A comparison of experiential learning activities available to juniors and seniors in secondary agriscience education and science education courses

Brittany Leigh Beasley

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A COMPARISON OF EXPERIENTIAL LEARNING ACTIVITIES AVAILABLE TO JUNIORS AND SENIORS IN SECONDARY AGRISCIENCE EDUCATION AND SCIENCE EDUCATION COURSES

By

Brittany Leigh Beasley

A Thesis
Submitted to the Faculty of Mississippi State University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Agricultural and Extension Education in the School of Human Sciences

Mississippi State, Mississippi

August 2010
A COMPARISON OF EXPERIENTIAL LEARNING ACTIVITIES AVAILABLE TO JUNIORS AND SENIORS IN SECONDARY AGRISCIENCE EDUCATION AND SCIENCE EDUCATION COURSES

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The purpose of this study was to determine if secondary agricultural education courses provide students with more experiential learning opportunities than other science-based courses in the high school curriculum. An ex post facto research design was employed for the study. A researcher created instrument was distributed to a sample of Alabama agriscience teachers (23), science teachers (35), and agriscience students (909). Based on the responses of 8 agriscience teachers, 12 science teachers, and 103 students, there was a statistically significant difference in the percentage of class time students spent participating in experiential learning activities. Teachers and students indicated that agriscience classes allowed students to spend a greater percentage of class time participating in service learning projects, and a lesser percentage of class time participating in teacher-centered activities and standardized test preparation and completion. Teachers and students also indicated that agriscience classes presented more opportunities for participation in service learning projects.
DEDICATION

To Daddy—Thank you for letting me be “Daddy’s little girl” but still making sure that I could work harder than any of the guys. Thank you for showing me what it means to be a real ag teacher. I have watched you spend your weekends, spring breaks, summers, and holidays hauling students all over the country and truly admire your dedication to them and your profession. Without your example and guidance, I would not have chosen a career in agricultural education.

To Jared and Jacob—Thank you, Jared, for being a great big little brother. You were my biggest competition in the show ring, a partner in the okra growing business, and a good listener when I needed to vent. Jacob, thank you for always being excited to see or talk to me. You are the smartest little kid I know, and I look forward to watching you grow up and become another super-competitive Beasley kid.

To Grandmother & Granddaddy—Thank you for your Sunday night phone calls just to check in and for letting me “move in” during the summers and Christmas breaks. You are both full of Godly wisdom and encouragement and I could not have made it through college without you.

To Lee—Thank you for being that guy that I knew God would put in my life. I could not have asked for a better boyfriend. I look forward to spending even more time with you now that I am finished with this thing!
ACKNOWLEDGEMENTS

I wish to express thanks to my major professor, Dr. Kirk Swortzel, for providing endless support, guidance, and advice throughout the past six years. If more advisors truly cared for their students the way Dr. Swortzel does, there would be far fewer college drop-outs. I would like to thank my committee members, Dr. Jacquelyn Deeds and Dr. Michael Newman, for their encouraging words and willingness to answer “just one quick question”. All three of you have modeled qualities of great teachers both inside and outside of the classroom and I truly appreciate the examples you have set. I am appreciative to the entire faculty and staff of Agricultural and Extension Education for their willingness to help me grow and succeed as a student at Mississippi State University.
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CHAPTER 1
INTRODUCTION

“Agricultural education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber, and natural resources systems” (National FFA Organization, 2003, p. 1). From this mission statement, it can be recognized that agricultural education is unique, especially in a world where teaching to a test is the accepted norm (Oklahoma Department of Career and Technology Education, 2009, “What is Agricultural Education?”, para. 1). In an article featured on the Carnegie Foundation’s web site, Lloyd Bond (2004) wrote, “A recurring criticism of tests used in high-stakes decision making is that they distort instruction and force teachers to “teach to the test.” The criticism is not without merit.” The agricultural education classroom is unique in its opportunities to use more than one domain of learning (Jenkins & Kitchel, 2008). From activities involving plants and animals to wood-working and welding in the agricultural mechanics lab, students are given a chance to combine what they have learned cognitively with a real life experience. Agricultural education provides students with opportunities to not only learn to do, but also do to learn.
Background

Experiential learning has served as a cornerstone of agricultural education for the last century. These unique learning situations are found in abundance in all three components of agricultural education—classroom/laboratory instruction, Supervised Agricultural Experience (SAE), and FFA (Figure 1).

Figure 1  The Three Circle Model of Agricultural Education

Note: The areas of classroom/laboratory instruction, SAE, and FFA are equally significant to agricultural education. Adapted from the National FFA Organization, 2010.

As shown in the diagram above, it is the intention of agricultural education that equal importance be placed on each of the three components (Georgia Department of Education, 2010, “What It’s About,” para. 4). Each one serves a distinct purpose in ensuring that students have an opportunity to gain agriculturally related experience both inside and outside the classroom. Classroom/laboratory instruction includes not only
traditional classroom or lab learning opportunities, but also school farms, gardens, land labs, greenhouses, and agricultural mechanics labs. Students can learn not only by watching or listening, but by actively participating in a variety of projects.

Supervised agricultural experience, or SAE, is another integral part of agricultural education. Students with an SAE have the opportunity to put into practice the concepts they have learned in the agricultural education classroom and laboratory. The agricultural education teacher/FFA advisor, parents, and community volunteers can oversee students and their chosen projects. The four SAE program areas (exploratory, research/experimentation and analysis, ownership/entrepreneurship, placement) allow students from all social and economic backgrounds to be actively involved. Whether researching new and emerging technologies, pet sitting, or growing zucchini, students have a variety of options when choosing an appropriate and interesting project.

The FFA component of the agricultural education model is a student organization providing agriculturally related activities and leadership opportunities. Students have experiential learning opportunities including career development event participation, livestock shows, and travel. FFA members are eligible for numerous scholarships and can attend leadership conferences on the local, state, and national levels. FFA provides students with opportunities to learn life skills such as teamwork, responsibility, and time management.

A study by Rusk, Summerlot-Early, Machmues, Talbert, and Balschweid (2003) determined if youth livestock exhibitors believed they developed project and life skills from their experiences. They concluded that because of the applied learning experiences
provided by the livestock program, students could relate what they learned in the classroom to something they had seen and done. The youth livestock program is one of many elements of the National FFA Organization that allows students to use psychomotor skills in learning opportunities. Upon reviewing the words of the motto of the National FFA Organization, “Learning to Do, Doing to Learn, Earning to Live, Living to Serve” (National FFA Organization, 2003, p. 27), it could be said that experiential learning has engrained itself into the very heart of agricultural education.

Many agricultural education philosophies have strong experience based components. Even during the formation of agricultural education almost a century ago, philosophers understood the importance of applied learning opportunities. A study by Knobloch (2003) analyzed the ideas of four of the most influential men of early agricultural education. John Dewey emphasized learning in real life concepts. Seaman Knapp stressed the importance of learning by doing. Rufus Stimson highlighted learning through projects. William Lancelot pointed out the idea of learning by solving problems. The thoughts of these four men are still applicable to agricultural education today.

Roberts and Ball (2008) reviewed the philosophies of John Dewey and David Snedden. The researchers stated, “Snedden supported content-centered curricula, focused on specific skill acquisition, based on established industry standards, and delivered separate from general academic content” (pp. 104-105). Snedden’s educational views differed significantly from those of Dewey. Roberts and Ball said, “Dewey argued for an integrated approach in which vocational skills and academic content were blended, delivered in a context-rich environment, with a purpose of developing transferable life
skills” (p. 105). These five agricultural education philosophers realized the importance of incorporating experiential learning into all aspects of agricultural education.

**Statement of the Problem**

Although the opportunities may not be as evident, it is possible for subject areas other than agricultural education to engage students in experiential learning activities. Experiential education theorist Mitchell Sakofs (1995) stated, “It is important to note that experiential education refers to a philosophical orientation and method of presentation rather than a content area. In fact, experiential programming can be applied to all academic fields” (p. 149).

Teachers in other subject areas should be taking advantage of opportunities to integrate experiential learning activities into their curriculum. Perhaps the problem lies in a failure to understand the concepts behind experience based education. In Laura Joplin’s (1981) quest to define experiential education, she outlined nine characteristics used to identify these programs. Included in these traits were the following: (a) student based rather than teacher based; (b) personal, not impersonal nature; (c) process and product orientation; (d) evaluation for internal and external reasons; (e) holistic understanding; (f) component analysis; (g) organized around experience; (h) perception based rather than theory based; and (i) individual based rather than group based (p. 20).

Regardless of the reasons behind the lack of experiential learning opportunities in most secondary education classrooms, one thing is certain: experiential education—if done correctly—involves authentic learning (Knobloch, 2003) and should be utilized not only in agricultural education, but in all science related classes and beyond.
Purpose

The purpose of this study was to determine if secondary agricultural education courses provide students with more experiential learning opportunities than other science-based courses in the high school curriculum.

Research Questions

Keeping in mind the purpose of this study as it relates to experiential learning and agriscience and science courses, the research questions answered by this study were as follows:

1. Will all students have a high quality Supervised Agricultural Experience Program?
2. Will students have more opportunities for participation in service learning projects in agriscience or science courses?
3. Will there be a difference in the percentage of agriscience and science class time students spend participating in experiential learning activities?
4. Will there be a difference in the percentage of agriscience and science class time teachers spend facilitating experiential learning activities?
5. Will there be a difference in the percentage of agriscience and science class time students spend participating in teacher-centered activities?
6. Will there be a difference in the percentage of agriscience and science class time teachers spend directing teacher-centered activities?
Significance of the Study

At the initiation of this study, there was no evidence of research comparing experiential learning in secondary courses of agricultural science and science. However, during March 2010 the National Council for Agricultural Education (The Council) formed a National Planning Committee for Experiential Learning. This committee was charged with SAE implementation, defining the term experiential learning as it related to agricultural science education, and determining the role of experiential learning in the learning process. In the mean time, the research conducted in this study can establish teacher and student perceptions of the amount of experiential learning taking place in science and agricultural science (agriscience) classes. Students and teachers will also be able to identify service learning projects and SAEs conducted in the classes relevant to this study.

The Council has developed a strategic plan for the improvement of Agricultural Education in the United States. For the years 2010-2015, one initiative was to “implement a strategy that makes Agricultural Education more relevant” (National Council for Agricultural Education [The Council], 2010). Agricultural Education provides students with learning experiences unlike those they receive in any other secondary education classroom. However, the stereotype of agricultural education being exclusively for those who wish to farm for a living must be proven fallacious.

The Curriculum for Agricultural Science Education, known as the CASE initiative, is being developed for possible implementation in a number of secondary agricultural education programs across the United States. This curriculum is designed to
use “educational experiences to enhance the rigor and relevance of agriculture, food, and natural resources subject matter” (The Council, 2007). By providing active or real world experiences where students can apply the information learned in other classes, CASE also aids in the comprehension in areas of the sciences and mathematics. However, CASE is not intended to be used in all agricultural education programs, and the expense associated with this curriculum may prevent its widespread utilization.

Although the Curriculum for Agricultural Science Education may not be the solution, agricultural education must find means of showing its relevance in public education. This may be achievable though research studies, such as this one, which compares learning in agriscience education to learning that transpires in other courses in the secondary education curriculum.

Definition of Terms

For the purpose of this study, the following terms have been defined:

1. Experiential Learning—Learning that occurs when students are placed in a situation where they think and interact, learn in and from a real-world environment; involves active participation of the student in planning, development, and execution, of learning activities, is shaped by the problems and pressures arising from the real-world situation and occurs most effectively outside the classroom (Experiential Learning Report: Executive Summary, n.d.).
2. Agricultural Education—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 (Team Ag Ed, 2008).

3. Science-based courses—According to the Alabama State Department of Education, the four science classes available to 9-12 grade students are physical science, biology, chemistry, and physics. The ten elective specializations are aquascience, botany, earth and space science, environmental science, forensic science, genetics, geology, human anatomy and physiology, marine science, and zoology (Alabama Department of Education, 2005).

Assumptions

In connection with the research presented in this study, the following assumptions were considered:

1. Agriculture instructors familiarize students with the three components of agricultural education (Classroom/Laboratory Instruction, SAE, FFA) and facilitate students’ participation in each of the areas.

2. One of the primary reasons students enroll in agriculture classes is because they desire to actively participate in unique experiential learning opportunities.
Limitations

The following limitation was considered while conducting the research study:

1. Due to scheduling conflicts, students may not be enrolled in agricultural science courses and science courses in the same semester.
CHAPTER 2
REVIEW OF LITERATURE

This chapter will examine existing literature in the areas of experiential education and experiential learning. Theories of John Dewey and his contemporaries will be reviewed, followed by an assessment of techniques utilized to incorporate experiential learning opportunities into the secondary education classroom.

Theories of John Dewey

John Dewey is often recognized as one of the first and most influential leaders in experiential education. Disenchanted with the educational practices and the divisions that existed among educational philosophers, he wrote *Experience and Education* (1938) in hopes of uniting the “traditional” and “progressive” education fronts. Dewey believed that learning occurred in all phases of life to all people and could not be restricted to a classroom environment. While analyzing Dewey’s educational theories, Fishman and McCarthy (1998) wrote,

One of the appealing features of Dewey’s philosophy of education is that he shows learning to be natural, not a process confined, as it was for much traditional philosophy, to special schooling or a particular social class. It is not a product of leisure or wealth or divine inspiration. To the contrary, for Dewey, learning is
rooted in biological life, not above the earth but embedded in it, emerging in the very process by which life evolves and is maintained. (p. 19)

Although Dewey denied that social standing or schooling determined a student’s power to learn, he did believe that the quality of experiences had by individuals could affect how much learning occurred. According to Dewey (1938), experience does not equal education, and vice versa. One experience can desensitize learners to the point that they do not react to or learn from similar experiences later. Even experiences that may seem enjoyable and stimulating lose at least some of their educative value if not linked together in some way.

Dewey (1938) believed in two principles that serve to determine the quality and success of experiential education—continuity and interaction. He stated, “Continuity and interaction in their active union with each other provide the measure of the educative significance and value of an experience” (p. 43). Continuity of experience is linked not only with interaction, but also with the principle of habit. On the principle of habit, Dewey (1938) had this to say: “The basic characteristic of habit is that every experience enacted and undergone modifies the one who acts and undergoes, while this modification affects, whether we wish it to or not, the quality of subsequent experiences” (pp. 26-27). When the joining of continuity and habit occurs, the principles then assert that each experience is framed by a previous experience and will continue to shape those occurring in the future. The quality of these experiences is a defining characteristic in determining whether or not learning will occur. Dewey (1938) stated, “Every experience is a moving force. Its value can be judged only on the ground of what it moves toward and into”
Educators have an opportunity to shape the experiences of students by providing an atmosphere that promotes the free expression of ideas and encourages their inquisitive nature.

The principle of interaction is another determinant of the quality of experiential education. According to Dewey (1938), an experience exists because of the interaction between the student and his or her environment (p. 41). This interaction may form a positive or negative experience and can help or hinder the learning process. Much of this is influenced by the teacher. An educator should not focus solely on creating an environment conducive to learning and ignore the strengths and weaknesses of students. Dewey declared,

The principle of interaction makes it clear that failure of adaptation of material to needs and capacities of individuals may cause an experience to be non-educative quite as much as failure of an individual to adapt himself to the material. (p. 46)

John Dewey alleged that continuity and interaction were the cornerstone of experiential education. His contemporaries add to his ideas in the following section.

Theories of David A. Kolb

Another notable experiential education theorist is David A. Kolb. A Professor of Organizational Behavior at Case Western Reserve University in Cleveland, Ohio, he has authored or co-authored several books pertaining to experiential learning.

In the early chapters of his book entitled *Experiential Learning: Experience as the Source of Learning and Development*, Kolb (1984) described experiential learning models of several theorists, including Dewey, Piaget, and Lewin. His experiential
learning model is represented in Figure 2. The three sides of the triangle symbolize the areas of personal development, education, and work. He explained how each part was linked to experiential learning. Regarding his model, Kolb (1984) stated, “It stresses the role of formal education in lifelong learning and the development of individuals to their full potential as citizens, family members, and human beings” (p. 4). Parts of Kolb’s experiential learning model mirror the FFA mission statement which promotes the personal growth, premiere leadership, and career success of agricultural education students.

![Experiential Learning Diagram](image)

**Figure 2** Experiential Learning as the Process that Links Education, Work, and Personal Development

Adapted from *Experiential Learning: Experience as the Source of Learning and Development*, by D.A. Kolb, 1984, p. 4.
Kolb (1984) also discussed several characteristics of experiential learning. He wrote that learning should be thought of as a process rather than an outcome (p. 26). In support of this premise, Kolb (1984) stated, “Learning is described as a process whereby concepts are derived from and continuously modified by experience. No two thoughts are ever the same, since experience always intervenes” (p. 26).

The second characteristic purported by Kolb was the belief that learning is an incessant process with experience as its backbone (p. 27). The classroom application of this characteristic was explained by Kolb in the following:

One’s job as an educator is not only to implant new ideas but also to dispose of or modify old ones. In many cases, resistance to new ideas stems from their conflict with old beliefs that are inconsistent with them. (p. 28)

Perhaps if students had educational experiences that were in conflict with their “old beliefs” rather than being told that their established beliefs were wrong, the resistance to the new ideas could be reduced.

When describing the process of experiential learning, Kolb (1984) presented the *Lewinian Experiential Learning Model* (p. 21). The model is composed of a four stage cycle with concrete experience as the cornerstone. As demonstrated in Figure 3, the cycle begins with a learning experience. At this point, the student may or may not be aware that this is a tangible learning experience. After the experience, a reflection process is initiated. Teachers may ask questions relating to the experience or students may silently or verbally reflect upon what happened. This is often labeled the “What?” phase because it is used to describe the experience. The next part of the cycle involves
forming abstract concepts. This is known as the “So What?” phase because individuals are expected to dig deeper into the meaning of the experience. Finally, the ideas and concepts gleaned from the original experience are tested in new situations. This is recognized as the “Now What?” phase of the experiential learning model. As students apply their newfound knowledge to additional situations and experiences, the cycle begins another rotation.

Figure 3 The Lewinian Experiential Learning Model

Additional Experiential Theorists

Contemporary experiential education theorists support, redefine, or refute the philosophies of John Dewey. However, the contributions that he made to the field of experiential education are notable.

Martha Bell (1993), a sociology professor at the University of Otago in New Zealand, challenged the traditional views of experiential education. She argued that we have gotten away from Dewey’s philosophies of experiential learning as social and group oriented by now using words such as “personal growth” and “character building” to describe it (p. 22). Bell believed that although the models proposed by Dewey, Kolb, and Joplin were useful in defining and identifying some experiential education processes, they should not be used in a restrictive nature. When this happens, experience becomes a concept and fails to be recognized as a “personally and socially lived reality given contextual meanings” (p. 24). She theorized that experiences do not always fit into a certain mold or model and change based on a student’s interpretation of the situation or experience (p. 23). Bell continued by stating, “one of the best functions of experiences is that they are diverse, cannot be fixed or determined, and may invalidate the assumptions that theories rely on” (p. 26).

After visiting 80 high schools in the United States and Australia as a part of a study on school reform, Theodore Sizer, former dean of Harvard’s Graduate School of Education, had many suggestions on how to incorporate experiential learning into modern public education. In an effort to share the findings of his studies, he participated in an interview with Peggy Walker Stevens (1984). Sizer believed that teachers should
do less lecturing and more “coaching” (p. 62). Students should have opportunities to solve problems in a trial and error fashion rather than being automatically told the correct way of completing an assignment. He continued by sharing that experiential learning activities should be within the individual student’s capacity for learning. Sizer declared to Stevens (1984), “You never want to exceed the kid’s grasp. And to come up with a problem that the kids can solve in a legitimate way, not a fake way—that’s hard to do” (p. 64). He encouraged teachers to concentrate more on context rather than simply teaching concepts. If students did not understand the importance of learning a particular concept—how they may have applied it to their lives—or if they had no desire to learn the information, an educational opportunity had been lost. When asked if he saw teachers as problem-posers, Theodore Sizer’s comment provided a good summary of the educator’s role in experiential education. He said, [referring to teacher as problem-poser]

That’s right. Coach, critic, cajoler, supporter, harasser, lover, all of that. But the kid has to be the worker. We have to stop thinking of the schools as the deliverer of instructional services. That’s nonsense. Nobody ever learned by being delivered knowledge on a platter. They have to experience it. (p. 67)

Eighty years after *Experience and Education* was published, Dewey’s philosophies still resonate in the ideas of experiential education theorists.

**Experiential Learning in Secondary Education**

“Like the Hopi vase on the museum shelf which cries for water, the youth of our society cry for useful work” (Kielsmeier, 1989, p. 3). This quote by Marge Piercy serves as an encouragement to all teachers who desire to make their students’ educations a
learning experience, rather than a dumping of ideas into adolescent minds. Opportunities for experiential learning exist in a variety of formats that can be incorporated into secondary education classrooms and beyond. Examples include service learning projects, field trips, and laboratory activities.

**Service Learning Projects**

After much discussion on what exactly constituted a service learning project, the Commission on National and Community Service developed four guidelines that could be used in distinguishing service learning projects from other experience based programs. Kraft (1995) highlighted these guidelines in an article on service learning. Included are the following: (a) Students learn and develop through active participation in thoughtfully organized service experiences that meet actual community needs and that are coordinated in collaboration with school and community; (b) Integrated into the students’ academic curriculum or provides structured time for a student to think, talk, or write about what the student did and saw during the actual service activity; (c) Provides a student with opportunities to use newly acquired skills and knowledge in real-life situations in their own communities; and (d) Enhances what is taught in school by extending student learning beyond the classroom and into the community and helps to foster the development of a sense of caring for others (pp. 102-103).

Examples of service learning projects include working on a Habitat for Humanity project, river/highway clean-up, or building a small greenhouse for an elderly couple. According to an article by Nathan and Kielsmeier (1991), “Combining classroom work with service/social action projects can help produce dramatic improvements in student
attitudes, motivation, and achievement” (p. 78). A service learning project not only provides students with an experience to link classroom activities to the real world, but also allows them to develop their public speaking, critical thinking, and problem solving skills.

Field Trips

Traditional field trips, however exciting and educational they may be, are becoming a thing of the past. Budget constraints and legalities have put an end to a majority of the trips to museums and zoos that had been customarily popular. In an effort to provide students with experiential learning opportunities that connect to lesson content and save money all at the same time, electronic field trips are being developed and used by teachers across the nation.

In a study by Cassady, Kozlowski, and Kommann (2008), instructional materials, including computer modules and classroom curriculum, were created and used in class prior to the electronic field trip—a live broadcast from the Grand Canyon (p. 445). Students who were provided with all of the instructional materials relating to the electronic field trip, including computer modules, curriculum, and the live broadcast, had the highest scores on a knowledge test relating to the Grand Canyon when compared to students who had only partial access to instructional materials and no access to the live broadcast (p. 448). Students who were given the opportunity to connect concepts with experiences performed better than those who participated in a lecture or complete computer based assignments. Cassady et al. (2008) stated, “Empirical studies of experiential learning activities for children provide evidence that it is generally the
concrete experiences combined with active experimentation that leads to the greatest
degree of individual learning” (p. 440).

*Supervised Agricultural Experiences (SAEs)*

Supervised Agricultural Experiences represent one third of the model of
agricultural education. This component gives students the opportunity to apply the
concepts and skills learned in the agricultural education classroom or laboratory to an
actual problem or situation. With the possible exception of record-keeping, which some
teachers may use as an in class assignment, students are responsible for carrying out their
SAE’s outside of the classroom.

As previously mentioned, students can choose an SAE in one of four areas:
exploratory, research/experimentation and analysis, ownership/entrepreneurship, or
placement. Because of this variety, all agricultural education students—regardless of
socioeconomic level or background in agriculture—can have a quality SAE.

An exploratory SAE gives students an opportunity to discover which areas of
agriculture interest them the most (National Council for Agricultural Education [The
students can especially benefit from this type of Supervised Agricultural Experience. An
example of an exploratory SAE includes job shadowing at an agriculturally related
business. An exploratory SAE can easily evolve into a placement or entrepreneurship
SAE.

A research/experimentation SAE allows students to conduct research on an issue
Since agriculture is a science based field, students use the scientific method to make predictions, conduct research, and draw conclusions. As long as it relates to agriculture, options for research/experimentation SAEs are without limit.

An ownership/entrepreneurship SAE gives students the opportunity to operate their own business or enterprise (The Council & National FFA Organization, 2002, p. 2-2). Ideas for this type of SAE are only limited by the interests and efforts of students. Examples may include lawn care businesses, photography, or producing and marketing livestock or crops. As with any Supervised Agricultural Experience, students should be able to show steady growth with their project.

Students with placement SAEs work for someone else in return for experience or pay (The Council & National FFA Organization, 2002, p. 2-2). Internships with agriculture companies can also provide unique placement experiences. Students may choose to work in an area that they would be interested in as a career. Examples could include working with a veterinarian or as an apprentice welder. According to a 1993 study by Hughes and Barrick, “SAE programs allow students to focus on their vocational interests and can effectively provide job training” (p. 65). Experience based activities are a vital part of any Supervised Agricultural Experience project.

Summary

Literature describing the work of both Dewey and Kolb recognized them as visionaries in the field of experiential learning. The work of additional experiential learning theorists, such as Joplin, Bell, and Sizer, often strengthened and complemented the findings of both Dewey and Kolb. Experiential learning goals and models are often
reflective of the goals and models of agricultural education. No matter which philosophies are supported or what type of instruction is used, it should be noted that although not all experience is educational, all true learning involves experience.

Experiential learning opportunities in secondary education include experiments/lab activities, service learning projects, and field trips. Many of these student centered learning activities are used sparingly in the normal secondary classroom, with teacher centered activities dominating the class time. Agricultural education is unique in that its components and curricula are more often than not experience based. Literature supports the theories that individual components of agricultural education (classroom/laboratory instruction, SAE, FFA) provide students with vast experiential learning opportunities. However, there has been little exploration of the actual amount of class time students spend on experiential learning activities. The current study will compare the amount class time allotted for experiential learning in science courses and agricultural education courses.
CHAPTER 3
METHODOLOGY

The purpose of this chapter is to describe all methods and measures used by the principal investigator when carrying out the present study. This includes a description of the design of the research, the population utilized in the study, the instrumentation employed, reliability and validity of the instrument, data collection protocol, and the analysis of the data.

Design of the Research

Because this research study desired to discover if a relationship existed among the variables, an ex post facto, or causal comparative, research design was used with this study. From the two types of ex post facto research designs, the proactive ex post facto design was deemed more appropriate for this study. According to Ary, Jacobs, Razavieh and Sorenson (2009), the proactive design is used when subjects are grouped based on preexisting independent variables. The independent variable either cannot be manipulated or the manipulation occurred before the researcher became involved with the subjects.
Considering the utility of ex post facto studies, Ary, Jacobs, and Razavieh (1990) stated, Causal-comparative research, though not a satisfactory substitute for experimentation, does provide a method that can be used in the circumstances under which much of educational research must be conducted. It remains a useful method that can supply much information of value in educational decision making. (pp. 357-358)

Population

Since the Alabama State Department of Education refers to agricultural education as “agriscience”, for the purpose of this study all references to agricultural education from this point forward will instead state “agriscience”. The words are very similar, if not identical, in meaning and intent.

The population utilized for this study consisted of the agriscience and science courses taken by eleventh and twelfth grade agriscience students in public secondary schools in Alabama. A cluster sampling of schools with agriscience programs yielded a sample of 20 schools. The sample included 23 agriscience teachers, 35 science teachers, and 909 students.

Variables

The independent variable in the study was the course. The variable had two levels, agriscience education and science education. Team Ag Ed, an alignment of several agricultural education organizations, defines agricultural science education as “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” (Team Ag Ed, 2008). High school students are offered a variety of science courses during their eleventh and twelfth grade years. These courses may include chemistry, physics, biology, anatomy and physiology, and physical sciences. A simple definition of science education offered by J.P. Siepmann (1999) involves attempting to describe and understand the nature of the universe in whole or part.

The dependent variable was the level of experiential learning. This was identified as the percentage of class time that students spent engaged in experiential learning activities. These percentages were recorded by utilizing the surveys completed by both agriscience and science students and teachers.

Pilot Test

During the winter of 2009, a pilot test was conducted as a means of determining the reliability of the instrument. The instrument was completed by 8 students, 2 science teachers, and 1 agriscience teacher in an Agricultural and Environmental Science and Technology program in Mississippi. The pilot test was presented in test-retest fashion, with three weeks between the testing dates. Instruments were given to participants the first and fourth weeks of February.

Instrumentation

One student survey and two teacher surveys were created by the principal investigator. The student survey was divided into three sections: Agriscience Class Information, Science Class Information, and Demographic Information.
The teacher instruments were composed of two sections, the first containing class information and the second pertaining to demographic data.

In regards to the student instrument (Appendix A), part one, Agriscience Class Information, asked students questions relating to formal and informal learning environments. Students were asked to describe their Supervised Agricultural Experience program, but this question may have been left unanswered if students did not have an SAE. Another question inquired about class service learning projects. Again, if the agriscience class did not participate in any service learning activities this question was unanswered. SAE’s and service learning projects can provide students with valuable experience based learning in an informal environment, i.e. outside of the classroom.

Next, the instrument asked students to name the most enjoyable aspects of their agriscience class. Finally, students were to identify the percentage of class time utilized in a typical month for the following: experiential learning, teacher centered learning, standardized test preparation and completion, and special events/school functions.

A statement highlighting that percentages should add up to 100 was also present in the student surveys. With the exception of the questions pertaining to SAEs—because of its exclusiveness to agriculture education—the Science Class Information section is comparable to the Agriscience Class Information section.

The Demographic Information section of the agriscience student instrument included inquiries about the grade level, gender, ethnicity, title of agriscience class in which the student was enrolled, and the title of the science class in which the student was currently enrolled or the one most recently completed.
The first sections of the teacher instruments were fundamentally the same as the related sections of the student instruments. Once again, the agriscience teacher instrument (Appendix B) asked for SAE information where the science teacher instrument (Appendix C) did not. Specifically, the teacher instrument asked for the number of students who have an SAE. The teacher survey also requested an inventory of the agriscience and science courses offered for eleventh and twelfth grade students. Both teacher instruments requested the data relating to the amount of class time spent in a typical month on the areas of experiential learning, teacher centered learning, standardized test preparation and completion, and special events/school functions.

Part two of the teacher instruments inquired about the demographic information of the agriscience and science teachers. The teachers were asked to indicate the following: gender, number of years in specific profession (teaching agriscience or science), length of class period, and number of eleventh and twelfth grade students.

Reliability and Validity

Data from the pilot test were used to establish the reliability of the instrument. According to Ary et al. (2009), reliability is useful in determining if the instrument consistently measures what it says it will measure. Test-retest reliability is commonly used when test data is to be used in the future or when test items are not heterogeneous (Burns, 1980).

The test-retest data were entered into Predictive Analytics Software (PASW 17.0 for Windows), formerly known as SPSS, a statistical computation program for the social sciences. Based on the processes used by Ferguson (1976), Pearson’s correlation was
used to find $r$ for questions on the agriscience student, agriscience teacher, and science teacher instruments. Next, $r$ was transformed to a normally distributed variable using Fisher’s $z’$. An average $z’$ was calculated for each instrument and was converted back to $r_{\text{test-retest}}$ for a final reliability score on student and teacher instruments. All reliability coefficients are presented in Table 1.
Table 1  Reliability of Student and Teacher Instruments

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pearson’s $r$</th>
<th>Fisher’s $z'$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Instrument</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriscience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiential Learning</td>
<td>.998</td>
<td>2.994</td>
</tr>
<tr>
<td>Teacher-Centered Learning</td>
<td>.994</td>
<td>2.647</td>
</tr>
<tr>
<td>Standardized Tests</td>
<td>1.000</td>
<td>2.994</td>
</tr>
<tr>
<td>Activities Unrelated to Course</td>
<td>.976</td>
<td>2.185</td>
</tr>
<tr>
<td>Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiential Learning</td>
<td>.912</td>
<td>1.528</td>
</tr>
<tr>
<td>Teacher-Centered Learning</td>
<td>.995</td>
<td>2.994</td>
</tr>
<tr>
<td>Standardized Tests</td>
<td>.928</td>
<td>1.623</td>
</tr>
<tr>
<td>Activities Unrelated to Course</td>
<td>.970</td>
<td>2.092</td>
</tr>
<tr>
<td>$r_{test-retest} = .980$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Agriscience Teacher Instrument</strong></td>
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<td></td>
</tr>
<tr>
<td>Experiential Learning</td>
<td>1.000</td>
<td>2.994</td>
</tr>
<tr>
<td>Teacher-Centered Learning</td>
<td>1.000</td>
<td>2.994</td>
</tr>
<tr>
<td>Standardized Tests</td>
<td>1.000</td>
<td>2.994</td>
</tr>
<tr>
<td>Activities Unrelated to Course</td>
<td>1.000</td>
<td>2.994</td>
</tr>
<tr>
<td>$r_{test-retest} = .995$</td>
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<td></td>
</tr>
<tr>
<td><strong>Science Teacher Instrument</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiential Learning</td>
<td>1.000</td>
<td>2.994</td>
</tr>
<tr>
<td>Teacher-Centered Learning</td>
<td>1.000</td>
<td>2.994</td>
</tr>
<tr>
<td>Standardized Tests</td>
<td>1.000</td>
<td>2.994</td>
</tr>
<tr>
<td>Activities Unrelated to Course</td>
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<td>2.994</td>
</tr>
<tr>
<td>$r_{test-retest} = .995$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

30
According to Ary et al. (2009), “Validity is the most important consideration in developing and evaluating measuring instruments” (p. 225). Validity has traditionally been defined as the degree to which an instrument measures what it asserts it will measure. However, Ary et al. (2009) indicated that the purpose of validity has been revisited and now focuses more directly on the interpreting and measuring of instrument results than on the instrument itself.

For this research study, content validity was established through an expert panel review. The panel was comprised of professionals in the field of agricultural and extension education. The expert panel included teacher educators and extension specialists. The panel reviewed instrument items to insure that all questions were aligned with the purpose of the research study and that they were appropriate for the age level of the participants.

The instrument used for this research study should consistently measure what it is intended to measure. It exhibits good test-retest reliability and satisfactory validity as established by the panel of experts.

Data Collection

Upon completion of the pilot test and verification of the reliability and validity of the instrument, final edits were made to the student and teacher instruments during early spring 2009. Identical questionnaire packets were sent to agriscience teachers during April 2009 and October 2009. Both of these groups comprise the sample for the research study. There is no record of major events or circumstances that would cause a substantial difference between the spring and fall participants.
Several factors helped determine that paper form mailed surveys would best serve the population. An initial email sent to a group of agriscience teachers had a response rate of 9% (2 out of 23). Additionally, gaining computer and internet access could have presented an issue in some rural school systems, especially considering the fact that teachers indicated that as many as 70 students at a single school would be eligible for participation in the research study.

Prior to receiving approval from the Institutional Research Board (IRB), principals from the selected schools had to grant permission for their schools to be utilized in the research study. The letter (Appendix D) first explained that the study would be a comparison of experiential learning in science and agriscience classes and identified what groups would be asked to complete a survey. It indicated that the agriscience teacher would be responsible for distribution and collection of the instruments. Furthermore, the letter stated that all school, student, and teacher information would remain confidential and that results of the research could be mailed to the principal if he or she so desired. Principals had the option of mailing the permission letter directly to the researcher or submitting it to the agriscience teacher. The researcher’s contact information was listed at the conclusion of the letter. Principals who were unresponsive to the original letter were contacted by phone. Once the principal permission letters had been received, they were submitted to the IRB. The Institutional Review Board granted permission to the principle investigator to officially begin the research study (Appendix K).
After gaining principal permission, a formal letter (Appendix E) was sent to the agriscience teachers requesting their consent to participate in the research study. Attached to the letter was a form (Appendix F) that teachers could return if they agreed to participate in the study. As with the principal permission letter, an explanation of the purpose of the study was included. If the agriscience teachers agreed to participate in the study, they were asked to indicate the number of students eligible to take part in the research on the attachment and fax the attachment to the principal investigator. Approximately three weeks after the letters were mailed, teachers who had not responded were contacted by phone. Teachers who were unable to be contacted via phone call received a fax reminder reflective of the original letter. Agriscience teachers unresponsive beyond this point were assumed to have denied consent for participation.

Those agriscience teachers who indicated a desire to participate were mailed the survey packet containing a letter thanking them for their cooperation (Appendix G), directions for distributing the instruments (Appendix H), assent forms for students, and the science teacher, agriscience teacher, and student instruments. Because student participants were minors, the parental permission (Appendix I) and student assent forms (Appendix J) had to be returned prior to participation in the study. These consent forms explained the purpose of the research and expectations of participants. Investigator contact information was provided.

Instruments were color-coded and labeled to insure that participants filled out the correct forms. Science teachers received green instruments, agriscience teachers were provided with blue instruments, and the student surveys were yellow. Teachers were
directed to return surveys no later than Wednesday, May 20, 2009 for the spring participants and Friday, December 4, 2009 for the fall participants. The principal investigator attempted to contact by phone all teachers who had not returned the instrument packets. Teachers who did not answer when phoned were faxed a reminder. No instrument packets were received after the deadlines; therefore, there were no late respondents. A total of 8 agriscience teachers, 12 science teachers, and 103 students responded. This yielded a 35% response rate for agriscience teachers, a 34% response rate for science teachers, and an 11% student response rate.

Because of the low response rate, non response bias had to be considered. Substantial differences existed in the demographics of respondents and non respondents. Because of these differences, the findings of this study cannot be generalized.

Data Analysis

Data was transferred from the hardcopy instruments to Predictive Analytics Software (PASW 17.0 for Windows), formerly known as SPSS, a statistical computation program for the social sciences. Descriptive statistics including means, standard deviations, and frequencies were calculated. Means and standard deviations were computed for the experiential learning activities, lecture/bookwork, test preparation and test taking, and school assembly questions in the agriscience course and science course sections. Frequencies and percentages were computed for the demographic information.

A dependent t-test, more specifically, a paired samples t-test was used to analyze the results of the student questionnaires. Dependent t-tests, also commonly named correlated, non-independent, or paired t-tests, are used to compare variables based on
qualities that are significant to the study (Ary, Jacobs, Razavieh and Sorenson, 2006). The paired samples $t$-test was selected to compare the means of two sets of data for a single sample.

An independent measures $t$-test was employed to compare the experiential learning results of the agriscience teacher and science teacher instruments. Independent $t$-tests are used when there are two separate samples for each treatment condition. For both the dependent and independent $t$-tests statistical significance was set at the .05 alpha level.
CHAPTER 4

FINDINGS

The purpose of this chapter is to explain the findings of the research study conducted to compare the experiential learning opportunities in agriscience and science courses as perceived by eleventh and twelfth grade agriscience students and their agriscience and science teachers. Included in this chapter is a restatement of the problem and research questions, as well as descriptions of the demographics of the participants and research findings that relate to the research questions.

Statement of the Problem

Although the opportunities may not be as evident, it is possible for subject areas other than agricultural education to engage students in experiential learning activities. Experiential education theorist Mitchell Sakofs (1995) stated, “It is important to note that experiential education refers to a philosophical orientation and method of presentation rather than a content area. In fact, experiential programming can be applied to all academic fields” (p. 149). Teachers in other subject areas should be taking advantage of opportunities to integrate experiential learning activities into their curriculum. Perhaps the problem lies in a failure to understand the concepts behind experience based education. In Joplin’s (1981) quest to define experiential education, she outlined nine characteristics used to identify these programs (p. 20). Included in these traits were the
following: (a) student based rather than teacher based; (b) personal, not impersonal nature; (c) process and product orientation; (d) evaluation for internal and external reasons; (e) holistic understanding; (f) component analysis; (g) organized around experience; (h) perception based rather than theory based; and (i) individual based rather than group based. In addition to Joplin’s characteristics, David Kolb’s model, as outlined by Proudman (1992), purports that true experiential learning should embrace each of the recognizable learning styles: concrete experience, reflective observation, abstract conceptualization, and active experimentation (p. 245). Regardless of the reasons behind the lack of experiential learning opportunities in most secondary education classrooms, one thing is certain: experiential education—if done correctly—involves authentic learning (Knobloch, 2003) and should be utilized not only in agricultural education, but in all science related classes and beyond.

Research Questions

Keeping in mind the purpose of this study as it relates to experiential learning and agriscience and science courses, the research questions for the study are as follows:

1. Will all students have a high quality Supervised Agricultural Experience Program?

2. Will students have more opportunities for participation in service learning projects in agriscience or science courses?

3. Will there be a difference in the percentage of agriscience and science class time students spend participating in experiential learning activities?
4. Will there be a difference in the percentage of agriscience and science class time teachers spend facilitating experiential learning activities?

5. Will there be a difference in the percentage of agriscience and science class time students spend participating in teacher-centered activities?

6. Will there be a difference in the percentage of agriscience and science class time teachers spend directing teacher-centered activities?

Demographics

Demographic data were collected from students and teachers who participated in the study. Students were asked to indicate their grade level, gender, and ethnicity. Of the 102 valid responses, approximately 21% of the students were female and approximately 78% were male. A majority (64%) of students indicated that they were in the eleventh grade, while 35% of the students were in the twelfth grade. As Table 2 revealed, 92.2% of the students were Caucasian, almost 3% reported being of an unlisted ethnic group, 1% reported being Asian-American and 1% were Hispanic/Latino.
Table 2  Frequencies and Percentages of Student Demographic Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>21.3</td>
</tr>
<tr>
<td>Male</td>
<td>80</td>
<td>77.7</td>
</tr>
<tr>
<td>No Response</td>
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<td>1.0</td>
</tr>
<tr>
<td><strong>Grade level</strong></td>
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<td></td>
</tr>
<tr>
<td>Eleventh</td>
<td>66</td>
<td>64.0</td>
</tr>
<tr>
<td>Twelfth</td>
<td>36</td>
<td>35.0</td>
</tr>
<tr>
<td>No Response</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Asian American</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>Caucasian</td>
<td>95</td>
<td>92.2</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>2.9</td>
</tr>
<tr>
<td>No Response</td>
<td>3</td>
<td>2.9</td>
</tr>
</tbody>
</table>

The demographic information solicited from both agriscience and science teachers included gender, number of years in profession, and length of class period. All of the agriscience teachers were male. Of the nine agriscience teacher responses, the largest percentage (55.6%) reported having taught between 19-27 years, with the average number of years having taught being 21.0 ($SD=11.64$). As shown in Table 3, approximately 55% of agriscience teachers reported being on block or modified block class schedule with the length of classes being between 80-96 minutes.
Of the twelve science teacher responses, 50% were male and 50% were female. Upon collapsing data into categories, approximately 58% of the science teachers had between 10-18 years of teaching experience, with an average of 12.8 years ($SD=7.79$). As Table 3 illustrates, length of class period was equally divided with 50% of science teachers having 48-60 minute classes and 50% having 80-96 minute classes.
Table 3  Frequencies and Percentages of Agriscience Teacher (N=9) and Science Teacher (N=12) Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Agriscience Teacher</th>
<th>Science Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Male</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Years in Profession</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-9</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10-18</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>19-27</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Over 28</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Length of Class Period</td>
<td></td>
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</tr>
<tr>
<td>48-60</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>80-96</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
Part 1 of the agriscience student instrument asked students to indicate whether or not they had an SAE and briefly describe it. Agriscience teachers were asked to indicate the number of junior and senior students who had an SAE. Since SAEs are exclusive to the agriscience education curriculum, questions pertaining to SAEs were not included in the science teacher instrument.

Agriscience teachers were asked to indicate the specific number of junior students and senior students who had SAEs. When compared to the total number of junior and senior students enrolled in agriscience classes (272), 171 junior and senior students (approximately 63%) had a Supervised Agricultural Experience program, as reported by agriscience teachers. It is important to note that some of the students recognized by the agriscience teachers as having SAEs may not have participated in the research study.

Of the 103 valid student responses, 71.3% of students indicated that they had a Supervised Agricultural Experience (Table 4). When asked to describe their SAE, 44.6% gave satisfactory responses. In order to be considered a “satisfactory response”, the description of the SAE should have allowed the researcher to classify it into a SAE category (exploratory, research/experimentation and analysis, placement, or ownership/entrepreneurship) honored by the National FFA Organization. Examples of satisfactory responses listed by students on the questionnaire are as follows: work at the city park, HVAC apprentice, work for a landscaping and lawn care company, grow soybeans and corn, and raise cattle.
Examples of responses that were not considered satisfactory included descriptions of the agriscience teacher, describing quality of the SAE in words like “good” or “fun”, or listing the title of the agriscience course.

Table 4  Frequencies and Percentages for Student Supervised Agricultural Experience Data

<table>
<thead>
<tr>
<th>SAE</th>
<th>$f$</th>
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</tr>
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<tr>
<td>Yes</td>
<td>72</td>
<td>71.3</td>
</tr>
<tr>
<td>No</td>
<td>29</td>
<td>28.2</td>
</tr>
<tr>
<td>No Response</td>
<td>2</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Teacher and Student Data on Service Learning Projects

Both science and agriscience teachers were asked if service learning projects were carried out as a part of the courses they taught. If the teachers answered yes, then they were asked to describe the service learning project or projects. All agriscience teachers responded that they utilized service learning projects as a part of experiential learning activities in junior and senior agriscience courses. Approximately 58% of science teachers reported facilitating service learning projects for their junior and senior students.

Students were asked to indicate whether or not they participated in service learning projects in agriscience and/or science class (Table 5). Approximately 85% of students indicated participating in service learning projects in agriscience courses. Common examples of agriscience class service learning projects reported by students
included landscaping around the school and park, reading to elementary school students, and organizing agriculture awareness events for Farm-City week. As reported in Table 5, 54.4% of students participated in service learning projects in science courses. Commonly listed examples of science service learning projects were recycling and highway cleanup.

Table 5  Frequencies and Percentages for Student Service Learning Project Data

<table>
<thead>
<tr>
<th>Class</th>
<th>$f$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriscience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>87</td>
<td>84.5</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>13.6</td>
</tr>
<tr>
<td>No Response</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Science</td>
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<td></td>
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<tr>
<td>Yes</td>
<td>56</td>
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<tr>
<td>No</td>
<td>47</td>
<td>45.6</td>
</tr>
<tr>
<td>No Response</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Paired-samples $t$-test for Student Service Learning Project Data

A paired-samples $t$-test was conducted in order to compare the means of the percentage of students who participated in service learning projects in agriscience and science courses. As responses were keyed into PASW, no service learning project was given a score of 0 while a yes answer to service learning project questions were given a score of 1, for both agriscience and science courses. There was a significant difference in the percentage of students who participated in service learning projects in agriscience courses ($M=.86, SD=.35$) and science courses ($M=.54, SD=.50$), $t(100)=6.52, p < 0.001$
(two-tailed). Exhibited in Table 6, these results suggest that students participated in more service learning projects in agriscience courses when compared to science courses.

Table 6  Paired-Samples t-test of the Comparison of Participation in Service Learning Projects in Agriscience and Science Courses as Reported by Students (N=101)

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>$M$</th>
<th>$SD$</th>
<th>$SEM$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Learning Project Pair</td>
<td>.32</td>
<td>.49</td>
<td>.05</td>
<td>6.52</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Note.* No service learning project=0, service learning project=1.

Most Enjoyable Activities in Agriscience and Science Courses

Students were asked to describe the activities they found the most enjoyable in agriscience courses and science courses. Depending on the teaching methods used by the agriscience and science teachers, the majority of the activities could have been experiential learning activities.

The most commonly mentioned activities for agriscience courses included the following: wood working, welding, engines, electricity, landscaping, mowing/lawn care, taking care of horses, and learning about beef cattle/animal science. For science courses, the most commonly listed activities included recycling, dissecting, catching bugs,
learning about the body, learning about wildlife, science documentaries/watching movies, group projects, and lab experiments.

A Comparison of the Amount of Time Utilized for Classroom Activities

Paired-samples $t$-tests were used to compare the means of the time spent participating in activities in agriscience and science courses as reported by students. Independent $t$-tests were used to compare the means of agriscience teacher and science teacher responses. Paired-samples $t$-tests and independent $t$-tests were computed for each of the following: class time spent conducting experiential learning activities, class time spent on teacher centered activities (bookwork, lecture, etc.), class time spent preparing for or taking standardized tests and class time spent in non-class related functions, such as pep rallies or assemblies. Means and standard deviations of the data are provided in Table 7.

Students and teachers reported how class time was utilized in terms of percentage of a typical month. With that in mind, students reported spending an average of approximately 63% of time in agriscience courses participating in experiential learning activities and only 23% of time in science courses. For agriscience teachers and science teachers, an average of 67% and 17% of class time was spent facilitating experiential learning activities, respectively.

Upon reviewing the data for class time spent on teacher-centered activities, students indicated that an average of 22% of time in agriscience and 49% of time in science was utilized for these activities in a typical month (Table 7). Teachers indicated
that an average of 23% of class time in agriscience courses and 65% of class time in science courses was spent directing teacher-centered activities.

When considering the responses for the percentage of class time spent preparing for and taking standardized tests, students reported for agriscience courses an average of 8% of class time was used for this purpose in a typical month. For science courses, students reported 16% of class time was utilized. Agriscience teachers indicated that they spent 4% of class time preparing for and administering standardized tests, while average for science teachers was approximately 12%.

For activities unrelated to the course, such as assemblies or pep rallies, students indicated that approximately 8% of agriscience class time and 10% of science class time was utilized. As shown in Table 7, both agriscience teachers and science teachers indicated that an average of 6% of class time was devoted to these activities in a typical month.
Table 7  Means and Standard Deviations of Percentage of Class Time Utilized for Activities (Students and Teachers)

<table>
<thead>
<tr>
<th>Activity Type</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiential Learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriscience Course Student</td>
<td>62.97</td>
<td>20.73</td>
</tr>
<tr>
<td>Agriscience Teacher</td>
<td>67.00</td>
<td>14.95</td>
</tr>
<tr>
<td>Science Course Student</td>
<td>22.72</td>
<td>20.26</td>
</tr>
<tr>
<td>Science Teacher</td>
<td>16.86</td>
<td>9.72</td>
</tr>
<tr>
<td>Teacher Centered Learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriscience Course Student</td>
<td>22.19</td>
<td>13.97</td>
</tr>
<tr>
<td>Agriscience Teacher</td>
<td>23.13</td>
<td>13.08</td>
</tr>
<tr>
<td>Science Course Student</td>
<td>49.44</td>
<td>25.20</td>
</tr>
<tr>
<td>Science Teacher</td>
<td>65.04</td>
<td>9.50</td>
</tr>
<tr>
<td>Standardized Tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriscience Course Student</td>
<td>8.41</td>
<td>9.92</td>
</tr>
<tr>
<td>Agriscience Teacher</td>
<td>4.00</td>
<td>3.30</td>
</tr>
<tr>
<td>Science Course Student</td>
<td>16.56</td>
<td>15.37</td>
</tr>
<tr>
<td>Science Teacher</td>
<td>11.92</td>
<td>5.73</td>
</tr>
<tr>
<td>Activities Unrelated to Course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriscience Course Student</td>
<td>7.61</td>
<td>6.94</td>
</tr>
<tr>
<td>Agriscience Teacher</td>
<td>5.88</td>
<td>2.75</td>
</tr>
<tr>
<td>Science Course Student</td>
<td>9.86</td>
<td>9.06</td>
</tr>
<tr>
<td>Science Teacher</td>
<td>6.17</td>
<td>3.13</td>
</tr>
</tbody>
</table>
Comparison of Time Utilized for Experiential Learning Activities

A paired-samples *t*-test was conducted to compare the amount of time spent on experiential learning activities in agriscience and science courses, as reported by student participants. There was a significant difference in the amount of time spent conducting experiential learning activities in agriscience courses \((M=62.97, SD=20.73)\) and science courses \((M=22.72, SD=20.26)\), \(t(98)=14.69, p<0.001\) (two-tailed). As shown in Table 8, these results suggest that students spent a significantly greater percentage of class time participating in experiential learning activities in agriscience courses when compared to science courses.

Table 8  
Paired-Samples *t*-test of the Comparison of Experiential Learning as Reported by Students (N=99)

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>(M)</th>
<th>(SD)</th>
<th>(SEM)</th>
<th>(t)</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiential Pair</td>
<td>40.25</td>
<td>27.42</td>
<td>2.76</td>
<td>14.61</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

As displayed in Table 9, an independent *t*-test was used to compare the amount of class time agriscience teachers and science teachers spent facilitating experiential learning activities. There was a statistically significant difference in the amount of time teachers spent facilitating experiential learning activities in agriscience courses \((M=67.00, SD=14.95)\) and science courses \((M=16.86, SD=9.72)\), \(t(18)=-9.13, p<0.001\).
(two-tailed), when equal variances were assumed. These results propose that agriscience teachers spent a greater amount of class time facilitating experiential learning activities than science teachers.

Table 9  Independent Samples $t$-test of the Comparison of Experiential Learning as Reported by Teachers (N=20)

<table>
<thead>
<tr>
<th></th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Experiential</td>
<td>-50.13</td>
<td>5.49</td>
<td>-9.13</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Comparison of Time Utilized for Teacher-Centered Activities

In order to compare the amount of class time spent on teacher centered activities as reported by students, a paired-samples $t$-test was employed. As indicated in Table 10, there was a difference in the amount of time spent participating in teacher-centered activities in agriscience courses ($M=22.19$, $SD=13.97$) and science courses ($M=49.44$, $SD=25.20$), $t(98)=-8.78$, $p < 0.001$ (two-tailed). These results purport that students spent significantly less agriscience class time participating in teacher-centered activities, such as book work or lecture, when compared to science courses.
Table 10  Paired-Samples $t$-test of the Comparison of Teacher-Centered Activities as Reported by Students (N=99)

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>$M$</th>
<th>$SD$</th>
<th>$SEM$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher-Centered</td>
<td>-27.26</td>
<td>30.90</td>
<td>3.11</td>
<td>-8.78</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Activities Pair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An independent $t$-test was used to determine if a significant difference existed in the amount of class time taught by teacher-centered methods, as stated by agriscience and science teachers. As demonstrated in Table 11, a difference existed in the amount of class time spent directing teacher-centered activities by agriscience teachers ($M = 23.13$, $SD = 13.08$) and science teachers ($M = 65.04$, $SD = 9.50$), $t(18) = 8.33$, $p < 0.001$ (two-tailed), when equal variances were assumed. These results allege that science teachers spent a significantly greater amount of class time directing class by utilizing teacher-centered methods than agriscience teachers.
Table 11    Independent Samples $t$-test of the Comparison of Teacher-Centered Activities
as Reported by Teachers (N=20)

<table>
<thead>
<tr>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Centered Activities</td>
<td>41.92</td>
<td>5.03</td>
<td>8.33</td>
</tr>
</tbody>
</table>

Summary of Findings

Upon comparing how time is used in agriscience and science courses, it was revealed that students spent a greater amount of time participating in experiential learning activities in agriscience courses. When considering teacher-centered activities, such as book work or lecture, the greater amount of time was utilized in science courses. A larger percentage of class time was needed for preparation and administration of standardized tests in science courses. There was a nonsignificant difference in the amount of agriscience and science class time spent participating in functions unrelated to the courses, such as pep rallies or school assemblies.
CHAPTER 5
SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND DISCUSSION

The purpose of this final chapter is to summarize the study and to present conclusions from the data collected from selected Alabama agriscience students and teachers, as well as science teachers. Additionally, the chapter provides recommendations for further research and for improving the quality and quantity of experiential learning activities in agriscience and other science-based courses. The chapter and thesis concludes with a final discussion of the research and its findings.

Summary

Agriscience education courses provide secondary school students with opportunities to participate in a variety of experiential learning activities, in both formal and informal settings. The fact that all three parts of the agriscience education model are intracurricular makes for an easy transfer from “learning to do” in the classroom to “doing to learn” in real world settings. Although other classes in the secondary education curriculum, particularly science-based courses, contain experiential learning activities, little research has been conducted to compare the amount of class time utilized for experiential learning. At a time when each course must prove its worth and relevance, such research studies could help agriscience classes ascertain a permanent position in all secondary education curricula.
The purpose of this study was to determine if secondary agriscience education courses provide students with more experiential learning opportunities than other science-based courses in the high school curriculum. In order to accomplish the purpose of the study, an ex post facto research method was employed. The population utilized for this study consisted of the agriscience and science courses taken by eleventh and twelfth grade agriscience students in public secondary schools in Alabama. A cluster sampling of schools with agriscience programs yielded a sample of 20 schools. The sample included 23 agriscience teachers, 35 science teachers, and 909 students.

Information concerning the amount of experiential learning opportunities in agriscience and science courses was collected through the utilization of a researcher created instrument. The student instrument consisted of three parts: agriscience class information, science class information, and demographic information. The agriscience and science teacher instruments requested class information and demographic information.

Part one of the student instrument consisted of questions used to determine if students had a Supervised Agricultural Experience program and if so, would it be considered acceptable by the National FFA Organization. A question pertaining to students’ participation in service learning projects in agriscience classes was also included in the first section. Students were also asked to identify the percentage of class time utilized in a typical month for the following: experiential learning, teacher-centered learning, standardized test preparation and completion, and special events/school functions.
Questions in part two of the student instrument mimicked those presented in the first part, except these questions were to be a reflection of experiences in the science classroom. No SAE question was present in the second section of the student instrument.

Part three of the student instrument was utilized for the collection of demographic information. Students were asked to supply information about the following: grade level, gender, and ethnicity.

Part one of the teacher instruments consisted of a question about participation in service learning projects. Agriscience teachers were asked a question pertaining to the number of junior and senior students who had SAEs. As with the student instrument, the first section concluded by asking teachers to identify the amount of class time utilized in a typical month for experiential learning, teacher-centered learning, standardized test preparation and completion, and special events/school functions.

Part two of the teacher instruments was used to collect demographic information. Teachers were asked to indicate their gender, number of years teaching, length of class period, and number of junior and senior students.

After conducting a pilot test and examining the instrument for reliability and validity, the final student and teacher instruments were created. Before mailing questionnaire packets to the schools, principals and agriscience teachers had to agree to participate in the research study. All principals agreed to allow their schools to participate. If the agriscience teachers agreed to participate in the study, they were asked to indicate the number of students eligible to take part in the research on the attachment and fax the attachment to the principal investigator. Teachers who had not responded within
three weeks were contacted by phone. Teachers who were unable to be contacted via phone call received a fax reminder reflective of the original letter.

Those agriscience teachers who agreed to participate were mailed a packet containing a letter thanking them for their cooperation in the study, directions for distributing the instruments, assent forms for students, and the science teacher, agriscience teacher, and student instruments. Because student participants were minors, parental permission and student assent forms had to be returned prior to participation in the study. These consent forms explained in straightforward terms the purpose of the research and expectations of participants. Investigator contact information was provided.

Instruments were color-coded and labeled to insure that participants filled out the correct forms. Science teachers received green instruments, agriscience teachers were provided with blue instruments, and the student surveys were yellow. The principal investigator attempted to contact by phone all teachers who had not returned the instrument packets by the due date. Teachers who did not answer when phoned were faxed a reminder. No instrument packets were received after the deadlines; therefore, there were no late respondents.

Data were transferred from the instruments to PASW. Descriptive statistics such as frequencies, means, and standard deviations were computed. Demographic data were reported through frequencies and percentages. Means and standard deviations were calculated for the data concerning the utilization of class time. A paired-samples t-test was used to compare the percentage of students who reported participating in service learning projects in agriscience and science courses. Paired-samples t-tests were
employed to compare the amount of agriscience and science class time exhausted for each of the following: experiential learning, teacher-centered learning, standardized test preparation and completion, and special events/school functions, as reported by students. Independent \( t \)-tests were utilized to compare the findings from student and teacher instruments. A .05 alpha level was used for all \( t \)-tests. Statistically significant differences were found in several of the comparisons.

Conclusions

Conclusions concerning the student and teacher data were drawn based upon the findings of the research. Among student reported data, means for experiential learning, teacher-centered learning, standardized test preparation and completion, and special events/school functions in both agriscience and science courses were compared. The same means were compared between agriscience and science teacher data.

Comparison of Participation in Service Learning Projects

Comparing the means of the responses of students who participated in service learning projects led to the conclusion of which course, agriscience or science, provided more opportunities for students to participate in service learning projects.

The following conclusion was established based upon the data collected:

1. When comparing agriscience courses and science courses, students participated in more service learning projects in agriscience.
Comparison of Time Utilized for Experiential Learning Activities

Comparing the means of time spent participating in experiential learning activities in agriscience and science courses as identified by junior and senior students helped determine which of the courses provided more opportunities for experiential learning. Evaluating the means of time utilized on experiential learning activities reported by agriscience and science teachers helped establish which teacher spent more class time facilitating experiential learning activities.

The following conclusions were established based upon the data collected:

1. Students spent a greater percentage of class time participating in experiential learning activities in agriscience classes.
2. Agriscience teachers spent a greater percentage of class time facilitating experiential learning.

Comparison of Time Utilized for Teacher-Centered Activities

Investigating the student reported means of class time utilized for teacher-centered activities led to the determination of which course spent a greater percentage of time on teacher-centered activities. Exploring the teacher reported means of class time used for teacher-centered activities led to the discovery of which teacher, agriscience or science, spent a greater percentage of class time instructing through teacher-centered methods.

The following conclusions were established based upon the data collected:
1. Students spent a lesser percentage of class time participating in teacher-centered activities in agriscience classes.

2. Agriscience teachers spent a lesser percentage of class time directing class through teacher-centered methods.

Comparison of Time Utilized for Standardized Testing Preparation and Completion

Through the comparison of means of time spent preparing for and completing standardized tests in agriscience and science courses as identified by junior and senior students aided in the establishment of which of the courses utilized more class time for standardized testing preparation and completion. Inspecting the means of class time used preparing for and completing standardized tests as reported by agriscience and science teachers helped establish which course spent more class time on standardized testing.

The following conclusions were established based upon the data collected:

1. Students spent a smaller percentage of class time preparing for and taking standardized tests in agriscience classes.

2. Agriscience teachers spent a smaller percentage of class time preparing their classes for and administering standardized tests.

Recommendations

After reflecting upon the findings of the research study, recommendations were made for improving the quality and quantity of experiential learning in agriscience education. Suggestions for future research were also included.

The following recommendations are based upon the findings of the study:
1. Agriscience and science teachers should share lesson plans and ideas for experiential learning activities that may overlap in their curricula.

2. Agriscience teachers should utilize summer conferences and workshops to share ideas for SAEs, service learning projects, and experiential learning class activities.

3. An inventory should be taken regarding service learning projects that would be relevant and of value to the educational experience in agriscience courses and science courses.

4. A committee of agricultural science education stakeholders should work together in developing a definition of experiential learning.

5. A study should be conducted to determine why some agriscience students do not have SAEs.

6. Similar studies should be conducted in other states to determine how the percentage of class time utilized for experiential learning activities varies depending on states’ agriscience and science curricula.

Discussion

Although some research exists concerning experiential learning in agricultural science education (Knobloch, 2003; Roberts & Ball, 2008; Rusk et al., 2003), there is little research that closely examines the types of experiential learning activities. Research that compares these activities to those present in other courses in the secondary education curricula are also scarce.
In light of looming educational budget constraints, school systems have been forced to make difficult decisions concerning which teachers or programs should be retained, replaced, or altogether terminated. In order to keep its place in secondary education, agriscience must be able to show that it offers well rounded educational experiences not found in any other course. The present study sought to determine whether students spent more class time participating in experiential learning activities in agriscience courses or science courses. The study also attempted to recognize who utilized more class time facilitating experiential learning activities—agriscience teachers or science teachers.

The findings of this study suggest that students spend more class time participating in experiential learning activities in agriscience courses when compared to science courses. Students also felt that they spend less class time doing book work or listening to lecture (teacher-centered activities) in agriscience courses when compared to science courses. Due mostly to the fact that there is no standardized test required for agriscience courses in the state of Alabama, students use less time preparing for and taking standardized tests in agriscience courses than science courses. However, students may spend some agriscience class time preparing for or taking standardized tests such as graduation exams or college entrance exams. When considering service learning projects, students have more opportunities for participation in their agriscience courses.

If compared to science teachers, agriscience teachers spend more class time facilitating experiential learning activities. Agriscience teachers also utilize less class time for teacher-centered activities, such as book work or lectures. Because agriscience
teachers are not required to give a state standardized test within the course, they spend less class time preparing for or administering standardized tests when compared to science teachers.

Agricultural science education is unique in its ability to combine so many different learning experiences into one course (Classroom/laboratory, SAE, FFA). The skills attained from the learning that occurs both inside and outside of the classroom assist students in developing leadership potential, transferring knowledge to other courses or learning situations, and preparing for future careers. It is desired that the findings of this study shed some light on the importance of preserving agricultural science courses in the secondary education curriculum. When educational administrators and decision makers on the local, state, and national level see the value of the experiential learning opportunities in agricultural science education, its position in the secondary education curriculum will be protected. Then all may rest assured that agriscience teachers will continue to be a positive influence on the educational lives of their students, just as they have for the last 100 years.
REFERENCES


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APPENDIX A

A COMPARISON OF EXPERIENTIAL LEARNING ACTIVITIES IN AGRISCIENCE EDUCATION AND SCIENCE COURSES—STUDENT QUESTIONNAIRE
Part III: Demographic Information

Please put a checkmark beside your answer or provide the information requested

11. Grade level: 11th  12th

12. Gender: Female  Male

13. Ethnicity: African American  Asian  Caucasian  Hispanic/Latino  Other (please list)

14. What is the name of the AGRISCIENCE class you are currently enrolled in?

15. What is the name of the SCIENCE class that you are currently enrolled in or have most recently completed?

Thank you for choosing to participate!
6. During a typical MONTH, what percentage of time in your agriscience class do you spend participating in experiential learning activities such as welding, wood-working, soil testing, planting/maintaining flowers or vegetation, animal handling/care, giving presentations, conducting experiments, etc? 

During a typical MONTH, what percentage of time in your agriscience class do you spend listening to lectures, taking notes, or reading/bookwork? 

During a typical MONTH, what percentage of time in your agriscience class do you spend preparing for or taking standardized tests such as the graduation exam, achievement tests, etc? 

During a typical MONTH, what percentage of time in your agriscience class do you spend attending special events or school functions such as assemblies, pep rallies, awards/scholarship presentations, etc? 

**Assume month = 20 school days**  
1 day = about 5%  
3 days = about 15%  
5 days = about 25%  
10 days = about 50%  
15 days = about 75%  

**Assume month = 20 school days**  
100%  
** total percentage should add up to 100**  

Part II: Science Class Information

Please put a checkmark beside your answer or provide the information requested. If not currently in a science class, use the one most recently completed.

7. Has your current or most recently completed science class been involved in any kind of service learning project? (Examples may include recycling, highway or river clean-up, canned food drives, Habitat for Humanity, etc.)

YES ___________ NO ___________
APPENDIX B
A COMPARISON OF EXPERIENTIAL LEARNING ACTIVITIES IN
AGRICIENCE EDUCATION AND SCIENCE COURSES—
AGRICIENCE TEACHER QUESTIONNAIRE
Part I: Agriscience Class Information

Please put a checkmark beside your answer or provide the information requested

1. How many of your students have a Supervised Agricultural Experience Program (SAE)?
   JUNIORS  
   SENIORS  

2. Have your junior or senior agriscience classes been involved in any kind of service learning project? (Examples may include landscaping around the school, reading to elementary students, community service, etc.)
   YES  
   NO  

3. If yes, describe the service learning activity or activities that your junior and/or senior agriscience classes were a part of.

   __________________________
   __________________________
   __________________________

4. What are the names of agriscience classes that juniors and seniors take at your school?
   JUNIORS  
   SENIORS  
5. During a typical MONTH, what percentage of time in the junior and senior agriscience class(es) do students spend participating in experiential learning activities such as welding, wood-working, soil testing, planting/maintaining flowers or vegetation, animal handling/care, giving presentations, conducting experiments, etc? 

   %

During a typical MONTH, what percentage of time in the junior and senior agriscience class(es) do students spend listening to lectures, taking notes, or reading/bookwork? 

   %

During a typical MONTH, what percentage of time in the junior and senior agriscience class(es) do students spend preparing for or taking standardized tests such as the graduation exam, achievement tests, etc? 

   %

During a typical MONTH, what percentage of time in the junior and senior agriscience class(es) do students spend attending special events or school functions such as assemblies, pep rallies, awards/scholarship presentations, etc? 

   %

100% 

** total percentage should add up to 100**

Part II: Demographic Information

Please put a checkmark beside you answer or provide the information requested

6. Gender:       Female       Male

7. Number of years in profession (teaching agriscience):

8. Length of class period at your school: 

9. Number of agriscience students:  
   JUNIORS       SENIORS
APPENDIX C
A COMPARISON OF EXPERIENTIAL LEARNING ACTIVITIES IN AGRISCIENCE EDUCATION AND SCIENCE COURSES—SCIENCE TEACHER QUESTIONNAIRE
Part I: Science Class Information

Please put a checkmark beside your answer or provide the information requested.

1. Have your junior or senior science classes been involved in any kind of service learning project? (Examples may include recycling, highway or river clean-up, canned food drives, Habitat for Humanity, etc.)
   YES ________ NO ________

2. If yes, describe the service learning activity or activities that your students were a part of during science class(es).

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

3. What are the names of the science classes juniors and seniors take at your school?
   JUNIORS ____________________________
   SENIORS ____________________________
4. During a typical MONTH, what percentage of time in the junior and senior science class(es) do students spend participating in experiential learning activities such as dissecting, pH testing, titrating/neutralizing, conducting experiments, giving presentations, etc.? _____

During a typical MONTH, what percentage of time in the junior and senior science class(es) do students spend listening to lectures, taking notes, or reading/bookwork? _____

During a typical MONTH, what percentage of time in the junior and senior science class(es) do students spend preparing for or taking standardized tests such as the graduation exam, achievement tests, etc.? _____

During a typical MONTH, what percentage of time in the junior and senior science class(es) do students spend attending special events or school functions such as assemblies, pep rallies, awards/scholarship presentations, etc.? _____

100% _____

** total percentage should add up to 100**

Part II: Demographic Information

Please put a checkmark beside your answer or provide the information requested

5. Gender: Female Male

6. Number of years in profession (teaching science): __________________________

7. Length of class period at your school: __________________________

8. Number of science students: JUNIORS: ___________ SENIORS: ___________
APPENDIX D

LETTER REQUESTING PRINCIPAL PERMISSION
The Agricultural Information Science and Education Program at Mississippi State University is conducting a study to compare the amount of experiential learning opportunities in agriscience and science classes. This study will particularly include juniors and seniors and will determine whether agriscience classes or science classes provide these students with more opportunities for hands-on, experiential learning.

To accomplish the purpose of this study, we will need to collect data from junior and senior agriscience students, the agriscience teacher(s), as well as the science teacher(s) who have the most interaction with these students. Since it is not possible for us to physically collect data from each school selected to participate, the agriscience teacher will be asked to serve as the data collection liaison.

At no time in this study will the names of schools, students, or teachers be identified. All information will remain confidential. If you wish, results can be mailed to you at the conclusion of the research study.

Before initiating the data collection process, we need permission to use your school in this research study. To grant permission for your school to participate in the study, please return a signed school letterhead indicating your cooperation.

If you have any questions about the study, please contact us at (662)325-2950. Your support and participation will be greatly appreciated.

Sincerely,

Brittany Beasley
Graduate Teaching Assistant

Dr. Kirk Swortzel
Associate Professor
APPENDIX E

TEACHER CONSENT FORM
Teacher Consent Form

Project Title: A Comparison of Experiential Learning Activities Available to Juniors and Seniors in Secondary Agricultural Education and Science Education Courses

Investigator: Brittany Beasley

In efforts to complete my Master’s degree in Agricultural and Extension Education at Mississippi State University, I am conducting a study to compare the amount of experiential learning opportunities in agriculture and science classes. This study will particularly include juniors and seniors and will determine whether agriculture classes or science classes provide these students with more opportunities with hands-on, experiential learning.

To accomplish the purpose of this study, I will need to collect some data from junior and senior agriculture students, as well as you, the agriculture and science teachers who have the most interaction with these students.

Participation in this research study is completely voluntary. Although permission has been obtained from your school officials for the conduction of this study, you are not required to participate.

Please indicate your decision by signing/dating the statement below. No action is needed if you choose not to participate in the study.

I, ________________________________, choose to be a participant in this research study.

(Print your name here)

______________________________ (Sign your name here)  ____________ (Date)

If you have any questions or concerns, feel free to contact me.

Thank you,

Brittany Beasley
Graduate Teaching Assistant
(662)325-2950
blb222@msstate.edu

MSU IRB
Approved: 10/12/99
Expires: ------------
APPENDIX F

TEACHER PARTICIPATION AND NUMBER OF INSTRUMENTS NEEDED
September 24, 2009

In efforts to complete my Master’s degree in Agricultural and Extension Education at Mississippi State University, I am conducting a study to compare the amount of experiential learning opportunities in agriscience and science classes. This study will particularly include juniors and seniors and will determine whether agriscience classes or science classes provide these students with more opportunities with hands-on, experiential learning.

To accomplish the purpose of this study, I will need to collect some data from junior and senior agriscience students, as well as you and the science teacher or teachers who have the most interaction with these students.

If you wish to participate, please return the attached sheet via fax. By indicating how many junior and senior agriscience students you are teaching this semester, I can ensure that an accurate number of surveys are sent to your school.

Coming from a family of ag teachers, I am fully aware of how valuable your time is and am grateful for your willingness to participate. Feel free to contact me if you have any questions.

Sincerely,

Brittany Beasley
Graduate Teaching Assistant
(662)325-2950
blb222@msstate.edu

Attachment: Number of Instruments Needed
I, ___________________________ am willing to participate in the study entitled *A Comparison of Experiential Learning Activities Available to Juniors and Seniors in Secondary Agriscience Education and Science Education Courses*. I will need approximately ________ surveys (total) for the junior and senior students enrolled in an ag class this semester.

**Please return via fax as soon as possible**
APPENDIX G

INSTRUMENT PACKET LETTER
October 16, 2009

Several weeks ago I sent a letter to agriscience teachers throughout the state of Alabama who had been drawn in the sample for the research study entitled *A Comparison of Experiential Learning Activities Available to Juniors and Seniors in Secondary Agriscience and Science Courses*. I appreciate your quick response to the letter or fax as every step brings me closer to completion of my thesis and degree.

The Institutional Review Board requires that students sign an assent form and have their parents sign a permission form before completing the questionnaire. The attached directions should help guide you through this process, and I was required to include them in order to gain IRB approval for my study.

Coming from a family of agriscience teachers, I am fully aware of how valuable your time is and am grateful for your willingness to participate. Feel free to contact me if you have any questions.

Sincerely,

Brittany Beasley
Graduate Teaching Assistant
(662)325-2950
blb222@msstate.edu

Attachment: Data Collection Protocol
APPENDIX H

DATA COLLECTION PROTOCOL
Data Collection Protocol

Step 1: Distribute consent/assent forms to students

Step 2a: Upon receipt of completed consent/assent forms, distribute student questionnaires (yellow heading) to 11th and 12th grade agriscience students.

Step 2b: Distribute science teacher questionnaires (green heading) to the one or two science teachers who have the most class interaction with junior/senior students and complete agriscience teacher questionnaire (blue heading)

Step 3: Collect all questionnaires and student permission forms and return by Friday December 4, 2009 to:

Brittany Beasley
Agriculture Information Science and Education
Mississippi State University
Box 9731
Mississippi State, MS 39762

*If you have any questions, call Brittany Beasley at (256)390-8738 or Dr. Kirk Swortzel at (662)325-2950.
APPENDIX I

PARENTAL PERMISSION FORM
Parental Permission Form

Project Title: A Comparison of Experiential Learning Activities Available to Juniors and Seniors in Secondary Agricultural Education and Science Education Courses

Investigator: Brittany Beasley

I am doing a research study about the different types of learning activities your child participates in during his/her agriculture and science classes. A research study is a way to learn more about people and the reasons that they do certain things or behave certain ways. If your child decides that he/she wants to be part of this study, they will be asked to fill out a survey which should take no more than fifteen minutes of their time.

When I am finished with this study I will write a report about what was learned. The answers that they provide will help me to write an accurate report. This report will not include your child’s name or that they participated in the study.

Your child is under no pressure to participate in this study. He/she is allowed to stop at any point if they change their mind. Since minors are being asked to participate, I am required to have parental/guardian permission before your student can participate. Your cooperation is greatly appreciated.

I, ____________________________, give my child ____________________________, (print name here) (print child’s name here)

permission to participate in this research study.

__________________________ (Sign your name here) __________________________ (Date)

If you have any questions or concerns, feel free to contact me.

Thank you,

Brittany Beasley
Graduate Teaching Assistant
(662)325-2950
blb222@msstate.edu

MSU IRB
Approved: 16/12/16
Expires: 06/01/18
APPENDIX J

STUDENT ASSENT FORM
Student Assent Form

Project Title: A Comparison of Experiential Learning Activities Available to Juniors and Seniors in Secondary Agricultural Education and Science Education Courses

Investigator: Brittany Beasley

I am doing a research study about the different kinds of learning activities you do in your agriculture and science classes. A research study is a way to learn more about people and the reasons that they do certain things or behave certain ways. If you decide that you want to be part of this study, you will be asked to fill out a survey which should take no more than fifteen minutes of your time.

When I am finished with this study I will write a report about what was learned. The answers that you provide will help me to write an accurate report. This report will not include your name or that you participated in the study.

You do not have to be in this study if you do not want to be. You are allowed to stop at any point if you change your mind. It is okay to ask questions if you do not understand something in the survey.

If you decide you want to be in this study, please sign your name.

I, ____________________________, want to be a part of this research study.

(Print your name here)

(Sign your name here) (Date)

If you have any questions or concerns, feel free to contact me.

Thank you,

Brittany Beasley
Graduate Teaching Assistant
(662)325-2950
blb222@msstate.edu

MSU IRB
Approved: 10/12/94
Expires: 12/31/94

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APPENDIX K

HUMAN SUBJECTS APPROVAL LETTER
October 12, 2009

Brittany Beasley
Human Sciences
Mail Stop 9731

RE: IRB Study #09-053: A Comparison of Experiential Learning Activities Available to Juniors and Seniors in Secondary Agricultural Education and Science Education Courses

Dear Ms. Beasley:

The above referenced project was reviewed and approved via administrative review on 10/12/2009 in accordance with 45 CFR 46.101(b)(1). Continuing review is not necessary for this project. However, any modification to the project must be reviewed and approved by the IRB prior to implementation. Any failure to adhere to the approved protocol could result in suspension or termination of your project. The IRB reserves the right, at anytime during the project period, to observe you and the additional researchers on this project.

Please note that the MSU IRB is in the process of seeking accreditation for our human subjects protection program. As a result of these efforts, you will likely notice many changes in the IRB’s policies and procedures in the coming months. These changes will be posted online at http://www orc msstate edu/human/ahrrp php. The first of these changes is the implementation of an approval stamp for consent forms. The approval stamp will assist in ensuring the IRB approved version of the consent form is used in the actual conduct of research. You must use copies of the stamped consent form for obtaining consent from participants.

Please refer to your IRB number (#09-053) when contacting our office regarding this application.

Thank you for your cooperation and good luck to you in conducting this research project. If you have questions or concerns, please contact me at jmiller research msstate edu or call 662-325-2236.

Sincerely,

[For use with electronic submissions]

Jonathan Miller
IRB Officer

c: Kirk Swortzel

Office of Regulatory Compliance • Post Office Box 6221 • Mississippi State, MS 39762