FACTORS IDENTIFYING THE USE OF AGRICULTURAL MECHANICS PROJECTS AS A SAE IN TEXAS

A Thesis

by

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ABSTRACT

The purpose of this study was to determine why agricultural science teachers do not consider all agricultural mechanics projects to be a supervised agricultural experience (SAE). This descriptive study was conducted using survey and modified Delphi methods. Agricultural science teachers who had an agricultural mechanics project at one or more of four selected agricultural mechanics shows were used as the population. The sample was purposive in nature, so all teachers were surveyed (*N=324*). A response rate of 45.1% (*n=146*) was achieved on the first round of the study. The second and third rounds of the modified Delphi portion of the study had response rates of 63.0% (*N=146, n=92*) and 51.1% (*N=92, n=47*) respectively.

According to the findings of this study, teachers reported their programs constructed 3,567 agricultural mechanics projects. Of these, 1,691 projects were considered SAEs, whether they were group projects or built by a single student. The modified Delphi portion of this study was conducted to establish a consensus among the panel for reasons why agricultural mechanics projects are not considered SAEs. By the third round of the study, no response to this question reached the level of consensus set *a priori*. Reasons for this may have been because of the large panel size or broad range of responses for why agricultural mechanics projects are not considered SAEs. Some of the top reasons reported based on highest mean score were lack of student interest in awards and record keeping, project was built by a group of students, and project was funded by others.

Recommendations for practice included providing professional development for agricultural science teachers in the area of group projects and their use as a SAE. Further areas to address would be how to enter these projects in a record keeping system, how to classify the SAE, and how to handle different sources of funding when considering agricultural mechanics projects as SAEs. It is recommended that further research be conducted across the nation to see if or how other states include agricultural mechanics projects as SAEs.

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CHAPTER I

INTRODUCTION

According to Talbert, Vaughn, Croom, and Lee (2007), the supervised agricultural experience (SAE) is the part of agricultural education that allows students to practice in the workplace what they have learned in the classroom or laboratory. Home projects in agricultural education, today known as SAEs, have been around since Rufus Stimson initiated the practice at Smith's Agricultural School in 1908, allowing students to apply what they learned at school on their home farms (Moore, 1988). In 1917, the federal government recognized the need to link classroom instruction and supervised farming projects with the Smith-Hughes Act (Croom, 2008). The Vocational Education Act of 1963 readdressed the use of SAEs as a teaching tool, causing the expansion of SAE focus beyond farming and in some cases de-emphasizing the need for SAE programs all together (Phipps, Osborne, Dyer, & Ball, 2008).

Agricultural mechanics has roots in early vocational agriculture courses. In the book *The FFA at 50: A Golden Past-A Brighter Future* (Tenny, 1977), it was noted that when agricultural classes began, it was recognized that agricultural mechanics courses were needed to enable students to cope with technical changes that were taking place in farming. This led to the development of school shops used to teach essential agricultural mechanics skills to students and prepare them to use and maintain the equipment and machines on the farm. According to Tenny (1977), FFA proficiency awards were given in 1944 and were sponsored by International Harvester Company for the category of

agricultural mechanics. In 1972, Firestone Tire & Rubber Company sponsored the first national level FFA competition in agricultural mechanics (Tenny, 1977).

As early as 1995, there were signs that SAE was lacking in agricultural science programs across the nation (Dyer & Osborne, 1995). Many researchers have noted that SAE participation was declining as a portion of a complete agricultural science program (Croom, 2008; Lewis, Rayfield, & Moore, 2012b). However there are more ways available for students to participate in SAEs than in the past. There are now four categories of SAEs recognized by the National FFA Organization (2012): entrepreneurship, placement, research, and exploratory. Of the 49 proficiency areas awarded by the National FFA Organization (2013), four are directly related to agricultural mechanics. The National FFA recognizes power, structural, and technical systems, an agricultural mechanics area, as a category in the Agriscience Fair. This is one of six categories recognized on the national level.

Researchers have noted that experiential learning is deeply tied to agricultural education (Knobloch, 2003; Roberts, 2006; Baker, Robinson, & Kolb, 2012). Knobloch (2003) posited that experiential learning is supported by four pillars: learning in real-life contexts, learning by doing, learning through projects, and learning by solving problems. The construction of agricultural mechanics projects makes use of all four of the pillars described by Knobloch, highlighting their importance in the experiential learning process. Baker, Robinson, & Kolb (2012), pointed out that meta-learning occurs when students solve problems and implement plans on their own, transferring learning from one experience to another. They indicated that the connection of classroom instruction

and SAE are often the catalyst of meta-learning, applying Kolb's experiential learning theory to agricultural education. It could be postulated that agricultural mechanics SAEs fit the mold for meta-learning and experiential learning, reinforcing their importance as a teaching tool and pointing out the need to incorporate them more frequently into agricultural science programs.

Statement of the Problem

In the state of Texas, students have the opportunity to show agricultural mechanics projects at the Fort Worth Stock Show and Rodeo, the San Antonio Livestock Exposition Junior Agricultural Mechanics Show, the Houston Livestock Show and Rodeo, the State Fair of Texas, and numerous county and local shows. In their conclusions, Dyer and Osborne (1995) recommended the identification of factors that aid and/or limit student participation in SAE programs. Hanagriff, Briers, Rayfield, Murphy, and Kingman (2011) found that programs not involved in agricultural mechanics shows had higher SAE involvement than those that did participate in agricultural mechanics shows, indicating that those programs participating in agricultural mechanics shows were not reporting those projects as SAEs. Information on the percentage of students with agricultural mechanics projects and whether or not they consider them to be SAEs would shed light on this problem.

Identifying reasons why some students do not consider their agricultural mechanics projects to be SAEs more directly addresses the problem area described above. From personal observation by the researcher at numerous agricultural mechanics shows, students failed to realize that agricultural mechanics projects can be considered a

SAE. This was observed by asking students who built agricultural mechanics projects at these shows if they had a current SAE. Common responses to this question were "What is a SAE" and "No, I do not have an animal." The percentage of agricultural mechanics projects exhibited at major shows with SAE records is unknown. This number could improve our understanding of the extent that agricultural mechanics projects are underrepresented in the assessment of SAEs.

Purpose and Objectives

The purpose of this study was to determine why agricultural science teachers did not consider all agricultural mechanics projects to be a SAE. The research objectives for this study were the following:

1. Identify the type of agricultural mechanics projects constructed by students in high schools with agricultural mechanics programs in Texas.
2. Determine the number of agricultural mechanics projects in high school agricultural mechanics programs that are considered SAEs by the agricultural science teacher.
3. Identify reasons why agricultural science teachers do not consider agricultural mechanics projects to be a SAE.
4. Determine which FFA SAE category teachers use to classify an agricultural mechanics project if it is considered to be a SAE.
5. Examine agricultural science teacher practices and opinions of agricultural mechanics project instruction.

6. Identify sources of funding agricultural science instructors use in agricultural mechanics project construction.

Operational Definitions

Supervised Agricultural Experience (SAE) – application of concepts and principles learned in the agricultural education classroom under the supervision of the agricultural science teacher. (Talbert, Vaughn, Croom, & Lee, 2007).

Agricultural Science Program – a career and technical education program that teaches agricultural science in a secondary public school that has a chartered FFA chapter and includes SAE in their organization (National FFA Organization, 2012).

Agricultural Mechanics Program – program that provides strong technical content on the subject of agricultural mechanics and is complimented by the development of practical, hands-on skills (National FFA Organization, 2012).

FFA – the National FFA Organization, formerly known as the Future Farmers of America, is an agricultural youth organization that provides recognition of agricultural achievements and leadership, career, and learning opportunities for student who are members enrolled in an agricultural science class (National FFA Organization, 2012).

Agricultural Mechanics Project Show – program that allows FFA and 4-H students to exhibit agricultural mechanics projects focused on design, construction and workmanship. Typical projects normally include livestock equipment, trailers, agricultural machinery, restored tractors, or other agricultural laboratory fabricated equipment and structures.

Limitations of the Study

Data from this study came from a limited number of teachers leading agricultural mechanics programs and entering projects in the selected shows. The results of this study should only be generalized with care to other teachers and programs.

Assumptions

The researcher assumes the following in this study:

1. Agricultural science teachers who participated in this study responded honestly and to the best of their ability.
2. Agricultural science teachers who participated in this study consistently guide students in producing agricultural mechanics projects at their school.
3. Agricultural science teachers who participated in this study had a basic understanding of supervised agricultural experiences.
4. Agricultural science teachers who entered agricultural mechanics projects in a show were considered experts in SAE and in agricultural mechanics because of the working knowledge required to teach and supervise projects in this subject area.

Significance of the Problem

Identifying areas where participation is lacking may be useful in determining reasons for the decline in SAE participation. Lewis et al. (2012b) recommended that more instruction be provided in the area of SAE because knowledge is lacking. This study will examine why teachers do not consider some of the students' projects to be SAEs, specifically in the area of agricultural mechanics. If many teachers do not

consider the projects to be SAEs, this could be an area strengthened by instruction so teachers can begin to incorporate agricultural mechanics projects in the students' supervised agricultural experience programs.

CHAPTER II

LITERATURE REVIEW

SAE in the Agricultural Science Program

Supervised agricultural experiences (SAE) have been part of agricultural education classes since 1908 when they were developed by Rufus Stimson (Moore, 1988). Today SAEs are considered learning programs for agricultural education students designed to provide learning experiences in an agricultural career pathway (Croom, 2008). With SAEs, students are expected to conduct them outside of normal daily instruction, maintain records of their activities, and they should put into practice principles learned in the agriculture classroom (Croom, 2008).

Others have similar definitions, in that SAEs should be conducted outside normal class hours, the agricultural science teacher should observe the project, the project should have educational value, and the project should be linked to classroom and laboratory instruction (Phipps, Osborne, Dyer, & Ball, 2008, p. 439; Talbert, Vaughn, Croom, & Lee, 2007, p. 422). An area not clearly defined across the agricultural education field is whether or not SAEs can be conducted at school facilities or during class time. Talbert et al. (2007, p. 422) says that under some circumstances the students' SAEs can be located on the school premises, but they should occur outside of normal instruction hours. Phipps et al. (2008, p. 439) clearly states that the experience should be conducted outside of the normal class time. In a publication from the Texas FFA Association (n.d.) concerning types of SAEs, it was stated that "laboratory SAEs may

take place either during or outside of the regularly scheduled school and tend to serve students who have no facilities to conduct specialized activities at home or away from school." This provides a contradiction to other literature on the subject. Dyer and Osborne (1996) stated that SAE programs lack definition, direction, and focus, supporting the findings above.

The Texas FFA Association (2012) and the National FFA Organization (2013) both recognize achievements for agricultural mechanics SAEs by awarding proficiency awards in Agricultural Mechanics Design and Fabrication – Entrepreneurship/Placement, Agricultural Mechanics Energy Systems – Entrepreneurship/Placement, Agricultural Mechanics Repair and Maintenance – Entrepreneurship, and Agricultural Mechanics Repair and Maintenance – Placement for a total of four awards. Both the Texas FFA Association (2012) and the National FFA Organization (2013) recognize four categories of SAE: Entrepreneurship, Placement, Agriscience Research and Experimentation, and Exploratory and have award proficiencies for 49 different types of SAEs.

In agricultural education, many programs use the integrated three-component model of agricultural education to serve as a guideline for how to operate (Croom, 2008). The model has three overlapping rings arranged so that no one ring is by itself, it overlaps with the other two rings, and is not completely inside of another ring. The three rings are usually labeled with Classroom/Laboratory Instruction, SAE, and FFA (Croom, 2008). The FFA proficiency awards described above fit this model because it is where

the FFA recognizes achievement in SAEs, which are supposed to be based on classroom/laboratory instruction.

In a study by Roberts and Dyer (2004), it was determined that a characteristic of an effective agricultural science teacher was that he or she has a sound knowledge of SAE, supervises projects actively, and encourages students to have SAE projects. When teachers were asked their perceptions regarding planning activities for SAE, most agreed that agricultural education instructors should help students plan and carry out SAE programs (Swortzel, 1996). Many also perceived that class time should be used for updating record books and planning individual SAEs (Swortzel, 1996). Jenkins and Kitchel (2009) found that quality SAE programs should have time for teachers to supervise SAEs and should provide opportunities for students to showcase their SAEs. In the same study, it was found that quality FFA programs serve as a connecting activity for SAE and classroom instruction (Jenkins & Kitchel, 2009).

SAE Benefits

There are many benefits from students participating in SAEs. A benefit Robinson and Haynes (2011) found was that SAEs provide instructional value for agricultural science teachers in the area of developing critical thinking skills. They also found that teachers in Oklahoma who were alternatively certified recognized that SAEs are experiential in nature and allow students to develop important career preparation skills (Robinson & Haynes, 2011). Dyer and Williams (1997) concluded in a synthesis of research that research findings support the belief that SAEs are valuable in helping prepare people for jobs in agriculture and that they help develop good work attitudes and

habits in students. In a study conducted by Ramsey and Edwards (2011), agriculture industry experts reached consensus on 60 entry-level skills that students should learn from participating in a SAE. Industry experts also agreed most technical skills that could be learned from SAE were in the career pathways of animal science and agricultural communications (Ramsey & Edwards, 2011). In a second Delphi study by Ramsey and Edwards (2012), consensus was reached on 161 entry-level skills that should be learned by students participating in SAEs, with the greatest number of skills in the agricultural communication, agricultural power, structures, and technology, animal science, and plant and soil science career pathways. These studies quantified the number of skills that students can learn from participation in SAEs, highlighting one of the benefits of participation in them.

Rayfield and Wilson (2009) found that principals in North Carolina perceived that SAE was important as part of an agricultural education program. This was true for both principals who had and had not taken agriculture classes and for both rural and urban principals (Rayfield and Wilson, 2009). On an economic level, Hanagriff, Murphy, Roberts, Briers, and Lindner (2010) found that in Texas alone, including student investment in projects and travel costs, SAEs contribute approximately $189 million to the economy. As seen in the aforementioned studies, the benefits of SAEs have been well documented and are extensive.

SAE Decline

While many believe that student participation in SAEs is positive and a critical component of agricultural education, Dyer and Osborne (1995) found that the percentage

of students conducting SAE projects in programs is declining. Moore (1979) pointed out that the beginning of SAE decline started with the passing of the Vocational Education Act of 1963. Dyer and Osborne (1995) stated that participation in SAE programs by teachers and students is lacking. Others also mention that SAE participation is declining (Croom, 2008; Lewis, Rayfield, & Moore, 2012b). Teachers support the concept of SAE, but fail to implement the programs successfully, resulting in decreased student participation (Dyer & Osborne, 1995).

Many researchers have reported that the cause for the decrease in SAE participation is a lack of time the teacher has to spend supervising the projects (Lewis, Rayfield, & Moore, 2012a; Dyer & Osborne, 1996; Foster, 1986). Other causes contributing to decreased involvement in SAE have been identified as a lack of student interest in the subject and lack of school facilities to conduct projects (Robinson & Haynes, 2011; Lewis, Rayfield, & Moore, 2012a; Foster, 1986). Lewis, Rayfield, and Moore (2012b) found that students in Florida, Indiana, Missouri, and Utah may not have a SAE program because they lack knowledge and familiarity with SAE categories.

Agricultural Mechanics and SAE

In Texas, agricultural mechanics courses are taught in 90% of agricultural education programs (Hanagriff, Briers, Rayfield, Murphy, & Kingman, 2011). These classes usually offer laboratory instruction and the construction of various projects. Lewis, Rayfield, and Moore (2012a) found that students in Indiana, Missouri, and Utah perceived mechanics/woodworking labs to be available to use to conduct SAEs. Most schools in Texas also have these labs available to students. It is estimated that the

average SAE investment value to the Texas economy for all agricultural mechanics projects is $5.7 million (Hanagriff et al., 2010). In Texas, the highest individual investment costs were for tractor restoration and trailer projects (Hanagriff et al., 2011). In California a project auction was created in 1996 to sell agricultural mechanics SAE projects that were focused on wood and/or metal construction (Casey & Swan, 2010). It was noted by Casey and Swan (2010) that the SAE project auction provided a direct connection of classroom instruction and application of skills to the SAE. As mentioned earlier, there are many shows in Texas for students to exhibit their projects, but no known auctions. Hanagriff et al. (2011) found that programs not involved in agricultural mechanics shows had higher SAE involvement than those that participated in agricultural mechanics shows, indicating that those programs participating in agricultural mechanics shows are not reporting those projects as SAEs.

Summary

The review of literature revealed that SAE is one of the critical components of agricultural education today and it has roots in some of the earliest agricultural education classes. SAE is the component of agricultural education where students apply what is learned in the classroom and laboratory to a personal project that could be considered entrepreneurship, placement, research, or exploratory. Many researchers have identified benefits gained from participating in SAEs. The acquisition of entry-level job skills, development of critical thinking ability, and major contributions to the economy were all identified as major benefits. The percentage of students involved in SAE has been declining with lack of teacher supervision time, lack of facilities, and lack of student

interest cited as reasons for this. Specifically in the area of agricultural mechanics, many projects are constructed, but are not reported as SAEs in Texas. Data shows that many agricultural mechanics projects do not have as high of investment as many of the animal projects, though it is still significant, as 90% of school in Texas have agricultural mechanics programs (Hanagriff et al., 2011).

CHAPTER III

METHODOLOGY

To accomplish the purpose and objectives stated in Chapter I, the researcher followed a defined methodology for conducting this descriptive study. The design of the study, population and sample, consent, instrumentation, data collection, and data analysis and interpretation used in this study is described below.

Design of the Study

To accomplish the objectives of this study, a descriptive study was conducted using survey and modified Delphi methods. The survey instrument included 20 questions in the form of yes/no, multiple choice (both single- and multiple-response items), and open-ended short-answer and essay items. Descriptive statistics were used to analyze the data. Fraenkel, Wallen, & Hyun (2012, p. 187) note that descriptive statistics allow researchers to describe information contained in scores with a few indices, such as mean, standard deviation, and frequencies. For two of the open-ended questions, results were grouped and collapsed, and a follow up instrument was sent to participants to rate their level of agreement for the items provided. The follow up survey was a modified Delphi study, in that it consisted of sending results back out to the panel of experts to attempt to reach consensus on the items provided as answers to the open-ended questions for multiple rounds.

Population and Sample

The population of this study was Texas high school agricultural science instructors who teach agricultural mechanics courses. The participants in this study were selected from a purposive sampling frame developed from lists of schools that participated in the San Antonio Junior Agricultural Mechanics Show, the Houston Livestock Show and Rodeo Agricultural Mechanics Show, the San Angelo Agricultural Mechanics Contest, and the Blinn College Agriculture Mechanics Show during the spring of 2013. Some schools participated in more than one show, so the lists were combined with duplicates eliminated. There were 324 unique participants in the previously mentioned agricultural mechanics shows. Since the sample was purposive, all 324 participants were surveyed. The sample was purposive because the participants were selected based on their participation in project shows as an indication of their ability to provide the data needed. Instructors of students participating in agricultural mechanics projects shows are uniquely suited for the intent of the study (Fraenkel, Wallen, & Hyun, 2012, p. 100).

After the first round of the survey was completed, it was noted that 146 out of the total 324 agricultural science teachers completed the survey for a total response rate of 45.1% (N=324, n=146). The second round of the survey was sent back out to the 146 teachers that responded to the first round. Out of the total 146 teachers, 92 responded to the first question for a response rate of 63.0% and 79 responded to the second question for a response rate of 54.1%. The responses for question one are complete and are greater than the responses for question two because some participants chose not to

complete the survey in its entirety. Round three of the survey was sent back out to the 92 teachers that participated in the second round of surveys. Of the 92 teachers, 47 responded to the first question for a response rate of 51.1% and 44 responded to the second question for a response rate of 47.8%. As in round two, the responses for question one are complete and are greater than the responses for question two because some participants chose not to complete the survey in its entirety in round three.

Consent

A detailed description of the research and a copy of the survey instrument was sent to the Internal Review Board (IRB) for the Human Subjects Protection Program at Texas A&M University. The study was approved by the IRB on April 29, 2013, protocol number IRB2013-0303.

The email sent to the agricultural science teachers stated the purpose and directions for the survey. Teachers were informed in the email that by completing the survey, they were providing their consent to participate in the study. They were also informed that there was no penalty for not participating and their responses would be kept completely anonymous.

Instrumentation

The instrument used in this study was developed by the researcher. Categorical data such as personal and program information was collected. There were 20 questions on the instrument, with two of them being open-ended questions. A panel of experts at Texas A&M University reviewed and established content and face validity for the instrument. After revisions to the instrument, it was pilot tested to determine reliability

by 25 Texas agricultural science teachers who teach agricultural mechanics and were not selected to participate in the main study. Reliability was calculated with a Cronbach's alpha to determine internal consistency. It is appropriate to use a Cronbach's alpha on instrument items not scored right versus wrong (Siegle, 2002). "Although Cronbach's alpha is usually used for scores which fall on a continuum, it will produce the same results as KR-20 with dichotomous data" (Siegle, 2002). An alpha of .90 was calculated. These items were mostly dichotomous in nature.

Responses to the two open-ended questions on the first instrument were used to create a second instrument. To determine items to list on the second survey instrument, the responses for the two open-ended questions from the first instrument were grouped and collapsed. The second survey instrument asked respondents to rate their agreement with the items by using a four point Likert scale, with 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree. For an item to reach consensus of agreement on the second instrument, a mean score of 3.2 was established *a priori*. The second survey instrument was used for everything in this document that is reported as round two. A third survey instrument was used for round three and was set up exactly the same except the items were reordered from highest mean score to lowest mean score. No items were removed from the third instrument because no items reached a consensus of agreement on round two. All survey instruments were in electronic form, and administered through Qualtrics™, an online survey service.

Data Collection

Survey methods followed the Dillman's tailored design method (2000), with a link provided in an email to complete the online, researcher-designed, Qualtrics™ questionnaire. Teacher contact information was obtained from the show superintendents of the four agricultural mechanics project shows listed earlier. Email addresses were verified through an online agricultural science teacher directory. Dillman (2000) suggests four contacts are sufficient for conducting surveys. The initial email contact with an explanation of the study, instructions for completing the survey, and the link to the online survey was sent out August 12, 2013. After the initial contact, a reminder email was sent August 19th, August 25th, and September 2, 2013. Each reminder email had an explanation of the study, encouraged teachers to participate, and provided a survey link.

The follow up questionnaire, developed from the responses to the first instrument, was administered through Qualtrics™ with reminder emails sent on the same schedule as round one. The initial survey for round two was emailed on December 3, 2013 to the agricultural science teachers who responded to the first round of surveys. Three reminder emails were sent out on December 9th, December 13th, and December 18, 2013. With the initial and the three reminder emails, it was explained that since the teacher responded to the first round of surveys, their input was critical in rating their agreement with the responses for the two open-ended questions in order to reach a consensus of agreement. Each email contained instructions for completing the survey, a survey link, and a thank you for their time and effort.

A third round of surveys was emailed to the agricultural science teachers that responded to the second round. The initial email was sent of January 6, 2014, with three reminder emails sent on January 8th, January 13th, and January 15, 2014. A third round was necessary to confirm that no items on the survey would reach the level of consensus set *a priori*. Each contact email for the third round explained why the participants were being surveyed a third time, gave instructions and a link for completing the survey, and thanked them for their time and effort.

Data Analysis and Interpretation

Data from the online Qualtrics™ survey was exported into a Microsoft Excel spreadsheet. Each participant's survey was checked for missing data and was coded for electronic calculations in Microsoft Excel. Basic descriptive statistics such as frequencies, percentages, means, and standard deviations were used to analyze this study and were calculated in the above mentioned program.

CHAPTER IV

RESULTS

The purpose of this study was to determine why agricultural science teachers do not consider all agricultural mechanics projects to be a SAE. The findings of this study are presented below, following the research objectives stated in Chapter I. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to encapsulate the findings of the study objectives.

Demographic Data

Demographic data were collected from respondents of the online agricultural mechanics survey. Frequencies and percentages were calculated for gender, years of teaching experience, high school size, and agricultural science department size. This information is summarized in Table 1 for the teachers who responded to round one of the survey. A vast majority of the teachers surveyed were male (91.1%, *n*=133), while only a few female teachers responded (8.9%, *n*=13). Years of teaching experience was distributed well among respondents. During the 2012-2013 school year (22.6%, *n*=33) respondents had been teaching for one to five years, (19.9%, *n*=29) had been teaching for six to ten years, (17.1%, *n*=25) had been teaching for 11 to 15 years, (13.7%, *n*=20) had been teaching for 16 to 20 years, and (26.7%, *n*=39) had been teaching for 21 years or more.

Table 1

Breakdown of teacher demographics (N=146)

Demographic	*f*	%
Gender		
Male	133	91.1
Female	13	8.9
Teaching Experience		
1-5 years	33	22.6
6-10 years	29	19.9
11-15 years	25	17.1
16-20 years	20	13.7
21 or greater years	39	26.7

To develop an idea of the program size, the researcher asked the agricultural science teachers what size high school they were teaching at during the 2012-2013 school year and how many agricultural science teachers were in their agricultural science department at their school. In the state of Texas high schools are classified as 1A, 2A, 3A, 4A, or 5A. According to the University Interscholastic League (UIL), a 1A high school has 199 or less students, a 2A high school has between 200 and 449 students, a 3A high school has between 500 and 1,004 students, a 4A high school has between 1,005 and 2,089 students, and 5A high schools have 2,090 students or greater (University Interscholastic League, 2012). These categories were used in the survey to gain an understanding of the size of the school that the teacher taught in during the 2012-2013 school year. This information and the number of agricultural science teachers in their school agricultural science department are summarized in Table 2.

Table 2

School and program size of teachers (N=146)

Demographic	*f*	%
UIL High School Size		
1A	47	32.2
2A	36	24.7
3A	29	19.9
4A	20	13.7
5A	14	9.6
Agriscience Department Size		
1 Teacher	54	37.0
2 Teachers	54	37.0
3 Teachers	30	20.5
4 Teachers	5	3.4
5 or Greater Teachers	3	2.1

Teachers were also asked to specify student enrollment numbers for the 2012-2013 school year to gain an idea of program size. Specifically teachers were asked how many students were in the whole agricultural science program, including non-agricultural mechanics courses, and how many students were in enrolled in their agricultural mechanics courses alone. Means and standard deviations for this data are shown in Table 3.

Table 3

Program and course student enrollment numbers for 2012-2013 (N=146)

Student Enrollment	M	SD
Total in Agriscience Program	166.0	121.8
Total in Agricultural Mechanics Courses	58.9	38.5

To gain an understanding of the courses taught by survey participants, they were asked to indicate which of the four Texas Education Agency recognized

agricultural mechanics course they taught or to indicate other if they taught another local course related to agricultural mechanics. Some of the courses that teachers specified under other were: Welding I, Welding II, Introduction to Welding, Advanced Welding, Practicum in Welding, Construction Trades/Technology, and 7th/8th grade Introduction to Agriculture. Table 4 indicates the frequencies and percentages of the teachers surveyed that taught the listed courses.

Table 4

Agricultural mechanics courses taught by teachers surveyed (N=146)

Course	*f*	%
Agricultural Mechanics & Metal Technologies	131	89.7
Agricultural Facilities Design & Fabrication	94	64.4
Agricultural Power Systems	54	37.0
Practicum in AFNR	39	26.7
Other	28	19.2

Note. Teachers were asked to check all that apply for which agricultural mechanics course they taught. Some teachers may teach multiple agricultural mechanics courses.

Objective 1: Types of Agricultural Mechanics Projects Constructed

Identifying the types of agricultural mechanics projects constructed by high school students with agricultural mechanics programs in Texas was the first objective used to guide this study. To accomplish this objective, teachers were asked to list the types of projects that were constructed in their program during the 2012-2013 school year and provide the quantity of each. The responses to this question are summarized in Table 5.

Table 5

Agricultural mechanics projects constructed by programs surveyed (N=146)

Project Type	*f*	%
BBQ Pit	302	11.50
Firewood Rack	207	7.88
Trailer	202	7.69
Grill	160	6.09
Art/Decorative Projects	159	6.05
Hay Rings	133	5.06
Quail Cage	100	3.81
Toolbox	94	3.58
Picnic Table	93	3.54
Deer Stand	76	2.89
Signs	74	2.82
Feeders	73	2.78
Gates	65	2.48
Fire Pit	63	2.40
Flag Holder	60	2.28
Livestock Panels	59	2.25
Lamp	56	2.13
Livestock Pen	45	1.71
Benches	42	1.60
Hog Trap	40	1.52
Shop Table/Work Bench	31	1.18
Coffee Table	27	1.03
Cooker/Fryer	26	0.99
Tractor Implements	23	0.88
Cooking Stands	20	0.76
Table	20	0.76
Rocker	20	0.76
Adirondak Chairs	20	0.76
Bumpers	19	0.72
Porch Swing	16	0.61
Tractor Restoration	16	0.61
Pig Shed	15	0.57
Headache Rack	13	0.50
Hay Hauler/Trailer	13	0.50
Receiver Hitch Implements	13	0.50
Hay Spears/Forks	13	0.50
Shelf	12	0.46
Bee Hive Boxes	11	0.42
Coat Rack	11	0.42

Table 5 Continued

Project Type	*f*	%
Lamb/Goat Table	11	0.42
Sprayer	9	0.34
Saddle Rack	8	0.30
Cooler	7	0.27
Wood Cabinets	7	0.27
Dog Hauler	6	0.23
Dog House	6	0.23
Plant Stand	6	0.23
Implement Restoration	5	0.19
Gun Rack	5	0.19
Machined Parts	5	0.19
Bed	5	0.19
Ramps	4	0.15
Stool	4	0.15
3 Point Hitch	4	0.15
Fence Braces	4	0.15
Hog Show Rack	4	0.15
Barbed Wire Unroller	3	0.11
Log Splitter	3	0.11
Truck Bed	3	0.11
Welding Skid	3	0.11
Podium	3	0.11
Speaker Box	3	0.11
Fuel Tank	3	0.11
Aquaponic System	3	0.11
Chicken House	3	0.11
Squeeze Chute	2	0.08
Shuffle Board Table	2	0.08
Storage Building	2	0.08
Cattle Guard	2	0.08
Grapple	2	0.08
Welding Cart	2	0.08
Patio	2	0.08
Swing Set	2	0.08
Washerboards	2	0.08
Light Tester	2	0.08
Deer Skinning Rack	2	0.08
Metal Rack	2	0.08
Jack Stands	2	0.08
Duck Blind	2	0.08
Barn	2	0.08

Table 5 Continued

Project Type	*f*	%
Log Rack	2	0.08
Show Box	2	0.08
Deer Cradle	1	0.04
Farrowing Crate	1	0.04
Treasure Box	1	0.04
Trailer Dolly	1	0.04
Trim Chute	1	0.04
Bucking Chute	1	0.04
Fireplace Screen	1	0.04
Awning	1	0.04
Playhouse	1	0.04
Sheep/Goat Hauler	1	0.04
Pig Wash Rack	1	0.04
Portable Pitching Mound	1	0.04
Bridge	1	0.04
Rabbit Hutch	1	0.04
Boot Scraper	1	0.04
Entertainment Center	1	0.04
Skinning Knife	1	0.04
Bike Rack	1	0.04
Rainwater Collector	1	0.04
Solar Panel	1	0.04
Anvil Stand	1	0.04
Greenhouse	1	0.04
Calf Table	1	0.04
Totals	**2,626**	**100.00**

Objective 2: Agricultural Mechanics SAEs in Texas High Schools

Determining the number of agricultural mechanics projects that are considered SAEs by agricultural science teachers in high school agricultural mechanics programs was the second objective of this study. To meet this objective, participants were asked to provide the number of agricultural mechanics projects constructed by both a single student and projects constructed as a group. Teachers were also asked to specify how

many projects were considered to be a SAE on projects constructed by both a single student and as a group. The results of these questions can be found in Table 6.

Table 6

Quantity of agricultural mechanics projects constructed (N=146)

Category	*f*	%
Single Student Projects Constructed	2044	57.3
Group Projects Constructed	1523	42.7
Totals	***3567***	***100.0***
Single Student Projects Considered as a SAE	798	47.2
Group Projects Considered as a SAE	893	52.8
Totals	***1691***	***100.0***

Note. Data for this table came from question eight on the questionnaire. Totals may not match other project totals found in this study due to inconsistencies in teacher response.

Objective 3: Reasons Agricultural Mechanics Projects are not Considered SAEs

Identifying reasons why agricultural science teachers do not consider agricultural mechanics projects to be a SAE was the third objective of this study. A modified Delphi study was conducted to identify these reasons. The panel of experts were agricultural science teachers that entered agricultural mechanics projects in one of four agricultural mechanics shows in Texas. These agricultural mechanics teachers were considered experts in this area of study because of the extensive knowledge in SAE and agricultural mechanics required to teach and supervise the construction of agricultural mechanics projects. The first round of the Delphi was included in the initial survey as two open-ended questions. The first open-ended question asked agricultural science teachers to list reasons why any of the agricultural mechanics projects constructed at

their school were not considered a student's SAE. The panel provided 23 unique answers. These responses are listed in Table 7.

Table 7

Reasons teachers did not consider ag mechanics projects to be SAEs in their program

Reason	*f*
Student had other SAEs.	17
Students did not keep records.	10
Lack of student interest in awards and record keeping.	8
Project did not meet award standards or was a small project.	8
Project financed by someone other than the student.	6
Teacher unsure about SAE classification of project.	5
Students were not FFA members.	4
Students were seniors.	3
Project was built during class hours.	3
Project was for student's own use.	3
Project was built for teaching instruction purposes only.	3
Teacher did not consider possibility of using ag mechanics project as a SAE.	2
Ag mechanics project was a group project.	2
Students did not have access to record books.	2
Student did not complete the project.	2
Teacher did not know ag mechanics projects were SAEs.	1
Lack of teacher interest in ag mechanics SAEs.	1
Lack of project funding.	1
The project was for the school.	1
Lack of parent involvement.	1
Teacher new at the school.	1
Projects were for fundraisers.	1
Project construction was completed at home.	1

For the second open-ended question, participants were asked to list reasons why they believed agricultural mechanics projects are seldom used as a student's SAE in Texas. After all responses were compiled and collapsed, there were 31 unique responses. These answers to the question are provided in Table 8.

Table 8

Reasons agricultural mechanics projects are not considered SAEs across Texas

Reasons	*f*
Lack of student interest in FFA awards and record keeping.	22
Teacher unsure about record book category classification/entry.	22
Ag mechanics projects are not conventional SAEs like livestock.	20
Teachers or students do not have time for record keeping.	13
Lack of teacher awareness in ag mechanics SAEs.	13
Student had other SAEs.	12
Project was built during class hours.	11
Lack of project funding.	10
Project was not profitable.	9
Project was completed by a group of students.	7
Project does not meet degree requirements/small project.	6
Project funded by someone else.	4
Projects were built for other people.	4
Complexity of the project.	4
Too much emphasis is put on record keeping.	4
Students working on project were not FFA members.	3
Lack of teacher knowledge in agricultural mechanics.	3
Lack of school support (travel, materials, etc.)	3
Project takes more than one year to complete.	3
Project was built for a fundraiser.	3
Historically not able to enter ag mechanics projects as a SAE.	3
Project built for instructional purposes only.	2
Project for student's personal use.	2
Lack of project buyers.	2
Lack of student ability to put in records.	1
Lack of facilities for project construction.	1
Lack of student SAE awareness.	1
Scholarship judges do not consider ag mechanics projects to be SAEs.	1
SAE does not fit into course curriculum.	1
Not all students have to have an SAE.	1
Facilities for project construction unavailable after school.	1

In round two participants were asked to rate their level of agreement on a 1-4 Likert scale for each of the responses provided for the two open-ended questions. In the second round, none of the responses reached a consensus of agreement ($m \geq 3.2$).

Results of round two are presented with means and standard deviations in Table 9 for reasons why agricultural science teachers did not consider agricultural mechanics projects to be SAEs in their program. Reasons why teachers believed agricultural mechanics projects are seldom used as a student's SAE in Texas are presented with means and standard deviations for round two in Table 10.

Table 9

Round two reasons teachers did not consider ag mechanics projects to be SAEs (N=92)

Reason	M	SD
Project financed by someone other than the student	3.09	0.83
Ag mechanics project was a group project	3.02	0.88
Lack of student interest in awards and record keeping	2.88	0.80
Student had other SAEs	2.71	0.73
Project was built during class hours	2.71	0.90
Students did not keep records	2.57	0.85
Lack of parent involvement	2.53	0.89
Lack of project funding	2.52	0.94
Students were seniors	2.46	0.75
Project did not meet award standards or was a small project	2.42	0.82
Project was for student's own use	2.29	0.73
The project was for the school	2.27	0.88
Project was built for teaching instruction purposes only	2.26	0.73
Students were not FFA members	2.23	0.94
Teacher did not consider possibility of using ag mechanics project as a SAE	2.13	0.86
Student did not complete the project	2.09	0.81
Teacher unsure about SAE classification of project	2.08	0.82
Projects were for fundraisers	2.07	0.79
Teacher did not know ag mechanics projects were SAEs	1.86	0.85
Teacher new at the school	1.84	0.79
Project construction was completed at home	1.73	0.62
Lack of teacher interest in ag mechanics SAEs	1.71	0.83
Students did not have access to record books	1.65	0.62

Note. Scale: "1" = "Strongly Disagree," "2" = "Disagree," "3" = "Agree," "4" = "Strongly Agree."

Table 10

Round two reasons why ag mechanics projects are not considered SAEs across Texas (N=79)

Reason	M	SD
Project was completed by a group of students	2.86	0.87
Lack of student interest in FFA awards and record keeping	2.76	0.87
Project funded by someone else	2.68	0.91
Project was built during class hours	2.65	0.95
Lack of project funding	2.65	0.97
Projects were built for other people	2.61	0.91
Lack of student SAE awareness	2.61	0.84
Student had other SAEs	2.59	0.81
Ag mechanics projects are not conventional SAEs like livestock	2.54	0.86
Scholarship judges do not consider ag mechanics projects to be SAEs	2.53	0.87
Lack of project buyers	2.51	0.86
Project was not profitable	2.43	0.84
Too much emphasis is put on record keeping	2.38	0.79
Historically not able to enter ag mechanics projects as a SAE	2.34	0.81
Lack of teacher awareness in ag mechanics SAEs	2.33	0.96
Lack of student ability to put in records	2.30	0.70
Project for student's personal use	2.29	0.79
Teacher unsure about record book category classification/entry	2.28	0.88
Students working on project were not FFA members	2.27	0.89
Lack of school support (travel, materials, etc.)	2.27	0.87
Project built for instructional purposes only	2.25	0.76
Project does not meet degree requirements/small project	2.24	0.75
Lack of facilities for project construction	2.23	0.83
Teachers or students do not have time for record keeping	2.22	0.75
Project takes more than one year to complete	2.20	0.74
Project was built for a fundraiser	2.19	0.74
Complexity of the project	2.18	0.80
Not all students have to have an SAE	2.14	0.78
Facilities for project construction unavailable after school	2.10	0.78
Lack of teacher knowledge in agricultural mechanics	1.92	0.84
SAE does not fit into course curriculum	1.86	0.71

Note. Scale: "1" = "Strongly Disagree," "2" = "Disagree," "3" = "Agree," "4" = "Strongly Agree."

Since no items reached consensus on round two, the survey was sent out for a third round to determine if any of the items would reach consensus. As with round two, round three participants were asked to rate their level of agreement on a 1-4 Likert scale for each of the responses provided for the two open-ended questions. Results of round three are presented with means and standard deviations in Table 11 for reasons why agricultural science teachers did not consider agricultural mechanics projects to be SAEs in their program. Reasons why teachers believed agricultural mechanics projects are seldom used as a student's SAE in Texas are presented with means and standard deviations for round three in Table 12.

Table 11

Round three reasons teachers did not consider ag mechanics projects to be SAEs (N=47)

Reason	M	SD
Lack of student interest in awards and record keeping	2.94	0.76
Students did not keep records	2.83	0.89
Ag mechanics project was a group project	2.81	0.80
Project was built during class hours	2.81	0.80
Lack of parent involvement	2.74	0.90
Project financed by someone other than the student	2.72	0.90
Student had other SAEs	2.72	0.71
Lack of project funding	2.66	0.87
Students were seniors	2.60	0.80
The project was for the school	2.38	0.82
Student did not complete the project	2.32	0.75
Projects were for fundraisers	2.32	0.89
Project was for student's own use	2.28	0.71
Project was built for teaching instruction purposes only	2.28	0.74
Teacher did not consider possibility of using ag mechanics project as a SAE	2.23	0.84
Project did not meet award standards or was a small project	2.21	0.69
Teacher unsure about SAE classification of project	2.21	0.83
Students were not FFA members	2.13	0.80
Students did not have access to record books	1.89	0.73
Lack of teacher interest in ag mechanics SAEs	1.83	0.79

Table 11 Continued

Reason	M	SD
Teacher did not know ag mechanics projects were SAEs	1.79	0.75
Teacher new at the school	1.77	0.79
Project construction was completed at home	1.70	0.55

Note. Scale: "1" = "Strongly Disagree," "2" = "Disagree," "3" = "Agree," "4" = "Strongly Agree."

Table 12

Round three reasons why ag mechanics projects are not considered SAEs across Texas (N=44)

Reason	M	SD
Lack of student interest in FFA awards and record keeping	2.95	0.69
Project was completed by a group of students	2.79	0.67
Projects were built for other people	2.73	0.69
Project was built during class hours	2.72	0.77
Project funded by someone else	2.69	0.75
Student had other SAEs	2.63	0.72
Teachers or students do not have time for record keeping	2.59	0.73
Too much emphasis is put on record keeping	2.58	0.82
Lack of student SAE awareness	2.57	0.70
Lack of project funding	2.53	0.83
Teacher unsure about record book category classification/entry	2.52	0.79
Lack of student ability to put in records	2.48	0.76
Lack of project buyers	2.47	0.74
Historically not able to enter ag mechanics projects as a SAE	2.47	0.80
Ag mechanics projects are not conventional SAEs like livestock	2.42	0.79
Project was not profitable	2.40	0.69
Complexity of the project	2.40	0.73
Scholarship judges do not consider ag mechanics projects to be SAEs	2.37	0.69
Project does not meet degree requirements/small project	2.36	0.65
Project for student's personal use	2.32	0.67
Lack of school support (travel, materials, etc.)	2.32	0.80
Not all students have to have an SAE	2.32	0.77
Lack of teacher awareness in ag mechanics SAEs	2.30	0.90
Project takes more than one year to complete	2.30	0.63
Project built for instructional purposes only	2.27	0.66
Students working on project were not FFA members	2.25	0.78
Project was built for a fundraiser	2.23	0.68

Table 12 Continued

Reason	M	SD
Facilities for project construction unavailable after school	2.16	0.78
Lack of facilities for project construction	2.11	0.72
SAE does not fit into course curriculum	1.95	0.75
Lack of teacher knowledge in agricultural mechanics	1.93	0.82

Note. Scale: "1" = "Strongly Disagree," "2" = "Disagree," "3" = "Agree," "4" = "Strongly Agree."

Objective 4: FFA SAE Categories Used for Agricultural Mechanics Projects

The fourth objective of this study was to determine which FFA SAE categories teachers use to classify an agricultural mechanics project if it is considered a SAE. Teachers were asked to provide specific numbers of any agricultural mechanics projects considered to be SAEs in any of the following categories: Entrepreneurship, Placement, Research, Exploratory, and Improvement. The frequency of reported SAEs in each category and percentages are reported in Table 13. A total of 1,519 SAEs were classified by agricultural science teachers.

Table 13

Agricultural mechanics SAE categories used by ag mechanics instructors (N=146)

SAE Category	*f*	%
Entrepreneurship	1,041	68.5
Placement	126	8.3
Research	36	2.4
Exploratory	212	14.0
Improvement	104	6.8
Totals	**1,519**	**100.0**

Note. Data for this table came from question 10 on the questionnaire. Totals may not match other project totals found in this study due to inconsistencies in teacher response.

Objective 5: Teacher Practices and Opinions of Ag Mechanics Project Instruction

The fifth objective of this study was to examine agricultural science teacher practices and opinions of agricultural mechanics project instruction. To accomplish this, the researcher asked a series of yes/no questions regarding time and location of project construction, record book practices, and opinions of in-class and outside of class hours and their consideration for a SAE. Frequencies and percentages can be found for the answers provided to these questions in Table 14.

Table 14

Teacher practices and opinions of agricultural mechanics project instruction

	Yes		No	
Question	*f*	%	*f*	%
Did your students use school facilities to work on ag mechanics projects outside of their class period? [a]	117	81.8	26	18.2
Did your students use instructional/class time to work on ag mechanics projects during their class period? [a]	142	99.3	1	0.7
Do all of your students who construct ag mechanics projects maintain a record book? [b]	73	51.4	69	48.6
Do you think in-class hours used to build ag mechanics projects should count toward a student's SAE? [a]	127	88.8	16	11.2
Do you think outside of class hours used to build ag mechanics projects should count toward a student's SAE? [c]	142	98.6	2	1.4
Do you think all ag mechanics projects should be considered SAEs? [d]	113	80.1	28	19.9

Note. [a]$n = 143$, [b]$n = 142$, [c]$n = 144$, [d]$n = 141$

Objective 6: Sources of Agricultural Mechanics Project Funding

The final objective for this study was to identify sources of funding agricultural mechanics instructors use for agricultural mechanics project construction. The objective was addressed by asking participants in round one of the survey to check all that apply as sources of funding for agricultural mechanics projects in the following areas: student, parent, teacher, ag program/school, community member, built to sell, or other. Frequencies and percentages of participants that indicated each area of funding are provided in Table 15.

Table 15

Sources of funding for agricultural mechanics project construction in Texas (N=146)

Funding Source	*f*	%[a]
Ag Program/School	104	71.2
Student	100	68.5
Parent	96	65.7
Built to Sell	84	57.5
Community Member	78	53.4
Teacher	59	40.4
Other	8	5.5

Note. [a] Multiple sources of funding were reported by respondents. Percentages are reported as percent of sample indicating each source of funding.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Based on the results presented in Chapter IV, several conclusions, implications, and recommendations can be drawn about the use of agricultural mechanics SAEs in Texas. Research objectives guiding this study are discussed as well as recommendations for further research.

Purpose and Objectives

The purpose of this study was to determine why agricultural science teachers do not consider all agricultural mechanics projects to be a SAE. The research objectives for this study were the following:

1. Identify the type of agricultural mechanics projects constructed by students in high schools with agricultural mechanics programs in Texas.
2. Determine the number of agricultural mechanics projects in high school agricultural mechanics programs that are considered SAEs by the agricultural science teacher.
3. Identify reasons why agricultural science teachers do not consider agricultural mechanics projects to be a SAE.
4. Determine which FFA SAE category teachers use to classify an agricultural mechanics project if it is considered a SAE.
5. Examine agricultural science teacher practices and opinions of agricultural mechanics project instruction.

6. Identify sources of funding agricultural science instructors use in agricultural mechanics project construction.

Summary of Methodology

A descriptive study of Texas agricultural science teachers who had agricultural mechanics project entries for the San Antonio Junior Agricultural Mechanics Show, the Houston Livestock Show and Rodeo Agricultural Mechanics Show, the San Angelo Agricultural Mechanics Contest, and the Blinn College Agriculture Mechanics Show was conducted to determine why all agricultural mechanics projects are not used as SAEs. Participants were a purposive sample because they were uniquely suited for the intent of the study (Fraenkel, Wallen, & Hyun, 2012, p. 100). Data were collected through a researcher developed, 20 question, electronic survey. Two of the questions were open-ended allowing for the use of a modified Delphi method to quantify the open-ended responses. Two follow up surveys asked the respondents to rate their agreement with the responses of the open-ended questions on a Likert scale in order to attempt to quantify agreement among the panel members for response. The initial survey plus the two follow up surveys made up the three total rounds of surveys.

Because the sample was purposive, all 324 participants were surveyed in the first round of the study. Of the 324 teachers surveyed, 146 completed the survey for a response rate of 45.1%. The second round of the survey was sent back out to the 146 teachers that responded in the first round, with 92 teachers completing the first question (63.0%) and 79 completing the second question (54.1%). The responses for question one are complete and are greater than the responses for question two because some

participants chose not to complete the survey in its entirety. Round three of the survey was sent back out to the 92 teachers that responded in round two. Of the 92 teachers, 47 responded to the first question (51.1%) and 44 responded to the second question (47.8%). As in round two, the responses for question one are complete and are greater than the responses for question two because some of the participants chose not to complete the survey in its entirety in round three.

The instrument used in this study was developed by the researcher. Categorical data such as personal and program information was collected. There were 20 questions on the instrument, with two of them being open-ended questions. A panel of experts at Texas A&M University reviewed and established content and face validity for the instrument. After revisions to the instrument, it was pilot tested to determine reliability by 25 Texas agricultural science teachers who teach agricultural mechanics and were not selected to participate in the main study. Reliability was calculated with a Cronbach's alpha to determine internal consistency. It is appropriate to use a Cronbach's alpha on instrument items not scored right versus wrong (Siegle, 2002). An alpha of .90 was calculated using an Excel spreadsheet for instrument items that are not demographic. These items were mostly dichotomous in nature.

Responses to the two open-ended questions on the first instrument were used to create a second instrument. To determine items to list on the second survey instrument, the responses for the two open-ended questions from the first instrument were grouped and collapsed. The second survey instrument asked respondents to rate their agreement with the items by using a four point Likert scale, with 1 = Strongly Disagree, 2 =

Disagree, 3 = Agree, and 4 = Strongly Agree. For an item to reach consensus of agreement on the second instrument, a mean score of 3.2 was established *a priori*. The third instrument for round three was prepared exactly the same way except responses were listed from highest to lowest mean score as found in round two. No items were removed for the third instrument because no item reached a consensus of agreement on round two.

Survey methods followed the Dillman's tailored design method (2000), with a link provided in an email to complete the online, researcher-designed, Qualtrics™ questionnaire. Teacher contact information was obtained from the show superintendents of the four agricultural mechanics project shows listed earlier. Email addresses were verified through an online agricultural science teacher directory. Dillman (2000) suggests that four contacts are sufficient for conducting surveys. The initial email contact with an explanation of the study, instructions for completing the survey, and the link to the online survey was sent out followed by three weekly reminder emails. Round two and three asked participants to rate their agreement with the open-ended responses was sent out following the same email schedule.

Data from the online Qualtrics™ survey was exported into a Microsoft Excel spreadsheet. Each participant's survey was checked for missing data and was coded for electronic calculations in Microsoft Excel. Basic descriptive statistics such as frequencies, percentages, means, and standard deviations were used to analyze this study and were calculated in the above mentioned program.

Summary of Findings

With this study, a snapshot of current agricultural mechanics project construction in Texas has been provided as well as teacher practices concerning their inclusion as SAEs. The results provide reasons why agricultural science teachers do not consider all agricultural mechanics projects to be SAEs, as well as provide insight into ways to incorporate these projects as part of the supervised agricultural experience. It should be noted that the results of this study cannot be generalized to all students, teachers, and agricultural programs across the country because the data for this study was obtained from teachers in Texas only.

Demographic Data

According to the data collected, over 90% of the teachers surveyed were male. Teachers surveyed were only those who taught agricultural mechanics as indicated by their participation in agricultural mechanics project shows. It could be concluded that agricultural mechanics programs do not reflect the gender demographics of the agricultural education profession.

Years of teaching experience was spread out evenly across participants in the study. It should be noted though, that the largest area of teaching experience was 21 years or greater, with 26.7% of the agricultural mechanics teachers falling into this category. This may suggest that nearly a quarter of agricultural mechanics teachers in Texas are nearing retirement, meaning there will soon be a greater need for future teachers trained in the agricultural mechanics field.

Based on UIL high school size, a majority of the teachers surveyed taught at schools size 2A or less. Less than 10% of the teachers surveyed taught at 5A schools. These results align well with agriscience department size based off of teacher numbers. Over 70% of the teachers surveyed had two teachers or less in their agriscience department, as is common with the large number of size 2A schools or less in Texas. Only 5.5% of the teachers surveyed taught at schools with 4 or more agricultural science teachers. This does not necessarily mean large schools are less likely to have agricultural mechanics programs though.

Agriscience program total student enrollment averaged approximately 166 students. The average number of students enrolled in agricultural mechanics courses in Texas is approximately 59. When compared to the average total number of students in agriscience programs, these students make up nearly one third of the total students. According to the Texas Education Agency (2010), there are four courses out of 24 agricultural science courses that have agricultural mechanics standards to be taught. Based on the results of this study, the number of students enrolled in agricultural mechanics courses is disproportionate compared to the number of agricultural science courses offered. Enrollment numbers in agricultural mechanics courses may indicate a high level of student interest in courses designated as the agricultural mechanics pathway in Texas.

When teachers were asked to indicate which agricultural mechanics courses they taught in their program, nearly 90% of the teachers surveyed taught Agricultural Mechanics & Metal Technologies. This is to be expected since this course is generally

considered the first level of agricultural mechanics taught in most Texas high schools. Over half of the teachers surveyed also taught Agricultural Facilities Design & Fabrication. Both of the courses mentioned lend themselves to project construction because of the skills and information taught in them.

Objective 1: Types of Agricultural Mechanics Projects Constructed

To gain an understanding of what is currently being constructed by students in agricultural mechanics programs, teachers were asked to list the number and type of project constructed during the 2012-2013 school year. Out of the total 2626 projects reported, 302 were BBQ pits. This project included responses such as BBQ pit, BBQ smoker, smoker, and BBQ pit trailers. This project accounted for over 10% of the total projects constructed alone, indicating that this is a popular project for high school students in Texas. Another reason this question was asked was to determine if the projects presently constructed could be considered an SAE. Due to the time and effort required to build BBQ pits, it could be used as any of the four categories of SAE: exploratory, placement, research, or entrepreneurship.

The second highest reported project was the firewood rack with a total of 207 projects. This may not normally be so high on the list, but one school surveyed had built a large number (n=200) during the 2012-2013 school year. From attending the agricultural mechanics project shows in Texas, one might expect that trailers would be high on the list for projects constructed. Trailers ranked third in number with 202 constructed in the programs surveyed. Trailers were not divided into categories of size or type because most teachers surveyed did not specify. Building trailers has many

different processes involved including metal cutting, measurement, welding, electrical systems, painting, and basic mechanical work to name a few. Most trailers require extensive time to construct and could be used as a student's or multiple students' SAE.

Other notable projects reported were grills, art/decorative projects, hay rings, quail cages, toolboxes, picnic tables, deer stands, signs, feeders, gates, fire pits, flag holders, livestock panels, and lamps. Most of these projects are smaller in size than the top three reported above, but are still popular with all of them having been reported in numbers of 50 or greater. While the projects may be small in size, it is still possible to report them as a student's SAE. Most of the projects reported fit well with the curriculum of the Agricultural Mechanics & Metal Technologies, Agricultural Facilities Design & Fabrication, and Practicum in AFNR courses. Very few projects were reported that align with the Agricultural Power Systems course. This could be expected from the results found in the demographic data where only 39 teachers surveyed taught this course. Some projects were reported that could be associated with this course include making tractor implements, tractor restoration, log splitters, sprayers, implement restoration, three point hitches, and grapples.

Objective 2: Agricultural Mechanics SAEs in Texas High Schools

Dyer and Osborne (1995) stated that participation in SAE programs by teachers and students is lacking. Information gathered in this study supports Dyer and Osborne's position on the subject. When teachers were asked to specify how many projects were constructed in the 2012-2013 school year and how many of the projects were considered to be SAEs, there was a large difference in numbers. Teachers responding to the survey

for this study reported a total of 3,567 projects constructed with only 1,691 of the projects used as SAEs. Less than half of the projects constructed were used as a student's SAE, confirming that not all agricultural mechanics projects are considered SAEs. A possible reason the proportion of agricultural mechanics projects used as SAEs is low may be because teachers believe some of the projects lack the scale of other SAEs. For example, if a student project has very little expenses, is built quickly, or is small, it may not be recorded as a SAE. Many teachers may believe that a student should have only one SAE and small SAEs may not be worth the time and effort to create a SAE plan and record book.

Teachers were asked to specify how many of the projects were group projects and how many were single student projects. This same information was collected on project use as an SAE as well. Interestingly of the 3,567 projects constructed, 2,044 were single student projects. When asked how many projects were used as an SAE, 893 of the total projects used as a SAE were group projects. Over half of the projects considered to be SAEs were group projects, while nearly two-thirds of the projects built were constructed by a single student. Since the number of projects built by a single student was greater, one might expect the number of SAEs for single student projects to be greater as well. In this case, the opposite was found. Respondents reported more group projects as SAEs than projects built by a single student.

Objective 3: Reasons Agricultural Mechanics Projects are not Considered SAEs

The core of this study was to identify reasons why agricultural mechanics projects are not used as students' SAEs. Dyer and Osborne (1995) recommended the

identification of factors that limit student participation in SAE programs as a suggestion for further research from their study. To accomplish this part of the research, a modified Delphi study was conducted. Included in the first survey were two open-ended questions asking why teachers did not use agricultural mechanics projects as SAEs in their program and why they thought others seldom use them in programs across the state. After all responses were compiled and collapsed, agricultural science teachers participating in the survey provided 23 unique answers to why they did not use all agricultural mechanics projects as a student's SAE in their program. For the second question of why they thought other programs are not using agricultural mechanics projects as SAEs across Texas, respondents provided 31 unique responses.

For the second round of the survey, teachers were asked to rate their level of agreement for each response to the two questions. None of the responses for the two questions reached a mean score of 3.2 set *a priori* to indicate a consensus of agreement. A third round of the survey was sent out to confirm the results from round two and again, no responses had a mean score of 3.2 or greater. A possible reason for a lack of agreement between the participants may be because of the large size of the panel. With round two having 92 participants and round three having 47 participants, it could be difficult for large numbers to agree on a wide range of reasons for not using agricultural mechanics projects as SAEs. Another reason for lack of agreement may be because many of the responses given were not by definition of SAE a legitimate reason for not classifying agricultural mechanics projects as a SAE. Also, each teacher may have

his/her own personal philosophy of what constitutes a SAE and how it should be recorded, resulting in disagreement.

While none of the items met consensus, it is important to note responses given to the two questions. In the final round of the modified Delphi study, the top reason teachers did not consider agricultural mechanics projects to be SAEs in their program was a lack of student interest in awards and record keeping. This had the highest mean score of 2.94, and support the conclusions made by others on the subject of why SAE is in decline (Robinson & Haynes, 2011; Lewis, Rayfield, & Moore, 2012a; Forster, 1986). The second highest mean score of 2.83 was for the response that students did not keep records. A lack of record keeping was found in other studies as well (Lewis, Rayfield, & Moore, 2012b; Hanagriff et al., 2010). This could indicate a failure to implement a complete SAE by teachers. Dyer and Osborne (1995) provided this as reason for decreased student participation in SAEs, indicating that this may be an ongoing problem. The third highest reason for why teachers do not use all agricultural mechanics projects as a SAE was that the agricultural mechanics project was a group project. The researcher has not found any literature that states group projects cannot be used as a SAE. The problem with using a group project probably comes in with record book entries. Areas of confusion may be how to divide the hours or finances, how to complete award applications, or determining which SAE category it fits into. This may be an issue more common in agricultural mechanics projects because many of them are built and exhibited as a team at the project shows. Other SAEs such as livestock and research projects are commonly conducted by a single student. Traditionally, awards

offered for SAEs by the National FFA Organization are only one student receives the award, not a group. Interestingly, many of the agricultural mechanics project shows require students to present a record or scrapbook showcasing the project. From personal observation, some of the things included in these books are pictures of the students constructing the project, expenses/bill of materials, project plans, and material safety data sheets. Most of the items required for show notebooks overlap with requirements for student SAE record books, but not all. Since the project notebook and the SAE record book are not in the exact same format, SAE record books may not be kept as often on agricultural mechanics projects because it would result in double the work load.

Equally as important are some of the lower ranking answers provided to the question of why teachers do not use agricultural mechanics projects as SAEs in their program. The lowest ranking answer with a mean of 1.70 was that project construction was completed at home. While it is the lowest ranking, it probably should not have made the list as a reason because SAEs should be conducted outside of normal class hours and can be conducted off of school grounds (Croom, 2008; Phipps, Osborne, Dyer, & Ball, 2008, p. 439; Talbert, Vaughn, Croom, & Lee, 2007, p. 422). Two responses that point to a lack of teacher understanding of SAEs were that the teacher did not consider the possibility of using an agricultural mechanics project as a SAE (M=2.23) and that the teacher did not know agricultural mechanics projects were SAEs (M=1.79). While both were ranked low on the list of responses, they were still responses that were provided. These could be an indication of lack of teacher knowledge in the area of SAE.

Several reasons for not considering the project as SAEs were related to the area of project financing. The response project financed by someone other than the student had a mean score of 2.72. Also listed were lack of project funding, project was for the school, and projects were for fundraisers. These reasons may be listed because teachers may think that projects must be funded by the student for it to be their SAE. This is true if it is an entrepreneurship SAE, but not if it is placement, research, or exploratory.

The second question asked teachers why agricultural mechanics projects are seldom used as SAEs in other programs across the state. Again ranking highest was lack of student interest in FFA awards and record keeping. Second highest was project was completed by a group of students. These two answers correspond with reasons why teachers did not use SAEs in their own program. The third ranking reason was projects were built for other people (M=2.73). This response could also be an indication of misunderstanding of SAEs. If the project was built for someone else for money, it could be classified as an entrepreneurship SAE. If the project was built for someone else by paid labor, it could be considered a placement SAE. The project could be exploratory if the student was learning different processes related to agricultural mechanics. Just because a project is built for someone else, that does not mean it cannot be a SAE.

The response to why teachers think agricultural mechanics projects are not used as SAEs ranked seventh (M=2.59) was that teachers or students do not have time for record keeping. It was perceived that class time should be used for updating record books and planning individual SAEs in a study by Swortzel (1996). From the information collected in this study, this may not be happening. Many have cited the

cause of decreased SAE participation to be a lack of time the teacher has to spend supervising the projects, but none known to the researcher have cited lack of time for keeping record books as a cause (Lewis, Rayfield, & Moore, 2012a; Dyer & Osborne, 1996; Foster, 1986).

A response different from that of the first question was that teachers are unsure about record book category classification/entry. This may be from a lack of teacher knowledge of their current record keeping program and is an area that could be addressed easily. Two other responses that were ranked fairly high was that teachers were not historically able to enter agricultural mechanics projects as a SAE (M=2.47) and that agricultural mechanics projects are not traditional SAEs like livestock (M=2.42). These responses are interesting in that they highlight many agricultural science teachers' thoughts on using mechanics projects as SAEs.

Of the lower ranking responses, the response SAE does not fit into course curriculum had a mean score of 1.95. This is indicative of teacher misunderstanding of the definition of SAE. Even though it is the second lowest ranking, it is still a response that made the list that probably would not have, if there was a clear understanding of what SAEs are and how to implement them.

Objective 4: FFA SAE Categories Used for Agricultural Mechanics Projects

Agricultural mechanics projects can be classified as any of the four categories of SAEs recognized by both the Texas FFA Association (2012) and the National FFA Organization (2013). These are entrepreneurship, placement, research and exploratory. For this study, improvement was also listed as a category because it is still recognized by

many Texas agricultural science teachers. Participants were asked to list the number of agricultural mechanics projects they considered as SAEs in each of these five categories. Out of the 1,519 projects that participants classified in the survey, 1,041 of them were classified in the entrepreneurship category.

The second highest category used by teachers was exploratory, accounting for a distant 14.0% (n=212) of the total reported. SAEs classified as placement and improvement both had numbers slightly over 100. By far the least used was research with only 2.4% (n=36) reported. The results of this part of the study might indicate that using agricultural mechanics projects as an entrepreneurship SAE is more easily done than in other categories. It may also indicate that teachers are unsure how to enter agricultural mechanics projects in a record book as a placement, research, exploratory, or improvement SAE. According to Roberts and Harlin (2007), projects in general have had a history of having many different ways of being classified. Teacher confusion in this area may have its roots in the ever evolving and complicated past of classifying projects.

Objective 5: Teacher Practices and Opinions of Ag Mechanics Project Instruction

Teachers were asked a series of yes/no questions to gain a clearer understanding of their practices and opinions regarding agricultural mechanics project construction and their implementation as SAEs. Of the teachers surveyed, 81.8% indicated that their agricultural mechanics laboratory was available for student use outside of normal class hours. According to the definition of SAE by many, this would allow the students to consider the projects as SAEs (Croom, 2008; Phipps, Osborne, Dyer, & Ball, 2008, p.

439; Talbert, Vaughn, Croom, & Lee, 2007, p. 422). Over 99% of the teachers reported that the projects were worked on during class hours. If a project is constructed only during class time, then it probably should not be considered a SAE (Croom, 2008; Phipps, Osborne, Dyer, & Ball, 2008, p. 439; Talbert, Vaughn, Croom, & Lee, 2007, p. 422).

When teachers were asked if all students who construct agricultural mechanics projects maintained a record book, the responses were approximately half no and half yes. Reasons related to this, found in objective three, were a lack of time for record keeping and a lack of student interest. Maintaining a SAE in any area of agricultural education, including agricultural mechanics should include maintaining a record book to simulate real world business applications and further reinforce the purpose of having a SAE.

Concerning teacher opinions on hours spent constructing agricultural mechanics projects, 98.6% of teachers thought that outside of class hours should count toward a student's SAE. This may indicate that most of the teachers surveyed were familiar with requirements for SAEs and agreed with them. On the other hand, 88.8% of the teachers surveyed thought that in-class hours should be counted toward student SAEs. This is interesting since most publications do not list in-class hours as part of a SAE. One source for this line of thought may come from a publication from the Texas FFA Association (n.d.) that stated "laboratory SAEs may take place either during or outside of the regularly scheduled school and tend to serve student who have no facilities to conduct specialized activities at home or away from school." It is unclear if agricultural

science teachers used in-class hours for agricultural mechanics SAEs because they were only asked if they thought they should be able to use in-class hours. The information collected from teachers possibly indicates that there is a lack of agreement on what SAEs are and a lack of agreement on what teachers think SAEs should be.

When agricultural science teachers were asked if they thought all agricultural mechanics projects should be SAEs, 80.1% of them said yes. Most of the teachers surveyed thought that all agricultural mechanics projects should be SAEs, indicating that the intention to use them may be there, but other factors may prevent their full implementation. Many reasons for this were identified in objective three, but none reached a consensus of agreement by teachers on the panel. This may be because reasons for not implementing agricultural mechanics projects as SAEs are different for each specific agricultural mechanics instructor.

Objective 6: Sources of Agricultural Mechanics Project Funding

As an indicator of how agricultural mechanics projects could be categorized as a SAE, participants were asked to identify which sources of funding their program used to finance agricultural mechanics projects. The area of funding that the most teachers acknowledged using for agricultural mechanics project construction was from the agriscience program/school. This type of funding for a project can limit which type of SAE a student could use to the categories of exploratory or research. Since a school does not pay students wages to build projects and the students did not invest their own money, placement and entrepreneurship SAEs are not possible.

The source of funding for projects that was indicated as the second highest was from students. This source of funding makes it easy to use as an entrepreneurship SAE. Parents were the third most used source of funding followed by built to sell. Approximately 53% of teachers reported that community members fund projects, also eliminating the possibility of using the project as an entrepreneurship SAE. The source of funding with the lowest number reporting was funding by the teacher. Interestingly, the category of SAE used the most was entrepreneurship as found in objective four.

Personal investment by the student is only one of the sources of project funding teachers indicated using. The other five sources of funding do not technically allow the students to use a project constructed from those sources as an entrepreneurship SAE because they would not be investing their own money. This may indicate that teachers are unsure how to enter records to use the project as a SAE when it is funded by someone other than the student.

Recommendations for Practice

Agricultural mechanics projects can provide hands-on experience for students, both inside and outside of class. Often these projects are completed in groups by students in a class. While the majority of the SAEs reported in this study were group projects, some teachers also provided this as a reason for not considering agricultural mechanics projects SAEs. Professional development for agricultural science teachers should be provided to clarify how group projects can be used for SAEs not only in the area of agricultural mechanics, but others as well. Based on the findings of this study, teachers sometimes do not know how to enter some projects into a record book when

documenting SAEs. Teacher educators in Texas should clarify how to enter group projects in record books. Davis and Williams (1979) stressed that record keeping for supervised agricultural experiences should not be over emphasized, but is a critical component in agricultural education because it provides skills in simple business analysis. The consideration of agricultural mechanics projects as a SAE should not be dismissed just because teachers do not know how to enter them into a record book. All agricultural mechanics students should gain record keeping skills so they may be able to use them after high school. Project funding was also an area of confusion when considering agricultural mechanics SAEs that should be addressed in any professional development prepared for agricultural science teachers. This may be accomplished by addressing how to implement non-traditional SAEs in agricultural education programs.

Due to some of the responses provided for the open-ended questions in this study, it was apparent that there is some misunderstanding as to what defines a SAE among teachers. It would be helpful if teacher educators, in collaboration with the National FFA Organization, developed a well-defined description of SAEs with specific requirements included. While this already largely exists, there is some disagreement concerning in class and out of class hours and how to treat group projects. Once a clear description for SAEs is developed, it should be adopted by all state FFA organizations so that it aligns with the National FFA Organization. Unless the agricultural education community agrees on one definition of SAE, there will likely continue to be confusion on the subject.

The highest ranking response for why all agricultural mechanics projects are not considered SAEs in programs across Texas was that there is a lack of student interest in record keeping and FFA award recognition. The agricultural science teacher should encourage students to keep records so that they will gain this skill. With evolving technology, the record keeping process is continuing to become more streamlined and easier for students to accomplish. Greater reward for students may be an incentive to encourage greater participation and interest in this area.

Recommendations for Further Research

One of the limitations of this study was the use of a purposive sample of agricultural science teachers in Texas. A broader investigation should be conducted concerning the use of agricultural mechanics projects as SAEs across the nation. Agricultural mechanics SAEs have the potential to instill many entry-level technical skills on students (Ramsey & Edwards, 2012). These SAEs should continue to be developed and further implemented to guarantee a future in this pathway. Since there is a lack of SAE involvement, the use of agricultural mechanics projects as SAEs could be a way to begin to reverse this trend. Further research in other states may reveal that agricultural mechanics projects are being used more effectively as SAEs and could provide insight into how to implement their use more effectively in Texas. Before professional development concerning SAEs is presented to teachers in Texas, an assessment of teacher knowledge in SAEs is necessary in order to more effectively address problems in the area.

The identification of record keeping practices in all pathways of SAE could be helpful in determining why there is a lack of interest in the process. Identifying specific reasons for lack of both student and teacher interest in the record keeping process would be vital information in order to attempt to correct the problem. To address a concern identified in this study, further research should be conducted concerning the use of group projects as SAEs.

Identification of specific record keeping practices and practices used in applying for FFA awards when using a group project would be useful for teachers so that these projects may be used as SAEs. A possible way to encourage the use of group projects may be to explain how to classify the project in each student's record book. The classification of the project would depend on the student's role in the financing of the project. A group project may have one student classify it as entrepreneurship if he/she financed its construction. Other students in the group could categorize their role as unpaid placement or exploratory, depending on how much time was spent working on the project by each individual student. Students could be encouraged to keep records on the project if it was part of their course grade. If each student is required to have a SAE, a group project would be a way to get several students keeping records on an active SAE, with little difference required in explanation of record book entry for each individual.

Supervised agricultural experiences are an essential part of the integrated three-component model of agricultural education (Croom, 2008). Research in the area of SAE

should continue so that its interaction with FFA and classroom activity will continue to enhance the complete agricultural science program.

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APPENDIX A

ROUND ONE INSTRUMENT

What is your gender?

- Male
- Female

How many years have you been an agricultural science teacher?

- 1-5 Years
- 6-10 Years
- 11-15 Years
- 16-20 Years
- 21+ Years

How many teachers are there in your agricultural science department?

- 1 Teacher
- 2 Teachers
- 3 Teachers
- 4 Teachers
- 5+ Teachers

What is the size classification of your high school?

- 1A
- 2A
- 3A
- 4A
- 5A

Which agricultural mechanics course did you teach in the 2012-2013 school year? (Check all that apply)

- Agricultural Mechanics and Metal Technologies
- Agricultural Facilities Design and Fabrication
- Agricultural Power Systems
- Practicum in AFNR

☐ Other

How many students were enrolled in your whole agricultural science program in the 2012-2013 school year? (Enter a number)

How many students were enrolled in your agricultural mechanics courses in the 2012-2013 school year? (Enter a number)

How many agricultural mechanics projects were built by students enrolled in agricultural science courses in the 2012-2013 school year? (Enter a number)

Single Student Projects	0
Group Projects	0
Total	0

How many of these agricultural mechanics projects did you and the students consider to be a SAE? (Enter a number)

Single Student Projects	0
Group Projects	0
Total	0

If any of the projects were used as a SAE, how many were in each SAE category? (Enter a number for each blank)

Entrepreneurship	
Placement	
Research	
Exploratory	
Improvement	

If any of your agricultural mechanics projects were NOT used as a student's SAE, please provide the three most important reasons why they were not used.

Please list the numbers and types of agricultural mechanics projects that were built in the 2012-2013 school year.
(e.g. 2 Trailers, 5 Hay Rings, 4 BBQ Pits, etc.)

Please indicate sources of funding for the agricultural mechanics projects constructed during the 2012-2013 school year.
(Check all that apply)

- ☐ Student
- ☐ Parent
- ☐ Teacher
- ☐ Ag Program/School
- ☐ Community Member
- ☐ Built to Sell
- ☐ Other (describe)

Did your students use school facilities to work on agricultural mechanics projects *outside of* their specific agricultural science class period?

- ○ Yes
- ○ No

Did your students use instructional/class time to work on agricultural mechanics projects *during* their specific agricultural science class period?

- ○ Yes
- ○ No

Do all of your students who construct agricultural mechanics projects maintain a record book?

- ○ Yes
- ○ No

Do you think *in-class* hours used to build agricultural mechanics projects should count toward a student's SAE?

- ○ Yes
- ○ No

Do you think *outside of class* hours used to build agricultural mechanics projects should count toward a student's SAE?

- ○ Yes
- ○ No

Do you think all agricultural mechanics projects should be considered SAEs?

- ○ Yes
- ○ No

Why do you believe agricultural mechanics projects are seldom used as a student's SAE in Texas? Please provide your top three reasons.

>>

APPENDIX B

ROUND TWO INSTRUMENT

Default Question Block

The following answers were collected in response to the question "why did YOUR students not use agricultural mechanics projects as their SAE?" Please rate your level of agreement with the responses below.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Student had other SAEs.	○	○	○	○
Students did not keep records.	○	○	○	○
Project financed by someone other than the student.	○	○	○	○
Lack of student interest in awards and record keeping.	○	○	○	○
Project did not meet award standards or was a small project.	○	○	○	○
Students were not FFA members.	○	○	○	○
	Strongly Disagree	Disagree	Agree	Strongly Agree
Teacher unsure about SAE classification of project.	○	○	○	○
Students were seniors.	○	○	○	○
Teacher did not know ag mechanics projects were SAEs.	○	○	○	○
Project was built during class hours.	○	○	○	○
Teacher did not consider possibility of using ag mechanics project as a SAE.	○	○	○	○
Project was for student's own use.	○	○	○	○
	Strongly Disagree	Disagree	Agree	Strongly Agree
Ag mechanics project was a group project.	○	○	○	○
Project was built for teaching instruction purposes only.	○	○	○	○
Lack of teacher interest in ag mechanics SAEs.	○	○	○	○

Lack of project funding.	○	○	○	○
Students did not have access to record books.	○	○	○	○
Student did not complete the project.	○	○	○	○
	Strongly Disagree	Disagree	Agree	Strongly Agree
The project was for the school.	○	○	○	○
Lack of parent involvement.	○	○	○	○
Teacher new at the school.	○	○	○	○
Projects were for fundraisers.	○	○	○	○
Project construction was completed at home.	○	○	○	○

The following answers were provided in response to the question, "why do you think agricultural mechanics projects are seldom used as a student's SAE in Texas?" Please rate your level of agreement with the teachers' responses below.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Teachers or students do not have time for record keeping.	○	○	○	○
Lack of student interest in FFA awards and record keeping.	○	○	○	○
Teacher unsure about record book category classification/entry.	○	○	○	○
Ag Mechanics projects are not conventional SAEs like livestock.	○	○	○	○
Student had other SAEs.	○	○	○	○
Lack of teacher awareness in ag mechanics SAEs.	○	○	○	○
Project was built during class hours.	○	○	○	○
	Strongly Disagree	Disagree	Agree	Strongly Agree
Project does not meet degree requirements/small project.	○	○	○	○
Project was completed by a group of students.	○	○	○	○
Project was not profitable.	○	○	○	○
Project built for instructional purposes only.	○	○	○	○
Project funded by someone else.	○	○	○	○
Lack of project funding.	○	○	○	○
Students working on project were not FFA members.	○	○	○	○
	Strongly Disagree	Disagree	Agree	Strongly Agree
Lack of teacher knowledge in	○	○	○	○

agricultural mechanics.	○	○	○	○
Lack of school support (travel, materials, etc.)	○	○	○	○
Project takes more than one year to complete.	○	○	○	○
Projects were built for other people.	○	○	○	○
Project was built for a fundraiser.	○	○	○	○
Complexity of the project.	○	○	○	○
Historically not able to enter ag mechanics projects as a SAE.	○	○	○	○
	Strongly Disagree	Disagree	Agree	Strongly Agree
Lack of student ability to put in records.	○	○	○	○
Too much emphasis is put on record keeping.	○	○	○	○
Lack of facilities for project construction.	○	○	○	○
Lack of student SAE awareness.	○	○	○	○
Project for student's personal use.	○	○	○	○
Scholarship judges do not consider ag mechanics projects to be SAEs.	○	○	○	○
SAE does not fit into course curriculum.	○	○	○	○
	Strongly Disagree	Disagree	Agree	Strongly Agree
Not all students have to have an SAE.	○	○	○	○
Facilities for project construction unavailable after school.	○	○	○	○
Lack of project buyers.	○	○	○	○

APPENDIX C

ROUND THREE INSTRUMENT

Default Question Block

The following answers were collected in response to the question "why did YOUR students not use agricultural mechanics projects as their SAE?" Please rate your level of agreement with the responses below.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Project financed by someone other than the student.				
Ag mechanics project was a group project.				
Lack of student interest in awards and record keeping.				
Student had other SAEs.				
Project was built during class hours.				
Students did not keep records.				

	Strongly Disagree	Disagree	Agree	Strongly Agree
Lack of parent involvement.				
Lack of project funding.				
Students were seniors.				
Project did not meet award standards or was a small project.				
Project was for student's own use.				
The project was for the school.				

	Strongly Disagree	Disagree	Agree	Strongly Agree
Project was built for teaching instruction purposes only.				
Students were not FFA members.				
Teacher did not consider possibility of using ag mechanics projects as a SAE.				
Student did not complete the project.				
Teacher unsure about SAE classification of project.				
Projects were for fundraisers.				

	Strongly Disagree	Disagree	Agree	Strongly Agree
Teacher did not know ag mechanics projects were SAEs.				
Teacher new at the school.				
Project construction was completed at home.				

Project construction was completed at home.				
Lack of teacher interest in ag mechanics SAEs.				
Students did not have access to record books.				

The following answers were provided in response to the question "why do you think agricultural mechanics projects are seldom used as a student's SAE in Texas?" Please rate your level of agreement with the teachers' responses below.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Project was completed by a group of students.				
Lack of student interest in FFA awards and record keeping.				
Project funded by someone else.				
Project was built during class hours.				
Lack of project funding.				
Lack of student SAE awareness.				
Student had other SAEs.				

	Strongly Disagree	Disagree	Agree	Strongly Agree
Ag mechanics projects are not conventional SAEs like livestock.				
Scholarship judges do not consider ag mechanics projects to be SAEs.				
Lack of project buyers.				
Projects were built for other people.				
Project was not profitable.				
Too much emphasis is put on record keeping.				
Historically not able to enter ag mechanics projects as a SAE.				

	Strongly Disagree	Disagree	Agree	Strongly Agree
Lack of teacher awareness in ag mechanics SAEs.				
Lack of student ability to put in records.				
Project for student's personal use.				
Teacher unsure about record book category classification/entry.				
Students working on project were not FFA members.				
Lack of school support (travel, materials, etc.).				
Project built for instructional purposes only.				

	Strongly Disagree	Disagree	Agree	Strongly Agree
Project does not meet degree requirements/small project.				
Lack of facilities for project construction.				
Teachers or students do not have time for record keeping.				
Project takes more than one year to complete.				
Complexity of the project.				
Project was built for a fundraiser.				

	Strongly Disagree	Disagree	Agree	Strongly Agree
Not all student have to have a SAE.	○	○	○	○
Facilities for project construction unavailable after school.	○	○	○	○
Lack of teacher knowledge in agricultural mechanics.	○	○	○	○
SAE does not fit into course curriculum.	○	○	○	○

APPENDIX D

ROUND ONE EMAIL CONTACTS

First Contact

Dear Agriscience Teacher:

I hope this e-mail finds you well. I am writing to ask you to represent Texas in a study on using agricultural mechanics projects as a student's SAE. This study will determine reasons that agricultural mechanics projects are not used as SAEs. Participating in an agricultural mechanics project show gives you the expertise to provide information concerning this area. More specifically, your input will help assess the current status of agricultural mechanics projects as a student's SAE, examine barriers to using agricultural mechanics projects as SAESs, and aid in the development of guidelines and materials to assist in utilizing agricultural mechanics projects as SAES. Please take 10-15 minutes to share your expertise by completing an electronic questionnaire; click on the link directly below to begin. If you would like to know more about the questionnaire or how we will use your responses, please read below the link.

<<LINK TO QUESTIONNIARE>>

How did we come up with the items?

The beginning of the survey has five demographic questions on gender, teaching experience and school size to gain an understanding of the types of places that have agricultural mechanics projects. The next five questions ask about the number of students in your department and the number of SAEs constructed to gain an idea of the percentage of students involved in agricultural mechanics projects and their use as SAEs. To determine reasons why students do not use agricultural mechanics projects as their SAE, we asked two opened-ended questions for your opinion on the matter. The remaining eight questions are to determine your opinion of when SAEs should be conducted, when your students work on their projects, and what types of projects they construct.

Why are you contacting me and what is this going to be used for?

You are an expert. We need people, who have recently participated in agricultural mechanics project shows because you have expertise in the nature of these projects and know about their SAE use.

Why are we doing this?s

One reason we are doing this is to possibly improve the integration of agricultural mechanics project construction into agriscience programs and hopefully increase the amount and quality of agricultural mechanics projects.

Are There Any Benefits To Me?

With your help, this research could potentially lead to improved SAE participation and the development of guideline and materials to assist in utilizing agricultural mechanics projects as SAEs.

If you have any questions, you may contact the Principal Investigator, Dr. John Rayfield, Assistant Professor at 979-862-3707 orjrayfield@tamu.edu. You may also contact me, the Protocol Director, at 979-845-7557 or william.doss@agnet.tamu.edu or Dr. Tim Murphy, the co-investigator at 979-862-3419 or tmurphy@tamu.edu. I appreciate your time in helping us conduct what we hope will be a valuable research project to improve the agriculture education and SAE involvement, as well as giving your time and expertise to us.

Thank you in advance for your willingness to take part in this endeavor.

Will Doss
Texas A&M University
Graduate Student

Second Contact

Dear Agriscience Teacher:

Good morning. Recently, I asked you to help determine reasons that agricultural mechanics projects are not used as SAEs.

Many of your peers from around the state have responded, but it's important that everyone within the state is represented. Participating in an agricultural mechanics project show gives *you* the expertise to provide information concerning this area. More specifically, your input will help assess the current status of agricultural mechanics projects as a student's SAE, examine barriers to using agricultural mechanics projects as SAESs, and aid in the development of guidelines and materials to assist in utilizing agricultural mechanics projects as SAES. Please take 10-15 minutes to share your expertise by completing an electronic questionnaire. Click on the link directly below to begin. If you would like to know more about the questionnaire or how we will use your responses, please read below the link.

<<LINK TO QUESTIONNIARE>>

How did we come up with the items?

The beginning of the survey has five demographic questions on gender, teaching experience and school size to gain an understanding of the types of places that have agricultural mechanics projects. The next five questions ask about the number of students in your department and the number of SAEs constructed to gain an idea of the percentage of students involved in agricultural mechanics projects and their use as SAEs. To determine reasons why students do not use agricultural mechanics projects as their SAE, we asked two opened-ended questions for your opinion on the matter. The remaining eight questions are to determine your opinion of when SAEs should be conducted, when your students work on their projects, and what types of projects they construct.

Why are you contacting me and what is this going to be used for?

You are an expert. We need people, who have recently participated in agricultural mechanics project shows because you have expertise in the nature of these projects and know about their SAE use.

Why are we doing this?s

One reason we are doing this is to possibly improve the integration of agricultural mechanics project construction into agriscience programs and hopefully increase the amount and quality of agricultural mechanics projects.

Are There Any Benefits To Me?

With your help, this research could potentially lead to improved SAE participation and the development of guideline and materials to assist in utilizing agricultural mechanics projects as SAEs.

If you have any questions, you may contact the Principal Investigator, Dr. John Rayfield, Assistant Professor at 979-862-3707 or jrayfield@tamu.edu. You may also contact me, the Protocol Director, at 979-845-7557 or william.doss@agnet.tamu.edu or Dr. Tim Murphy, the co-investigator at 979-862-3419 or tmurphy@tamu.edu. I appreciate your time in helping us conduct what we hope will be a valuable

research project to improve the agriculture education and SAE involvement, as well as giving your time and expertise to us.

Thank you in advance for your willingness to take part in this endeavor.

Will Doss
Texas A&M University
Graduate Student

Third Contact

Dear Agriscience Teacher:

I hope this email finds you well. I recently asked for your input regarding reasons that agricultural mechanics projects are not used as SAEs, but we need your response for this to be accurate.

SAE involvement in all areas of agricultural education is vital and with your help, this research could potentially lead to improved SAE participation and the development of guideline and materials to assist in utilizing agricultural mechanics projects as SAEs. The information you provide regarding the reasons agricultural mechanics projects are not used as SAEs is important to us! Our plan is to share this information with you once the study is complete. I realize you are very busy, but only you can provide this information.

The survey should take 10-15 minutes for you to complete. Please click on the link to the electronic questionnaire directly below to begin. Your participation is much appreciated.

<<LINK TO QUESTIONNIARE>>

If you have any questions, you may contact the Principal Investigator, Dr. John Rayfield, Assistant Professor at 979-862-3707 or jrayfield@tamu.edu. You may also contact me, the Protocol Director, at 979-845-7557 or william.doss@agnet.tamu.edu or Dr. Tim Murphy, the co-investigator at 979-862-3419 or tmurphy@tamu.edu. I appreciate your time in helping us conduct what we hope will be a valuable research project to improve the agriculture education and SAE involvement, as well as giving your time and expertise to us.

Will Doss
Texas A&M University
Graduate Student

Fourth Contact

Dear (First Name):

Good morning. I recently asked for your input regarding reasons that agricultural mechanics projects are not used as SAEs. Many of your peers have provided their input, but we need your response for this research to be accurate.

The survey should take about 10-15 minutes for you to complete. Please click on the link to the electronic questionnaire directly below to begin. Your participation is much appreciated.

<<LINK TO QUESTIONNIARE>>

If you have any questions, you may contact the Principal Investigator, Dr. John Rayfield, Assistant Professor at 979-862-3707 or jrayfield@tamu.edu. You may also contact me, the Protocol Director, at 979-845-7557 or william.doss@agnet.tamu.edu or Dr. Tim Murphy, the co-investigator at 979-862-3419 or tmurphy@tamu.edu. I appreciate your time in helping us conduct what we hope will be a valuable research project to improve the agriculture education and SAE involvement, as well as giving your time and expertise to us.

Will Doss
Texas A&M University
Graduate Student

APPENDIX E

ROUND TWO EMAIL CONTACTS

First Contact

Dear Agriscience Teacher,

You recently participated in a survey concerning agricultural mechanics project construction. To attempt to quantify results from your responses on the open-ended questions of the previous ag mechanics survey, we are asking you to rate your agreement with statements provided for the two question. Please click on the link below to complete the survey. It only takes about 5 minutes to complete. Results will be used to develop materials for professional development on the subject. Know that your time is very much appreciated!

By clicking on the link below you agree to participate in this study. You may contact the Principal Investigator, Dr. John Rayfield, Assistant Professor, to tell him about a concern or complaint about this research at 979-862-3707 or jrayfield@tamu.edu. You may also contact me, the Protocol Director, at 979-845-7557 or william.doss@agnet.tamu.edu, Dr. Tim Murphy, the co-investigator at 979-862-3419 or tmurphy@tamu.edu.

For questions about your rights as a research participant; or if you have questions, complaints, or concerns about the research, you may call the Texas A&M University Human Subjects Protection Program office at (979) 458-4067 or irb@tamu.edu.

Thank you,
Will Doss
Texas A&M University

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Or copy and paste the URL below into your internet browser:
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Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Second Contact

Dear Agriscience Teacher,

You recently received emails to participate in a survey concerning agricultural mechanics project construction. Many of your fellow teachers have completed the survey, but **your input is still needed**. Please click on the link below to complete the survey. It only takes about 5 minutes to complete. Results will be used to develop materials for professional development on the subject. This survey will be used to determine your agreement on answers provided for the two open-ended questions that you respoded to previously. Know that your time is very much appreciated!

By clicking on the link below you agree to participate in this study. You may contact the Principal Investigator, Dr. John Rayfield, Assistant Professor, to tell him about a concern or complaint about this research at 979-862-3707 or jrayfield@tamu.edu. You may also contact me, the Protocol Director, at 979-

845-7557 or william.doss@agnet.tamu.edu, Dr. Tim Murphy, the co-investigator at 979-862-3419 or tmurphy@tamu.edu.

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Texas A&M University

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Third Contact

Dear Agriscience Teacher,

You recently received emails to participate in a survey concerning agricultural mechanics project construction. Many of your fellow teachers have completed the survey, but **your input is still needed**. Please click on the link below to complete the survey. It only takes about 5 minutes to complete. Results will be used to develop materials for professional development on the subject. This survey will be used to determine your agreement on answers provided for the two open-ended questions that you respoded to previously. Know that your time is very much appreciated!

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Fourth Contact

Dear Agriscience Teacher,

You recently received emails to participate in a survey concerning agricultural mechanics project construction. Many of your fellow teachers have completed the survey, but **your input is still needed**. Please click on the link below to complete the survey. It only takes about 5 minutes to complete. Results will be used to develop materials for professional development on the subject. This survey will be used to determine your agreement on answers provided for the two open-ended questions that you respoded to previously. Know that your time is very much appreciated!

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APPENDIX F

ROUND THREE EMAIL CONTACTS

First Contact

Dear Agriscience Teacher,

The open-ended responses you entered on the previous agricultural mechanics survey were recorded and were sent out for you to rate your agreement on the importance of each response in relation to the question asked. As a collection of teachers, there was a lack of agreement with your responses on the previous survey. For the answers to reach consensus, we are looking for a mean of 3.2 on the 4 point scale. The survey is short and should take about 5 minutes to complete. I understand you are busy and sincerely appreciate your time and effort. Click on the link below to take the survey.

By clicking on the link below you agree to participate in this study. You may contact the Principal Investigator, Dr. John Rayfield, Assistant Professor, to tell him about a concern or complaint about this research at 979-862-3707 or jrayfield@tamu.edu. You may also contact me, the Protocol Director, at 979-845-7557 or william.doss@agnet.tamu.edu, Dr. Tim Murphy, the co-investigator at 979-862-3419 or tmurphy@tamu.edu.

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Second Contact

Dear Agriscience Teacher,

The open-ended responses you entered on the previous agricultural mechanics survey were recorded and were sent out for you to rate your agreement on the importance of each response in relation to the question asked. As a collection of teachers, there was a lack of agreement with your responses on the previous survey. For the answers to reach consensus, we are looking for a mean of 3.2 on the 4 point scale. The survey is short and should take about 5 minutes to complete. I understand you are busy and sincerely appreciate your time and effort. Click on the link below to take the survey.

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Texas A&M University

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Third Contact

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Texas A&M University

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Fourth Contact

Dear Agriscience Teacher,

Last chance to have you opinions recorded. The open-ended responses you entered on the previous agricultural mechanics survey were recorded and were sent out for you to rate your agreement on the importance of each response in relation to the question asked. As a collection of teachers, there was a lack of agreement with your responses on the previous survey. For the answers to reach consensus, we are looking for a mean of 3.2 on the 4 point scale. The survey is short and should take about 5 minutes to complete. I understand you are busy and sincerely appreciate your time and effort. Click on the link below to take the survey.

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Texas A&M University

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APPENDIX G

IRB APPROVAL

DIVISION OF RESEARCH

Office of Research Compliance and Biosafety

TEXAS A&M UNIVERSITY

APPROVAL DATE:	05/01/2013
MEMORANDUM	
TO:	John Rayfield ALRSRCH - Agrilife Research - Ag Leadership, Education & Communication
FROM:	Dr. James Fluckey Chair Institutional Review Board
SUBJECT:	Initial Review Submission Form Approval

Protocol Number:	IRB2013-0303
Title:	Agricultural Mechanics Projects in Texas and Their Classification as a Supervised Agricultural Experience
Review Type:	Expedite
Approved:	**05/01/2013**
Continuing Review Due:	03/30/2014
Expiration Date:	04/30/2014
Review Categories and Regulatory Determinations:	Category 7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies
Document of Consent:	Waiver approved under 45 CFR 46.117 (c) 1 or 2/ 21 CFR 56.109 (c)1

This research project has been approved. As principal investigator, you assume the following responsibilities

1. **Continuing Review:** The protocol must be renewed by the expiration date in order to continue with the research project. A Continuing Review application along with required documents must be submitted by the continuing review deadline. Failure to do so may result in processing delays, study termination, and/or loss of funding.
2. **Completion Report:** Upon completion of the research project (including data analysis and final written papers), a Completion Report must be submitted to the IRB.
3. **Unanticipated Problems and Adverse Events:** Unanticipated problems and adverse events must be reported to the IRB immediately.
4. **Reports of Potential Non-compliance:** Potential non-compliance, including deviations from protocol and violations, must be reported to the IRB office immediately.
5. **Amendments:** Changes to the protocol must be requested by submitting an Amendment to the IRB for review. The Amendment must be approved by the IRB before being implemented.
6. **Consent Forms:** When using a consent form or information sheet, you must use the IRB stamped approved version. Please log into iRIS to download your stamped approved version of the consenting instruments. If you are unable to locate the stamped version in iRIS, please contact the office.

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7. **Audit:** Your protocol may be subject to audit by the Human Subjects Post Approval Monitor. During the life of the study please review and document study progress using the PI self-assessment found on the RCB website as a method of preparation for the potential audit. Investigators are responsible for maintaining complete and accurate study records and making them available for inspection. Investigators are encouraged to request a pre-initiation site visit with the Post Approval Monitor. These visits are designed to help ensure that all necessary documents are approved and in order prior to initiating the study and to help investigators maintain compliance.
8. **Recruitment**: All approved recruitment materials will be stamped electronically by the HSPP staff and available for download from iRIS. These IRB-stamped approved documents from iRIS must be used for recruitment. For materials that are distributed to potential participants electronically and for which you can only feasibly use the approved text rather than the stamped document, the study's IRB Protocol number, approval date, and expiration dates must be included in the following format: TAMU IRB#20XX-XXXX Approved: XX/XX/XXXX Expiration Date: XX/XX/XXXX.

The Office of Research Compliance and Biosafety is conducting a brief survey for the purpose of programmatic enhancements. Click here to take survey or copy and paste in a browser https://tamu.qualtrics.com/SE/?SID=SV_1CgOkLNU45QebvT

This electronic document provides notification of the review results by the Institutional Review Board.