GEORGIA AGRICULTURAL EDUCATION INSTRUCTORS AND SCHOOL GARDENS: CURRENT PRACTICES, PERCEIVED BENEFITS, BARRIERS AND RESOURCES

by

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(Under the Direction of Roger Hill)

ABSTRACT

The purpose of this mixed methods research was to determine the types of garden-based learning programs utilized by agricultural education instructors in Agricultural Education (AG) programs in Georgia, along with current practices, perceived benefits, barriers, and resources of AG instructors as related to garden-based learning practices and school gardens in public schools. Over 100 AG instructors completed a quantitative survey; Ten of those instructors then participated in in-depth qualtitative interviews. The findings were extremely encouraging and revealed many positive benefits perceived by instructors with school gardens including the chance to coordinate learning with other disciplines such as science, mathematics and humanities. By participating in school garden, children gain knowledge about cooperation, planning, designing and executing long-term experiences, acting in accordance with a community and providing sustainable resources in the form of healthy produce. Students benefit greatly from instructional practices. Learning is enhanced and enthusiasm for working with instructors is increased. The study also found a number of unanticipated benefits that

students derive from school gardens such as hands-on and project-based learning, and problem solving. A variety of barriers must be overcome (e.g., time, space and funding) exist but clearly the many benefits outweigh challenges and provide the rationale for reasons to promote and sustain school garden programs. This valuable data contributes to and supports literature on school gardens and should be used to benefit AG instructors to develop/implement horticultural-based curricula, tie lessons with STEM disciplines, and assist Georgia AG Education State Staff in planning professional development opportunities for teachers for school gardens and garden-based learning.

INDEX WORDS: School gardens, Garden-based learning, Agricultural Education, Hands-on learning, Cooperative Learning

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DEDICATION

This dissertation is dedicated to all agricultural education instructors. Your passion and dedication to the field of agriculture and to students is unexplainable to the rest of the world. Thank you for the early mornings and long nights that work to ensure that all students fully experience all that agricultural education has to offer. Your labor does not go unnoted and students will reap the benefits of your toil for years to come. Thank you for teaching students' practical real-world experiences.

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I am grateful and fortunate for guidance and support of my dissertation committee and University of Georgia faculty. I will always be thankful for agricultural education instructors and their contributions to student lives each day. Without their participation, knowledge and experience this dissertation would not have been possible. Agricultural education instructors sacrifice countless hours to provide educational opportunities for their students each day. I hope this dissertation gives back to the profession.

I would like to thank my supportive parents for instilling a strong work ethic and love for education that has sustained me through my educational endeavors. Thank you to my husband and children for tolerating me as I worked through this long process. Thank you to amazing friends, coworkers and students who gave advice, inspiration, time and efforts that facilitated this process. I will be eternally thankful. Finally, I would like to dedicate this dissertation to my late father, Robert Earl Nedley. He did not live to see me walk across the stage but will be with me always. His influence on my life has been humbling and I can only hope that I can follow in his footsteps by making a difference in the lives of others every day.

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CHAPTER ONE

INTRODUCTION

"A garden is a wonderfully interesting and exciting place in which children can play, work, and learn" (Herd, 1997). School gardens have grown in popularity in schools and communities with programs and initiatives such as *Community Support Agriculture* (CSA) and *Farm to School* (F2S) focusing on the implementation and education of school gardens in elementary and middle schools. This focus has also been on schools in urban and over populated areas, as a means of providing children with healthy food alternatives and to teach them to grow their own food. School-based gardening has been shown to be effective for increasing children's knowledge, preference and consumption of fruit and vegetables (Parmer, Salisbury-Glennon, & Struempler, 2009).

Garden-based learning, with outdoor classrooms and gardens, provides an opportunity for students to be taught science, math, social studies, language and visual arts through hands on and cooperative learning. These lessons provide real-world scenarios and practical experiences for students. Students not only experience growing and tending to various types of gardens, they also learn life skills such as responsibility and patience. In the school garden students can utilize project-based learning concepts which can encompass collaboration, research, creativity and math and science concepts.

In the shadows behind rejuvenated excitement about garden-based learning stands the traditional school-based agricultural education program (SBAE) which have long used a variety of school gardens to incorporate experiential leaning into classrooms. This

is the same type of hands-on learning that current research surrounding garden-based learning supports. According to the National Association of Agricultural Educators, students in Georgia with the desire to study agricultural issues have many options available, including systematic educational programs about the science and technologies of plant and animal production, natural resources systems and the environment ("What is Agricultural Education," 2017).

Agricultural education first became a part of public education when the U.S. Congress passed the Smith-Hughes Act in 1917 ("FFA History," 2017). Today, school-based agricultural education programs are in schools all over the country with more than 800,000 students participating in formal agricultural instruction. School-based agricultural education programs are offered in middle school and high schools with additional adult programs throughout all 50 U.S. states and three territories ("What is Agricultural Education", 2017; "FFA History," 2017).

Rationale for the Study

Agricultural education is an old and well-established area of study in the United States (Campbell & Martin, n.d.) and programs are each unique to the state, region, city, town or school. Courses range from Agricultural Business, Animal Science, and Small Animal to Horticulture, Food Science, Forestry and Environmental Science and leadership development just to name a few. Despite their location or particular emphasis, what each of these school-based agricultural education programs share in common is the purpose is a "pathway striv[ing] to advance agricultural technology and sustainability to improve the world in which we live" (Ryan, 2015). Regardless of a student's interest, school-based agricultural education instructors provide opportunities for students to

understand the importance of the concepts being learned in an authentic, hand-on and meaningful way. These programs spark new student interests, create climates of acceptance, foster teamwork and open the door for students to discover potential future careers (Ryan, 2015). Data on current practices, challenges and benefits is needed.

Enhancing Classroom Lessons

Over the past 220 years, school gardening has been championed by instructors who believe that school gardens provide the best way to enhance classroom lessons (Becker, 1995). Dewey (1938) promoted garden learning in schools in the early 1900's. The process of school gardening offers students empowering experiences and various forms of engagement including designing, planting, maintaining gardens, harvesting, preparing, and sharing food. Through this process of garden-based learning students experience working cooperatively in groups, learn science and nutrition concepts, and create art and stories inspired by the gardens. According to Dirks and Orvis (2005), students that actively engage in garden projects tend to enjoy learning and show improved attitudes towards education as a whole. Gross and Lane (2007) point out that exposure to healthy foods, moderate physical activity, and positive social interactions while gardening in childhood can lead to a lifetime of gardening and healthy living. Furthermore, research among instructors has shown that school gardens enhance the learning of students, promote experiential learning, and teach environmental education (Skelly & Bradley, 2000).

Lack of Model

There is no universal model of garden-based learning that can be applied to every school and each educator must design a plan that address the needs of their learners

(Desmond, Grieshop & Subramaniam, 2002). School gardens vary in design and can be for focused learning in subject areas such as science, math, nutrition or environmental science (Bucklin-Sporer & Pringle, 2010). Each school garden is distinctive to its own program based on factors such as but not limited to, space, funding, curriculum and maintenance of the garden (Bareng-Antolin, 2017). Ratcliffe, Goldberg, Rogers and Merrigan (2009) remind us that goals for school gardens are as unique as the schools themselves and in general school gardens target four student outcomes: (a) science learning and school achievement; (b) ecological and environmental awareness and responsible behaviors such as recycling and composting; (c) knowledge about food systems and nutrition and healthy eating, especially consumption of fresh fruits and vegetables; and (d) positive youth development.

SBAEs promote the use of school gardens in their classrooms and support the benefits provided to students. Although the idea of using school gardens to teach is not new for agricultural education instructors and programs, the practice of garden-based learning has become a global phenomenon and is now often central to the educational curriculum or playing a large supporting role that enriches it (Desmond et. al., 2002).

SBAEs in the past have operated more traditional large-scale garden that encompassed the curriculum but with the expansion of SBAE programs into more urban school districts (Pannoni, 2014) there has been an increase in the use of container gardening, raised beds and hydroponics among SBAE programs along with an expansion of Agri science curriculum. These urban school districts are sometimes limited in space or located in the middle of town; therefore, these educators found alternative ways to teach their concepts while providing hands-on learning opportunities for students (Joshi,

Azuma, & Feenstra, 2008). As a part of the three-circle model of agricultural education that includes classroom, supervised agricultural experience project and FFA, students receive all types of hands on learning experiences included activities in shops, labs, greenhouses and gardens ("What is Agricultural Education", 2017). These agricultural education classroom experiences spill over to the school gardens to provide endless opportunities. Students apply the academic knowledge gained in the classroom to the hands-on activities conducted in the school garden. The knowledge gained is further transferred to career development events and other components of the agricultural education programs.

Science and Technology

Academic achievement is an important component of school gardens and garden-based learning curriculum, as revealed by a series of research studies between 1990-2010 which focused on the academic impact of garden-based learning in schools and revealed that garden-based learning did indeed have a positive impact on core academic subjects such as science, math and language arts (Williams & Dixon, 2013). Learning related to science and technology is critical today, and knowledge from SBAEs are used daily to make decisions concerning critical issues such as national security, cloning and the use of genetically modified organisms in food.

Challenges and Barriers

Along with the benefits of school gardens come challenges and barriers. Ozer (2006) reported that educators are faced with numerous challenges in the implementation phase of school gardens including funding shortfalls, and lack of time and staff for both implementation and maintenance. School gardens are frequently not self-sustaining

financially and funding in a constant issue. Other barriers reported in a study of fourth grade instructors in California indicated lack of time to utilize the garden and teach lessons, lack of instructors' interest in using the garden and lack of teacher experience and training in garden-based learning curriculum (Graham, Beall, Lussier, McLaughlin & Zidenberg-Cherr, 2005). Even with the resurgence of energy for gardens and experiential learning in school, agricultural education instructors and garden-based learning labs go unnoticed, unsupported and underfunded by their school systems. Through this research, we will discover the types of school gardens utilized by agricultural education instructors in Georgia. Along with the challenges and benefits of these school gardens.

Statement of the Problem and Significance

Research and documentation of garden-based learning and school gardens has grown over the last twenty years (Williams & Dixon, 2013) and numerous studies have documented the outcomes and effects of incorporating school gardens in the classroom; however, little research is found on garden-based learning specifically in the agricultural education classroom. Garden-based learning programs have rapidly gained popularity as an additional educational component of academic classes, but school gardens have long been used in conjunction with agricultural education programs. Despite the amount of research on school gardens in schools, there is limited amount of research on school garden programs as they relate to agricultural education programs. Additionally, garden-based learning research in the past has mainly focused on elementary and middle school outcomes, with very little high school research. Williams and Dixon (2013) pointed out that the grades least studied with regards to school gardens were preschool and tenth through twelfth grades.

Research Purpose

The purpose of this study is to determine the types of garden-based learning programs utilized by agricultural education instructors in SBAE programs. The study will also acknowledge the benefits and barriers of the implementation and utilization of garden-based learning programs in agricultural education programs based on the agricultural education teacher's perspectives. This study will focus on agricultural education instructors and programs in Georgia. Determining the types of gardens used and also the viewpoints of agricultural education instructors are important for the continuance of support and improvement of school garden programs in agricultural education. Realizing that not all agricultural education instructors utilize garden-based learning practices, it was still important to gain their perception and gain knowledge of achievements or limitations if those were present. It is expected that this data will benefit agricultural education instructors as they develop and implement horticultural-based curricula and tie these lessons with STEM disciplines (Williams & Dixon, 2013). Data from this research also benefits the Georgia Agricultural Education State Staff in planning professional development opportunities for instructors across the state on the topic of school gardens and garden-based learning.

Research Questions

1. What types of garden-based learning programs do agricultural education instructors utilize in SBAE programs as instructional supports?
2. What are the benefits of garden-based learning instruction according to agricultural education program instructors?

3. What barriers and challenges exist in garden-based learning instruction in school-based agricultural education programs according to agricultural education program instructors?

Theoretical Framework

Theory is an important aspect of research and can be a vital research foundation. Experiential learning has long been associated with both SBAE programs and garden-based learning curricular. The reason for this is through practice and hands-on experience students apply what they have learned in the classroom to real life situations, thus making connections between curricular and real life. This makes the curricular applicable and more meaningful to the students (Cheek & Arrington, 1990). Experiential learning also allows for new problems to arise during experiences which sparks additional interest in students to seek additional information and new ways of applying knowledge learned (Cheek & Arrington, 19990). Because of the historical aspects of SBAE programs and school gardens and the elements of experiential learning; experiential learning will be the theoretical framework that will be used for this research study.

All learning encompasses experiential learning (Dewey, 1938, Kolb, 1984, Roberts, 2011); however, Dewey (1938) reminds us that "everything depends on the quality of the experience which is had" (p. 27). SBAE programs are known for their "hand-on approach" to teaching. Agricultural Education instructors utilize laboratories, shops, farms, greenhouse and outdoor classrooms to provide students with opportunities to experience and learn from real-life situations first hand. "Agriculture instructors routinely provide students with opportunities to learn needed skills and to practice these skills in simulated environments" (Boone, 2011, p.2). According to Phipps, Osborne,

Dyer and Ball (2008) experiential learning is “an experience-based approach to learning in which students experience a direct encounter with the phenomenon under study, reflect on that experience, draw general conclusions, and test their newly acquired knowledge through subsequent performance” (p.530).

Experiential learning leads to more powerful academic learning, while developing social skills, work ethic and practical expertise. “Experiential learning also develops a deeper understanding of subject matter, the capacity for critical thinking and application of knowledge and the ability to engage in life-long learning” (Eyler, 2009, p.26). Providing learning opportunities through experiential learning activities provides the personal hands on agricultural experiences that “address the needs of students regardless of their base agriculture knowledge” (Shoulders, Wilder & Myers, 2011, p.12). Novice agricultural education students can gain “concrete experiences to which they can apply classroom concepts, while those with more experience can develop a deeper understanding for the processes and reasons behind those processes in agriculture (Shoulders et al., 2011, p.12).

CHAPTER TWO

REVIEW OF THE LITERATURE

The review of the literature established the foundation for importance of this study with regards to the use, benefits and barriers as they relate to garden-based learning curriculum and SBAE programs. The underlying topics addressed through this literature review will be garden-based learning and SBAE programs. A definition and history of garden-based learning will be provided along with the benefits of garden-based learning curricular. A definition and history of SBAE programs along with the benefits will be provided as well. SBAE programs and garden-based learning will be discussed as they relate to experiential learning and Kolb's (1984) experiential learning model.

Background

The field of agriculture is a dynamic and rapidly changing industry. There is a growing U.S. movement for the "greening" (p.1) of schools through gardens on school campus, and much enthusiasm for the potential of garden-based learning (Ozer, 2006). There are numerous rationales for the value of school gardens, primarily as outdoor learning laboratories, aesthetically pleasing spaces for children to play, and most recently, as places to promote the consumption of fresh produce among a youth population with elevated rates of obesity (Hedley et al., 2004). In the late 1990s, California's Superintendent for Public Instruction, Delaine Eastin called for "a garden in every school" (Ozer, 2006). It was at this time that California state legislation began to set aside small start-up funds for schools interested in planting instructional gardens that included

teaching and practice of composting and recycling (Bucklin-Sporer & Pringle, 2010). Graham estimated in 2002 there were more than 2,000 school gardens in the state of California being used for academic instructions in subjects including science, math, nutrition, environmental students and health. Thirteen years later according to the USDA National Farm to School 2015 Census (2017) Data in 2015 there were over 42,711 schools incorporating garden-based learning programs. More specifically to this research study, it was reported that 1,615 schools in Georgia with 1,226,413 students reached by some type of garden-based learning curriculum ("USDA Farm to School 2015 Census").

The idea of incorporating garden-based education into the classroom appears to be a new trend in education to some however, gardens have a long history of being used in education (Blair, 2009; Meyer, 1997; Skelly & Bradley, 2000; Subramaniam, 2002). According to Subramaniam (2002) the philosophies behind garden-based education are made up of a conglomeration of the philosophies behind experimental education, ecological literacy and environmental awareness, and agricultural literacy. Gardens have also been used to teach traditional agricultural education courses and allow for hands-on learning opportunities. More recently these traditional farming methods and gardening techniques have turned into raised beds, greenhouses and hydroponic development.

Garden-based learning involves teaching through a method where students learn through personal discovery, in a natural setting where they learn ecological principles that govern all life and inculcate an awareness of the physical environment and developing in them a sense of connectedness with their land and all that grows on it (Subramaniam, 2002). Garden-based learning offers a context for integrated learning, just as agricultural education programs. An integrated curriculum often associated with

real-life problems in contrast with a traditional subject-based curriculum. This curriculum is similar to that taught in a SBAE program, which also teaches academics associated with real-world problems. Murphy and Schweers (2003) stated that instructors believed that curriculum based on experiential, garden-based learning activities are conducive to the learning environment and students learn more effectively.

Garden-based learning is a vehicle for higher order thinking as students are challenged to move beyond memorization, to see patterns and relationships and pursue topics in depth. Students are engaged in constructing knowledge rather than accumulating information and they also develop analysis and synthesis skills (Drake, 1998). School garden programs and curricula built on models of hands-on, problem-based environmental and science education. They also are a form of community garden, providing a new setting for interactions among members of the school community and potentially promoting the social networks, sense of connectedness, and skills of the community (Twiss, Duma, Kleinman, Paulsen, & Rilveria, 2003).

Garden Based Learning

The first school garden movements were recorded in Europe as early as 1811. The first compulsory school in Europe that included school gardens was located in Prussia and by 1869 school gardens had become mandatory in all schools (Subramaniam, 2002). Erasmus Schwab was hired in 1871 to enforce the school garden law and eventually published a book that emphasized that agricultural, natural and vocational sciences could be learned in the garden titled, *The Public School Garden* (Sealy, 2001). Followed by another school garden movement that was noted in Australia (Robin, 2001). This movement was thought to be strongly influenced by the annual School Garden

Conference in 1903, sponsored by the Australian Natives Association. This conference led to the development of school gardens in the early decades of the twentieth century that were viewed as ideal for integration with the educational curriculum for incorporating the standards of progressive conservation with its concerns for the responsible stewardship of nature as well as ideas about connections between nature, hard work and moral improvement (Robin, 2001).

The earliest school garden programs in the United States were implemented in 1891 with the return of Henry Lincoln Clapp a statesman that was sent to Europe to research and study school gardens. Upon his return he assisted in the development of the first school garden in the United States at the George Putnam School in Roxbury, Massachusetts. The Massachusetts Horticulture Society assisted in the initial education development of school gardens was credited with providing educators a background for teaching gardening in schools (Subramaniam, 2002).

By the early 1900s the school garden movement was rapidly expanding in both the United States and Canada. The United States Department of Agriculture estimated that there were more than 75,000 school gardens by 1906 (Hayden-Smith, 2015) and every state in the United States and providence in Canada by 1918 contained at least one school garden (Sealy, 2001). Also, during this time Louise Klein Miller's book Children's Gardens for School and Home, a Manual of Cooperative Learning was hot off of the press and highlighted two purposes of children's gardens: civic beautification and nature study, with the goal of instilling a love and appreciation of nature in youth.

Along with her focus of appreciation for nature Miller also saw the educational importance of the school garden and referenced this in her book. She argued that school

gardens were not a new phase of education, but rather an old one that was gaining merit for its ability to accomplish a wide variety of needs (Hayden-Smith, 2015). During this time of school garden expansion, we were also a country at war. While many men were deployed, back at home over one million students contributed to the production of food during the war effort, but sadly the educational value of school gardens diminished. There was a small resurge of school gardens during World War II with the second Victory Garden program, but after that they began to decline with the development of playgrounds and athletic fields taking over garden areas and schools focused more on technology (Subramaniam, 2002).

There was another resurgence of school gardens in education from 1964 until 1975 in the United States with an educational reform strategy focusing on the "war on poverty" (Meyer 1997). During the late seventies and early eighties, along with the environmental movement and public concern for the environment, school gardens were seen as progressive, interactive educational links for children to understand and connect with "life processes" and environmental understanding (Yamamoto, 2000). School garden programs began to gain new life and another period of intense movement and growth as the nineties began to focus on health and farm to school programs in schools.

Changes in educational trends came about in the early 1990s and educators began to look for more innovative ways of learning (Desmond et al., 2002). According to Desmond et al. (2002) the focus on experiential and environmental education came together with the interest in agricultural education, making an ideal climate for the expansion of school gardens. In 1993, The American Horticultural Society held its first symposium based on youth gardening entitled: Children, Plants, and Gardens:

Educational Opportunities. The aim was to recognize ways in which children's gardens could support educational curricula (Sealy, 2001). This again spurred new interest in the school garden movement and the use of school gardens for teaching and learning. Sub sequentially in 1995, California's State School Superintendent Delaine Eastin mandated "a garden in every school" to "create opportunities for our children to discover fresh food, make healthier food choices, and become better nourished" (Subramaniam, 2002). This vision helped other states develop and implement school gardens as well. The USDA National Farm to School 2015 Census (2017) reported that 51 states have some type of garden-based learning school program, in 42,711 schools across the United States and 1,226,413 students are involved in some type of garden-based learning program ("USDA Farm to School 2015 Census").

Those who have studied the history of the school garden movement and garden-based learning draw a strong connection to the ongoing cycle of educational reform (Meyer, 1997). In the United States the school garden movement reaches its highest pointes in the following eras and in response to specific reform (Desmond et al., 2002; Meyer, 1997; Sealy, 2001; Subramaniam, 2002).

- Early twentieth century (1900 to 1930s) – Progressive Education and Social Reform movements encourage garden-based learning.
- Mid-twentieth century (1960-1970) – Counter Culture and Environmental Movements create a resurgence in school and community gardens.
- Late twentieth century (1990-2000) – Rebirth of Progressive Education coupled with renewed interest in Environmental Education and nutrition/health issues for children.

Garden-based learning has always had a vocational and practical side and this aspect of has not shown the cyclical swings seen in the more academic educational settings (Desmond et al., 2002). For example, using the garden to teach basic vocational skills in plant science, horticulture, agriculture and environmental science has continued virtually uninterrupted in a variety of formal and non-formal educational settings. Those settings include such diverse ones as Pioneros in Cuba, 4-H and Future Farmers of American (FFA) in the United States (Desmond et al., 2002).

From a historical perspective garden-based learning has been viewed as contributing to many aspects of basic education, including academic skills, personal, social and, moral development, vocational and/or subsistence skills, and life skills. In each era the lure of garden-based learning in basic education was premised on its facilitation of educational strategies that are universally accepted as valid, if not essential, pedagogical approaches to meaningful learning (Subramaniam, 2002). According to Subramaniam (2002), these concepts: learn by doing, project-based learning, real world learning, and child-centered learning, clearly focus on engaging the learner as the central figure in educational experience and in allowing individual and social constructivism.

Garden Based Learning Impact

Historically, gardening has been an important aspect of home and family. Children helped to plant, weed and harvest crops to feed the family. Today, formal children's gardens are very popular in the United States, being found in elementary schools, arboretums, and community gardens (DeMarco, Relf & McDaniel, 1999). School gardens in conjunction with garden-based learning curriculum has been known to have several positive outcomes including improved academics (Murphy & Schweers,

2003), positive environmental attitudes (Beckler, 1995), health and nutrition awareness (Morris, Briggs,& Zidenberg-Cherr, 2000) and positive student behavior (Ozer, 2006).

Impact on academic achievement. School gardens have been predominantly used by most schools to enhance academic instruction through teaching subjects such as science, environmental studies, nutrition, language arts and math or as vocational electives in secondary schools. Participants in a comprehensive garden-based learning instructional curriculum in a California middle school showed significant gains in overall grade point averages and specifically in math and science as compared to the control group (Murphy & Schweers, 2003). Garden-based learning provides an authentic and cross-disciplinary experience for all learners and can be easily adapted for all students and because of the experiential, hands-on nature of garden-based learning, garden-based learning potentially unlocks the learning of students. School gardens serve as living laboratories for students in which they see, feel and experience firsthand learning and can apply these experiences to real life situations (Hughes, DiClaudio & Savoco, 2013).

There are multiple indirect pathways by which school garden programs could affect students' general academic behavior and performance. School garden program could improve achievement, however, through the pathway of strengthening school bonding because children who are more invested in school are likely to care more about how their instructors view them and to engage in behaviors rewarded by the school such as attending class and doing their homework (Hawkins, Geo, Hill, Battin-Pearson & Abbot, 2001). Waliczek (2010), Murphy and Schweers (2003), and Dirks and Orvis (2005) all reported that students show more positive attitudes towards school and

improved interpersonal relationships as a result of working in a school garden program and this can in turn result in an increased interest and excitement for learning.

Gardening itself also provides opportunities for naturalistic and "emergent" scientific inquiry (Rahm, 2002). An understanding of science is critical in today's society, which is increasingly technology-driven. People use science on a daily basis to make decisions concerning current issues and technologies such as air travel, national security, cloning and genetically modified organisms and their possible incorporation into our food. In order to better understand current issues and develop informed opinions, we as a society need to have a basic understanding of the principles of science. Science educators have long recognized the value of school gardens and motivating students to study science (Dirks & Orvis, 2005). According to Dirks and Orvis (2005), research studies show that school gardening programs also boost students' scores on science achievement tests.

Students in 14 third grade Indiana classrooms who participated in Junior Master Gardener curriculum showed significant gains in knowledge in science, horticulture and the environment compared to control groups (Dirks & Orvis, 2005). A similar study with 5^{th} grade inner city students in Texas showed significant increases in mean test scores in science after participating in supplementary garden-based education projects (Smith & Motsenbocke, 2005). Klemmer, Waliczek, and Zajicek (2005) found that students in the experimental group scored significantly higher on the science achievement test compared to the students in the control group. In a similar study Smith and Motsenbocker (2005) suggested that once-weekly use of gardening activities and hands-on classroom activities helps improve science achievement test scores. Garden-based learning activities generally

provide the opportunity to extend inquiry-based learning over time and garden-based learning is sufficiently robust to address all eight of the National Science Education Standards (National Research Council, 1996) content.

As a part of science instruction, garden-based learning is helpful for all students in advancing understandings of change over time. The life cycle of a plant exemplifies change over time: something that cannot be observed in a moment, but is easily seen over time (e.g., germination of a seed). Traditionally, instructors have used pictures, books and virtual field trips to expose students to these concepts; however, the school garden provides a much richer, hands-on learning experience. The garden allows students to have ownership of something that is alive and also learn to be responsible by providing water and nourishment for their plant. Students also have the opportunity to observe their plant daily and record the growth. This allows them to collect real time data instead of watching something on a video or looking at photos in a text book. School gardens can be instrumental in teaching the scientific method and research techniques to students of all ages (Rye, Selmer, Pennington, Vanhorn, Fox & Kane, 2012). Students collect data, sketch photos, analyze data, make charts and graphs and reflect on what they have discovered or learned. Garden-based learning brings the classroom alive and allows students to experience real world, hands-on, cross-curricular exploration.

Of the research that has been conducted on garden-based learning, Williams and Dixon (2013) conducted a study and reviewed 48 previous studies to determine the impact of garden-based instruction on academics. Science had the highest proportion of positive effects, with 14 (93%) of the 15 resulting in positive effects. In one study, using a sample of 647 students in Grades 3-5 in seven elementary schools in Temple, Texas

found that “science achievement of students who participated in a hands-on school gardening program was higher than that of students who did not participate” (Kelmmer et al., 2005, p. 448). They concluded, “hands-on, constructivist learning serves as the main idea behind school garden programs. Gardens can serve as living laboratories in which students can see what they are learning and in turn, apply that knowledge to real world situations” (Klemmer et al., 2005, p. 452). Furthermore, Williams and Dixon (2013) reported that 80% of the direct academic outcomes in mathematics and 72% in language arts had positive outcomes and the curriculum for science and math were recorded as most frequently connected to gardens, these varied widely across studies. Positive outcomes were often attributed to direct, hands-on experiences that made classroom learning relevant.

Students sometimes have difficulty reaching the highest level of learning in a traditional lecture-based classroom, therefore garden-based learning provides hands-on, real life examples and kinesthetic experiences that can enrich the learning of all students (Rye et al., 2012). For example, in garden-based learning students are active by moving, touching, creating and are responsible for developing and nurturing an environment. This gives the student firsthand experience, ownership and responsibility of not only their learning experience but also the finished product or artifact. Instead of telling students about the growth cycle, instructors become coaches by helping students become actively involved and explore and manipulate soil, worms, seeds and plants (Rye et al., 2012). Instructors discuss concepts with students as they observe seeds germinate and seedlings grow. Students can actually show and point to different plant parts on the live plant rather than be taught using one-dimensional techniques based solely on paper and pencil.

Beyond instruction, the school garden can also be used by instructors to allow students a needed "sensory break" to water and measure plants or simply to admire what they have achieved by growing something on their own. (Rye et al., 2012).

Impact on environmental attitudes. Nature education and outdoor experiences help children gain respect for living things, stimulate their curiosity, and provide them with meaningful life experiences (Bullock, 1994). According to Pennington (1988) "gardening is a transforming activity that moves us from ignorance to understanding and appreciation, from passivity to action, from a state of dependence to one of independence with nature and others in our community" (p.1). School gardening is a powerful environmental education tool that fosters a sense of responsibility among students.

Exploration of both living and nonliving organisms in the world around them occurs in the outdoor classroom. Students begin to develop a better understanding and appreciation of nature. Gardening and environmental education programs promote positive attitudes toward the environment in elementary school children (Skelly & Zajicek, 1998, Waliczek & Zajicek, 1999). Pivnick (1994) and Becker (1995) support the argument that gardens help students connect and respond to nature, as well as help students discover the wonders of nature. Pivnick (1994) pointed out that these connections to nature are important and necessary if children are going to develop an environmental ethic.

Garden-based learning programs also offer opportunities for hands-on, or active learning experiences that encourage higher-order thinking and problem solving (Athman & Monroe, 2001; Waliczek, Logan & Zajicek, 2003). As human pressures on the environment increase, schools have been given a greater degree of responsibility to

educate children on caring for the environment. One method of integrating environmental education into the classroom is through an activity-based curriculum including hands-on experiences like those gained through garden-based learning.

Not only can a garden and gardening act activities enable students to learn about the environment, but also children can actually experience ecological processes firsthand. Research with instructors has shown that they use school gardens to enhance the learning of their students, promote experiential learning, and teach environmental education (Skelly & Bradley, 2000). Studies have also found that using school gardens to teach does in fact improve students' environmental dispositions (Alexander, North, Hendren, 1995). Cohen and Horm-Wingerd (1993) found that students in kindergarten begin to develop attitudes about the environment at an early age. Their study concluded that, even at an early age, positive environmental attitudes can carry on into adulthood.

Another study conducted by Harvey (1989) found that children's contact and experiences with nature can affect their environmental dispositions. Therefore, establishing a connection with nature at an early age is extremely important. These connections can reflect how these children view nature and the environment once they reach adulthood. Garden-based learning can also provide students with a lifelong hobby of spending time outdoors, exploring and harvesting the products of their toil.

Impact on children's health and nutrition. School gardens have been used to teach children about nutrition and how to make healthier food choices (Morris, Briggs et al, 2000). Researchers emphasize the importance of nutrition education and the need to develop innovative methods to motivate young children to develop lifelong healthy eating habits and state school gardens serve as an ideal context for nutritional programs.

Research demonstrates that children who plant and harvest their own vegetables are more willing to taste and like them (Morris et al., 2000).

Nutritional programs in the garden have been shown to have multiple benefits. The Nutrition Education and Training Section of the California Department of Education states five benefits of garden-based nutrition education: (a) Building bridges between school and community, (b) Promoting the transfer of information from one generation to another, (c) Developing environmental awareness in students by caring for a living environment, (d) Providing opportunities for cultural exchange and, 5. Building life skills (Sealy, 2001).

A huge benefit of using a garden-enhanced nutrition education curriculum is the increased availability and accessibility of fresh fruits and vegetables. Planting vegetables in a garden that children can walk by, harvest, and eat from can be served as a part of the school lunch for the whole school to enjoy (Heim, Stang, & Ireland, 2009). Gardens also provide students with hands-on experience throughout growing and harvesting foods. Learning continues in the classroom with students conducting research to find recipes and cooking methods for the food they harvest. Furthermore, preparing and consuming their garden items completes the lesson and provides these students with a sense of pride and accomplishment (Heim et al., 2009).

Impact on student behavior. According to Ozer (2006), one of the most promising aspects of school gardens as a model of school-based intervention is its potential to strengthen the school environment as a whole. Prior research on school-based health promotion with youth demonstrate the effectiveness of programs that include a school wide component (Center for the Study and Prevention of Violence, 1998). If a

school garden succeeds in influencing the norms of the school, then these norms will support individual students' efforts at maintaining the behavior and activities taught in the garden (Ozer, 2006).

Garden-based learning encompasses a great deal of group learning. Students often work in groups or pairs to achieve tasks such as planting, weeding or constructing items. Garden projects also draw on skills and interests not necessarily associated with high achievement in the regular classroom: for example, physical strength, visual-spatial skills, or experience in building. Garden instructors anecdotally comment that some students who struggle with classroom learning shine in the garden (Ozer, 2006). Group work in the garden can allow students who traditionally might not be grouped together in the academic classroom to partner and learn from each other. This type of peer grouping can be healthy for students by teaching them to work with various groups of classmates. Cooperative group learning, involving small teams of students of different ability level as learning partners and providing recognition for group performance, has been associated with better peer relationship as well as higher academic achievement in the classroom (Marr, 1997).

Legg (2013) pointed out that students in school, like adults at work, must work on tasks that require a large amount of direct attention for extended periods of time. Unlike adults, children's attention abilities are not yet fully developed. Therefore, Taylor, Kuo, and Sullivan (2001) stated that students need "attention supportive environments" (p.58) such as outdoor spaces, where they can retreat to restore their directed attention capacities. Crain (2005) found that children were more willing to quietly observe things in nature and less likely to become restless as quickly when they were outdoors.

Similarly, Lieberman and Hoody (1998) reported that schools that used the outdoors as a setting for learning reported fewer disciplinary problems and classroom management issues. Wells (2000) found that children who were exposed to environments with more nature, and thus exposed to more restorative qualities, were likely to have improved attentional capacities. Multiple researchers contend that outdoor instruction gives students opportunities to enhance the types of skills and qualities needed in order to be successful academically (Crain, 2005; Watson, Miller, & Buckler, 2012). For example, Crain (2005) suggests that free play in nature helps children develop three qualities; patient observation, creativity and a sense of place and belonging. In addition, he argues that being in nature offers children the opportunity to sit and think, what Crain refers to as "quiet contemplation" (p.3). This time allows students the valuable opportunity to reflect on the things that they have learned. In addition to honing skills that would help students succeed academically, learning outside also allows students to contextualize problems across the curriculum and deepen the level of their understanding of the material (Watson et al., 2012).

School-Based Agricultural Education Programs

School-based agricultural education (SBAE) programs are a part of the overall middle and secondary United States education program. SBAE programs are designed to provide students with skills and competencies that prepare them to become productive citizens in society. Through these programs, students obtain opportunities for leadership development, personal growth and career success ("Agriculture Education," 2017). *Figure 1* shows the three-component model of the SBAE Program. This model is the foundation of agricultural education programs and no matter how diverse the classrooms

are across the nation they are all grounded in this model. Agricultural education is delivered through three interconnected components:

- Classroom or laboratory instruction which is inquiry-based instruction and learning through an interactive classroom and laboratory ("Agriculture Education," 2017).
- SAE is experiential, service and/or work-based learning through the implementation of a supervised agricultural experience program ("Agriculture Education," 2017).
- FFA is premiere leadership, personal growth and career success through engagement in the National FFA Organization programs and activities ("Agriculture Education," 2017).

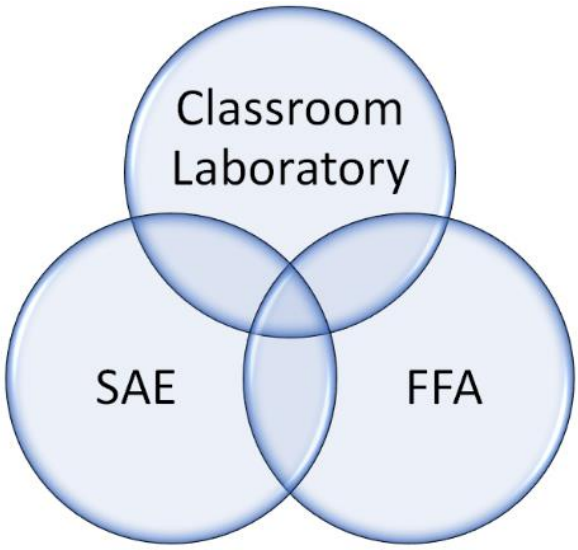

Figure 1. Depiction of SBAE Three-component Model (SBAE, 2017).

SBAE programs focus on the "needs of individuals and groups in developing individually satisfying and socially responsible knowledge, skills, and occupational values" (Campbell & Martin, n.d.). This focus on the needs of individuals and knowledge

recognizes the value of experiences and relies on these experiences as the context in which knowledge and skills are learned in SBAE programs. Agricultural education programs at the most basic level provide opportunities for students to learn basic agricultural skills and knowledge, occupation skills, training and professional growth. SBAE programs encompass but are not limited to the study of horticulture, floriculture, floral design, forestry, environmental science, conservation, natural resources, agricultural products and processing, agricultural sales and services, production of food and fiber, aquaculture, agricultural mechanics, agricultural economics, animal science, small animal care, veterinary science, animal production and leadership development (Campbell & Martin, n.d.).

Through these subjects, agricultural educators teach students a wide variety of skills, including science, math, communications, leadership, management and technology. SBAE programs embody the three-circle model of instruction. This intra-curricular three circle model is made up of classroom and laboratory instruction, leadership development, and experiential learning ("What is Agricultural Education," 2017). Research supports the successful integration of each of these three components results in providing a context for learning content and life skills while producing well rounded individuals prepared for leadership roles in agriculture, business and industry (Dailey, Conroy & Shelly-Tolbert, 2001).

School gardens in school-based agricultural education programs. School gardens incorporated into SBAE programs offer "a plethora of opportunities in the areas of agricultural literacy, community outreach, economic growth, student involvement and program growth" (Lawrence & Rayfield, 2012, p.7). School gardens in SBAE programs

are traditionally planned and implemented by the students. This provides opportunities for achievement and engagement in numerous facets. When examining SBAE program gardens through the three-circle model of agricultural education the use is endless. Many agricultural education instructors use school gardens to teach plant science, plant identification, food science, conservation practices and to make science more relevant through Science, Technology, Engineering and Mathematics (STEM) activities (Lawrence & Rayfield, 2012).

According to Lawrence and Rayfield, (2012, p.7) the "level of rigor" in agricultural education courses is increased by utilizing school gardens. These gardens in agricultural education provide opportunities for agricultural educators to partner with academic instructors to reinforce lessons about soil science, chemistry, biology, food science, plant science, math and more. This focus on academic concepts and the greenhouse is not the only use of garden-based learning in SBAE programs (Lawrence & Rayfield, 2012). Agricultural education instructors also teach business management skills, advertising, marketing, customer service and life skills through the execution of garden-based learning curriculum. A few examples include plant sales, landscaping designs and implementation, vegetable sales, meal preparations and menu planning, canning and preservation and much more. Garden-based learning curricular goes beyond the agricultural education classroom and is evident in the entire SBAE program through the FFA and Supervised Agricultural Experience (SAE) (Lawrence & Rayfield, 2012).

Importance of educators' perspectives. Sprague (2016) reported that instructors are vital to the success of school gardens. Educators are major variables and must be in support of garden-based learning in order for it to be successful and flourish. The

principal is also needed to support the educators in their planning, promoting, funding and development stages of the school garden program, however the educator ultimately will spend the most time in the garden, setting up the garden, teaching the curriculum and maintaining the garden (Sprague, 2016). The educators' attitudes, belief and knowledge about garden-based learning are important factors in the implementation and execution of the programs. If the educator is excited about the curriculum then the students are more apt to be excited as well.

Campbell and Martin (n.d) state that instructors are a vital component of the agricultural education program and garden-based learning curriculum; they are the leader, trainer, implementer and provider of knowledge for the students. Without the effort and support of instructors, SBAE programs and garden-based learning curricular could not be implemented or sustained. Therefore, it is important to include their uses, practices, resources, perceived benefits and barriers of their school garden programs in this study. The significance of the agricultural education teacher is referenced by Campbell and Martin (n.d.) in Aretas Nolan's *The Teaching of Agriculture* (1918):

> Good education depends on good teaching, which depends, in turn, on good instructors. The well-educated vocational agricultural teacher . . . must be a thorough scientist and a technically trained agriculturalist. He should also have studied rural sociology, agricultural economics, public speaking [and] educational principles, psychology, and management. This is because the teacher's "influence and activities extend outside of the school to the rural life of the community" (n.d., para 25).

Few research studies have focused on the teacher and administrator perspective of school gardens, but none specifically focusing on agricultural education instructors. According to Blair (2009), researchers studying educators' perceptions of school gardens should focus on the following: (a) principals' and teacher' enthusiasm for school gardens as learning tools; (b) how instructors find school gardens useful; (c) what barriers are perceived in the integration of the garden into the curriculum. Two studies conducted in California evaluated the attitudes and perceptions of both teacher and principals on their school garden programs. Graham et al. (2005) reported that 89% of principals reported having a school garden for the development of academic instruction. The areas focused on were science, environmental education and nutrition. This study also reported that principals reported lack of time, lack of curriculum linked to standards and lack of teacher interest, knowledge and training as a barrier (Graham et al., 2005).

Graham and Zidenberg-Cherr (2005) conducted a survey of 4th grade educators in California and found that school gardens were mostly connected to science, nutrition and environmental studies. Again, a majority of instructors noted there was a need for curriculum, materials, training for instructors and time (Graham & Zidenberg-Cherr, 2005). Skelly and Bradley (2000) conducted a study in Florida, evaluating the importance of school gardens as perceived by elementary instructors. This study showed that the most frequent reason for using the school garden was environmental education followed by helping students learn better and experiential learning. Overall the results of this student showed that while many instructors were using the school gardens, these instructors were only using them as an educational tool 10% or less of their class time (Skelly & Bradley, 2000).

"All learning is experiential" (Baker, Robinson & Kolb, 2012, p7). Learning is a concept that is built upon how experiences change people, however we are reminded that the experience itself does not constitute learning. The learner must reflect, draw abstractions and experiment actively using newly construct knowledge to transform learning. According to Baker et al. (2012) "instructors must be present and mindful throughout the experiential process in order to guide and direct the learning process" (p. 7). The agricultural education teacher plays an important role in each phase of the learning cycle. The teacher acts as a facilitator thought each phase and making connections for the students. The students are continuous learnings and it is up to the educator to capitalize on experiences.

Experiential learning for GBL and SBAE programs. Garden-based learning can be defined in "simple form as an instructional strategy that utilizes a garden as a teaching tool and the pedagogy is based on experiential education, which is applied in the hands-on laboratory of the garden" (Desmond et al., 2002, p.20). This definition is can be somewhat misleading in that it does not account for the powerful elements of the garden learning experience or experiential education. This definition of garden-based learning fails to highlight the relationship of garden-based learning experiences to educational reform and to the transformation of contemporary basic education from a sedentary, sterile experience to one that is more engaging of the whole child (Desmond et al., 2002).

As the demand for more alternative ways of teaching continues, the educator will be the key in implementing these alternative opportunities for students. Therefore, the educator perspective on garden-based learning could provide key information for the

success and growth of school gardens. It is important to know the strengths, weaknesses, wants, needs and accomplishments of those involved with such programs as garden-based learning. Agricultural Education teacher perspective and use is also of importance because these educators could be used as models of proven programs and assist in the implementation of future school gardens.

According to Desmond et al. (2002), theoretical and methodological approaches to garden-based learning vary greatly, however the "application of the pedagogy within garden-based learning falls principally under one of two frameworks: experiential education and/or environmental education" (p.20-21). Experiential education is a process through which a learner constructs knowledge, skill, and value from direct experiences.

Learning by doing is a simplistic way to describe experiential learning. Experiential Learning is one of the most utilized and widely accepted theories/learning models that stems from the experiential works of Dewey, Lewin, and Piaget. According to Kolb, Boyatzis, and Mainemelis (2001) taken together, Dewey's philosophical pragmatism, Lewin's social psychology, and Piaget's cognitive developmental genetic epistemology form a unique perspective on learning and development (History of Experiential Learning, n.d.). Experiential learning can be described as a holistic theory of learning that identifies style differences among different academic specialties and multi-linear model of adult development, both of which are consistent with what we know about how people learn, grow, and develop (Kolb et. al., 2001).

Experiential learning emphasizes the central role that experience plays in the learning process, an emphasis that distinguishes experimental learning from other learning theories. For example, internships, field trips, lab activities and other

experiences deemed meaningful and experienced by the individual. Experiential learning focuses on how meaningful the experience is to the learner and the actual learning process for the individual. Piaget and other scientists have shown that a child's understanding is developed through his actions on the environment and not merely through language. Another unique point about experiential education is that it is based on the intrinsic motivation of the learner. (Desmond et al., 2002).

John Dewey (1938) was one of the first educators to promote experiential learning as a viable teaching method to link education, work, and the individual. He believed that students should have direct learning experiences and textbooks should be supplemental to those experiences since they do not provide real world problems. Only when students are exposed to experiential learning techniques that maximize skills and learning from their own experience can the full potential for learning be realized (Kolb & Lewis, 1986). Since Dewey's first theories of experiential learning there have been many others research and develop their own definitions of experiential learning. Keeton and Tate's (1978) definition of experiential learning compiles many of the concepts common to experiential learning theories: "it (experiential learning) involves direct encounter with the phenomenon being studied rather than merely thinking about the encounter or only considering the possibility of doing something with it." (p.2).

Kolb, best known for his experiential learning model that includes four elements: concrete experience, observation and reflection, the formation of abstract concepts, and testing in new situations. He represented these in the famous experiential learning circle that involves concrete experience, observation and experience, forming abstract concepts, and testing in new situations (Kolb, et al., 2001). According to Kolb's (1984) experiential

learning model concrete experience leads to observations and reflections. These, in turn, result in the formation of abstract concepts and generalizations of these concepts as well as the capacity to test the implications of these concepts in new situations.

Figure 2 shows in detail Kolb's model of experiential learning. In the first stage, concrete or direct experience, students have a personal experience with the area/concept being studied (Hanley, 2013). Osborne (1994) pointed out that an opportunity to directly experience the phenomenon being studied can make the phenomenon more meaningful and relevant for students. During the second stage of Kolb's model students are given the opportunity to make observations and reflect upon learning experience (Hanley, 2013). This stage is important in that students should begin to transfer the experience into new knowledge. Stage number three is the formation of abstract concepts, which requires students to generalize elements of the experience and relate it to existing knowledge (Hanley, 2013). The final stages, students begin to develop new ideas and test theories (Osborne, 1994). Kolb described knowledge as something that is not static but rather is in constant flux, shaped by experience (Mazurkewicz, Harder, & Roberts, 2012). Building on past knowledge and making connections from new experiences to previous experiences is a main tenet of experiential learning (Mazurkewicz, et al., 2012).

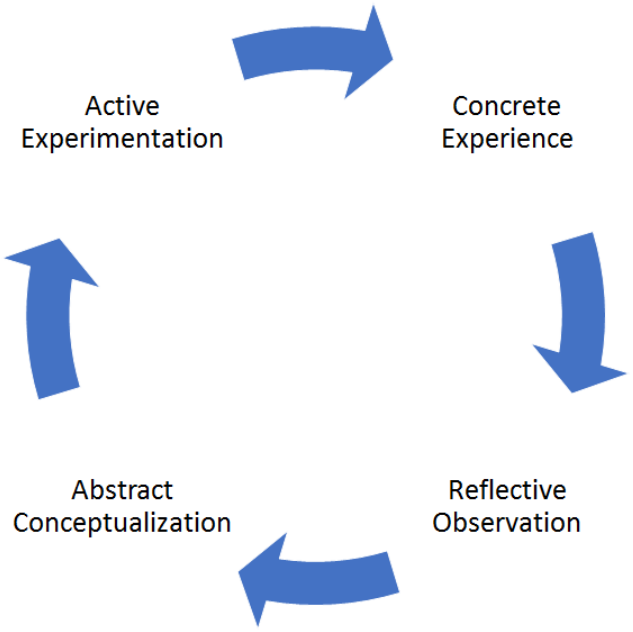

Figure 2. Depiction of the Kolb Learning Cycle (Baker & Robinson, 2011).

SBAE programs have for many years (Phipps, Osborne, Dyer & Ball, 2008) taken advantage of Kolb's (1984) experiential learning model of providing students with authentic hands on learning experiences in their classrooms and programs as an instructional strategy. (Rubenstein, Conner, Hurst, & Thoron, 2016). Experiential learning puts the emphasis on doing in the hands-on approach in education. Experiential learning is also referred to as learning through action, learning by doing, learning through experience, and learning through discovery and exploration (Roberts, 2006). Therefore, the motto of the National FFA Organization and agriculture education "Learning to do, doing to learning, earning to live and living to serve" ("The National FFA Organization," n.d., para 1) is a perfect fit for experiential learning. This theory is a nice mold for agricultural education and the agricultural classroom. Experiential learning is designed to encourage student centered learning which is also incorporated in the agricultural education curriculum. The learning impact seems to be greater for those students who

participate in agricultural education class activities, supplemented with supervised agricultural experience projects and career development events, because these experiential learning activities enhance the entire agricultural education package and produce a lasting impact on students (Roberts, 2006).

Kolb's (1984) experiential learning model is commonly discussed in agricultural education and "provides a practical process by which agricultural educators can draw in-depth learning from the everyday experiences in which students are exposed" (Baker & Robinson, 2011, p.10). Experiential learning does not have to be expensive, time-intensive, or vastly different from what agriculture education instructors do every day because typically all that it requires is an opportunity for students to reflect and think about what they are learning, the gentle guiding of abstract concepts related to the experience, and the opportunity for students to experiment with the newfound knowledge or skill (Baker & Robinson, 2011). Baker et al. (2012) collaborated to further clarify the connection between experiential learning and agricultural education:

> David A. Kolb helped to clarify the connection of experiential learning in the context of agricultural education, allowing movement from analysis to synthesis. Collaboration led to the conclusion that experiential learning should: (a) encompass each of the three components of the agricultural education model, (b) require purposeful and planned support from the agricultural education instructor, (c) lead to the development of important meta-cognitive skills and (d) include curriculum planning and assessment (Baker et al., 2012, p. 6).

According to Baker et al. (2012), the experiential learning model incorporated into the agricultural education three-circle model, "illustrates the total learning

experience of agricultural education" (p. 6). Agricultural education instructors have traditionally associated experiential learning with the supervised agricultural experience (SAE) portion of the model, however "each of the three components included in the agricultural education model must encompass rich experiences" (Baker et al., 2012, p.6).

The two models, experiential learning and agricultural education three-circle model are complementary of each other and the components intermingle together. The classroom aspect of the agricultural education model relates to the abstract, where the FFA is more of a concrete and reflective component. The SAE which has traditionally been viewed as experiential is a "field project or the whole achievement converging aspect" (Baker et al., 2012, p.6). The classroom and FFA have a direct connection to the student's SAE project and all of these aspects tie the learning concepts together and allow students to transfer their knowledge from one experience to another. According to Baker et al. (2012) it is at this point that meta-learning is occurring in students. In order for true experiential learning to occur Roberts (2006) concluded that each experience in agricultural education should be defined through four dimensions: the level, the duration, the intended outcome, and the setting. "*Figure 3* shows Kolb's (1984) experiential learning model modified to reflect the commonly used model as it relates to SBAE programs.

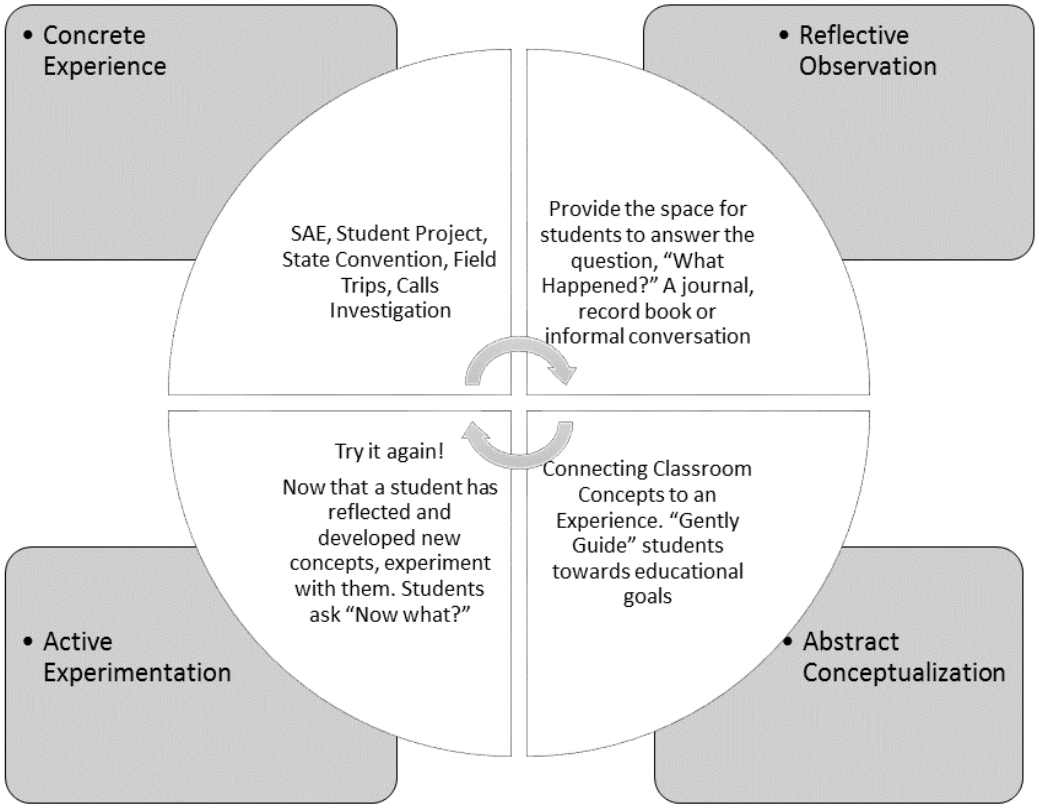

Figure 3. Kolb's experiential learning model as it relates to agricultural education (Baker & Robinson, 2011)

Assumptions and learning impacts of experiential learning. The experiential learning model portrays two dialectically related modes of grasping experiences; Concrete Experience (CE) and Abstract Conceptualization (AC) and two dialectically related modes of transforming experience; Reflective Observation (RO) and Active Experimentation (AE) (Hanley, 2013). According to Kolb (1984) the learning cycle can begin at any one of the four points and that it should be approached as a continuous spiral. However, traditionally it is thought the learning process begins with someone carrying out a particular action and then seeing the effects in the particular instance so

that if the same action was taken in the same circumstances it would be possible to anticipate what would follow from that action (Hanley, 2013). Kolb (1984) suggested that, "The learning process is not identical for all human beings, rather the physiological structures that govern learning allow for the emergence of unique individual adaptive processes that tend to emphasize some adaptive orientations over others?" (pg. 62 as cited in Baker, Robinson & Kolb, 2012, p. 4).

Many times, the cycle is subconscious, therefore it is up to educators to bring this cycle of learning to the conscious level for learning to occur (Stone, 1994). Osborne (1994) states that most educators have a subject matter orientation to teaching and hence this starts with the "whats," "hows," and facts first, with experiences of the subject matter, if any, coming later. Under the umbrella of experiential learning, educators instead should start the learning process with the direct, concrete experiences in order to place the subject matter into a real-world setting or problem (p.3). By starting the learning cycle with direct and concrete experiences, interest in the subject is usually stimulated, students are motivated to learn more, and a strong context for reflection and application is provided (Osborne, 1994, Skelly, 2000). According to Proudman (1992) "good experiential learning combines direct experience that is meaningful to the student with guided reflection and analysis. It is a challenging, active, student-centered process that impels students toward opportunities for taking initiatives, responsibility and decision making" (p.20). Baker, Robinson & Kolb (2012) state that "in order to facilitate learning, not only must the experience be grasped, but it must also be meaningful and relevant, because students remember knowledge longer when they have experienced it actively" (Knapp & Benton, 2006 as cited in Baker, Robinson & Kolb, 2012, p.3).

There has been significant growth in interest in experiential education and project-based learning as educators recognize the value of hands-on learning. While experiential education and project-based learning offer excellent strategies or pedagogies, they require a contextual framework or thematic structure in which to operate. Environmental education and more specifically garden-based learning can provide that context or thematic focus (Desmond et al. 2002). Engaging, hands-on learning activities incorporated into subject matter are key components of experiential education in which environment-based education programs have been employed, emphasizing the development of lifelong learning skills, such as problem solving and critical thinking. According to Waliczek et al. (2003) these programs use a multidisciplinary approach to educating students and have been shown to increase test performance, attention, and enthusiasm for learning and to decrease discipline issues in the classroom. Students engaged in hands-on gardening lessons showed increased positive attitudes towards content material and learning in general (Waliczek et al., 2003).

Nuances and Weaknesses

Although Kolb's model is widely accepted and utilized frequently today in educational research there are several criticisms. Salient issues exist concerning the structure and validity of its use, including logical inconsistencies in theory construction and for psychometric properties of the Learning Style Inventory (Joffrion, 2010). Experiential learning is prevalent in agricultural education programs, but the exact relationship and role of experiential learning has remained somewhat ambiguous (Roberts, 2006). Other critics question the four stages of the cycle and the thought that an individual could begin at any point in the cycle and continue. While providing excellent

framework for planning teaching and learning activities, Kolb's theory lacks account for culturally-based communication styles.

Summary

"Experiential learning is defined by the context in which it occurs" (Roberts, 2006, p. 27). Experiential learning is not only learning by doing but embracing the experience, reflecting and applying what is learned or gained. Students need meaningful learning and academic opportunities that develop crucial thinking skills and engaging at the core in order to be prepared to succeed in the world (Sprague, 2016). Students benefit from learning experiences that are real life and not focused solely on improving standardized achievement scores. Using garden-based learning curriculum aids in meeting many of the academic requirements of students and offers opportunity for students to participate, through hands-on gardening activities (DeMarco, 1997). SBAE programs have done a great job incorporating experiential hands-on learning, along with academics and real-life experiences through their three-circle model.

CHAPTER THREE

METHODS

This chapter describes the study's research methodology, including details of the quantitative and qualitative design, participants, procedure and instrumentation, and data analysis process**.**

Design

Research in education is traditionally characterized by three distinct, broad approaches: qualitative, quantitative, or mixed-methods that involve elements of both (Harwell, 2011). For the current study, a mixed-method two-phase approach known as Sequential Explanatory Design was used whereby the quantitative data was collected first through a cross sectional, online survey followed by qualitative data collection through in-person interviews to further inform and aid in the interpretation of the data (Creswell, 2003). This sequential approach was chosen over Concurrent Triangulation during which the quantitative and qualitative data are collected concurrently (i.e., simultaneously) due to the intent to collect the quantitative data from a large representative group, followed by qualitative data collection from a smaller subset of individuals from the same group.

The general purpose for both methods is to overcome the methodological weaknesses that are inherent in any one strategy and to confirm, cross-validate, or corroborate findings within a study (Creswell, 2003). The qualitative results assisted in explaining and interpreting the findings of a quantitative study and explained and offered insight into the briefer online survey answers (Creswell, 2003).

For the current project, the sample was selected from the population under study, all agricultural education instructors in the state of Georgia with a type of garden-based learning program as defined by the research study.

The specific research objectives to be addressed in this study were:

1. What types of individuals comprise the current population of SBAE instructors in Georgia and what are their thoughts, beliefs and experiences regarding school gardens?
2. What types of garden-based learning programs do agricultural education instructors utilize in SBAE programs as instructional supports?
3. What are the benefits of garden-based learning instruction according to agricultural education program instructors?
4. What barriers and challenges exist in garden-based learning instruction in SBAE programs according to agricultural education program instructors?

An additional rationale for the use of a Sequential Explanatory Design was the opportunity to take advantage of the benefits of triangulation that a mixed methods design offers. By definition, a research study that utilizes the process of triangulation will seek to produce understanding of a particular phenomenon through the use of multiple data sources. In some cases, a single method design may lack the ability to adequately resolve the research question(s) and using multiple methods will help facilitate deeper understanding (Angen, 2000).

Triangulation. The current study was purposefully designed as mixed methods, and relied on the analysis of both quantitative (i.e., large-scale online survey) and qualitative data (i.e., set of individual one-on-one interviews) to determine if the findings could be corroborated, and contribute to the study'svalidity. This should not imply that multiple data sources are mandatory for validity or verification. Rather, the researcher made a variety of choices utilizing each of the four identified types of triangutation as described below which help ensure that the analysis of data promotes a "rich, robust, comprehensive and well-developed" account of the phenomena (Creswell, 2008).

These are four different types of triangulation Denzin (1978) and Patton (1999) and how aspects of each were used in the current study:

1. Methods triangulation: Examines the consistency of the findings that have been generated by the various methods of data collection. The researcher planned to capitalize on the mixed method design by looking for the presence of absence of "complementary aspects" of the quantitative and qualitative data from the study, not only where it converged but where it might diverge since that would also provide insight into the research questions.
2. Triangulation of sources: A review the consistency of different data sources within a single method such as an examinination of the data at different points in time, in different types of settings or from different points of view. For example, the researcher purposefully collected data using an online survey which allowed for a larger sample and broader array of questions, however with only self-reported data and no follow up or debriefing. This was complemented by the setting of one-on-one interviews where the participants

were allowed to elaborate on their repsones and the researcher was able to elucidate by asking for clarification and details as needed, as well as the opportunity to end the interviews with a thorough debriefing to ensure that the participants' intentions were fully captured.

3. Analyst Triangulation: Although the primary analysis was conducted by the principal researcher, there were some instances of using more than one analyst or observer as a "check" on personal bias (i.e., selective perception) or to reveal possible differences in interpretation. The intent was not to seek consensus but rather to expose bias, and any potential inaccuracies of the amended instrument (Dillman, et al. 2014).
4. Theory/Perspective Triangulation: Employs multiple theories for data analysis. Throughout the process of the qualititave data analysis, the principal researcher relied on the theories and perspectives of various scholars such the tailored design research method by Dillman, Smythe and Christian (2014) and Kolb's Experiential Learning Model (1984) as a source for organizing and reporting themes that emereged from the findings.

Quantitative. A descriptive cross-sectional survey was used for the quantitative data collection. This is a type of survey design with the primary goal of assessing only one sample at only one specific point in time and generally without the intent of producing inferences or causal statements (NEDARC, 2010). With the cross-sectional survey, participants were asked to respond to the survey only once, with no intent to detect changes in the data that might occur over time. A major strength of descriptive studies is their ability to reveal patterns or demonstrate connections that are not

immediately obvious. In general, the rationale and goals for a descriptive suvery design are (NEDARC, 2010):

1. Gathering information about a specific condition.
2. Planning resource allocation, such as a needs assessment.
3. Identifying areas for further research.

Demographic information was obtained for factors such as gender, geographic location, number of years teaching, size of SBAE program (i.e., number of instructors), and type of garden-based learning program. The resulting quantitative data was utilized to test two hypotheses for group differences in terms of gender: If there was a statistically significant difference between males and females regarding "observation of positive changes" and "usefulness for different types of resources and materials when the garden is a learning laboratory."

Qualitative. The qualitative component of this research study consisted of a series of face to face and telephone interviews with a subset of ten participants from the larger group of participants from phase one. A structured interview guide was developed based on the research questions and identified constructs.The resulting data from the individual interviews allowed for an in-depth and detailed examination of the practices of garden-based learning from teachers who regularly utilize garden-based learning practices.

Data Analysis

The section below details results of all segments of the research study, including the quantitative online survey and qualitative interviews. The results are presented in alignment with the research questions and the methodologies used for each analysis.

Quantitative. Analysis began with downloading the completed questionnaires from Qualtrics to a comma separate value (CSV) file, which was then converted to a Microsoft Excel file for initial data cleansing and organization. After cases were removed for missing data, a set of one hundred complete surveys (n=100) was retained and coded for export into the Statistical Package for the Social Sciences (SPSS), version 25. The data was then analyzed using SPSS for generating descriptive and inferential statistics related to the research questions.

Participants

As with all types of surveys, cross-sectional online surveys may suffer from response rate and there was a limited availability of agricultural education instructors' email information. For this reason, the study participants for the quantitative phase of the study were not randomly chosen but rather attempts were made to reach a sample that was both representative of the population and large enough for conclusive results by contacting the State Agricultural Education Region Directors and Area Horticulture Teachers for recommendations based on their yearly evaluations of agricultural education teachers and programs, as well as the teachers' levels of knowledge and experience.

Prior to data collection, permission from the University of Georgia's Institutional Review Board (IRB) was granted to survey and interview subjects. Procedures for the protection of subjects and their rights were followed according to Creswell (2008). Potential participants received emails containing information about the questionnaire that included their consent to complete the online questionnaire. Interview participants received written consent forms that were signed prior to the conduction of the interviews.

Recommendations were requested as contact information for at least two teachers from their area that utilized school garden lessons regularly in their classrooms. Twelve instructors were recommended by the Georgia Agricultural Education Region Directors and Horticulture Area Instructors Association as candidates to participate in the qualitative interview process.

Invitations for voluntary participation were sent by email to as many instructors as possible within the population (i.e., those with available emails). The educators were recruited through the Georgia agricultural education email list-serve, after obtaining permission. The final participants were 100 agricultural education instructors currently teaching a SBAE program in the state of Georgia. These instructors then volunteered to participate after being recommended by the Georgia Agricultural Education State Staff due to their performance in maximizing their school gardens to teach academics. All granted informed consent to the researcher and the researcher will maintain confidentiality of all identifiable information. Efforts have been made to disguise identifiable information that will be reported in this or any other publication.

Procedure

After permission from the University of Georgia's Institutional Review Board (IRB) was granted, permission from the Georgia Agricultural Education Curriculum and Technology director were requested. Christa Steincamp, director of Georgia Agricultural Education Curriculum and Technology granted permission. Christa Steincamp facilitated the release of the survey on the Georgia agricultural education list-serve to agriculture education instructors in Georgia.

Dillman's Tailored Design Method for online questionnaires was followed in the development of the questionnaire (Dillman, Smyth & Christian, 2014), which was administered using web-based procedures. Web questionnaires have advantages over conventional questionnaires including reduction of postal costs, decreased risk of missing data within the questionnaire, ability to expand survey populations through professional organization list-serves, shorten response return time and no need to transfer data from written to electronic format. Surveys that are completely electronic or web-based are the fastest growing form of surveying occurring in the United States (Dillman, Smyth & Christian, 2014). Web questionnaires are designed to be interactive, tailed to individual responses, and provide immediate feedback.

Web questionnaires are powerful research tools, however there are limitations. The researcher must have access to a Web server and the ability to use specialized software to develop the questionnaire, process data, safeguard against security breaches, and protect the data from multiple submissions. Web questionnaires also require that participants have access to and the ability to use the Internet browser (Gall, Gall & Borg, 2003). In order to reduce coverage area, potential questionnaire participants were researched and found that in 2016, 34.9 million students had access to the internet, along with 88% of school districts being connected to the internet, 95% had fiber optic connections and 83% had WIFI capabilities to support 1:1 technology (Johnson, 2017); therefore, most online survey participants have Internet access to complete the online surveys. This was especially true for the current study because each participant was an active agricultural instructor currently teaching at a school.

The increasing use of mobile phones to access the Internet, especially among minorities and those with lower socioeconomic status also helps to reduce gaps in sampling (Dillman, Smyth, & Christian, 2014). According to Dillman et al. (2014) the fact that people have become more accustomed to completing various activities daily online can be good for survey researchers conducting web surveys.

The questionnaire was arranged based on Dillman's Tailored Design Method for online questionnaires. The answer choices were vertical, and each item was numbered. Topics were arranged in sections with information explaining what type of information the participant would be providing in those sections. A progress bar was featured at the top of the questionnaire to notify participants of their progress throughout the questionnaire. To assist with preventing measurement error the questionnaire was peer reviewed and piloted with a similar group of Florida Agricultural Education Instructors. Details of the pilot testing may be found in Appendix J.

The quantitative data was gathered through an online survey platform hosted by Qualtrics, a web-based software used by the University of Georgia community. Qualtrics is an online platform that aids in the development of online questionnaires, collects and stores data, and generates analysis reports. Qualtrics was used to create the online survey, distribute an email with an anonymous link to the survey and assist with the statistical analysis of the information collected. The questionnaire included a single graphic with a welcome and research study explanation. The participants were thanked for their time and received an estimate of how long it takes to complete the questionnaire. A clear set of instructions was included along with a progress bar on each page. To reduce error in the research a statement was typed at the end of the questionnaire reminding participants to

press the red arrow to submit their responses because a common error in electronic questionnaires are that they are never submitted.

The final data was exported from Qualtrics to SPSS to conduct descriptive statistics. Descriptive statistics includes both counts and percentages. To ensure participant anonymity, the questionnaire did not ask for any personally identifiable information such as, school name or social security number. However, the questionnaire did ask for the participants name, so that a potential follow up interview could be scheduled. All participants in this research study were voluntary and no risk will be posed for those involved. The purpose of this study was fully disclosed in an Internet-based consent document which will serve as a cover letter prior to participation in the Web-based survey (Dillman, 2000).

Mail and Internet survey procedures and timing recommendations by Dillman (2000) will be utilized to maximize the response rate of the survey. Dillman reminds us that our participants need to be valued and appreciated. Participants received a prenotice email to explain the purpose and value of the questionnaire. Approximately four days later, all potential participants received an email notice that includes the questionnaire link and participation agreement. Several days later a thank you and reminder email was sent and finally after two weeks, a final thank you and reminder email was sent to potential questionnaire participants.

Attempts were made to reach all Georgia agricultural education instructors, who were contacted through the Georgia agricultural education email list-serve. Volunteers responded anonymously to the survey. Using a third party to collect data is one method to ensure the anonymity of participants. Participants in this study were contacted via email.

They received instructional information, consent form and a questionnaire link. The survey was completed online using clear navigational directions and radio buttons for selection of responses. An alternate means of completing the survey was provided for those participants not wishing to complete the questionnaire on the Internet.

At the close of the survey, Georgia Agricultural Education Regon Coordinators and Area Horticulture Instructors were contacted to recommend instructors in their regions/areas who specialized in garden-based learning. These instructors were contacted, and interview times were scheduled. Prior to interviewing, an interview guide was developed to ensure that participants generated discussion. The interview guide was followed during the interview process and the researcher collected preliminary summaries of the data to ensure that statements were interpreted correctly by the researcher. The researcher shared the preliminary summaries with participants at the end of each focus group and interview as a form of reinforcement. During the interview and data collection process, the researcher ensured that each participant felt comfortable to share their thoughts and views regarding their best practices, uses, benefits and barriers of school gardens. Prior to the beginning of the interviews, the researcher worked to develop a positive relationship with participants to increase their sense of security and comfort.

Constructs

Data were grouped into five constructs: School garden information, academic instruction, support, resources and observations, funding and support and demographic information.

Construct 1: School garden information (yes/no). A majority of the questions regarding school garden information had nominal bivariate response options. Descriptive statistics such as frequencies, percentages, means and standard deviations were used to summarize this data. Questions about the school garden had scale-level multivariate response options and were also used to summarize this data.

Construct 2: Academic instruction. How are school gardens characterized? These questions had scale-level multivariate response options. Descriptive statistics such as frequencies, percentages, means and standard deviations were used to summarize this data. Some open-ended questions were included such as, School gardens are a great place to teach ____?

Construct 3: Support, resources and observations. Questions about support, resources and observations had scale-level multivariate response options. Descriptive statistics such as frequencies, percentages, means and standard deviations were used to summarize this data. Questions regarding resources and observations utilized ordinal multivariate response options.

Construct 4: Funding and support. Questions about funding and support had ordinal multivariate response options. Descriptive statistics such as frequencies and percentages, means and standard deviations were used to summarize this data. Questions regarding resources and observations utilized ordinal multivariate response options.

Construct 5: Demographic information. Demographic questions had nominal-level bivariate and multivariate response option and frequencies and percentages were used to summarize this data.

Instrumentation

LifeLab (2014) and the California School Garden Network developed the original survey that was utilized as a foundation in this research study. The California School Garden Survey (CSGS) was developed to gain an understanding of the factors that affect the implementation and sustainability of school gardens (2014 California school garden survey, 2014). The survey consists of a maximum of 26 questions depending on if the teacher utilized included both open and closed-end questions. The survey focuses on current garden practices, barriers and perceived benefits of having a school garden and funding sources used to implement and sustain the garden. The 2013-2014 CSGS was the basis for this study but was modified to align with the specific research questions for this study as they pertain to Georgia Agricultural Education Programs. Twenty six items bifurcated based on whether or not an instructor had a school garden.

Audit Trail

Qualitative research involves many choices for a researcher and for this reason it was desirable to maintain an audit trail, a process whereby the researcher maintained records to the extent that it ensures the availability of a transparent description of all of the steps that were taken from the beginning to the end of this study. From design, to data analysis to data reporting, the following steps were taken, as illustrated by Lincoln and Guba (1985, p. 319-310) who cite Halpern (1983). The principal research in this case:

1. Maintains all raw data, notes, and documents;
2. Has explained all techniques used for data reduction, data summaries, and theoretical notes;

3. Has described how data was reconstructed and synthesized including how categories have been structured into themes, the definitions that were used and the relationships in the data that were noted. Also defined are all of the study's results and final conclusions, and how they are tied to existing literature and integrated with the current study;
4. Has preserved all process notes regarding methodology, study design, procedures, and the researchers' strategies or rationales;
5. Has safeguarded materials relating to intentions, personal notes, motivations, expectations, predictions and intentions;
6. Has disclosed all pertinent information regarding instrument development, pilot forms, interview schedules, and formats.

For all of the reasons above, the "research path" for the current study is accessible and clear and includes details of the researdher's many choices and rationales regarding the management, analysis and reporting of the data (Lincoln & Guba, 1985, p. 319-310; as cited in Halpern, 1983). Similarly, Malterud (2001) has underscored the need for a detailed report of a study's analysis by stating that it is not enough for one to merely declare that a qualitative analysis has been done and report that categories then emerged; a reader should "know the principles and choices underlying pattern recognition and category foundation" (p. 486).

Qualitative

Qualitative data for the current study was gathered in the form of mostly non-numeric information from a series of individual interview transcripts and the researcher's

notes. Numerous methods exist for this type of data analysis but most fall within the following five parameters, as summarized by Dudovskiy (2018):

1. Content analysis: A process used to summarize, organize and categorize data based on similaritis in verbal or behavioral content.
2. Narrative analysis: A method that allows the researcher to create an amalgamation of the participants' stories by carefully considering each individual case, the surrounding context, and the participants' different experiences and finding the underlying themes that unite them.
3. Discourse analysis: Involves analyzing the content of the discussion and any type of written text that naturally ocurrs.
4. Framework analysis: An advanced type of qualitative data analysis with several stages such as familiarization, identifying a thematic framework, coding, charting, mapping and interpretation.
5. Grounded theory: A process where the researcher begins by analyzing a single case to formulate a theory, and then examining additional cases for how they may contribute to the theory.

For the current study, the researcher relied mostly on a combination of content and discourse analysis which progressed to a formal three step coding process (Dudovskiy, 2018). The primary function of coding is to categorize data based on words or short phrases which share common themes or ideas and initially, and in this case the research questions provided pertinent domains for coding to which the data could be applied. Dudovskiy (2018) further describes three specific types of coding: Open (initial steps at raw data organization), axial (finding links and interconnections between coding

categories) and selective (differentiating a story by connecting only selected categories). The current study relied upon a combination of these as the researcher used open coding to orgazine the raw data, axial coding to apply the verbal discourse to the research questions and selective coding by focusing on participants' thoughts and experiences about school based gardens.

The qualitative data for the current study was provided by a total of ten teachers (two teachers in each of the six agricultural education regions of Georgia). Each was recommended by the State Agricultural Education Region Directors and Horticulture Area Teachers and contacted to schedule individual interviews. The ten interviews were conducted (out of the 12 recommended educators) between January 23 and March 1, 2019. These interviews allowed for a deeper examination of the garden-based learning practices of agricultural instructors within the state of Georgia. The interviews were semi-structured and conducted with a focus on topics drawn from the literature.

During the analysis, the principal researcher moved "from raw interviews to evidence-based interpretations [by] classifying, comparing, weighing, and combining material from the interviews to extract the meaning and implications" (Rubin & Rubin, 2005, p. 201). This was done both within and across the set of interviews and allowed the researcher to consider the participants' descriptions and to discover patterns so they could be stitched together into a clear narrative answering the research questions. Care was taken to do more than simply count responses. Meaning and context were carefully considered so that themes could be identified and broken down into a series of "interlaced data units" which can then be combined into a cohesive presentation to create meaning (Rubin & Rubin, 2005, p. 203).

This was accomplished in two phases. Recordings were upload to a transcription service rev.com in order to save time. Once transcripts were transcribed, they were downloaded and checked for accuracy and errors before analyzing. The interviews were then coded for categorization into themes and representative quotations were identified for possible inclusion in the manuscript. Stage two involved a comparison of concepts and themes raised by the participants, and a process of combining them in alignment with the research questions. The objective throughout the process was to continually look for meaning and implications within the participants' words. (Rubin & Rubin, 2005, p. 203).

Instrument. A structured Interviewer Guide and Questioning Route was developed by the principal researcher and used as the foundation for the qualitative data collection and analysis (see Appendix I). This guide was broken into three areas based on the research questions. Each interview began with a request for some basic demographic information, including highest educational degree, type of certification, and level of involvement in a school-based agricultural education during the participants' own high school experience. This was followed by a brief introduction of the project, followed by nine items pertaining to Georgia Agricultural Education Programs, with multiple probes for each. The tenth item was open-ended and designed to provide the participant with an opportunity to present any additional information they deemed necessary.

Following this, a brief summary of each participant's responses was presented to ensure accuracy of the data that was captured and to clarify the participant's intentions. Finally, participants were given an opportunity to ask questions and all were thanked for their time. Data from this survey is presented below with a focus on current garden

practices, barriers and perceived benefits of school gardens and the funding sources that are needed to implement and sustain school gardens.

Sample demographics. Twelve agricultural education instructors were contacted about conducting interviews on their school gardens. This population was chosen due to their level of expertise in garden-based learning. As the interviewer I agreed to work around the agricultural education teacher's schedules. Ten of the 12 recommended educators were able to participate in the process, and the interviews were conducted between the dates of January 23 and March 1, 2019. Due to various locations of the agricultural education programs across the state of Georgia, and due to teacher schedules, not all of the interviews could be conducted at one time and location. A majority of the interviews were onsite at the participants' schools throughout the state; however, one was a phone interview and one was at a central location. During the interviews for this research, all subjects were made aware of the purpose of the interview, completed consent forms, and allowed use of their information. The interview participants included five female agricultural education instructors and five male agricultural education instructors. Agricultural education instructors were interviewed from all three of the agricultural education regions in Georgia (North, Central and South).

Researcher Subjectivity Statement. Growing up in the south, I was raised with an appreciation for agriculture and farming. As I later pursed this as a career, my passion for agriculture grew and after 23 years of teaching and working alongside students that flame is still going. I still have a passion for agricultural education.

Throughout my teaching career I have been fortunate to teach students of all ages and learning abilities and to utilize garden-based learning principles and curriculum. For

me, the school garden has always been an important teaching tool in addition to my traditional classroom. The school garden is a learning laboratory, an extension of the classroom and an opportunity to provide students with an experiential application of lessons taught in the classroom such as using the school garden to teach math and science concepts while incorporating real world experiences.

My school gardens consisted of a school greenhouse with a hydroponics system inside, raised garden beds, a cold frame/hoop house and individual garden rows in a large field. The students grew seasonal vegetables year-round and utilized the school garden approximately three house each week. The vegetables raised in the school gardens would be used for taste test experiments, classroom research and cooking projects, nutrition lessons and taken home by the students.

I experienced many barriers and challenges as I implemented my school garden lessons and programs. The time it took to plan the school garden, order supplies and maintain the garden is huge. Funding could also be an issue depending on the school budget and administration. Some years more funding was available for new equipment or supplies and other years, we worked for donations and applied for grants. Space and location were never major issues for me in that I had a supportive administration who allowcated me land area for my school gardens. Fortunately the school garden area was close to the school and the school operated on a block schedule which allowed the class periods to last 90 minutes, therefore travel time to the gardens

I found over the years that my students looked forward to working in the school garden. They took ownership and pride in their school garden projects. They were very proud of the products of their toil and enjoyed taking these items home to their families.

The students showed more positive attitudes towards learning and academics. The students learned to collaborate and work together to plan, organize and implement their garden plans. The students also learned to problem solve while working with each other. The life skills that these students learned along with the academics were huge accomplishments by the end of the school year. In addition, I found that students of all academic levels enjoyed the school gardens. For several years I taught a class of special needs students mixed with student mentors. These students worked together to plant school gardens, and everyone learned a great deal. Along with academic concepts the students learned patience and understanding. They learned how to work with people of all learning types and personalities.

Even though previous research has shown positive outcomes from the utilization of school garden programs, I recognize that not every agricultural education teacher will have the same passion for school gardening that I possess. I also realize that not every agricultural education teacher and program will have the same positive results or challenges that I have experience from utilizing the school garden in my classroom. However, I believe the school garden is an important part of the agricultural education curriculum and allows for hands on learning in the classroom. Garden-based learning can be used in many different forms in the classroom depending on the teacher's resources, for example: small pots inside and outside the classroom, seed cups in window seals, small hydroponics units, raised garden beds, to in ground garden plots. There is no set method for utilized school garden concepts to apply hands on learning in the classroom.

CHAPTER FOUR

RESULTS

Quantitative Results

The quantitative component of this study was conducted first. The independent variable was gender of SBAE program-certified educators. The dependent variables were: observation of positive changes (in students) and usefulness for different types of resources and materials when the garden is a learning laboratory. Results of the quantitative findings are reported below, including a few key demographics from the sample. Data from this survey is presented with a focus on current garden practices, barriers and perceived benefits of school gardens and funding sources needed to implement and sustain school gardens.

Sample demographics. The final 100 completed surveys were from instructors with school populations that ranged (based on instructors' estimations) from 250 to 1,800 students. Overall, there were 54 female instructors and 36 males (10 completed surveys did not report gender). No association was found between the variables of gender and yes or no for school garden. The total number of FFA members for the agricultural programs ranged from 40-275 with an average of 138. The average population for the schools was 915.

Most school garden in Georgia are within the Northern region (63%), followed by the Central region (33%) and the South (4%). Seventy-eight reported having school gardens, while 11 did not. Instructors with school gardens represented all six agricultural

areas, with nearly a third (29%) of the instructors indicating they location as Area 1 (see Table 1 below). Instructors without school gardens reported.

Table 1

Study participants' agricultural regions within Georgia.

Instructors With Gardens		Instructors Without Gardens	
Area 1	20%	Area 1	29%
Area 2	21%	Area 2	19%
Area 3	21%	Area 3	14%
Area 4	16%	Area 4	19%
Area 5	13%	Area 5	5%
Area 6	9%	Area 6	14%

Budgets. Budgets for school gardens ranged from $0 (11%) to $9,000 (1%) with a median annual budget of $500. Male instructors reported an annual budget for the past year with a mean of $723 and median of $500. Female instructors reported an annual budget for the past year with a mean of $1,129 and median of $600. Funding came from a variety of sources (see Table 2 below).

Table 2

During the last academic year, who has your school received funds from to support your school garden?

Funding Type	Count	Percent
School or district funds	48	34%
Grants	29	21%
FFA Alumni/Young Farmer Programs	20	14%
Community Organizations	16	11%
Business Donations	14	10%
Individual Donations	14	10%

Instructors with gardens were also asked how useful they find each of the following educational resources to be when the garden is a learning laboratory.

Table 3

Usefulness of each of the following types of educational resources for gardens as a learning laboratory.

Usefulness	Extremely Useful	Very Useful	Moderately Useful	Slightly Useful	Not at all Useful
Collaboration with Ag-Ed	40	34	0	0	0
Websites	31	32	11	0	0
Lessons found online	22	32	14	5	1
Lesson plans created by you	20	37	14	1	1
Materials, workshops	20	51	0	2	1
Online organizations	18	30	21	5	0
Collaboration with others	16	45	0	8	5
Garden publications	13	26	27	6	2
Textbooks	2	14	29	19	10

The majority, (74%) believe that the most useful educational resource available to them is their fellow agricultural education instructors, very to extremely useful and 0% stating they are moderately or not useful. Their responses are summarized in Table 3 (above).

Instructors without gardens. The majority of instructors without gardens (71%) reported having just one agricultural teacher in their education department while 19% reported having two and 10% had three instructors. The ages of the instructors ranged from 28 to 62, with years of teaching experience ranging from 3-27, with an average of 13.4 years. Only five out of 22 had Alternative Certification (i.e., non-Traditional). Instructors without school gardens were also asked to rank the following reasons why not. (See Table 4 below).

Table 4

Reasons according to instructors that schools do not have a school garden

	Agree	Disagree	Neither
Time constraints	19	1	2
Lack of volunteers	15	3	4
Lack of funding	13	5	4
Lack of gardening supplies	12	6	4
Inadequate space	11	7	4
Lack of staffing	10	7	5
No interest in having a school garden	9	5	8
Risk of vandalism	9	6	7
Few/no instructional materials	9	7	6
Technical assistance with gardening	8	8	6
Little to no knowledge about gardening	4	13	5
Difficulty linking to core academic standards	2	13	7

Instructors with gardens. Instructors with school gardens were from all types of neighborhoods: Urban (19%), Suburban (24%) and Rural (57%). Approximately 8% of respondents indicated that their school garden serves preschoolers, pre-K and under, while 13% serve elementary school-aged children (K through 5), 46% serve middle schoolers (grades 6 through 8), 73% serve high schoolers (grades 9 through 12) and 29% serve adults and the community. The average budget for the prior year for school gardens was $967 with a median of $500.

Similar to instructors without gardens, a majority (51%) reported just one agricultural teacher in the education department; however, this was approximately 29% lower than instructors without gardens who are single-instructor departments. Twenty-nine percent had two and 20% had three instructors. Instructors with gardens had an average of 12.9 years of teaching experience (ranging from less than one year to 36 years) and ranging in age from 28 to 62. The average number of FFA was 174 with an an

average population of 1,120. Of those who have gardens, 16 instructors had Traditional Certification, while 5 had Alternative Certification (e.g., TAPP or RESA).

Instructors with school gardens were asked to report on the specific type (See Figure 4 below). Many schools have more than one method for planting. The vast majority (97%) utilize space within the community outside of the school. The remainder of the instructors reporting overcoming space by using planters and pots, either within or outside of the classroom. One surprising finding was the high number of instructors utilizing hydroponics (n=51) as compared to in ground traditional means (n=46).

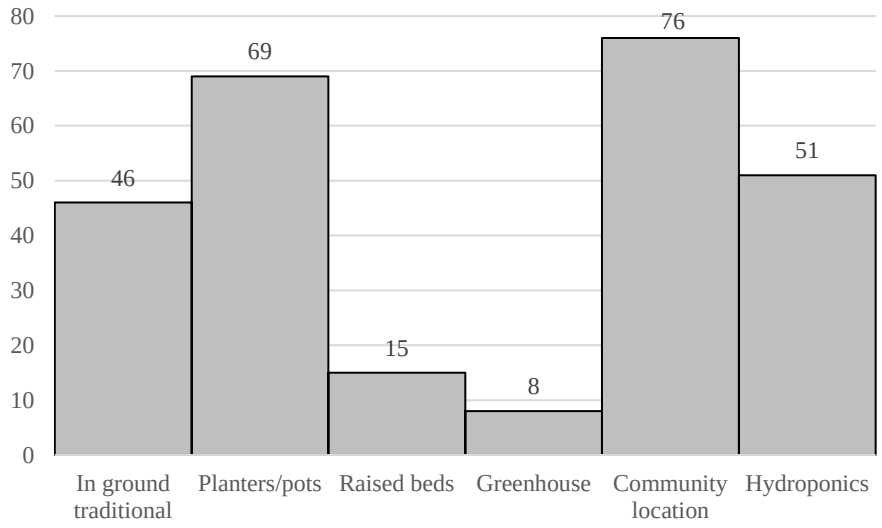

Figure 4. Types of gardens.

Instructors with school gardens were also asked about the following types of attitudes and behaviors in their students, and which they may have observed as having been positively impacted as a results of their participation in a school based garden program.

The frequencies of the teachers' responses (n=78) are reported for the following types of behavior (see Figure 5 below).:

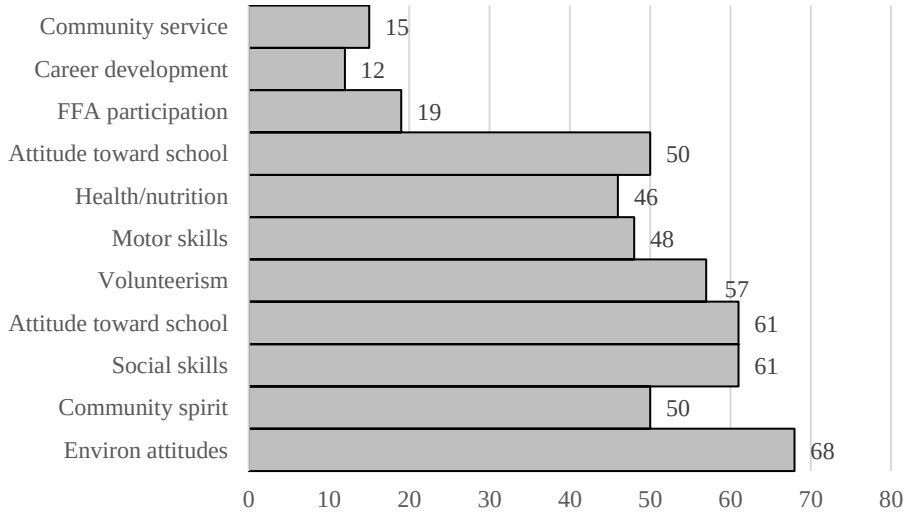

Figure 5. Types of positive attitude changes.

Clearly, the teachers believe that the greatest changes in children as a result of this type of experiential learning was in the domain of environmental attitudes (68%) followed by both attitudes toward school and social skills (61% each). Although it is not unexpected that children's attitudes and behaviors towrd the environment would be affected by participation in a school garden, it is nevertheless worthwhile to report this finding given the current significant of this issue. It may have been less expected by this researcher that such a noticeable impact would have been created in the areas of attitudes toward school and social skills; however, this aligns with this researcher's personal experience as a teacher of school based garden programs. This type of personal growth was witnessed frequently as the children grew more enthusiastic about their projects. Over time, they were able to see the progression of the gardens, which gave them

something concrete to anticipate during school on a daily basis along with the experience of cooperating in small groups with other students to achieve common goals.

Group differences. Two hypotheses were tested for group differences in terms of gender: If there was a statistically significant difference between males and females regarding "observation of positive changes" and "usefulness for different types of resources and materials when the garden is a learning laboratory." The Independent Sample t-test was used, a parametric test that requires a normal distribution of the dependent variable for all levels of the independent variable (Laerd Statistics, n.d.). SPSS was used to explore normality for each level of the IVs for each group in relation to the DVs. Appropriate levels of skewness and kurtosis were found (<2) except for the variable, *attitudes about the environment*. This variable was extremely positively skewed due to the fact that no instructor selected other than "extremely" or "very" as their rating of positive changes observed in students in this category. This is further reflected in the result that 78% of all male instructors and 76% of all female instructors made this observation.

All groups passed Levene's test for homogeneity of variance (another requirement of the Independent t test) except for *increased social skills/behavior* (p=.039) and *increased participation for career/development events* (p=.011). Although a p-value less than 0.05 is a violation of one of the primary assumptions for this statistical test, the deviations were not significant enough to prevent SPSS from classifying each test as "homogeneity assumption met" and the tests are considered valid (along with this noted limitation). Only one element, improvement in attitudes about health and nutrition,

approached significance (p=0.71) with female instructors expressing stronger agreement that they have noticed this (M=2.071) as compared to males (M=1.63).

There was no statistically significant difference between male and female instructors for any of these variables. Levels of normality were found to have appropriate levels of skewness and kurtosis and Levene's tests for Homogeneity of Variance were passed except for "collaboration with other instructors at your school."

Qualitative Results

Qualitative data for the current study was gathered in the form of mostly non-numeric information from a series of individual interview transcripts and the researcher's notes. For the current study, the researcher relied mostly on a combination of content and discourse analysis which progressed to a formal three step coding process (Dudovskiy, 2018). The current study used open coding to orgazine the raw data, axial coding to apply the verbal discourse to the research questions and selective coding by focusing on participants' thoughts and experiences about school based gardens.

The qualitative data for the current study was provided by two teachers in each of the six agricultural education regions of Georgia. Each was recommended by the State Agricultural Education Region Directors and Horticulture Area Teachers and contacted to schedule individual interviews. Ten interviews were conducted (out of the 12 recommended educators) between January 23 and March 1, 2019. These interviews allowed for a deeper examination of the garden-based learning practices of agricultural instructors within the state of Georgia and lasted approximately 45 minutes each. Due to various locations of the agricultural education programs across the state of Georgia, and due to teacher schedules, not all of the interviews could be conducted at one time and

location. A majority of the interviews were onsite at the participants' schools throughout the state; however, one was a phone interview and one was at a central location. During the interviews for this research, all subjects were made aware of the purpose of the interview, completed consent forms, and allowed use of their information. The interview participants included five female agricultural education instructors and five male agricultural education instructors. Agricultural education instructors were interviewed from all three of the agricultural education regions in Georgia (North, Central and South).

Table 5

Interview Participants

Teacher Number	Gender	Ag. Ed. Region	Pseudonym
Teacher 1	Female	North Region	Mary
Teacher 2	Female	North Region	Anna
Teacher 3	Female	North Region	Jessica
Teacher 4	Male	North Region	Eddie
Teacher 5	Male	North Region	Donna
Teacher 6	Male	Central Region	Tom
Teacher 7	Male	Central Region	Adam
Teacher 8	Male	South Region	Wyatt
Teacher 9	Female	South Region	Lori
Teacher 10	Male	South Region	Sam

Mary is an agricultural education teacher in the north Georgia mountains. She has various levels of agricultural education over a span of more than 10 years. She is an active facilitator of a school garden program which she was given the task to develop the school garden program within her school. The school garden has been fully operational for three years and serves approximately 850 students in grades K through 8. 100% of the school's population visits the school garden for some type of instructional lesson at least two times throughout the school year.

Mary stated "We've used the school gardens for STEM day demonstrations and for renaissance activities. We did that this year, for renaissance activities. So one of the

stations that the kids were able to visit during the day was to plant the greens in the gardens. And believe it or not, the kids loved digging in the dirt and planting the seeds as part of their reward system. So I would say 100% of the school visits the gardens or has demonstrations or participates twice a year."

The school garden was developed through several phases including 15 raised garden beds that are planted each year and a greenhouse that includes a hydroponics system to grow greens. The school garden mainly grows tomatoes, herbs and salad greens to serve in the school cafeteria. According to Mary "We do a lot of tomatoes. We try to grow plants that the cafeteria can use in the school lunches. And so they've partner with us to provide the salad greens and the tomatoes and, and herbs for some of the meals that they make. We don't grow enough salad greens or tomatoes to make the complete salad, but they incorporate what we do grow into the salads that they serve."

Anna has been teaching for approximately 9 years and is located in the Northwest Georgia. The school garden currently serves 628 students in grades K through 8. The school garden has been established for approximately three years and currently has 16 4x8 raised garden beds located behind the school near the playground area, a greenhouse and hydroponic system. Currently, lettuce, kale and cherry tomatoes are grown in the school garden. Anna does taste testing lessons with her students using the vegetables that were grown in the school garden and also contribute to the salads and meals served in the school cafeteria. In addition to the vegetable gardens we also have a pollinator garden and a sensory garden. Students utilize the school garden at least two to three hours per week. Anna stated "We start out with activities inside the classroom that's kind of teaching them about, you know, the seeds that they're gonna be planted and how they're

gonna watch that growth process. Where we have done garden in a glove or like, mini greenhouses. And then they take those out to the actual raised beds and plant them, um, versus, also showing them planting them from seed."

Jessica has over fifteen years teaching experience and teaches in a high school agriculture program in Northwest Georgia. She started her school garden program over ten years ago with a small cold frame. The cold frame is 16 feet wide and 48 feet in length and we added a heater so that it could be used as a greenhouse. Since then the program has expanded, but we also still utilize that space as well. A newer and larger greenhouse was built several years after the initial start of the school garden program. Jessica describes the newer greenhouse "I absolutely love my greenhouse, I would brag on my greenhouse all day long. I love my greenhouse. It is 28ft by 84ft. It is a two-part greenhouse, it has a front head house that's 28 by 24 and then the remaining part of the greenhouse is a separate operated full scaled greenhouse section with irrigation and, it's all the traditional stuff, it's just really big. It's kinda cool too 'cause it has automatic shade cloth inside which I like to be able to flip a switch and change things and it's pretty neat." In addition to the cold frame and greenhouse, the school garden also incorporated 14, 4ft by 8ft raised garden beds and 6 4ft by 12ft raised garden beds.

These garden beds are built with playground border. According to Jessica "you build them with playground border so they're heavy duty, heavy duty, heavy duty black plastic edges. So they last a little longer than any type of wood raised bed." There is an additional garden area with five long garden rows that are 4ft by 50ft with a solar powered irrigation system that came from grants to water the garden area. For storage Jessica has a shed and a 16ft by 30ft pole barn that are both used to sore soil and garden

supplies. Finally, in addition to all of the outdoor garden areas Jessica has added a hydroponics system in her classroom.

The school garden is visited by approximately 600 elementary students and 200 high school students throughout the year. Jessica states the students grow “anything from flowering plants to herbs. We have, I think, 9 or 10 different types of herbs, and then we typically produce anywhere from 14 to 24 different types of tomatoes in the greenhouse for our plant sale, so we often take several of those and establish them. We have squash and zucchini and strawberries and cabbage and your normal edibles, but we also do some really weird ones like Mexican sour gherkins, that's fun for the kids, and asparagus beans, they like that 'cause they like to see the weird stuff, anything to inspire, um, interest in those kids”. The students do taste tests with the vegetables and herbs, along with recipe research and preparation. They also take vegetables home to their families and sell to teachers and community members.

Eddie has over 27 years of teaching experience as an agricultural education teacher. Eddie teaches in a high school agricultural education program located in the Northeastern Mountain region of Georgia. Eddie’s school garden program began twenty years ago with the building of a makeshift greenhouse. According to Eddie, “we initially started off with a horticulture class with a makeshift greenhouse on the side of the school out building. We did this just trying to begin to raise plants, and eventually, we ended up getting a greenhouse. We were able to raise plants in the greenhouse, but to kind of extend what we were doing, and to hopefully let the students see more than just seeds being germinated, we have an area at the County Farm, what we call the County Farm, where we were able to come up with 15 foot by 15 foot plots, and we were able to allow

students to transplants plants, but we also allow them to plant seeds in these areas." The agricultural education students in grades 9 to 12 are the main students that utilize the school garden area. They grow seasonal vegetables and spend around three hours per week in the school garden. The students take their vegetables home to their families and give the surplus to school staff members. The school garden in mostly utilized in the spring and early fall of the year.

Teacher five is an agricultural education teacher located in an urban middle school in Northeast Georgia. In order to maintain confidentiality, she will be referred to as Donna. Donna has taught for over 15 years and taught at both the middle and high school levels. Donna's school garden program developed over six years ago. It began on the front lawn of the school with just a few rows and then grew into four rotating plots that are 20 feet by 50 feet each. Debbie explains how the garden plots are used for planting, "Ok so four rotating plots, each plot 1000 square feet. So in one season we'd have two plots and crop at a time while the other two were in cover crop. So in the summer we used Crotalaria the cover crop and then in winter we had Egyptian winter pea as a cover crop and then we'd rotate the plots around so we weren't always planting the same crop in the same plot every season. So four times 1000, so 4,000 square feet." A deer fence was then built around the garden and a produce stand was built to sell the produce from the garden. A school greenhouse was also implemented into the school garden program to start seeds and small plants. Seasonal vegetables are primarily grown in the school garden area. The vegetables produced in the school garden are sold to community members, taken home by the students, used for taste test experiments and

cooking by the students and provided to the cafeteria to supplement school lunches and snacks.

Around 800 total students made up of 6th, 7th and 8th graders utilize the school garden for lessons throughout the year. Approximately 300 students utilize the school garden regularly for at least one hour each week throughout the school year. Debbie explains the school garden is used "as a learning tool to learn about plant parts, plant growth, plant reproduction, but then also used it as a tool to learn about greenhouse management and production. Because we would start our starts in the greenhouse and then we also used it as a tool to learn about nutrition. But then and most importantly it gave young people a real opportunity to be involved with their own food production. So they would actually be involved start to finish with the growing of some foods. So they would sow the seeds, transplant plant the seeds, care for the plants, and then harvest and eat them. But then we also had a large composting program, so it would put the compost, the finished compost back on the garden. The garden also served as a great tool to learn about soil and just that connection between healthy soil and healthy food and healthy people."

Tom is a high school agricultural education teacher in central Georgia who has taught approximately ten years. Even through Tom is a high school agriculture teacher his has been instrumental in the implementation of school gardens in all of the county schools over a span of six years. According to Tom, "Okay, there's, two middle schools, two high schools and three elementary schools and one primary school. We have over the years started school gardens at every one of those schools and they're all raised bed gardens. We just gradually expanded as a part of a grant from the Young Farmer

Program." The raised garden beds were built to the needs of each school. The raised beds are 4ft by 12ft with the sides built higher for the middle and high schools. The sides are low to the ground for the primary and elementary schools. The school gardens serve agriculture students in both the high schools, middle schools and primarily 2nd and 3rd grades in the primary and elementary schools. years. The school gardens typically grow lettuce, carrots, potatoes, cabbage, spinach, collards, turnips and mustard. In addition some of the schools grow flowers such as Zinnias. The vegetables are harvested from the gardens and used for taste testing experiments, given to students to take home to their families and given to faculty and staff members.

Adam has over 29 years teaching experience and is located in a rural high school with a population of just over 1000 students in grades 9 through 12.. The school garden program started approximately 15 years ago. Adam describes the school garden as starting with 48 garden plots, 10' by 20' with a six foot grass area in between each area under irrigation with several different types of fruit trees such as apples, pears, and peaches. We had blueberries and lackberries, and all that was started with most of the funding from the building maintenance supervisor because he really liked me and they wanted to use the land for the athletic department. He said, "No. We're gonna use it for Ag." And that's how it got started. Other vegetables grown in the school garden include peas, Irish potatoes, sweet corn, snap beans and summer squash. Most of the harvested vegetables are taken home by the students or given to other teachers in the school for personal use. Ten percent of the high school utilized the school garden throughout the year, approximately 3 hours each week, however over 300 kindergarten students visit the school garden a couple of times a year for lessons.

Wyatt is an agriculture teacher located in the south eastern part of Georgia. Wyatt teaches in a high school agricultural education program in a small rural high school with 400 students, grades 9 through 12. The school garden consists of a half-acre field, established with a large grant only two years ago and just recently added 6 ft. x 12 ft. raised beds. There is a school greenhouse where to start seeds and vegetable plants. Wyatt explains, "We grow sweet corn, summer squash, potatoes, different varieties of peas, butter beans, watermelons cantaloupes, okra, and we are doing some raised beds this year, which we will do some, some winter crops such as onions, lettuce, greens, things like that." Twenty five percent of the school population utilizes the school garden for some type of formal education along with 150 fifth graders that visit the garden a couple of times a year for formal instruction. Students spend around three hours per week in the school garden throughout the school year. The students take the vegetables they grow home with them throughout the school year. The students also get to participate in processing some of the vegetables since we have a processing plant on our school campus as well.

Lori has taught agricultural education for over thirty years and is located in rural South Georgia. Lori's school garden program began many years ago with a small greenhouse. She explains, "So they built us a small greenhouse in a very inaccessible place out in the almost like a throwed-away area beside my classroom. It was as close as they could get, but it was so small you couldn't get a class in there. You had to do what you were gonna do in the mechanic shop and then send the kids out there to put the plants in. So it was frustrating. The kids enjoyed it, but they couldn't see it all together. We had to go in and look in through the door and there was no teaching inside of it. So to expand

on that I asked if I could put in a garden in the back and the school owned some land behind the high school and they allowed me to put in a garden." These school gardens were very large with a walkway down the middle which was nice, but she stated it was frustrating that the location was far from the school. Since that time a new school has been built that includes a new greenhouse. The school garden program has had to be reestablished in the last few years. The agricultural education students predominately use the school garden for educational opportunities three to four hours each week. The produce raised in the school garden is used in classroom lessons, experiments, taste tests and also taken home by the students.

Sam teaches high school agricultural education in a rural school located in Southeast Georgia and has taught less than five years. Sam's school garden program began with a 50 foot by 150 foot garden plot with rotational vegetables between seasons. Since then the program has grown. As Sam explains, "Currently, we're managin' about a 24 by 48 greenhouse that grows a lot of the produce and vegetable transplants that we utilize in the school garden to compliment the still 150 by 50 foot garden spot, along with a 30 by 40 something hoop house structure on the school property as well." Seasonal vegetables are produced in the school garden such as tomatoes, various types of peppers, eggplant, squash, collards, cabbage, broccoli, brussels sprout and cauliflower. The school garden serves approximately 500 students throughout the school year for instructional purposes; however, the school garden impacts over 7,000 students in the county. The students utilize the school garden around three hours each week throughout the school year. Produce is sold to the cafeteria and served in cafeterias around the county. The

schools do taste tests and highlight the locally grown vegetables, and students and teachers take home surplus produce.

Research questions. The data is summarized by the three research questions presented in the study, along with emergent themes from the data and representative quotes from the participants to illustrate the prevalent attitudes and beliefs among agricultural education instructors in Georgia about their school gardens. Research question one was answered using the quantitative data, however I will additionally report the types of gardens interview participants utilized.

1. What types of garden-based learning programs do agricultural education instructors utilize in school-based agricultural education programs as instructional supports?
2. What are the benefits of garden-based learning instruction according to agricultural education program instructors?
3. What barriers and challenges exist in garden-based learning instruction in SBAE programs according to agricultural education program instructors?

Themes

The following themes were discovered through the qualitative data analysis: Types of gardens, garden size and types of populations served by the school gardens. These themes emerged from the data provided by this particular group of participants; however, it also serves as confirmation of the findings of earlier studies and further supports the theories and perspectives of the scholars used as the basis of this study including Dillman, Smythe and Christian (2014) and Kolb's Experiential Learning Model (1984) as a source for organizing and reporting themes that emereged from the findings.

Types of gardens. The first theme established through the qualitative interviews was the type of garden-based learning programs that agricultural education instructors utilized. Raised garden beds was the constant across all agricultural programs examined (a result that was consistent with the quantitative data). These varied in size and location, but each program utilized raised garden beds to some degree. Half of the participants also utilized larger land areas for planting rows and larger quantities of crops. Seven out of the ten agricultural programs examined began their garden programs within the last 10 years. The programs described below also utilized greenhouses to start seeds and grow plants for transplanting:

Anna described her school garden as, "We have 16 raised beds 4' x 8' located behind our school, near our playground area [and] we do have a greenhouse. This is our second year having a greenhouse here." She continued by explaining "And, we have two hydroponic systems that we use in our greenhouse." She shared that one of the greenhouses was built by a student for his SAE project and that the other was used for a tower garden in the school garden area.

Donna stated the following about her school garden program, "Before this year, I worked at a middle school [with] four rotating plots 20' by 50' where we grew various crops. [It started] on the front lawn of the school [by] a parent who actually a professor of horticulture." She staed, " He had a great interest in gardening, and he got the garden going along with the ag teacher at that time just as a few rows. Then it grew into four rotating plots and we started a produce stand where we sold produce every Monday."

Garden size. The participants' school gardens exist in various types and range in size from large single or multiple plots (e.g., one 50' x 150' garden, four rotating plots 20' x 50' or a few raised garden beds 4' x 12' & 2' x 10') to a set of 15' x 15' foot plots (called by the teacher "County Farm"). More often multiple modalities exist, sometimes beyond the school's walls such as one teacher with 48 garden plots 10' x 20' with 6' grass area between each area under irrigation, a 30x40 hoop structure and a greenhouse. Or, another with a 2-acre school garden with ten 6' x 12' raised beds, row crops and raised beds, plus a 20-acre working farm for large production. Another currently has a greenhouse and is adding 58 acres of community garden.

Raised beds are often used in conjunction with other systems such as a greenhouse or hydroponic. One teacher reported having 16 raised vegetable garden beds (4 x 8) with a greenhouse and a hydroponic system. Another has 15 raised vegetable garden beds, a greenhouse and a hydroponic system, while another reported having a greenhouse, five long rows 48' x 4', six 4 x 12 raised beds in one location and twenty 4' x 8' garden boxes, a cold frame, and a pole barn.

Crops. The specific crops that are planted depend upon location within the state of Georgia which dictates growing area and climate, but the most popular appear to be sweet corn, tomatoes, summer squash, potatoes, peas, butter beans, watermelons, cantaloupes, okra, cotton, and peanuts. Winter crops included onions, lettuce and greens. One teacher described how her school started with 48 garden plots, 10' by 20' and different types of fruit trees like apples, pears, and peaches along with crops of blueberries and blackberries. Another detailed characteristics and crops of one of the largest gardens (see the paraphrased quote below):

Wyatt explains, “Our school garden consists of a 20-acre working farm with a variety of crops like corn, cotton, peanuts, sweet corn, and a lot of our fresh vegetables, such as sweet corn, we incorporate into our plant or food processing facility.” He explainaed that during the summer, the kids process corn for customers and help in the food processing facility. He expanded on their school garden area by stating, “We have two greenhouses with ferns and tomato plants, and a two-acre school garden funded through a Community Grant. This is our second year of operation on the smaller garden.” He also shared, “The ag students just finished building ten 6’ x 12’ raised beds to use with cotton gin trash from our local cotton gin as mulch for tomatoes, squash, cucumbers, etc.”

Disposal of crops. All of the educators stated that the crops harvested from the school gardens are given to students to take home by the Agriculture students. Some of them utilize programs in class, such as school taste tests, after preparing vegetables. Others provide vegetables to their cafeteria or lunch room. Sometimes crops are sold to other instructors or the community. Anything left is given to instructors or other students for personal use.

Population served. The population served by the school gardens varied from 10% of the school population to 100% percent of the school population. Some schools limited the school garden resources only to agricultural education students while other schools exposed the entire school population to the school garden. Grades that used the school gardens ranged from Pre-K to 12th grade. All of the interviews revealed that the school garden had an impact on the schools and the student population. Some of these were indirect impacts such as serving the food grown in the school garden in the

cafeteria. According to Sam, “Because food is used to feed students in cafeteria the impact [of our school garden] is huge, at times we serve over 7,000 students in our county.”

The total school population that visited the school garden for formal instruction ranged from very general (“Just the agriculture classes and students”) to specific proportions. Two instructors responded 10%, one said 25%, and another said 33% of the school population. Two said 50% (with one clarifying that it is more elementary students which decreases as the students get older) and two said 100 %.

Instructors were also asked if other departments utilized the school garden. Although about half of the instructors said “no,” those who said “yes” described partnering with instructors from the physical education department to teach healthy nutrition or with science instructors to teach the periodic table. Other students who visit the school garden come from classes in art (“They will use the things in the gardens as inspiration for some of their still-life’s), ESOL (“To do activities that maybe those students don't have exposure to, to help with their writing”) or engineering (For “a solar activity, solar power activity’).

Another stated that students from their math and special education departments go to the garden and “do different activities out there [and] we're hoping to incorporate more, even with our technology department and, and some of our academic areas to, to be able to transfer some of the things they're learning in the classroom to, to do some applicable applications in the garden.” One instructor described a honey bee activity “that was kind of fun 'cause they got to work in the gardens and work the honey bees, and then they wrote essays about it.” Finally, one teacher is actively “Workin' with gettin' our

science instructors to come out there whenever they're goin' over the periodic table and discussin' . . . how nutrients tie in directly with the periodic tables. As well with our history folks . . . how agriculture's revolutionized how cities were formed, et cetera."

Even instructors without visitors from other departments at the school have seen the benefit when "we would have over 400 kindergarten students come and my students would then do a walk through the gardens and they would talk about why they grow the vegetables and then what parts of the plants they would eat and just kind of let them know that ... you know, where food comes from." Another saw this as a long-term goal along with a "cross" in curriculum activities, "where we actually get the math department out there to calculate the amount of square footage, to calculate water use. To figure out how much water we need to do."

Benefits

What are the benefits of garden-based learning instruction according to agricultural education program instructors?

The interviews revealed that many positive benefits are perceived by the users of school gardens including the chance to coordinate learning with other disciplines such as science, mathematics and the humanities. Knowledge is gained about working well with others, planning, designing and executing long-term experiences, acting in accordance with the community and providing sustainable resources in the form of healthy produce. The students made a connection to the curriculum and real life while participating in hands on learning opportunities. Students gained valueable life skills and real life perspectives through project based learning school garden activities and lessons.

Connection to curriculum. All of the participants stated that they use the school garden to tie in academic subjects and real-world curriculum along with their agriculture curriculum and they universally see this as a huge benefit of school gardens. These subjects included math, science, nutrition, consumer awareness, social skills, technology and language arts/writing. They also felt that their students had a better understanding of these academic concepts because of the real-world connections and hands on applications they were utilizing in the school garden program and curriculum. Adam stated the following in favor of a connection to the curriculum, "Absolutely, because you're calculating square footage to calculate your, um, amounts of seed, fertilizers that you would need, also pesticides and the sciences involved with growing plants." Eddie support this theme also by sharing, "Anytime you're talk- talking about growing anything, it is all science based. You know, we're talking about germination. We're gonna talk about the plants. Hhow they grow. We're gonna talk about photosynthesis. We're gonna talk about the fertilizer requirements." He continued by stating, "When you talk about fertilizers, you're gonna incorporate math into that, because they're gonna be figuring up how many pounds that they have to put per thousand square feet. So, a lot of science and math goes into everything that you do, as far as this garden goes."

Jessica stated that she felt that "Ag Ed curriculum naturally incorporates academic subjects' hand in hand." She continued by stating that " Most students always talk about when they go to a Biology class and we say, "Oh, wait a minute. We just talked about that in Agriculture.", or they'll come to my class and say, "Oh, we just talked about this is Biology". I think adding academic subjects is pretty easy especially Science." She stressed, "Whether it's talking about fertilizer ratios or square footage

there's your Mathematics aspect. If we're talking about temperature, we're talking about foot can, we're talking about, um, the rafter lengths, if we're putting it in a pole barn up there so that we can do some of our school activities. All of those things I think are easily taught and can relate to academic subjects that they go with."

Half of the agricultural education programs specifically reported that their school gardens are utilized by other school departments and stated that this is a benefit for the students, the school and the agricultural education program. These programs allow for collaboration with fellow instructors such as science instructors, who incorporate teaching about the school garden with periodic tables, nutrients and soil types. The physical education department at one school has partnered with the agricultural education teacher to utilize the school garden and teach healthy nutrition concepts. Also, the art department, ESOL and engineering instructors have utilized the school gardens at one of the schools for inspiration, language activities and teaching solar energy. Math and special education departments also enjoy using the school gardens and produce is grown for several activities in the school. Wyatt explained, "Math and Special Education Departments to come out and do different activities out there. And we're hoping to incorporate more, even with our technology department and, and some of our academic areas to, to be able to transfer some of the things they're learning in the classroom to, to do some applicable applications in the garden." Jessica shared that her school was unique in that several departments utilized the school garden for nontradional activities. She explained, "The Art Department comes and they get to have different times where that they will use the things in the gardens as inspiration for some of their still-life projects." She also stated, "I work with the ESOL program too, so we go up there to do activities

that maybe those students don't have exposure to, to help with their writing. We did a honey bee activity and that was kind of fun 'cause they got to work in the gardens and work the honey bees, and then they wrote essays about it, so we try to get as many groups as possible." Finally Jessica mentioned, "The engineering group, I think, is gonna help with a solar power activity."

In addition to types of curriculum, another benefit found in utilizing the school garden was the variety in instructional practices instructors could use when teaching. The common themes were hands on learning, project-based learning, cooperative learning and problem solving. The instructors found the students benefited greatly from all of these instructional practices and they each enhanced learning. The students were more excited and willing to complete their work when instructors utilized these strategies. The instructors felt that these strategies were important parts of the school garden curriculum and enhanced their school garden lessons. These practices also assisted in connecting academics, the school garden and real world experiences. Eddie stressed the importance of hands on learning by stating, "Hands on learning, students think more in depth and deeper. I guide and facilitate but students make choices and solve problems." Wyatt followed up by stating the following were important to his program, "Hands on learning, application of tasks, project-based design and implementation." Lori supported this theme as well by stating, "Hands on learning and putting what students learn to use. Problem solving is important." Adam shared his thoughts and reinforced this theme by stating, "Hands on learning, cooperative learning and problem solving."

Resources and materials.

What types of educational resources and materials do you use? Responses to this question are summarized in the table below.

Table 6

Educational Resources

Frequency	Type
6	UGA Extension publications and calendars
5	Internet – google, online
5	Hands on learning, task application, putting what students learn to use
3	Experience/general self-knowledge; Previous knowledge and experience
3	Georgia Organics, Ag in classroom curriculum
3	Problem solving, inquiry
2	Horticulture text book; Old text books – vocational math in agriculture
1	Farmers' Almanac
1	Gardeners Naturalists
1	Cross-curricular lessons
1	Project based – design and implementation

Other academic concepts and student motivation. Many students have a better understanding of academic content through the use of the school garden. Not everyone agreed, but of those who responded yes, the feelings were strong. One teacher thinks "they see the application of it." Another said they "talk about the benefits a lot." One instructor stated that, "I think CDEs, FFA CDEs are good examples of how students do learn that information by working with the actual living plants and animals." Eddie stated, "Yes I do. comments sometimes from students, when they have had physical science or even math and you know, of course you will use some geometry." He continued by stating, "Obviously, you're using a lot of physical science and biology, and you know, sometimes they've heard those same terms, or they've done something that's

similar to this, but to actually see it put into practice, really lets the light bulb come on for them."

Some teachers also saw improvement in student attitudes towards school, academic learning and motivation. Students enjoyed working the garden and the hands-on aspect of the garden curriculum. The students also repeated the benefit of their work in the classroom. Jessica explained, "They're glad to do it, they're glad to get out of the classroom and to do something that they can actually do. Not do like, push a pin across the paper, not do like sit and raise their hand and, and go out there and physically do an activity that's involved in their learning experience." She continued by stating, " I think that's a good attitude to see. They need to know that they're gonna have to work hard later on, but the outcome is really cool. They're not always excited. If it's hot, they complain. If it's cold, they complain. If it's decent weather, you have a lot less complaining." But she stressed that "If you let them know in advance to wear appropriate clothing, you have a lot less complaining. But overall, I think, that they enjoy doing these activities because it is something different than they're used to and it's hands on."

Eddie shared the following student motivation, "I would say, number one that, that they are like I said, that they get motivated to do their work. You know when we get ready to go to the County Farm, and they will get to go to work in their gardens, I mean, you see them get excited about coming to your class." He continued by stating, "They get excited about when we go out there and take measurements off of those plants, and they're seeing them grow, they get excited about that. And I think that's one of the the main things."

Finally Donna stated, “Some students that at the very beginning would state, I'm not going to do that. I'm not getting dirty. I'm not touching that. I don't care about plants then at the end of the semester they were caring.” She continued by stating, “They cared about the plant that they were taking care of, they would ask, are we going to go see our plants today? Or I definitely had students that said they would never touch dirt and then in the end they were very happy to be touching dirt.” Donna continued,“So I just do that kind of change, I think they definitely felt like they were experienced in areas where they didn't feel experienced before. So I think they would describe themselves as being able to grow food or take care of living things. Whereas before the course they may not have described themselves that way.” Finally, Donna stated, “So I think there's a level of personal growth that's happening with the students that they're recognizing just in change of their attitudes or perceptions of things. And also a feeling of responsibility. So students that were more mature or responsible got the job of feeding the goats or going to look for eggs or that sort of thing. So there was also that level of leadership development that was happening in the garden.”

Barriers and Challenges

What barriers and challenges exist in garden-based learning instruction in SBAE *programs according to agricultural education program instructors?*

Time. Time was a theme that emerged as a challenge for garden-based learning instruction across all areas, settings, neighborhoods and funding levels. All of the instructors discussed the large amount of time it takes to plan, execute and maintain a school garden. Due to all of the other demands placed on agricultural education instructors, many find it difficult if not impossible to maintain a school garden, and to

maintain it as they would like, especially in the summer. Wyatt shared, “Time is a challenge. Incorporating something new into the Ag. Program that is already busy with many areas of agriculture and maintaining the garden to look nice in the summer and holidays. You know like weeds and stuff.”

Funding. Another significant challenge (if not barrier) to having and maintaining a school garden is funding. That quantitative and qualitative data supported the finding that most of the programs are funded through the schools, but that they also rely upon various types grants from individuals, businesses and companies along with vocational and agricultural funding. One of the related challenges is that that no type of funding, especially grants and donations, are guaranteed from year to year. Jessica shared, “Money is always good. We'd love a tractor if somebody wants to offer that. That'd be awesome (laughs). Those types of resources and also assistance.” Adam also statead, “Yeah. Funding, obviously, would be very helpful because, of course, mine was provided by the maintenance department, so it didn't come out of any of my funds, but, yeah. Finances would definitely be helpful.”

The instructors had gardens that ranged from two to 30 years old, with an average of 9.5 years. They reported the need to rely on a wide variety of funding sources to purchase seeds and supplies. The most frequent response (about half) rely on school funding, followed by grants and community or business donations. Grants came from Electrical Membership Cooperatives (EMC) and Georgia Young Farmers Association (GYFA) while one teacher received a $10,000 grant from Monsanto. A few have access to consumable supply money. A couple have funding from school farm projects. Others have benefitted from the generosity of the Young Farmers Organization, Farm Bureau,

Perkins Funding, Georgia Organics, and Keep Athens-Clarke County Beautiful. One school had to rely upon their school's maintenance department to get their program started. A couple of schools were able to benefit from sales of their produce and the donation of supplies.

Space and location. Space and location are significant barriers to school garden programs, especially regarding a lack of space for raised beds and the actual location of the school garden on or off of the school campus. There are numerous alternatives to space for school gardens such as flower pots and indoor activities, but to actually utilize the entire school garden concept you need space to actually plant a garden. This has been defined as raised garden beds or garden plots or rows. These can take up a great deal of space on a school campus and create a problem for teachers and schools with limited land area. For gardens that are offsite, travel must be arranged from and to the school, creating a host of issues related to time, expense for vehicles and fuel, and for liability issues that arise when taking students off campus.

Jessica shared some of the challenges that she has faced with her school garden program by stating, "Some challenges I've faced in implementing a school garden into my program was funding because we are limited [and] now that I remember it, location." She describes her school garden frustrations as, "We originally had our cold frame at the bottom of our parking lot and it's on a sliver of land, I kid you not. Maybe 30' wide and it had our cold frame running long ways, which is 16' and a 4' gap all the way around and a chain link fence. That was the original horticulture facility. Later we got a grant [for a] greenhouse [but no] place to put it. So we scrambled and scrambled, clear across the campus, the County had removed a hill and they agreed we could use some soil." She

continued by stating, “It is, all the way across the parking lots. Clear the top of the hill. So, the first challenge was location, the second was funding. It grows every year, I don't want it to get so big that I can't take care of it. Those are the major challenges.”

Curriculum and training. The majority of agricultural instructors found many positive aspects of school curriculum that could be tied into school garden programs (see above). However, others expressed a lack of resources for materials needed to teach the curriculum. They would like training and materials that are more standardized and aligned with other academic standards. They felt it would be most beneficial to attend training or seminars where they could talk with other agricultural education instructors about their school garden practices and that this networking and communication would be a huge asset to agricultural education instructors and the school garden programs. They also felt that workshops and training that assisted agricultural education instructors through every step of the school garden development process would be beneficial. This direction and guidance would help instructors throughout the year with barriers and challenges that could arise. Anna shared, “I think if there was some sort of curriculum or guidelines to follow that helped bridge that gap between academics and what they're learning in that hands-on experience would be a really important factor or resource just so that you can assure they're getting that connection.” Mary expressed, “I think any program that talks about things that we could use in a school garden, fruit trees, things that we could use to help the kids make more concrete connections. More hands-on types of learning experiences with the kids.” Finally, Wyatt concluded, “You know, I think one just on planning a school garden, talking about issues. Being able to see it, and just collaborate with other people who are doing it, and hearing what they're doing, how

they've solved problems, I think would be a great learning opportunity for anybody who's interested in doing this."

Beyond the Garden

A number of themes emerged as a result of the data that exceeded the original research questions, including insight into the intructors' experiences and beliefs about their roles. Most expressed strong opinions about teaching with school based gardens, the impact of their role and how school based gardens help student relate to a variety of other academic areas.

Instructors. All of the agricultural education instructors played an important role in the school garden as facilitator and coordinator. The instructors expressed that they were basically in charge of the school gardens from implementation until harvest and even after harvest if they used the vegetables for classroom lessons. They are "hands on" in these programs from designing the curriculum for the classroom to leading activities such as planting, maintaining and harvesting the gardens. Many take on the additional responsibility of conducting fundraising. This is consistent with the quantitative finding that the greatest limitation to having a school garden is time and funding.

In the instructors' own words, their roles are "Basically, anything and everything you could think of as far as the design and all the way up through the implementation and maintenance, repairs and fixing irrigation." Many see themselves as not only instructors, but as an "advisor," facilitator, manager or planner to help students make decisions about purchasing "seeds, supplies [or] repairs." Three specifically used the word "coordinator" and similar to those above, perceive themselves as guides to "help get them started [and] lots of consulting." Another called themselves "in charge, coordinator of the school

garden, planning, managing and overseeing production." Another popular word was "assist." One of the participants had recently passed the school garden role on to a younger teacher and described the role over many years as someone who is "facilitating, guiding and planning" along with the students. In summary, these instructors see themselves as team leaders and guides; they are involved on a variety of levels beyond the classroom, such as for planning and maintaining the gardens. They are there to advise and guide but very much respect the students' autonomy in the learning process.

Instructor passion and motivation for school gardening also emerged through this research study. The instructors were all excited about their school garden programs and very passionate about teaching. They were asked why they continued to have school gardens even though their were many barriers and challenges to the school garden process and all of their answers were very positivie. All stated they would continue with their school gardens, even with the challenges they faced. Eddie shared, "I think the biggest thing is I really think students, learn at a greater depth of knowledge." He continued by stating, "They gain a greater depth of knowledge in this. I think it's more meaningful for them. I think it motives them to wanna know more and it's fun to see them get excited about learning versus sitting in the classroom and doing the same old thing that they're gonna do in math, and English, and social studies." He went on to share, "You know, to give them something else to get out there, and like I said, really take what they already know and put it to use, and do the problem-solving part of it. That's what I enjoy about it."

Jessica shared that the outcome alone was motivation. She stated, "Exactly what I just talked about, seeing those kids, see what they did and how it changes. Our society is

so immediate. Everything has to have this immediate outcome. Kids need to develop the ability to have patience, to put a seed in a ground, where I plant in the ground and watch it develop." She continued by stating, "It is not going to develop overnight, it takes a while and to see those times, that they had to work hard, they've sweat a little bit, they had to mix some soil, they had to do this, then to get out there and, and dig in their garden box is to see an outcome over time and watch it develop, that's cool. And then when they taste something for the first time that they've never had, "Miss I don't eat green things", "Oh, how 'bout you try this", and then all of a sudden they are a fan of that green thing." She concluded by stating, "That right there, that's, that's what makes it worthwhile. It's messy, it's a lot more work than just giving 'em a worksheet, it takes time, it's not cheap, it's, it- it's so worth it. Just to see the differences."

Donna shared the following about her motivation for continuting her school garden program, "Well, I personally feel like a healthier, happier person and I've done work with living things outdoors and I think it provides this great opportunity to see growth literally with the plants." She continued by stating, "So that in and of itself for me it's just a personal preference I'd rather be outdoors working with living things. But then again the students that remember my class, I don't think they would remember it, remember me as well if the class hadn't taken place outside in a garden. So that motivates me to know that it has meant something to some students."

Finally, Lori statead that it takes a lot of effort to keep up the school garden and make it work. She shared the following, "It takes a lot of extra effort to make it work. Especially the greenhouse space and garden and what makes you wanna do it is because you get to have, you get to have those kind of lessons and some of 'em aren't planned, but

you get to have those kind of lessons and you get to, um, send students home with product." She continued by stating, "They get to carry their stuff home. And for some of 'em, they've never eatin' somethin' fresh out of the garden. And I think that's really important about sustainability and educating people about agriculture."

Other roles. Agriucltural Education Teachers find themselves teaching more than just agriculture. They teach life skills along with academic subjects that are incorporated into their daily lessons. Three responded that generally the answer is yes they teach many subjects in their lessons and this includes science, math, measurement, or growth. Other representative answers to this question are summarized below.

- Absolutely; calculating square footage [for] amounts of seed, fertilizers, pesticides and the sciences involved with growing plants.
- Yes, the kids measured and did fractions . . . the social part of it . . .producers and consumers, heat from the griddle and the physical science aspect of it.
- Science, math - anytime you're talking about growing, it is science based. Germination, plants, how they grow, photosynthesis and fertilizer requirements. How many pounds per thousand square feet. How much lime has to be added. A lot of science and math goes into everything as far as a garden goes.
- *Making a Growing* guide is a good lesson to teach with the students. It involves math, science, research, writing.
- Math; we teach land measurement, plot work, irrigation and of course science – soils and plants.
- Math, social studies on where seeds come from, science and PE/health

- Math and Science, some social studies. I work with ESOL to do some English and essay writing.

Summary of Findings

The quantitative component of this study examined SBAE program-certified educators using gender, number of years teaching and size of SBAE program (1 teacher, 2 instructors) as independent variables. The dependent variables included instructors' experiences with the programs, opinions about resources for the programs and observations of students' attitudes. Gender differences were explored in terms of instructors' "observation of positive changes" among the children in classrooms with gardens and instructors' perceptions of the "usefulness for different types of resources and materials when the garden is a learning laboratory."

No statistically significant differences were found regarding instructor gender and experiences teaching Georgia SBAE programs. In fact, the most marked result of the analysis revealed that instructors are mostly in agreement about the positive effects of school gardens, including an obvious increase in positive *attitudes about the environment* (with approximately 77% of all instructors making this observation). Only one element, improvement in *attitudes about health and nutrition*, even approached significance with female instructors expressing stronger agreement compared to males.

The qualitative data and open response items from the online surveys revealed that gardens in schools come in every size shape and location. They vary from simple potted plants inside of schoolrooms to raised beds and acres of crops outdoors and produce everything from herbs to seasonal vegetables. The students are encouraged to take home what is grown and also experience what it is like to supply their school

cafeterias with food and to sell to other instructors. These gardens are full of collaboration and teach a variety of life skills and qualities that enhance classroom learning in other subjects. Children and instructors in schoolrooms without a garden benefit from visiting classrooms on their campus that do, and there do not appear to be any negatives outside of efforts needed to fund and sustain them, such as materials and maintenance.

CHAPTER FIVE

DISCUSSION

The objective of the research was fulfilled. A mixed methods design was utilized, and quantitative and qualitative data was gathered and synthesized for each of the three research questions. The minimum required sample of participants was obtained, and the time and energy that was devoted to both the online surveys and in-person interviews went beyond expectations. The sample represented all agricultural regions and should be considered a good representative of SBAE in the state of Georgia. All three questions were addressed along with a series of emergent findings. Many benefits were discovered both inside and outside of the agricultural department and classroom.

School gardens are an important part of agricultural learning programs in Georgia and affect anywhere from 10-100% of school populations. They affect the relationships between instructors, different class levels, and different classes (based on curriculum). They even affect the families of the students as the students learn self-efficacy from growing food that they are able to take home and provide for their families. All of the schools of the instructor interviewed were able to have a garden, even if only a raised bed; however, those with grants have the benefit of significantly more funding.

Numerous positive observations were reported from the instructors in this study about the utilization of school gardens, which supported previous research in this area. Students' attitude was an important theme across all samples with all instructors reporting

that they had observed an increase in positive student attitudes when working in a school garden, especially regarding their attitudes about the environment.

According to the instructors, the children seemed to work harder over the course of the garden experiences, which created the impression that their work ethic may have been strengthened as they stuck with the process and found satisfaction in a project that did not provided instant gratification. Even children with the poorest attitudes tended to become positive by the end, and the instructors' noted improvements in both academic and social/life skills. Same statead, "It allows the students to, actually, take their learning beyond just simply learning and hearing me lecture, but, actually, doing something with their hands. The students see the fruits of the labor, that says to them this is just not something you need to learn and memorize for the test, but something that'll ultimately, potentially feed your family if the economy goes south."

Although every teacher was satisfied that they had taught students a life skill and as a result they were highly motivated to continue, agriculture instructors were very passionate about the opportunity for the hands-on, cooperative type of learning that a school garden provides. When asked what motivated them to continue developing and implementing school gardens, the primary theme that emerged was the positive outcome of the school garden projects and the synergy with the classroom curriculum. They believe that the school garden contributes to students' enthusiasm for learning and during the process they gain an important life skill, make real world connections and gain a greater depth of knowledge about the world.

The instructors universally believed that these changes were directly related, in least in part, to the students' participation in school gardening. Even those with less than

positive attitudes at the start of a program tended to demonstrate improved attitudes by the end of the project. The instructors reported that most of these students were "happy" and "excited" about the crops they had learned to grow and harvest. Younger instructors especially appeared to be the most excited about a school garden's beneficial impact even if they didn't have one of their own. These findings should encourage all schools to consider not only instigating or promoting school-based gardens in agricultural programs but also perhaps for every child in more classrooms.

It has long been understood that students who complete school garden projects develop a greater understanding of where food comes from and gain the specific skill of growing a crop that can be eaten and enjoyed. The instructors were gratified that they were able to teach these students how to grow their own food at home along with instilling respect for nutrition and the environment. Again, this is confirmed by the quantitative data finding that students' attitudes about the environment were observed by instructors to be most improved out of a series of potential areas such as social skills, motor skills or positivity toward community service.

The expenses related to school gardens include equipment and consumable supplies along with maintenance and repairs which quickly become costly to the agricultural program and also sometimes to the teacher. Many of the instructors expanded the school garden programs if the funds could be made available. In fact, the instructors universally felt that more funding would be the single most beneficial asset that could be provided to ensure that schools are able to support these programs.

No gender differences were found for instructors in terms of attitudes about best resources and observations of students but the finding of gender neutrality may be

considered a positive outcome for students since it may be evidence of equal treatment. In general, educators have goals of maintaining neutrality in the classroom and refraining from stereotypes about students or curriculum. This finding was substantiated by the interview data and is a good indicator that the participants provided answers that were based on their honest perceptions and preferences without gender effect. These findings are not surprising given my personal experience that most agricultural educators despite their gender have a demonstrable passion for the curriculum and students.

Validity, Trustworthiness, and Reliability

The researcher ensured the validity, trustworthiness, and reliability of the research study through employing various methods. Qualitative validity, according to Creswell (2008), means that the researcher checks for the accuracy of the findings by employing certain procedures (p. 190). Validation of qualitative research occurs throughout the various stages in the process of the research (Creswell, 2008). The researcher did a continual check throughout the coding process to ensure that coding did not deviate from the original intent as the coding process evolved.

Strengths

The following strengths were noted for this study. The representativeness of the sample for the State of Georgia is assisted by the fact that approximately 25% of all agricultural education instructors in the state participated in the research. The goal of the qualitative portion was to interview a minimum of six agricultural instructors, (two from each region in Georgia), but 10 actually participated in the interviews. Each of the participants expressed enthusiasm and a strong willingness to participate in both the quantitative and qualitative components of the study, especially those who sat for the

qualitative interviews. It was noted that the agricultural instructors expressed great enthusiasm for their gardens and the many positive ripple effects that extended far beyond their classroom.

This research also provided valuable data and information on school garden programs and garden-based learning curriculum in Georgia public schools with agricultural education programs. The findings from this research could serve as a foundation to begin discussions in the area of professional development needs, funding, barriers and benefits surrounding garden-based learning practices in agricultural education programs across the state of Georgia.

Limitations

Research quality is heavily dependent on the individual skills of the researcher and more easily influenced by the researcher's personal biases and idiosyncrasies. In qualitative research especially, the researcher is the instrument for data collection and analysis, processes which are influenced by characteristics of the researcher. The researcher was presence during the interview process, an aspect of qualitative data gathering that is often unavoidable and that can affect subject's responses (Anderson, 2010). Bias, however, can be reduced through the use of triangulation, multiple data sources, prolonged engagement and other methods utilized to uphold credibility of the study (Rubenstein, 2014.p. 31). The current study utilized a mixed method approach and the findings were consistent in the quantitative and qualitative analysis.

The findings of this study should be interpreted with consideration of the following limitations. The participants for this study were recruited through a purposively selected sampling method and included only schools in Georgia with current garden-

based agricultural education programs; therefore, attempts to generalize the results of this study beyond the sample should be taken with caution. The study only examined garden-based learning programs in schools in Georgia who currently had agricultural education programs. Therefore, the results of this study may not be applicable to all schools with garden-based learning programs in Georgia or other states. A delimitation was that the stakeholders provided responses to questions without prejudice or bias and as accurately as was possible.

Reflexivity

Reflexivity is the process of a researcher systematically attending to knowledge construction along all phases of a research project since a "researcher's background and position will affect what they choose to investigate, the angle of investigation, the methods judged most adequate for this purpose, the findings considered most appropriate, and the framing and communication of conclusions" (Malterud, 2001, p. 483-484). All researchers should consider the possible effects of research bias. Despite our best efforts at subjectivity, "There is an assumption among researchers that bias or skewedness in a research study is undesirable [and] preconceptions are not the same as bias, unless the researcher fails to mention them" (Malterud, 2001, p. 484).

Similar to triangulation, it should be noted that different researchers will approach a study situation from different positions or perspectives leading to the development of different, although equally valid, understandings of a particular situation under study (Koch, & Harrington, 1998; Malterud, 2001). For this reason, some understanding of the researcher's position, perspective, beliefs or values should be offered especially during qualitative research with human subjects. Specific steps to encourage reflexivity are using

multiple investigators (to promote dialogue and possible divergent beliefs) and being open about , the researchers' beliefs, values, perspectives and assumptions can be revealed and contested (Malterud, 2001).

Peer Debriefing

Peer debriefing is the "process of exposing oneself to a disinterested peer in a manner paralleling an analytical sessions and for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind" (Lincoln & Guba, 1985, p. 308). This is a valuable exercise that the principal researcher undertook in an effort to help reveal any unnoted personal biases, perspectives or assumptions this researcher may have missed while during the data collection process. Exposing these details to a peer in the form of a debriefing provides a valuable opportunity for testing and defending findings to test them for their reasonableness and plausibility and may also allow the researcher to experience some catharsis (Lincoln & Guba, 1985).

Reflexive Journal

Lincoln and Guba (1985) have suggested that a reflexive journal of the research process and regular reflections regarding a study's methodological decisions, rationales, logistics may be challenging to one's values and interests but may also be both private and cathartic. This type of diary keeping is not uncommon in the present day and may be a valuable tool and essential to briefly report in manuscripts, as best as possible, how one's preconceptions, beliefs, values, assumptions and position may have come into play during the research process.

Recommendations for Georgia Agricultural Education Teachers

Based on the findings of this research study the following recommendations can be made to Georgia Agricultural Education Teachers. Georgia Agricultural Education Teachers found that their peers were the most useful when planning and utilizing a school garden. They felt that being able to network with other agricultural education teachers who utilize school gardens was overall very beneficial. Teachers found publications from the University of Georgia Extensions service on school gardens and planting guides very beneficial. They also utilized the Farmers Almanac and Ag in the Classroom curriculum.

The research study showed that teachers who utilized school gardens taught science and math lessons along with life skills and cooperative learning. This research study also showed that Georgia Agricultural Education Teachers would like to see more of a connection between their school garden programs and academic classes. They expressed the need and want to collaborate more with academic teachers on lessons that would incorporate the school garden. They realize the importance of the connection between the school garden and academics, but many had concerns that academic teachers might not make the connection to the students. They felt that more students could benefit from the school garden if agricultural teachers and academic teachers could collaborate more utilizing the school garden.

Wyatt shared, “I think just better cooperation with, with our administrators, with our teachers and academic areas and, and to kind of sell them on the idea that there's so many areas in, in this garden that you can incorporate with either math, science, even English.” He continued, “You know, there's just a, there's a lot of connections we can

make that we can actually show the kids what they're learning in the classroom, how they can apply it to a real-life situation."

Lori stated, "I think our academic teachers would use it a lot more if we could have a cross-curricular break-out, PLU, whatever you wanna call it, where we could actually bring 'em into a greenhouse and say, "Okay, this is what your Ag teacher has to offer you." It could be somethin' as simple as, um, we need to figure up how much soil we need." She continued by stating, "This is how much our compressed bales will fill. We got this many pots. How much do we need? And when it comes to time for that teacher to teach it, then we could actually bust one open and actually see if it does."

This research study highlighted the benefits, barriers and resources of school gardens, but it also asked teachers what motivated them to continue to develop, implement and maintain those school gardens even though they faced challenges. Their motivation included seeing the connection students made with the garden, academics and life skills. The passion to help children understand the importance of agriculture and where their food comes from and the outcome alone. Seeing students proud of what they have accomplished over time motivated some teachers. Even though these teachers stated that they took on all rolls and responsibilities in the school garden program, they also felt the benefits outweighed the barriers.

Recommendations for Georgia Agricultural State Staff

Based on the findings of this research study the following recommendations can be made to the Georgia Agricultural Education State Staff. Georgia Agricultural Education Teachers would benefit from professional development sessions that include question and answer sessions, round table discussions and time to share with other

agricultural education teachers about their school gardens. The study revealed that Georgia Agricultural Education Teachers felt that their peers are their greatest resource when it comes to executing school gardens and school garden lessons. Eddie stated, "You know, I think one just on planning a school garden, talking about issues. Uh, being able to see it, and just collaborate with other people who are doing it, and hearing what they're doing, how they've solved problems, I think would be a great learning opportunity for anybody who's interested in doing this."

They study also showed that teachers would like hands on workshops that take them through the entire school garden process. This includes planning, budgeting, supplies, implementation, maintenance and utilization of the school garden. Other topics of interest included crop selection, overall design and management, weed control, pesticide use, irrigation and pollinators. Teachers also felt they would benefit from professional development that provided them with lessons on how to take their students to the school garden and also additional lessons to teach in the school garden. Teachers felt they needed a more streamlined school garden curriculum that was aligned with academic standards, where they could partner with more academic teachers. They also felt they would benefit from workshops that taught school garden lessons that highlighted academic concepts and curriculum in these garden lessons.

Georgia Agricultural Education Teachers would also benefit from professional development that focused on grants and funding for school gardens. Funding was a major barrier for teachers at all stages of the school garden process. Lori stated, "It would be nice to, to have grants and stuff that were readily available, and there are some, just takes writing them up and, and you've seen how today is, it's so busy every day. It's just findin'

the time to do it. Lowe's is kind to us and gives us seed a lot of times. Sometimes they'll give us broken bags of fertilizer and such. But, the, the main thing is you have to budget it in and you have to have a, a school system that'll back you". The teachers would benefit from examples of school garden grants, lists of school garden grants available and school garden budget sheets.

All of the teachers interviewed were very excited about school garden professional development opportunities that would meet their needs and further enhance their school garden programs. They were more than willing to participate in anything that would help their school garden programs grow and enhance student learning. In addition to professional development Georgia Agricultural Education Teachers also found that examples of school garden lessons and outlines would be beneficial when planning their own school garden lessons.

Future Research

Goals for extending the current study might include an attempt at replication with an increased sample size. According to Dillman (2000) surveys with a sample size equal to or greater than 30 should not produce different results, even if the population increases. Therefore, these results should not change. But a larger sample size would allow for the opportunity to include a broader mix of public and private schools and/or additional geographic areas (even other states) which would allow for greater statistical power for the quantitative portion of the study and potentially serve to increase the validity or reliability of the current findings. Surveys could be conducted with greater detail, especially regarding how barriers might be overcome including inquiry about alternatives to limits that are present and what has contributed to a program's longevity and success.

Other areas for potential expansion include extending beyond garden-based learning programs and not limited at agricultural education programs with school gardens. Other studies could include how instructors overcame and continue to overcome the many challenges and barriers they described, more information on specifics types of curriculum and resources used in garden-based learning programs at the elementary, middle and high school levels. The State of Georgia, or some entity within the agricultural industry, could subsidize a large-scale research project that could help distinguish the results between elementary, middle and high schools or include schools that have resisted these programs to understand why.

Given the expression of a lack of teaching resources and reliance on the internet for teaching materials, research could be focused on types of resources most desired along with questioning about specific content. This could lead to training or workshops on garden-based learning and provide instructors with tools to develop and enhance their school gardens and increase their effectiveness or with a venue to share best practices. These findings are extremely encouraging, and this study has revealed a number of unanticipated benefits that students derive from school gardens. A variety of ongoing barriers (e.g., time, space and funding) must be overcome in order to sustain them but clearly the many benefits outweigh these challenges and provide the rationale for reasons to promote and sustain school garden programs.

REFERENCES

Agricultural Education. (2017). Retrieved from https://www.ffa.org/about/agricultural-education

Alexander, J., North, M., & Hendren, D. (1995). Master gardener classroom garden project: An evaluation of the benefits to children. *Children's Environments*, *12*(2), 123-133. Retrieved from http://www.colorado.edu/journals/cye/

Anderson, C. (2010). Presenting and evaluating qualitative research. *American Journal of Pharmaceutical Education*, *74*(8).141.

Angen, MJ. (2000). Evaluating interpretive inquiry: Reviewing the validity debate and opening the dialogue. *Qualitative Health Research*, *10*(3), 378-395.

Athman, J. A. & Monroe, M. C. (2001). Elements of effective environmental education programs. School of Forest Resources and Conservation, University of Florida, Gainesville.*Recreational Boating and Fishing Foundation, July*, 37-48.

Baker, M. A., & Robinson, J. S. (2011). Should this rightfully be called education? The application of Kolb's experiential learning model in agricultural education. *The Agricultural Education Magazine, 83*(4), 9-11.

Baker, M. A., Robinson, S. J., & Kolb, D. A. (2012). Aligning Kolb's Experimental Learning Theory with a Comprehensive Agricultural Education Model. *Journal of Agricultural Education,53*(4), 1-16.

Bareng-Antolin, N. C. (2017). *High school gardens programs across the nation: Current practices, perceived benefits, barriers, and resources*. UNLV Thesis,

Dissertations, Professional Papers, and Capstones, 2939. Retrieved from https://digitalscholaship.unlv.edu/thesesdissertations/2939

Becker, J. (1995). Our secret garden. *American Horticulturist,* 74(6/95), 9-10.

Blair, D. (2009). The child in the garden: An evaluation review of the benefits of school gardening. *The Journal of Environmental Education, 40*(2), 15-38.

Boone, H. (2011). Defining experiential learning. *The Agricultural Education Magazine, 83*(4), 2.

Bucklin-Sporer, A., & Pringle, R. K. (2010). *How to grow a school garden: A complete guide for parents and instructors.* Portland: Timber Press.

Bullock, J.R. (1994). Helping children value and appreciate nature. *Day Care Early Education. 21*(4), 4-8.

Campbell, S. M., & Martin, R. A. (n.d.). Agricultural education - Early congressional efforts, an early philosophy of agricultural education. Retrieved from http://education.stateuniversity.com/pages/1744/Agricultural-Education.html

Center for the Study and Prevention of Violence. (1998). Blueprints for violence prevention. Boulder, CO: University of Colorado.

Cheek, J., & Arrington, L. (1990). Reshaping SAE to provide experiential learning in the 1900s. *The Agricultural Education Magazine, 62,* 12-13.

Cohen, S., & Horm-Wingerd, D. (1993). Children and the environment: ecological awareness among preschool children. *Environmental and Behavior, 25*(1), 103-120.

Crain, W. (2005). Green places to play. *Encounter, 18*(2), 2-4.

Creswell, J. W. (2008). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. (4th ed.). Los Angeles, CA: Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd Ed.). Thousand Oaks, CA: Sage Publications, Inc.

Dailey, A. L., Conroy, C. A., & Shelly-Tolbert, C. A. (2001). Using Agricultural Education as the Context to Teach Skills. *Journal of Agricultural Education*,*42*(1), 11-20. doi:10.5032/jae.2001.01011

DeMarco, L. (1997). *The factors affecting elementary school instructors' integration of school gardening into curriculum.* Doctoral dissertation, Virginia Tech University, Blacksburg, VA.

DeMarco, L, Relf, D., McDaniel, A. (1999). Integrating gardening into the elementary school curriculum. *HortTechnology*, 9, 276-281.

Denzin, NK. (1978). *Sociological methods*. New York: McGraw-Hill.

Desmond, D., Grieshop, J. & Subramaniam, A. (2002). Revisiting garden-based learning in basic education. Paris, France: International Institute for Educational Planning (IIEP).

Dewey, J. (1938). *Experience and Education.* New York, NY: Simon and Schuster.

Dillman, D. A. (2000). Mail and Internet surveys: *The tailored design method* (2nd ed.). New York, NY: J. Wiley.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, mail, and mixed-mode surveys: The tailored design method*. Hoboken, NJ: John Wiley.

Dirks, A. E., & Orvis, K. (2005). An evaluation of the junior master gardener program in third grade classrooms. *HortTechology,* 15, 443-447.

Drake, S. M.(1998). Creating integrated curriculum. Thousand Oaks, CA: Corwin Press.

Dudovskiy, J. (2018). The ultimate guide to writing a dissertation in business studies: A step-by-step assistance. Retrieved from https://research-methodology.net/research-methods/data-analysis/qualitative-data-analysis/

Experiential Learning. (n.d.). Retrieved from Northern Illinois University, Faculty Develop and Instructional Design Center website: http://www.niu.edu/facdev/resources/guide/strategies/experiential_learning.pdf

Eyler, J. (2009). The power of experiential education. *Liberal Education, 95*(4), 24-31.

Farm to school resources. (2011). Retrieved from *The Ultimate Guide to Writing a Dissertation in Business Studies: A Step-by-Step Assistance.* http://www.farmtoschool.org/policies.php

FFA History. (2017). Retrieved from https://www.ffa.org/about/what-is-ffa/ffa-history

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational research: An introduction* (7th ed.). Boston, MA: Pearson.

Graham, H. (2002). *Statewide principals' school garden survey.* Sacramento: California Department of Education and Department of Nutrition, University of California at Davis.

Graham, H., Beall, D., Lussier, M., McLaughlin, P., & Zidenberg-Cherr, S. (2005). Use of school gardens in academic instruction. *Journal of Nutrition Education and Behavior, 37*(3), 147-151.

Grahman, H., & Zidenberg-Cherr, S. (2005). California Teachers Perceive School Gardens as Effective Nurtitional Tool to Promote Healthful Eating Habits. *Journal of American Diet Association,105*(11), 1797-1800. doi:10.1016/j.jada.2005.08.034

Goss, H. & Lane, N. (2007). Landscapes of the lifespan: Exploring accounts of own gardens and gardening. *Journal of Environmental Psychology,* 27(3), 225-241.

Hanley, M. (2013, November 22). Constructivism pt. 4: Experiential learning theory | E-Learning Curve Blog [Web log post]. Retrieved from http://michaelhanley.ie/elearningcurve/index.php/2013/11/22/constructivism-pt4-experiential-learning-theory-2/

Harvey, M. (1989). Children's experiences with vegetation. *Children's Environmental Quarterly, 8*(1), 36-43.

Harwell, M. R. (2011). *The SAGE handbook for research in education: Pursuing ideas as the keystone of exemplary inquiry* (pp. 147-164). Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781483351377

Hawkins, J. D., Guo, J., Hill, K. G., Battin-Pearson, S., & Abbot, R. (2001). Long-term effects of the Seattle social development intervention on school bonding trajectories. *Applied Developmental Science, 5*(4), 225-236.

Hayden-Smith, R. (2015, May 20). A history of school gardens...and how the model is getting a boost today from FoodCorps. Retrieved from http://ucfoodobserver.com/2015/05/06/a-history-of-school-gardens-and-how-the-model-is-getting-a-boost-today-from-food-corps/

Heim, S., Stang, J., & Ireland, M. (2009). A garden pilot project enhances fruit and vegetable consumption among children. *Journal of the American Dietetic Association,109,* 1220-1226.

Hedley, A., Ogen, C., Johnson, C., Carroll, M., Curtin, L, & Flegal, K. (2004). Overweight obesity among U.S. children adolescents, and adults, 1999-2002. *Journal of the American Medical Association, 291*(23), 2847-2850.

Herd, M. (1997). *Learn and play in the garden.* Hauppauge, NY: Barron's Educational Series.

Hughes, L., DiClaudio, D., & Savoco, L. (2013, August). FS1211: Learning through the garden. Retrieved from https://njaes.rutgers.edu/fs1211/

Joffrion, C. (2010, July 23). Critique of experiential learning. *Free Press Release Distribution Service*. Retrieved from http://www.prlog.org/10814357-critique-of-experiential-learning.html.

Johnson, S. (2017, May 31). 34.9M US students-88 percent of school districts-now connected online. EdSurge. Retrieved from https://www.edsurge.com/news/2017-01-17-34-9-million-us-students-up-10-4-million-since-2015-now-connected-online.

Joshi, A., Azuma, A., & Feenstra, G. (2008). Do farm-to-school programs make a difference? Findings and future research needs. *Journal of Hunger & Environmental Nutrition, 3(2/3*), 229-246.

Keeton, M. & Tate, P. (1978). *Learning by experience what, why, how.* San Francisco, CA: Josey Bass.

Klemmer, C. D., Waliczek, T. M., & Zajicek, J. M. (2005). Growing minds: The effect of a school gardening program on science achievement of elementary students. *HortTechnology,* 15(3), 448-452.

Koch, T. & Harrington, A. (1998). Reconceptualizing rigour: The case for reflexivity. *Journal of Advanced Nursing. 28*(4), 882-890.

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Upper Saddle River, NJ: Prentice Hall.

Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2001). Experiential learning theory: Previous research and new directions. In L. Zhang (Ed.), *Perspectives on thinking, learning, and cognitive styles* (pp. 227-247). Mahwah, NJ: Lawrence Erlbaum Associates.

Kolb, D. & Lewis, L.H. (1986). Facilitating experiential learning: Observations and reflections. *New Directions for Continuing Education,* 30, 99-107.

Kolb's experiential learning cycle. (n.d.). Retrieved from http://www2.le.ac.uk/departments/gradschool/training/eresources/teaching/theories/kolb

Laerd Statistics (n.d.). Independent t-test in SPSS. Retrieved from https://statistics.laerd.com/spss-tutorials/independent-t-test-using-spss-statistics.php

Lawrence, S. G., & Rayfield, J. (2012). School gardens: Ripe with STEM and experiential learning, fertile soil for agricultural program growth. *The Agricultural Education Magazine, 84*(4), 7-8. Retrieved from

https://www.naae.org/profdevelopment/magazine/archive_issues/Volume84/2012_01-02.pdf.

Legg, C. (2013). Exploring the outdoors: Using outdoors education to increase relevance, interest, and academic achievement in elementary school mathematics. *Implementing New Strategies,* Summer(6).

Lieberman, G. A., & Hoody, L. (1998). *Closing the achievement gap.* San Diego, CA: State Education and Environment Roundtable.

LifeLab, (2014) California school garden survey. Retrieved from http://www.lifelab.org/2013?12/schoolgardensurvey2014/

Lincoln, YS. & Guba, EG. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.

Mack, N., Woodsong, C., MacQueen, K., Guest, G., & Namey, E. (2005). *Qualitative research methods: A data collector's field guide.* Research Triangle Park, NC: Family Health International. Retrieved from http://www.ccs.neu.edu/course/is4800sp12/resources/qualmethods.pdf

Malterud, K. (2001). Qualitative research: Standards, challenges, and guidelines. *Qualitative Research,358*(9280), 483-488. doi:https://doi.org/10.1016/S0140-6736(01)05627-6

Marr, M. B. (1997). Cooperative learning: A brief review. *Reading and Writing Quarterly: Overcoming Learning Difficulties, 13*(1), 7-20.

Mays, N. & Pope, C. (2000). Qualtative research in health care: Assessing quality in qualitative research. *BMJ, 320*(7226), 50-52.

Mazurkewicz, A., Harder, A., & Roberts, T. Grady. (2012). Evidence for experiential learning in undergraduate teaching farm courses. *Journal of Agricultural Education, 53*(1), 176-189. doi: 10.5032/jae.2012.01176.

Meyer, E. (1997). Cultivating change: A historical overview of the school garden movement. Unpublished paper from graduate seminar on Social and Cultural Studies in Education. University of California, Davis, CA.

Morris, J., Briggs, M., & Zidenberg-Cherr, S. (2002). Development and evaluation of a garden-enhanced nutrition education curriculum for elementary schoolchildren. *The Journal of Child Nutrition & Management,* 26 (2). Retrieved from http://docs.schoolnutrition.org/newsroom/jcnm/02fall/morris/

Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research, 40,* 120-123.

Murphy, M. & Schweers E. (2003) *Evaluation of a food systems-based approach to fostering ecological literacy.* Final Report to Center for Ecoliteracy, Retrieved from: www.ecoliteracy.org

National Reseearch Council (1996). *National Science Education Standards*. Washington, DC: The National Academic Press. https://doi.org/10.17226/4962

NEDARC (2010). Descriptive study. *National Emergency Medical Services for Children Data Analysis Resource Center.* Retrieved from http://www.nedarc.org/statisticalHelp/projectDesign/descriptiveStudy.html

Osborne, E. (1994). Completing the cycle. *The Agricultural Education Magazine, 67*(3), 3, 11.

Ogden, R. (2008). Pseudonym. In L. M. Given (Ed.), *The SAGE encyclopedia of qualitative research methods* (pp. 693-693). Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781412963909.n345

Ozer, E. (2006). The effects of school gardens on students and schools: Conceptualization and considerations for maximizing healthy development. *Health Education & Behavior, 34*(6), 846-863. doi: 10:1177/1090198106289002.

Parmer, S., Salisbury-Glennon, S. D., Struempler, B. (2009). School Gardens: An experiential learning approach for a nutrition education program to increase fruit and vegetable knowledge, preference, and consumption among second-grade students. *Journal of Nutrition Education and Behavior, 41*(3), 212-217. doi: 10.1016/j.jneb.2008.06.002

Pannoni, A. (2014, March 31). Agriculture education blooms in urban, rural high schools. *U.S. News and World Report.* Retrieved from https://www.usnews.com/education/blogs/high-school-notes/2014/03/31/agriculture-education-blooms-in-urban-rural-high-schools

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage Publications.

Patton, MQ. (1999). Enhancing the quality and credibility of qualitative analysis. *HSR: Health Services Research, 34*(5), 1189-1208.

Patton, MQ. (2001). *Qualitative evaluation and research methods* (2nd ed.). Thousand oaks, CA: Sage Publications.

Pennington, G. (1988). Education and school gardens. *City Farmer: School Garden Guidelines.* Canada's Office of Urban Agriculture: Vancover, Canada. Retrieved from: http://www.cityfarmer.org/

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. L. (2008). Handbook on agricultural education in public schools. Clifton Park, NY: Thomson Learning, Inc

Pivnick, J. (1994). Sowing a school garden: reaping an environmental ethic. *HortTechnology, 8*(3), 7-8.

Proudman, B. (1992). Experiential education as emotionally-engaged learning. *The Journal of Experiential Education. 15*(2), 19-23.

Rahm, J. (2002). Emergent learning opportunities in an inner-city youth gardening program. *Journal of Research Science Teaching, 39*(2), 164-184.

Ratcliffe, M., Merrigan, K., Rogers, B., & Goldberg, J. (2009). The effects of school garden experiences on middle school-aged students' knowledge, attitudes, and behaviors associated with vegetable consumption. *Heath Promotion Practice, 12* (1), 36-43. doi: 10.1177/1524839909349182.

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education, 47*(1). 17-29. doi:10.5032/jae.200601017.

Roberts, T. G. (2011). What is experiential learning? The Agricultural Education Magazine, *83*(4). 4.

Robin, L. (2001). "School gardens and beyond: progressive conservation, moral imperatives and the local landscape". In: C. Vernon (Ed.), Studies in the history of gardens and designed landscapes. Special Australian issue (2001).

Rubin, H. J. & Rubin, I. S. (2005). *Qualitative interviewing: The art of hearing data*. Thousand Oaks, CA: Sage Publications.

Rubenstein, E. D. (2014). *Exemplary supervised agricultural experience programs in rural secondary schools* (Doctoral dissertation, University of Florida).

Rubenstein, E. D., Conner, N. W., Hurst, S. D., & Thoron, A. C. (2016). A philosophical examination of school-based agricultural education and NBC's education nation. *NCATA Journal, 60*(3), 263-271.

Ryan, J. (2015). 2015 Teacher of the year [Special edition]. AdvancedED,. Retrieved from http://www.advanc-ed.org/source/importance-agricultural-education-and-ffa

Rye, J.A., Selmer, S., Pennington, S., Vanhorn, L., Fox, S., Kane, S. (2012). Elementary school garden programs enhance science education for all learners. *Teaching Exceptional Children, 44*(6), 59-65.

School-based agricultural education. (2017). Retrieved from https://www.ffa.org/sitecollectiondocuments/about_three_component_model.pdf

Sealy, M. R. (2001). *A garden for children at Family Road Care Center* (Unpublished master's thesis). Louisiana State University and Agricultural Mechanical College: School of Landscape Architecture, Baton Rouge, LA.

Shoulders, C., Wilder, C., & Myers, B. (2011). Agricultural facilities: Experiential learning under a different roof. *The Agricultural Education Magazine, 83(4), 12-14.*

Skelly, S. M. (2000). *The growing phenomenon of school gardens: cultivating positive youth development.* Doctoral dissertation, University of Florida, Gainesville.

Skelly, S. M., & Bradley, J. C. (2000). The importance of school gardens as perceived by Florida elementary school instructors. *HortTechnology,* 15(3), 439-443. http://horttech.ashspublications.org

Skelly, S. M., & Bradley, J. C. (2007). The growing phenomenon of school gardens: Measuring their variation and their affect on students' sense of responsibility and attitudes towards science and the environment. *Applied Environmental Education and Communication, 6,* doi: 10.1080/15330150701319438

Skelly, S. M., & Zajicek, J. M. (1998). The Effect of an Interdisciplinary Garden Program on the Environmental Attitudes of Elementary School Students. *HortTechnology*,*8*(4), 579-583. doi:https://doi.org/10.21273/HORTTECH.8.4.579

Smith, L., & Mostenbocker, C. E. (2005). Impact of hands on science through school gardening in Louisiana public elementary schools. *HortTechnology, 15*(3), 439-443.

Sprague, P. (2016). Instructional school gardens: Opportunities for and barriers to scaling (Doctoral dissertation). Duquesne University. Retrieved from hps://dsc.duq.edu/etd/30

Steup, M. (2005, December 14). Epistemology. Retrieved from http://plato.stanford.edu/entries/epistemology/

Stone, J. R. (1994). Experiential learning and school-to-work transition. *The Agricultural Education Magazine, 67*(3), 6-8, 11.

Subramaniam, M. A. (2002). *Garden-based learning in basic education: A historical review*. [Monograph]. Retrieved from http://fourhcyd.ucdavis.edu

Supervised Agricultural Experiences. (2017). Retrieved December 03, 2017, from https://www.ffa.org/about/supervised-agricultural-experiences

Taylor, A.F., Kuo, F.E., Sullivan, W.C. (2001). Coping with ADD – The surprise connection to green play settings. *Environment & Behavior* (33)1, p.54-77.

Twiss, J., Dickinson, J., Duma, S., Kleinman, T., Paulsen, H., & Rilveria, L. (2003). Community gardens: Lessons learned from California Healthy Cities and Communities. *American Journal of Public Health,* 93(9), 1435-1438.

USDA farm to school 2015 census. (2017, January 11). Retrieved from https://farmtoschoolcensus.fns.usda.gov/about

University of California Garden-based Learning Workgroup (November, 2007). *Overview of current research supporting garden-based learning.* (PDF) Retrieved from:http://www.ourcommunityourkids.org/media/4852/OVERVIEW%20of%20Research%20supporting%20Garden-Based%20Learning.pdf

Waliczek, T. M., & Zajicek, J. M. (1999). School gardening: Improving environmental attitudes of children through hands-on learning. *Journal of Environmental Horticulture,* 17(4), 180-184.

Waliczek, T. M., Logan, P., & Zajicek, J. M. (2003). Exploring the impact of outdoor environmental activities on children using a qualitative text data analysis system. *HortTechnology, 13*(4), 684-688.

Watson, J., Miller, B., & Buckler, C. (2012). Breaking down the barriers of learning in the outdoors. *Education for Sustainable Development Newsletter, 3*(2), 1-2.

Wells, N. M. (2000). At home with nature: Effects of "greenness" on children's cognitive functioning. *Environment and Behavior, 32*(6), 775-795.

What is Agricultural Education? (2017). Retrieved from https://www.naae.org/whatisaged/

Williams, D., & Dixon, P. (2013). Impact of garden-based learning on academic outcomes in schools: Synthesis of research between 1990 and 2010. *Review of Educational Research, 83*(2). 211-235, doi: 10.3102/0034654313475824.

Yamamoto, B. T. (2000). But who's going to water? Complexity and thick explanation on critical ethnographic study of two school garden projects (Unpublished master's thesis). Department of Human and Community Development, University of California, Davis, CA.

APPENDICES

APPENDIX A: CLARIFICATION OF TERMS

Clarification of Terms

This section includes descriptions of frequently used terms throughout this study. The descriptions are provided from existing literature. The intent of this section is to help clarify the use of these terms throughout this dissertation.

Environmental Education - a process by which learners develop knowledge, skills and a greater appreciation for the environment and the world around them.

Experiential Education - a process by which the learner constructs knowledge, skill, and value from direct experiences (Steup, 2005).

Experiential Learning - can be defined as an instructional strategy for learning that identifies style differences among different academic specialties and multi-linear model of adult development, both of which are consistent with what we know about how people learn, grow, and develop (Kolb et al., 2001). Experiential Learning emphasizes the central role that experience plays in the learning process, an emphasis that distinguishes experimental learning from other learning theories.

Critical Thinking - includes a complex combination of skills including rationality, self-awareness, honesty, open-mindedness, discipline and judgment. An individual uses critical thinking skills when she or he relies on evidence rather than emotion, never ignores evidence and follows evidence wherever it leads whether the desired outcome or not (Harris, 2010).

Garden-Based Learning - an instructional strategy that utilizes a garden as an instructional resource, a teaching tool. "Garden-based learning encompasses programs, activities and projects in which the garden is the foundation for integrated learning, in

and across disciplines, through active, engaging, real-world experiences" (Desmond et al., 2002, p. 7).

FFA – co-curricular youth organization with agricultural education courses in middle and high school agricultural education programs that offer students opportunities for premiere leadership, personal growth and career success ("Agricultural Education", 2017)

School Gardens - commonly defined as a piece of school property where plants are grown, and horticulture is practiced as an educational strategy and learning tool (DeMarco, 1997).

School-Based Agricultural Education Programs (SBAE) - a systematic program of instruction available to students desiring to learn about the science, business, technology of plant and animal production and/or about the environmental and natural resources systems. ("Agricultural Education", 2017).

Supervised Agricultural Experience Projects (SAE) - required component of a total agricultural education program and intended for every student. Through their involvement in the SAE program, students consider multiple careers and occupations, learn expected workplace behavior, develop specific skills within an industry, and are given opportunities to apply academic and occupational skills in the workplace or a simulated workplace environment. Through these strategies, students learn how to apply what they learn in the classroom as they prepare to transition into the world of college and career opportunities ("Supervised Agricultural Experience Project", 2017)

The California School Garden Network - collaborative effort of a number of educational institutions, non-profit organizations, private and government partners

committed to enhancing learning through the use of teaching gardens in schools and other community settings (Bucklin-Sporer & Pringle, 2010).

APPENDIX B: QUESTIONNAIRE

Questionnaire

Garden Based Learning Survey - Dissertation Spring2019 Final Survey Flow

Standard: School garden information (21 Questions)
Standard: Academic Instruction (5 Questions)
Standard: Support, Resources, Observations (4 Questions)
Standard: Funding and Support (4 Questions)
Block: Demographic Information (15 Questions)

Page Break

Start of Block: School garden information

Q1

Q2 Thank you for taking the time to take this garden-based learning survey for agricultural education instructors in Georgia. The information gathered through this survey will allow researchers to identify the barriers and benefits of school gardens as viewed by agricultural education instructors in Georgia. This research will also gather data that will help determine needs for training and resources in the area of garden-based learning. This survey is made up of 5 sections and will take approximately 12 minutes to complete. Thank you very much! Trish Williams

Q3 Section 1: School Garden Information. This section indicates if your school has a school garden and the makeup of the garden.

Q4 Does your school have a garden or garden program? (This includes any type of facility/land lab area where plants/vegetables can be grown.)

- ○ Yes (1)
- ○ No (2)

Skip To: Q7 If Does your school have a garden or garden program? (This includes any type of facility/land lab ar... = Yes
Skip To: Q5 If Does your school have a garden or garden program? (This includes any type of facility/land lab ar... = No

Q5 Please rank the following reasons that describe why your school does not have a school garden?

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
Lack of Staffing (1)	○	○	○	○	○
Little to know knowledge about gardening (2)	○	○	○	○	○
Lack of gardening supplies (3)	○	○	○	○	○
Lack of funding (4)	○	○	○	○	○
Difficulty linking to core academic standards (5)	○	○	○	○	○
Lack of volunteers (6)	○	○	○	○	○
No interest in having a school garden (7)	○	○	○	○	○
Inadequate space (8)	○	○	○	○	○
The risk of vandalism (9)	○	○	○	○	○
Time constraints (10)	○	○	○	○	○
Few or no instructional materials (11)	○	○	○	○	○
Technical assistance with gardening (12)	○	○	○	○	○

Skip To: Q111 If Please rank the following reasons that describe why your school does not have a school garden? = Little to know knowledge about gardening
Skip To: Q111 If Please rank the following reasons that describe why your school does not have a school garden? = Lack of Staffing
Skip To: Q111 If Please rank the following reasons that describe why your school does not have a school garden? = Lack of gardening supplies
Skip To: Q111 If Please rank the following reasons that describe why your school does not have a school garden? = Lack of funding
Skip To: Q111 If Please rank the following reasons that describe why your school does not have a school garden? = Difficulty linking to core academic standards

Page Break

Q7 How would you describe your school garden?

	No (1)	Yes (2)
In ground traditional garden in one or more areas (1)	○	○
Planters/Pots (2)	○	○
Raised bed in one or more areas (3)	○	○
Greenhouse (4)	○	○
Potted plants inside or outside classroom (5)	○	○
Off school campus, community location (6)	○	○
Hydroponics (7)	○	○

Q8 What population does your school garden serve?

	No (1)	Yes (2)
Pre-school - PreK and under (1)	○	○
Elementary K-5th (2)	○	○
Middle 6th - 8th (3)	○	○
High 9th - 12th (4)	○	○
Adults & Community (5)	○	○

Skip To: End of Block If What population does your school garden serve? = Elementary K-5th
Skip To: End of Block If What population does your school garden serve? = Pre-school - Pre K and under

Page Break

Q111 In which Agricultural Education Region of Georgia is your school located? (select only one region)

- North (1)
- Central (2)
- South (3)

Q66 Please enter your first and last name? (Example: John Doe)

_____

Q101 In which Agricultural Education Area in Georgia is your school located?

- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)

Q103 Which best describes your school neighborhood?

- Urban (1)
- Sub-urban (2)
- Rural (3)

Q105 Which best describes your school type? (select one)

- ○ Public (1)
- ○ Private (2)

Q107 Which best describes your agricultural education department?

- ○ One teacher (1)
- ○ Two instructors (2)
- ○ Three or more instructors (3)

Q112 How many years have you taught school or been a classroom teacher? (Please write out number of years in numerical form. Example: 23)

_____

Q110 Which best describes your teacher certification method? (select one)

- ○ Traditional certification method - Ex. college degree in education (1)
- ○ Alternative certification method - Ex. TAPP program or RESA certification program (2)

Q114 What is your estimated school population? (Write the number out - ex: 998)

_____

Q116 How many total FFA members does your agricultural education program have? (Write the number of students out in numerical form. Example: 167)

_____

Q118 Please select the gender that you identify with:

- ○ Male (18)
- ○ Female (19)

Q120 In what year were you born? (Please enter 4-digit birth year; for example, 1974)

_____

Q122 What else is on your mind regarding school gardens? Please share any information, barriers or benefits that you would like us to know about your school garden.

_____

Skip To: End of Survey If What else is on your mind regarding school gardens? Please share any information, barriers or ben... Is Empty
Skip To: End of Survey If What else is on your mind regarding school gardens? Please share any information, barriers or ben... Is Not Empty

Q124 Thank you so much for completing this survey! The information gathered will not only be used for my class research but also provide valuable information about the benefits and barriers of school garden curriculum in Georgia agriculture programs. **PLEASE CLICK THE RED ARROW TO RECORD YOUR ANSWERS AND SUBMIT THE SURVEY.**thank you!

End of Block: School garden information

Start of Block: Academic Instruction

Q14 Section 2: This section will tell what type of academic instruction is used in your school garden.

Q58 School gardens are a great place to teach mathematics instruction.

- ○ Strongly agree (11)
- ○ Somewhat agree (12)
- ○ Neither agree nor disagree (13)
- ○ Somewhat disagree (14)
- ○ Strongly disagree (15)

Q54 School gardens are a great place to teach English-Language Arts Instruction.

- Strongly agree (11)
- Somewhat agree (12)
- Neither agree nor disagree (13)
- Somewhat disagree (14)
- Strongly disagree (15)

Q56 School gardens are a great place to teach History/Social Studies instruction.

- Strongly agree (11)
- Somewhat agree (12)
- Neither agree nor disagree (13)
- Somewhat disagree (14)
- Strongly disagree (15)

Q60 School grdens are a great place to teach Science instruction.

- Strongly agree (11)
- Somewhat agree (12)
- Neither agree nor disagree (13)
- Somewhat disagree (14)
- Strongly disagree (15)

Page Break

End of Block: Academic Instruction

Start of Block: Support, Resources, Observations

Q22 Section 3: This section tells what educational resources are used in the school garden.

Q23 What educational resources do you find useful when the garden is a learning laboratory?

	Extremely useful (1)	Very useful (2)	Moderately useful (3)	Slightly useful (4)	Not at all useful (5)
Textbooks (1)	○	○	○	○	○
Garden-based learning publications (2)	○	○	○	○	○
Lesson plans created by you (3)	○	○	○	○	○
Lesson plans found online created by other educators (4)	○	○	○	○	○
Lesson plans found online created by other organizations (5)	○	○	○	○	○
Websites (6)	○	○	○	○	○
Materials received at workshops or seminars (7)	○	○	○	○	○
Collaboration with other instructors at your school (8)	○	○	○	○	○
Collaboration with agricultural education instructors (9)	○	○	○	○	○

Q24 Which of the following positive observations have you made in your school garden participants?

	Extremely positive (1)	Somewhat positive (2)	Neither positive nor negative (3)	Somewhat negative (4)	Extremely negative (5)
Increased environmental attitude/attitudes (1)	○	○	○	○	○
Increased community spirit (2)	○	○	○	○	○
Increased social skills/behaviors (3)	○	○	○	○	○
Improved attitude towards school (4)	○	○	○	○	○
Sense of volunteerism (5)	○	○	○	○	○
Improved motor skills (6)	○	○	○	○	○
Improvements in health and nutrition (7)	○	○	○	○	○
Academic gains (8)	○	○	○	○	○
Increased participation in FFA (9)	○	○	○	○	○
Increased participation in Career Development Events (10)	○	○	○	○	○
Increased participation in community service activities (11)	○	○	○	○	○

Q26 Over the past three years what types of garden-based professional development have you received? (Select all that apply)

- [ ] On-site school sponsored (1)
- [ ] Off-side workshop (2)
- [ ] conferences or seminars (3)
- [ ] webinars (4)
- [ ] online course (5)
- [ ] YouTube or online videos (6)
- [ ] No professional development (7)

Page Break

End of Block: Support, Resources, Observations

Start of Block: Funding and Support

Q28 Section 4: This sections is to gather information about funding and support for your school garden.

Q31 During the last academic year, what was your annual school garden budget? (materials/supplies - example $545)

_____

Q33 During the last academic year, who has your school received funds from to support the school garden. (Select all that apply)

- [ ] School or district funds (1)
- [ ] Individual Donations (2)
- [ ] Community Organizations (3)
- [ ] Business Donations (4)
- [ ] Grants (5)
- [ ] PTA/PTO funds (6)
- [ ] FFA Alumni/Young Farmer Programs (7)

Q37 During the last academic year, what was the average number of total hours per week spent utilizing the school garden? (Example 5 hours per week)

_____

Page Break

End of Block: Funding and Support

Start of Block: Demographic Information

Q38 Section 5: This section is to provide a little more information about you and your school.

Q65 Please enter your first and last name. (Example: John Doe)

_____

Q39 In which Agricultural Education Region of Georgia is your school located? (select only one region)

- ○ North (1)
- ○ Central (2)
- ○ South (3)

Q40 In which Agricultural Education Area in Georgia is your school located?

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)

Q41 Which best describes your school neighborhood?

- ○ Urban (1)
- ○ Sub-urban (2)
- ○ Rural (3)

42 Which best describes your school type? (select one)

- ○ Public (1)
- ○ Private (2)

Q43 Which best describes your agricultural education department?

- ○ One teacher (1)
- ○ Two instructors (2)
- ○ Three or more instructors (3)

Q47 How many years have you taught school or been a classroom teacher? (Write out the number of years in numerical form - example: 23)

_____

Q48 Which best describes your teacher certification method? (select one)

- ○ Traditional certification method - Ex. college degree in education (1)
- ○ Alternative certification method - Ex. TAPP program or RESA certification program (2)

Q49 What is your estimated school population? (Write the number out - ex: 1,098)

_____

Q50 How many total FFA members does your agricultural education program have? (Write the number out - ex: 198)

_____

Q59 Please select the gender you identify with:

- ○ Male (18)
- ○ Female (19)

Q61 In what year were you born? (Please enter 4-digit birth year; for example, 1974)

_____

Q51 What else is on your mind regarding school gardens? Please share any information, barriers or benefits that you would like us to know about your school garden.

_____

Q58 Thank you so much for completing this survey! The information gathered will not only be used for dissertation research but also provide valuable information about the benefits and barriers of school garden curriculum in Georgia agriculture programs.**PLEASE CLICK THE RED ARROW TO RECORD YOUR ANSWERS AND SUBMIT THE SURVEY.**

End of Block: Demographic Information

APPENDIX C: IRB APPROVAL

IRB Approval

UNIVERSITY OF GEORGIA

Tucker Hall, Room 212
310 E. Campus Rd.
Athens, Georgia 30602
TEL 706-542-3199 | FAX 706-542-5638
IRB@uga.edu
http://research.uga.edu/hso/irb/

Human Research Protection Program

EXEMPT DETERMINATION

October 8, 2018

Dear roger hill:

On 10/8/2018, the Human Subjects Office reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Georgia Agricultural Education Teachers and School Gardens: Benefits, Barriers and Resources
Investigator:	roger hill
Co-Investigator:	Patricia Williams
IRB ID:	STUDY00006417
Funding:	None
Review Category:	Exempt, HHS (2)

We have approved the protocol from 10/8/2018 to 10/7/2023.

This is an exempt study, so it's not necessary to submit a modification for minor changes to study procedure. You can keep us informed of changes that don't affect the risk of the study by using "Add Comment".

Please close this study when it is complete.

In conducting this study, you are required to follow the requirements listed in the Investigator Manual (HRP-103).

Sincerely,

William Westbrook, IRB Analyst
Human Subjects Office, University of Georgia

APPENDIX D: PERMISSION FOR RESEARCH LETTER

Permission for Research Letter

Good afternoon,

As moderator of the Ag Ed teacher listserve in Georgia, I reviewed the survey & emails from Mrs. Tricia Williams and approved them to go out to the Georgia Ag Ed teacher list via email. Please feel free to contact me with any questions.

-- Christa

Christa Steinkamp
Georgia Agricultural Education
Curriculum & Technology Director
1420 Experiment Station Road
Watkinsville, GA 30677
csteinkamp@gaaged.org
www.gaaged.org
706-310-3466 Office
706-244-8991 Cell

Agricultural Education Mission

"To be a premier learning system that delivers agricultural, environmental and leadership education programs and services."

APPENDIX E: AGRICULTURAL EDUCATION STATE STAFF RECOMMENDATIONS

Dear Georgia Agricultural Education Region Director and Horticulture Teachers,

Good morning, for those who do not know me, I am a former agricultural education teacher of 20 plus years and am very passionate about agricultural education. I wanted to touch base with you and ask for your help. I am currently in the process of finishing up my doctorate through UGA Workforce Education. Dr. Rubinstein has been working with me on my research. My dissertation topic is based around agricultural education, specifically garden based learning/school gardens/horticulture use in the classroom to teach academics.

The committee has recommended that I incorporate mixed methods in my research and interview a few teachers on their best practices and use of school gardens/horticulture programs. The committee felt that as experts in the field, you would be a great panel to recommend two teachers from each area that utilize school gardens/horticulture programs in their agricultural classrooms. For example - I would have interviewed Dr. Sara Clark if she was still teaching from Area 1. Would you each recommend two teachers from each area that would be top in this area? My goal is to interview at least one of them and have each area represented. I would like to contact the teachers and possibly meet with some of them next week at midwinter conference. It does not matter if the teacher recommended is middle or high school.

Please let me know if you have any additional questions. Thank you so much for your help and I look forward to sharing my research and findings with agricultural education staff this summer.

Thank you,
Trish Williams
Murray County High School/Counselor/Dual Enrollment

APPENDIX F: EMAIL WITH OFFICIAL QUESTIONNAIRE LINK

Email with Official Questionnaire Link

Dear Georgia Agricultural Education Instructors,

A few days ago, you received an email providing details about my plans to survey Agricultural Education Instructors in Georgia's knowledge and experience with regards to school gardens and gardening curriculum. This voluntary research study will ask you to respond to statements by sharing your level of agreement and how true specific qualities are for you. You will be asked to share some demographic information as well.

Due to the fact that you are an agricultural education teacher in Georgia, your insight and opinions are very valuable. This research involves the transmission of data sent via the Internet. Every reasonability effort has been taken to ensure the effective use of available technology; however, confidentiality during online communication cannot be guaranteed. Also, note that no personal or identifiable information will be gathered in this survey. You may choose not to participate or to stop the survey at any time without penalty. By completing this questionnaire, you are agreeing to participate in the described research project. Please click the following link to complete the online questionnaire.

PLEASE CLICK HERE TO BEGIN TAKING THE SURVEY:

https://ugeorgia.ca1.qualtrics.com/jfe/form/SV_cXR0DfFKxKkikOp

There are no anticipated risks or discomforts from participation in this study. There are also no direct benefits to participants. However, this study will contribute to the literature on school gardens, It will also identify benefits, barriers and resources of school gardens and school garden curriculum within the agricultural education programs in Georgia. While there is a lot of research on garden-based learning at the elementary school level, there is very little research on garden-based learning/instruction at the

middle and high school level. Therefore, this study will be useful for further garden program implementation in Georgia agriculture programs and schools. The results from this study may be published however, any potential identifying information will not be used. I encourage you to complete this survey as it will provide Agricultural Education with important information and assist in my path to graduation.

If you have any additional information about this research project, please feel free to contact me at paw34@uga.edu or Dr. Roger Hill, the study Principal Investigator at rhill@uga.edu. Questions or concerns about your rights as a research participant should be directed to University of Georgia Institutional Review Board; (706) 542-3199; email address irb@uga.edu.

Sincerely,

Patricia Williams, Co-Principal Investigator

Ed.D. Candidate

Department of Workforce Education, Leadership and Social Foundations

University of Georgia

Paw34@uga.edu

APPENDIX G: FIRST REMINDER EMAIL

First Reminder Email

Dear Georgia Agricultural Education Instructors,

This is a reminder to please complete Patricia Williams's survey of Georgia Agricultural Education Instructors about their knowledge and experience with regards to school gardens and gardening curriculum. **If you have already completed this questionnaire ---THANK YOU!!** As stated before, this voluntary research study will ask you to respond to statements by sharing your level of agreement and how true specific qualities are for you. You will be asked to share some demographic information. The on-line questionnaire can be found at the following link:

PLEASE CLICK HERE TO BEGIN TAKING THE SURVEY:

https://ugeorgia.ca1.qualtrics.com/jfe/form/SV_cXR0DfFKxKkikOp

I know your time is very valuable and the questionnaire will take 25 minutes to complete. The information collected could be published, however any identifiable information will not be included in the publication or shared. This research involves the transmission of data sent via the Internet. Every reasonability effort has been taken to ensure the effective use of available technology; however, confidentiality during online communication cannot be guaranteed. If at any time you wish to stop taking the questionnaire, you may do so without penalty. There are no anticipated risks or discomforts from participation in this study. There are also no direct benefits to participants. However, this study will contribute to the literature on school gardens, It will also identify benefits, barriers and resources of school gardens and school garden curriculum within the agricultural education programs in Georgia. While there is a lot of research on garden-based learning at the elementary school level, there is very little

research on garden-based learning/instruction at the middle and high school level. Therefore, this study will be useful for further garden program implementation in Georgia agriculture programs and schools. The results from this study may be published however, any potential identifying information will not be used. I encourage you to complete this survey as it will provide Agricultural Education with important information and assist in my path to graduation.

If you have any additional information about this research project, please feel free to contact me at paw34@uga.edu or Dr. Roger Hill, the study Principal Investigator at rhill@uga.edu. Questions or concerns about your rights as a research participant should be directed to University of Georgia Institutional Review Board; (706) 542-3199; email address irb@uga.edu.

Sincerely,

Patricia Williams, Co-Principal Investigator

Ed.D. Candidate

Department of Workforce Education, Leadership and Social Foundations

University of Georgia

Paw34@uga.edu

APPENDIX H: SECOND/FINAL REMINDER EMAIL

Second/Final Reminder Email

Dear Georgia Agricultural Education Instructors,

This is a **FINAL** reminder to please complete Patricia Williams's survey of Georgia Agricultural Education Instructors about their knowledge and experience with regards to school gardens and gardening curriculum. **We hate to be a bother, but receiving your responses is critical to Patricia's research and will help her graduate. If you have already completed this questionnaire ---THANK YOU!!** As stated before, this voluntary research study will ask you to respond to statements by sharing your level of agreement and how true specific qualities are for you. You will be asked to share some demographic information but will not be asked for personal information or identifiers. This research does involve the transmission of data sent via the Internet. Every reasonability effort has been taken to ensure the effective use of available technology; however, confidentiality during online communication cannot be guaranteed. The on-line questionnaire can be found at the following link:

PLEASE CLICK HERE TO BEGIN TAKING THE SURVEY:

https://ugeorgia.ca1.qualtrics.com/jfe/form/SV_cXR0DfFKxKkikOp

I know your time is very valuable and the questionnaire will take 25 minutes to complete. The information collected could be published, however any identifiable information will not be included in the publication or shared. If at any time you wish to stop taking the questionnaire, you may do so without penalty. There are no anticipated risks or discomforts from participation in this study. There are also no direct benefits to participants. However, this study will contribute to the literature on school gardens, It will also identify benefits, barriers and resources of school gardens and school garden curriculum within the agricultural education programs in Georgia. While there is a lot of research on garden-based learning at the elementary school level, there is very little research on garden-based

learning/instruction at the middle and high school level. Therefore, this study will be useful for further garden program implementation in Georgia agriculture programs and schools. The results from this study may be published however, any potential identifying information will not be used. I encourage you to complete this survey as it will provide Agricultural Education with important information and assist in my path to graduation.

If you have any additional information about this research project, please feel free to contact me at paw34@uga.edu or Dr. Roger Hill, the study Principal Investigator at rhill@uga.edu. Questions or concerns about your rights as a research participant should be directed to University of Georgia Institutional Review Board; (706) 542-3199; email address irb@uga.edu. Again, thank you so much for assisting with this Doctoral project.

Sincerely,

Patricia Williams, Co-Principal Investigator

Ed.D. Candidate

Department of Workforce Education, Leadership and Social Foundations

University of Georgia

Paw34@uga.edu

APPENDIX I: RESEARCH CONSENT LETTER

Research Consent Letter

Dear Georgia Agricultural Education Instructors,

Thank you very much for completing the previous questionnaire your received via the agricultural education listserv on the topic of garden-based learning. The information your supplied is vital in helping myself as the researcher understand the various garden-based learning demographics throughout the state of Georgia. Based on your responses in the initial questionnaire and recommendations from Georgia Agricultural Education State Staff I would like the opportunity to interview you at your earliest convenience. This interview would provide you the opportunity to share your school garden best practices and more in-depth details about your school garden in a one on one setting. This information will be valuable in determining the needs and successes of school garden programs in Georgia agricultural education programs and how they are used to teach academics. This information will also provide insight into what additional trainings and resources could be offered to assist programs in being more successful in the school garden.

I know your time is very valuable and the interview will take approximately 45 minutes to complete. The information collected could be published, however any identifiable information will not be included in the publication or shared. If at any time you wish to stop the interview process, you may do so without penalty. The interview will be audio-recorded and extracts from your interview may be quoted, however names and identifying information will not be used. There will be a transcript of the interview, but names and identifying information will be removed. There are no anticipated risks or discomforts from participation in this study. There are also no direct benefits to participants. However, this study will contribute to the literature on school gardens, It will also identify benefits, barriers and resources of school gardens and school garden curriculum within the agricultural education programs in Georgia. While there is a lot of research on garden-based learning at the elementary school level, there is very little research on garden-based learning/instruction at the middle and high school level. Therefore, this study will be useful for further garden program implementation in Georgia agriculture programs and schools. The results from this study may be published however, any potential identifying information will not be used. I encourage you to

complete this survey as it will provide Agricultural Education with important information and assist in my path to graduation.

If you have any additional info about this research project, please feel free to contact me at paw34@uga.edu or Dr. Roger Hill, the study Principal Investigator at rhill@uga.edu. Questions or concerns about your rights as a research participant should be directed to University of Georgia Institutional Review Board; (706) 542-3199; email address irb@uga.edu. Again, thank you so much for assisting with this Doctoral project.

Sincerely,

Patricia Williams, Co-Principal Investigator, Ed.D. Candidate
University of Georgia
Department of Workforce Education, Leadership and Social Foundations
Paw34@uga.edu

Participation Agreement/Consent Form - Garden-Based Learning Interviews

- I _____ voluntarily agree to participate in this research study on garden-based learning in Georgia Agricultural Education Programs.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I have the purpose and nature of this study explained to me inwriting and I have had the opportunity to ask questions about the study.
- I understand that participation involves an interview about my garden-based learning practices that will take place during the Georgia Agricultural Education Midwinter Conference.
- I understand that I will not benefit directly from participating in this research.
- I agree to my interview being audio-recorded.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that in any report on the results of this research my identity will remain anonymous. This will be done by changing my name and disguising any details of my interview which may reveal my identity or the identity of anyone I speak about.
- I understand that extracts from my interview may be quoted in a dissertation document, conference presentation and/or published research article.
- I understand that signed consent forms, original audio recordings, and transcripts will be retained in the researcher's possession until the completion of the study.
- I understand that under freedom of information legalization I am entitled to access the information I have provided at any time while research is being conducted.
- I understand that I am free to contact any of the people involved in the research to seek further clarification and information.
- If you have any additional information about this research project, please feel free to contact me at paw34@uga.edu or Dr. Roger Hill, the study Principal Investigator at rhill@uga.edu. Questions or concerns about your rights as a

research participant should be directed to University of Georgia Institutional Review Board; (706) 542-3199; email address irb@uga.edu.

Signature of Research Participant_____
Date_____

Signature of Researcher _____ _____
Date_____

APPENDIX I: INTERVIEWER GUIDE AND QUESTIONING ROUTE

Interviewer Guide and Questioning Route – Interviews (Instructors)

Garden Based Learning in School-based Agricultural Education

Interviewer reads: Hello and welcome to our session today. Thank you for taking the time to join our discussion about garden-based learning practices in school-based agriculture classrooms. My name is Trish Williams and I am a graduate student at the University of Georgia. Before we begin, let me share some things that will make our discussion easier. There are no right or wrong answers. Please feel free to share your point of view. Please speak up and clearly. We are audio recording the session because we do not want to miss any of your comments. The tape will not be heard by anybody other than myself. Once the tapes have been transcribed, the audio recordings will be destroyed. We will be on a first-name basis, and in our later reports your name will not be attached to the reported comments. You may be assured of confidentiality. My role here is to ask questions and listen. I will be asking around 8 questions. Our session will last about forty-five minutes. Please turn off your cell phone. Let's begin.

Introductory Information

Interviewer reads: Let's find out some more about you. Tell share your name, highest educational degree, how you were certified, and your involvement in school-based agricultural education during your high school experience.

Garden Based Learning Programs

Interviewer reads: Garden-based learning curriculum and school gardens have been on the rise for the last several years especially with the STEM push in schools. Since you are worked with school gardens and are considered an outstanding teacher in this area by your supervising instructors. I would like to ask you a few questions.

- Please describe your school garden program, including the history of the school garden all features of the program. For example, raised beds, garden area, hydroponics, greenhouse etc….
    - Probe: How large or small are these areas?
    - Probe: What is your role in supporting the school garden?
    - Probe: Is the school garden utilized year-round?

- Please describe how you utilize or use your school garden?
    - Probe: What activities do you do while utilizing the school garden?
    - Probe: What population in your school utilizes your school garden?
    - Probe: How often do your students utilize the school garden? Average number of hours per week spent in the school garden?

- Please describe how you plan lessons to utilize the school garden, include subjects that you incorporate such as math, science etc.
    - Probe: What resources do you use to plan these lessons?
    - Probe: Have you had any training in this area and planning these lessons?
    - Probe: What would you find useful in assisting you in planning these lessons?

- Please describe some lessons that you have taught incorporating academic subjects in the school garden.
    - Probe: What academic subjects did you incorporate in to these lessons?
    - Probe: Do you feel that your students have a better understanding of the academic concept through using the school garden?
    - Probe: What educational resources do you find useful when incorporating academic subjects into school garden lessons.
    - Probe: What factors or resources would best support academic instruction in the school garden?

- Describe the instructional practices you utilize when teaching in the school garden and how effective you feel they are?
    - Probe: How do the students respond to these different instructional practices?
    - Probe: Do you have a favorite instructional practice or one that you feels works better than others

- What motivates you to continue developing and implementing the school garden program?
    - Probe: Is it an intrinsic motivator?
    - Probe: Are their extrinsic factors that motivate you?

- What are some positive observations that you made in participants while teaching in the school garden?
    - Probe: Do students make real world connections?
    - Probe: Do students make academic connections?
    - Probe: What attitudes do you observe in your students when utilizing the school garden?
    - Probe: Do students collaborate and work as teams? Explain?

- Describe how your school garden is funded?
    - Probe: What factors/resources would benefit your school garden program?
    - Probe: Do you sell the plants/vegetables from your school garden?

- What factors or resources would benefit your school garden program?
    - Probe: What professional development topics would be beneficial to you dealing with school gardens?
    - Probe: What professional development have you had in the area of school gardens?

Concluding Discussion

We've talked today about your experiences utilizing a school garden in an agricultural education classroom. What challenges have you faced in implementing your school garden programs into a school-based agricultural education program?

- Do you have any thoughts or comments regarding your school garden program development, implementation, and management that we have not discussed?

I am now going to try to summarize the main points from today's discussion.

(*Interviewer lists the key messages and broad ideas that developed from the discussion.*)

- Is this an adequate summary?

Interviewer reads: As was explained at the beginning of the session, the purpose of this interview was to gather information related to your school garden teaching experiences. Your comments today will aid in future studies involving school garden programs. Also, instructors and teacher educators will be able to learn from your perceptions and experiences related to the development and implementation of school garden programs.

- Have we missed anything or are there any other comments?

Interviewer reads: Thank you for taking time out of your day to share your opinions. Your participation is greatly appreciated and has provided valuable information.

APPENDIX J: PILOT STUDY

Instrumentation & Procedures - Pilot

- Dillman recommends a minimum of 30 responses.
- 42 responses to the online pilot with Florida Ag. Teachers.
- 37 responded yes they had a school garden.
- 3 surveys responded no they did not have a school garden.
- 2 surveys were test surveys.
- 27 respondents answered all of the questions.
- Group sampled was a purposive non-random sample of Florida Agricultural Education teachers.
- Questionnaire was sent through the Florida Ag. Education email list serve.
- All procedures were followed as stated previously.
- Original questionnaire consisted of 47 questions.
- Data was collected through Qualtrics and imported into SPSS software.
- Questionnaire included five constructs:
    - School Garden Information
    - Academic Instruction
    - Support, Resources and Observation
    - Funding and Support
    - Demographic Information

Construct 1: School Garden Information

- School Garden – Yes/No
    - Questions will have nominal bivariate response option.
    - Frequency and percentages will be used to summaries this data.
- Question (if no school garden) will have scale-level multivariate response option.
    - Mean and standard deviation will be used to summarize this data.
- About the School Garden
    - Questions will have scale-level multivariate response options.
    - Frequency and percentages will be used to summarize this data.
- Cronbach's alpha will be calculated using SPSS to determine the consistence of responses in this construct.
- **Data - School Garden Information**
- 92.5% (37) participants reported that their school had a garden or garden program as described in the survey.
- 7.5% (3) participants reported that their school did not have a school garden/program.
- Question (if no school garden) - Crombach's Alpha of .801 from pilot
- Use basic descriptive statistics to identify trends in school garden usage compared to location, number of years teaching, training, size of school.
- T-tests
- Questions Removed:
    - When was your school garden established?
    - What is your role in supporting the school garden?
    - When is the garden used?

Construct 2: Academic Instruction

- How are school gardens characterized?
    - Questions will have scale-level multivariate response options.
    - Frequency and percentages will be used to summarize this data.
- School Gardens are a great place to teach Science, Math, English, Social Studies?
    - Questions will have scale-level multivariate response options.
    - Mean and standard deviation will be used to summarize this data.
    - **Geometric Scoring** within this construct.
- Cronbach's alpha will be calculated using SPSS to determine the consistence of responses in this construct.

- **Data - Academic Instruction**

- Questions Removed:
- What percentage of your school's total population visits that school garden at least once for formal instruction each academic year?
- In your school garden utilized by any other school department?
- Which of the following Non-Core subjects are taught using the garden at your school?
- **Construct 3: Support, Resources and Observations**
- Support
    - Questions will have scale-level multivariate response options.
    - Mean and standard deviation will be used to summarize this data.
- Resources and Observations
    - Questions will have ordinal multivariate response options
    - Frequencies and percentages will be used to summarize this data.
    - Geometric Scoring
- Cronbach's alpha will be calculated using SPSS to determine the consistence of responses in this construct.
- **Data – Support, Resources, Observations**
- What educational resources and materials do you find useful when the garden is a learning laboratory?
    - Cronbach's Alpha of .82
    - Does a significant difference exist between male and female agricultural education teachers' perceptions of positive observations made in their school garden?
- Which of the following positive observations have you made in your school garden participants?
    - Cronbach's Alpha of .924
    - Does a significant difference exist between the preference of resources and materials that male and female agricultural education teachers' find useful when the garden is a learning laboratory?
- For each of the questions the alpha level that was set priori was .05
- The Evaluator will be using an Independent Samples t-test for each question because male and females are independent of each other.