichment within an agriculture education classroom.

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Auburn University Human Research Protection Program

EXEMPTION REVIEW APPLICATION

For information or help completing this form, contact: **THE OFFICE OF RESEARCH COMPLIANCE,**
Location: 115 Ramsay Hall **Phone:** 334-844-5966 **Email:** IRBAdmin@auburn.edu

Submit completed application and supporting material as one attachment to IRBsubmit@auburn.edu.

1. PROJECT IDENTIFICATION **Today's Date** April 8, 2020

a. Project Title Impact of Virtual Learning on High School Agriculture Education

b. Principal Investigator Jamie Rich Degree(s) Doctor's of Philosophy
Rank/Title Student Department/School Curriculum and Teaching
Phone Number 229-886-6484 AU Email jsr0046@auburn.edu

Faculty Principal Investigator (required if PI is a student) James Lindner
Title Professor Department/School Curriculum and Teaching
Phone Number 334-844-6797 AU Email jrl0039@auburn.edu

Dept Head David Virtue Department/School Curriculum and Teaching
Phone Number 334-844-4443 AU Email dcv004@auburn.edu

c. Project Personnel (other PI) – Identify all individuals who will be involved with the conduct of the research and include their role on the project. Role may include design, recruitment, consent process, data collection, data analysis, and reporting. Attach a table if needed for additional personnel.

Personnel Name________ Degree (s) ________
Rank/Title________ Department/School________
Role________
AU affiliated? ☐ YES ☐ NO If no, name of home institution ________
Plan for IRB approval for non-AU affiliated personnel? ________

Personnel Name________ Degree (s) ________
Rank/Title________ Department/School________
Role________
AU affiliated? ☐ YES ☐ NO If no, name of home institution ________
Plan for IRB approval for non-AU affiliated personnel? ________

Personnel Name________ Degree (s) ________
Rank/Title________ Department/School________
Role________
AU affiliated? ☐ YES ☐ NO If no, name of home institution ________
Plan for IRB approval for non-AU affiliated personnel? ________

d. Training – Have all Key Personnel completed CITI human subjects training (including elective modules related to this research) within the last 3 years? YES ☐ NO ☒

The Auburn University Institutional Review Board has approved this Document for use from
04/08/2020 to ----------
Protocol # 20-180 EX 2004

AU Exemption Form Version 02.05.2020 Version Date (date document created): April 8, 2020 Page 1 of 8

e. Funding source – Is this project funded bythe investigator(s)? ☐ YES ☒ NO
Is this project funded by AU? ☐ YES ☒ NO If YES, identify source ______________
Is this project funded by an external sponsor? ☐ YES ■ No If YES, provide the name of the sponsor, type of sponsor (governmental, non-profit, corporate, other), and an identification number for theaward.
Name______________________Type______________________Grant #______________

f. List other IRBs associated with this research and submit a copy of their approval and/orprotocol.

____

2. Mark the category or categories below that describe the proposedresearch:

☐ 1. Research conducted in established or commonly accepted educational settings, involving normal educational practices. The research is not likely to adversely impact students' opportunity to learn or assessment of educators providing instruction. 104(d)(1)

■ 2. Research only includes interactions involving educational tests, surveys, interviews, public observation if at least ONE of the following criteria. (The research includes data collection only; may include visual or auditory recording; may NOT include intervention and only includes interactions). **Mark the applicable sub-category below (i, ii, or iii).** 104(d)(2)

☐ (i) Recorded information cannot readily identify the participant (directlyorindirectly/linked);
OR

- surveys and interviews: no children;
- educational tests or observation of public behavior: can only include childrenwhen investigators do not participate in activities beingobserved.

☐ (ii) Any disclosures of responses outside would not reasonably place participant at risk; **OR**

☐ (iii) Information is recorded with identifiers or code linked to identifiers and IRB conducts limited review; no children. **Requires limited review by the IRB.***

☐ 3. Research involving Benign Behavioral Interventions (BBI)** through verbal, written responses (including data entry or audiovisual recording) from adult subjects who prospectively agree and ONE of the following criteria is met. (This research does not include children and does not include medical interventions. Research cannot have deception unless the participant prospectively agrees that they will be unaware of or misled regarding the nature and purpose of the research)
Mark the applicable sub-category below (A, B, or C). 104(d)(3)(i)

☐ **(A)** Recorded information cannot readily identify the subject (directly or indirectly/linked); **OR**

☐ **(B)** Any disclosure of responses outside of the research would not reasonably placesubject at risk; **OR**

☐ **(C)** Information is recorded with identifiers and cannot have deception unless participant prospectively agrees. **Requires limited review by theIRB.***

☐ 4. Secondary research for which consent is not required: use of identifiable information or identifiable bio-specimen that have been or will be collected for some other 'primary' or 'initial' activity, if one ofthe following criteria is met. Allows retrospective and prospective secondary use. **Mark the applicable sub-category below (I, ii, iii, or iv).** 104(d)(4)

☐ (i) Biospecimens or information are publically available;

☐ (ii) Information recorded so subject cannot readily be identified, directlyorindirectly/linked; investigator does not contact subjects and will not re-identify thesubjects;OR

☐ (iii) Collection and analysis involving investigators use of identifiable health information when use is regulated by HIPAA "health care operations" or "research or "public health activities and purposes" (does not include biospecimens (only PHI and requires federal guidance on how to apply); OR

☐ (iv) Research information collected by or on behalf of federal government usinggovernment generated or collected information obtained for non-researchactivities.

☐ 5. Research and demonstration projects which are supported by a federal agency/department AND designed to study and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs;(iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs. (must be posted on a federal web site). 104(d)(5) (must be posted on a federal web site)

☐ 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture. The research does not involve prisoners as participants. 104(d)(6)

New exemption categories 7 and 8: Both categories 7 and 8 require Broad Consent. (Broad consent is a new type of informed consent provided under the Revised Common Rule pertaining to storage, maintenance, and secondary research with identifiable private information or identifiable biospecimens. Secondary research refers to research use of materials that are collected for either research studies distinct from the current secondary research proposal, or for materials that are collected for non-research purposes, such as materials that are left over from routine clinical diagnosis or treatments. Broad consent does not apply to research that collects information or biospecimens from individuals through direct interaction or intervention specifically for the purpose of the research.) **The Auburn University IRB has determined that as currently interpreted, Broad Consent is not feasible at Auburn and these 2 categories WILL NOT BE IMPLEMENTED at this time.**

******Limited IRB review*** **– the IRB Chairs or designated IRB reviewer reviews the protocol to ensure adequate provisions are in place to protect privacy and confidentiality.**

*******Category 3 – Benign Behavioral Interventions (BBI)*** **must be brief in duration, painless/harmless, not physically invasive, not likely to have a significant adverse lasting impact on participants, and it is unlikely participants will find the interventions offensive or embarrassing.**

3. PROJECT SUMMARY

a. Does the study target any special populations? (Mark applicable)

Minors (under 19)	☐ YES ☒ NO
Pregnant women, fetuses, or any products of conception	☐ YES ☒ NO
Prisoners or wards (unless incidental, not allowed for Exempt research)	☐ YES ■ NO
Temporarily or permanently impaired	☐ YES ☒ NO

b. Does the research pose more than minimal risk to participants? ☐ YES ☒ NO

Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or test. 42 CFR 46.102(i)

c. Does the study involve any of the following?

Procedures subject to FDA regulations (drugs, devices, etc.)	☐ YES ☒ NO
Use of school records of identifiable students or information from instructors about specific students.	☐ YES ☒ NO
Protected health or medical information when there is a direct or Indirect link which could identify the participant.	☐ YES ☒ NO
Collection of sensitive aspects of the participant's own behavior, such as illegal conduct, drug use, sexual behavior or alcohol use.	☐ YES ☒ NO
Deception of participants	☐ YES ☒ NO

4. Briefly describe the proposed research, including purpose, participant population, recruitment process, consent process, research procedures and methodology.

The purpose of this study is to measure the impact of virtual learning on agricultural education courses. The population of this study includes adults who are 19 years of age or older. Agriscience education teachers (up to 315) will be target specifically for this research. Study participants will be identified through publicly available sources. Participants for this study will be contacted via email (see recruiting email). Available through the Alabama Department of Education.

Data will be collected using standard survey methods via online instrument (see attached). Participants will be distributed a copy of the instrument and information letter and asked to review the materials in the "information letter" and only complete the instrument if the understand their rights and agree to participate. Participants may choose not to participate simply by not completing/returning the instrument. As noted above the instrument is online and participants will return by clicking submit or not return by simply doing nothing.

It will take approximately ten minutes to complete the questionnaire.

5. Waivers

Check any waivers that apply and describe how the project meets the criteria for the waiver. Provide the rationale for the waiver request.

- ☐ **Waiver of Consent (Including existing de-identified data)**
- ■ **Waiver of Documentation of Consent (Use of Information Letter)**
- ☐ **Waiver of Parental Permission (for college students)**

All retrospective information will be de-identified.

In order to protect anonymity of participants, no identifying data will be collected. The only record linking the participant with the research would be the consent document. Participants will be subjected to no more risk of harm than they would experience in everyday activities.

6. Describe how participants/data/specimens will be selected. If applicable, include gender, race, and ethnicity of the participant population.

Participants will be purposefully selected using defined strata which include participants currently teaching Agriscience education in p-12 schools in Alabama. Participants' contact info will be secured through publicly available databases through the Alabama Department of Education.

7. Does the research involve deception? ☐ YES ☒ NO If YES, please provide the rationale for deception and describe the debriefing process.

8. Describe why none of the research procedures would cause a participant either physical or psychological discomfort or be perceived as discomfort above and beyond what the personwould experience in dailylife.

Risks of individuals in this study are minimal and no more than encountered in everyday life. There are no direct benefits for participation in the study other than awareness of the content covered in the questionnaire. Results will be presented at academic conferences, journals, popular publications and student research outlet (dissertation).

9. Describe the provisions to maintain confidentiality of data, including collection, transmission, and storage.

Data will be collected in a manner that there are no direct links to an individual participant. Data will be entered into a spreadsheet and saved in a password protected file. Data files will not contain any potentially identifying information. It will take participants approximately 10 minutes to participate. No audio or video recordings will be collected. No sensitive subject matter or procedures will be used. SPSS will be used to analyze data exported from Qualtrics.

10. Describe the provisions included in the research to project the privacy interestsofparticipants (e.g., others willnot overhear conversations with potential participants, individuals will not be publicly identified or embarrassed).

Participants will be recruited through publicly available means (email) using attached recruitment script. No identifying information about participants will be collected and all information about the study will be presented in aggregate form. Anticipated outcomes of the study include a better understanding of how virtual learning has or could impact high school agriculture education courses.

11. Will the research involve interacting (communication or direct involvement) with participants?
☐ YES ☒ NO If YES, describe the consent process and information to be presented tosubjects. This includes identifying that the activities involve research; that participation is voluntary; describing the procedures to be performed; and the PI name and contact information.

12. Additional Information and/or attachments.

In the space below, provide any additional information you believe may help the IRB review of the proposed research. If attachments are included, list the attachments below. Attachments may include recruitment materials, consent documents, site permissions, IRB approvals from other institutions, etc.

Attachments included are recruitment email, information letter and survey research methods via online instrument.

Principal Investigator's Signature ______ **Date** April 8, 2020

If PI is a student,
Faculty PrincipalInvestigator's Signature ______ **Date** 4.8.20

Department Head's Signature David C. Virtue Digitally signed by David C. Virtue Date: 2020.04.09 14:34:08 -05'00' **Date** ______

AU Exemption Form Version 02.05.2020

Version Date (date document created): April 8, 2020

Page 8 of 8

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS AN IRB APPROVAL STAMP WITH CURRENT DATES HAS BEEN APPLIED TO THIS DOCUMENT.)

INFORMATION LETTER
for a Research Study entitled
The impact of virtual learning in high school agricultural education courses

You are invited to participate in a research study on the impact of virtual learning n high school agricultural education courses. The study is being conducted by Jamie Rich, doctoral candidate, under the direction of Professor James Lindner in the Auburn University Department of Curriculum and Teaching's Agriscience Education Program. You are invited to participate because you are a middle/secondary agriculture education teacher and are age 19 years or older.

What will be involved if you participate? Your participation is completely voluntary. If you decide to participate in this research study, you will be asked to complete a questionnaire. Your total time commitment will be approximately ten minutes.

Are there any risks or discomforts? The risks associated with participating in this study are minimal and no more than encountered in everyday life. To minimize these risks, data will be collected anonymously and presented only in aggregate form. No direct links to your responses will be collected.

Are there any benefits to yourself or others? There are no direct benefits to your participation in this study. Benefits to others may include a better understanding of what factors affect virtual learning and its relationship with high school agriculture education.

Will you receive compensation for participating? You will not receive any compensation for your participation.

Are there any costs? Other than your time there are no costs associated with your participation.

If you change your mind about participating, you can withdraw at any time by closing your browser window or simply not submitting it. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Once you have submitted anonymous data, it cannot be withdrawn since it will be unidentifiable.

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Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University, the College of Education, Curriculum and Teaching, and the Agriscience Education program.

Any data obtained in connection with this study will remain anonymous. We will protect your privacy and the data you provide by maintaining your anonymous responses and insuring there are no connections between your responses and you. At the conclusion of this study all data collected will be destroyed after Information collected through your participation may be used presentation at academic conferences, journals, population publications, and student research outlets (dissertation, thesis).

If you have questions about this study, please contact Jamie Rich at jsr0046@auburn.edu or 334-372-0056 or Professor James Lindner at jrl0039@auburn.edu or 334.844.6797.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP.

____

Investigator's Signature　　　　　　　　　　　　Date
James Lindner, Ph.D.

The Auburn University Institutional Review Board has approved this document for use from __________ to _________..

The Auburn University Institutional Review Board has approved this Document for use from
04/08/2020 to ----------
Protocol # 20-180 EX 2004

CITI PROGRAM

Completion Date 08-Jun-2019
Expiration Date 07-Jun-2022
Record ID 31822369

This is to certify that:

Jamie Rich

Has completed the following CITI Program course:

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic/Refresher (Curriculum Group)

IRB # 2 Social and Behavioral Emphasis - AU Personnel (Course Learner Group)

1 - Basic Course (Stage)

Under requirements set by:

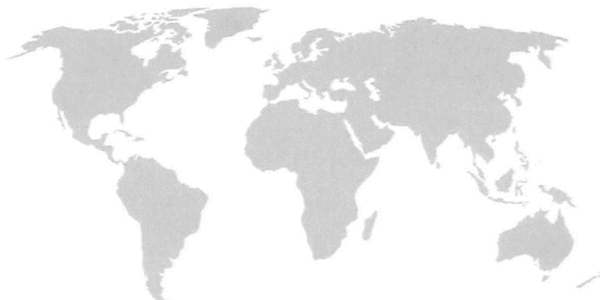
Auburn University

CITI

Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wf0de17f3-7078-4e49-a21c-3ea936411e67-31822369

CITI PROGRAM



Completion Date 07-Jan-2019
Expiration Date 06-Jan-2022
Record ID 29940441

This is to certify that:

james lindner

Has completed the following CITI Program course:

IRB # 2 Social and Behavioral Emphasis - AU Personnel - Basic/Refresher (Curriculum Group)
IRB # 2 Social and Behavioral Emphasis - AU Personnel (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Auburn University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?we31fd416-e8e4-4c03-b1e4-9274320e3e1b-29940441

E-MAIL INVITATION FOR ON-LINE SURVEY

Greetings Fellow Agricultural Education Teacher,

I am Jamie Rich, a Graduate Student in the Department of Curriculum and Teaching's Agriscience Education Programs at Auburn University. We would like to invite you to participate in our research study on the impact of virtual learning on high school agriculture education courses. We value the opinions and perceptions on the topic from Alabama Agriculture Educators.

Please review the informed consent information sheet and complete the questionnaire. Your participation will take approximately ten minutes.

INFORMATION SHEET

Your participation is voluntary. You may stop participation at any time. You will not be compensated for participating. Participation involves minimal risk and no more than encountered in everyday life. Data is being collected in a manner that there are no direct links to an individual participant and all responses will be aggregated.

I AGREE to participate (I have read the information sheet and agree to participate)

I DO NOT wish to participate

If you have any questions, please contact my advisor or me using the information below.

Thank you and we look forward to your response!

Jamie Rich
Doctoral Candidate
jsr0046@auburn.edu
334-844-5058

James Lindner
Alumni Professor Agriscience Education
jrl0039@auburn.edu
334.844-5058

The Auburn University Institutional Review Board has approved this Document for use from 04/08/2020 to ---------- Protocol # 20-180 EX 2004

Impact of Online Learning on High School Agriculture Education Courses

<u>*THIS SURVEY IS BEST TAKEN ON A DESKTOP COMPUTER***</u>**
<u>This survey should take approximately 10 minutes to complete.**</u>**
*** <u>Your participation and expertise is important and valued!*</u>**
The purpose of this survey is to measure the impact of online learning on agricultural education courses. We are conducting this survey "Impact of Online Learning on High School Agriculture Education" and invite you to participate. You and the other identified participants are the only source of data for this study. We ask you to review the informed consent information sheet (details) and complete the accompanying questionnaire.

This study is being conducted by Jamie Rich, doctoral candidate, under the direction of Dr. James Lindner, Professor of Agriscience Education in the Auburn University Department of Curriculum and Teaching.

This survey will take approximately 10 minutes to complete. Your participation is voluntary, and you will not directly benefit from your participation. You may stop participating at any time. Participation involves minimal risk (no more than occurs during daily life). Information about participants will be kept confidential and no individual responses will be reported.

If you have any questions, you can contact Jamie Rich at 334-372-0056 or at jsr0046@auburn.edu. For further information, click the "Information Letter" link below.

<u>Research information letter</u>

Thank you!

Jamie Rich
Auburn University Doctoral Candidate
334-372-0056
jsr0046@auburn.edu

James Lindner
Alumni Professor and Program Lead
Agriscience Education, Auburn University
334-844-6797
jrl0039@auburn.edu

Block 5

The purpose of this survey is to measure the impact of virtual learning on agricultural education courses. We are conducting this survey "Impact of Virtual Learning on High School Agriculture Education" and invite you to participate. You and the other identified participants are the only source of data for this study. We ask you to review the informed consent information sheet (details) and complete the accompanying questionnaire.

This study is being conducted by Jamie Rich, doctoral candidate, under the direction of Dr. James Lindner, Professor of Agriscience Education in the Auburn University Department of Curriculum and Teaching.

This survey will take approximately 10 minutes to complete. Your participation is voluntary and you will not directly benefit from your participation. You may stop participating at any time. Participation involves minimal risk (no more than occurs during daily life). Information about participants will be kept confidential and no individual responses will be reported.

If you have any questions, you can contact Jamie Rich at 334-372-0056 or at jsr0046@auburn.edu. For further information, click the "Information Letter" link below.

Information Letter

Thank you!

Jamie Rich
Auburn University Doctoral Candidate
334-372-0056
jsr0046@auburn.edu

James Lindner
Alumni Professor and Program Lead

Agriscience Education, Auburn University
334-844-6797
jrl0039@auburn.edu

Block 3

Which form of instruction do you relate with the most?

Face to Face Instruction
O

Distance Education Instruction
O

Remote Learning Instruction
O

I consider myself competent with instructing in an online learning environment. An online learning environment is defined as a delivery of instructions based on (and accessible from) the Internet.

Yes O

No O

Block 1

Scale I - Access of Online Learning: Looking at each statement, decide the level of importance the statement currently has in relation to working in an online learning environment.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Online learning environments are an effective time management tool.	O	O	O	O	O
Students can access lessons on the internet at times convenient to them.	O	O	O	O	O
Students can access lessons on the internet on days when he/she is not in class or absent from school.	O	O	O	O	O
Lessons on the internet allow students to work at their own pace to achieve learning objective.	O	O	O	O	O
In an online learning environment, the students have to be self-disciplined in order to learn.	O	O	O	O	O

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Lessons on the internet enable the students to decide how much they want to learn in a given period.	O	O	O	O	O
Students are more likely to cheat in an online learning environment.	O	O	O	O	O
The flexibility of lessons on the Internet allows students to explore their own interests.	O	O	O	O	O
The flexibility of lessons on the Internet allows students to meet their learning goals.	O	O	O	O	O
I feel online learning is the wave of the future.	O	O	O	O	O

Block 2

Scale II - Interaction between teacher-student and student-student: Looking at each statement, decide the level of importance the statement currently has in relation to the interaction between teacher to student and student to student in an online learning environment.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
The teacher is able to interact with students in an online learning environment.	O	O	O	O	O
Online learning environments force the instructor to be more sequential.	O	O	O	O	O
Students have the option of asking the teacher what he/she does not understand by sending an email.	O	O	O	O	O
Students are allowed to communicate with the teacher electronically via email.	O	O	O	O	O
Students feel comfortable contacting the teacher via email.	O	O	O	O	O
Students are able to ask other students questions during computer lessons.	O	O	O	O	O
Online learning environments teach students to be precise in answering questions directly.	O	O	O	O	O
Students respond positively to questions in relation to Internet lessons.	O	O	O	O	O
Students are more open to communicate in online learning environments.	O	O	O	O	O
The online learning environment holds students' interest in the subject throughout the term.	O	O	O	O	O

Matrix

Scale III - Agricultural Education: The following statements are designed to measure relevance of online learning in Agricultural Education courses. The statements are vital to understanding if a common variable can be identified which predicts the impact of virtual learning on agricultural education courses. Your responses are confidential and can not be identified outside of this study.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Agribusiness systems courses are relevant to be used in an online learning environment.	O	O	O	O	O
Agriconstruction courses are relevant to be used in an online learning environment.	O	O	O	O	O
Agriculture communication courses are relevant to be used in an online learning environment.	O	O	O	O	O
Animal systems courses are relevant to be used in an online learning environment.	O	O	O	O	O
Aquaculture courses are relevant to be used in an online learning environment.	O	O	O	O	O
Environmental and Natural Resources Systems courses are relevant to be used in an online learning environment.	O	O	O	O	O
Floral Design courses are relevant to be used in an online learning environment.	O	O	O	O	O
General Agriscience are relevant to be used in an online learning environment.	O	O	O	O	O
Plant Systems courses are relevant to be used in an online learning environment.	O	O	O	O	O
Power Mechanics courses are relevant to be used in an online learning environment.	O	O	O	O	O

Block 5

The following multiple choice questions are designed to investigate variables which describe your current and past experiences, both personal and professional, in agriculture education. Each statement is representative of a specific variable under investigation, however, your responses are confidential and can not be identified outside of this study.

What is your age?

▾

What is your gender?

▼

What is the highest degree or level of school you have completed? If you are currently enrolled, what is the highest degree received?

▼

Including this year, how many years have you been teaching agriculture education at the middle/secondary level?

▼

Which option below best describe your formal teacher preparation? (Select all that apply)

- ☐ Undergraduate teacher education program (full Ag Ed Certification)
- ☐ Alternate Teacher Certification
- ☐ Graduate program with teacher certification
- ☐ No prior teaching experience, but I have a degree in an agriculturally related field
- ☐ Combined Undergraduate and Graduate Program
- ☐ Certified in content area outside of Ag Ed
- ☐ Substitute teaching that led to a permanent position
- ☐ No prior teaching experience and do not have a degree in an agriculturally related field

Which student age group best represents your current teaching assignment?

▼

Which of the following best describes the student population of your agricultural education program?

▼

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