DETERMINING THE SCHOOL AND COMMUNITY NEEDS FOR A NEW CAMPUS GREENHOUSE

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A Project

Presented

to the Faculty of

California State University, Chico

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In Partial Fulfillment

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Master of Science

in

Agricultural Education

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by

Abigail Ferrell

Spring 2014

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DEDICATION

This project is dedicated to my students. I hope that I am able to fulfill the goal of obtaining a new greenhouse, so that my students may grow and become productive citizens and smart consumers.

I would also like to dedicate this project to my nephews, Kade and Liam, who will be the next generation of agriculture students.

ACKNOWLEDGEMENTS

Mollie Aschenbrener, for reading this project over and over again.

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My family, for their support and love.

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ABSTRACT

DETERMINING THE SCHOOL AND COMMUNITY NEEDS FOR

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The purpose of this project was to determine the role and impact of farm facilities, specifically the greenhouse, at Calaveras High School. Two objectives were created to for this study. The first objective sought to determine if student, parent, and community support for revitalizing the school farm existed. The second objective sought to determine potential impact of a school farm. A researcher developed needs assessment determined student, parent and community support exists to improve the school farm, and more specifically, improve the greenhouse. Additionally, it determined that Supervised Agriculture Experience (SAE) projects would improve with development of the school farm.

CHAPTER I

INTRODUCTION

Purpose of the Project

Overview of Agriculture Education Model

The comprehensive agriculture education model is composed of three rings; classroom, FFA (leadership) and Supervised Agriculture Education Projects (SAE) (National FFA, n.d.). Each ring of the model intersects with the other, creating a program in which students receive knowledge, leadership skills and hands on learning experiences (see Figure 1). This educational model is interdependent and provides opportunity for students to gain knowledge and skills (California FFA, n.d.).

Figure 1. Three-circle model of agricultural education.

Source: National FFA. (n.d.). *New farmers of America: NFA history and milestones*. Retrieved from https://www.ffa.org/About/NationalFFA/diversity_and_inclusion/newfarmers/Pages/NFA-History-and-Milestones.aspx Reprinted with permission.

The first ring is comprised of classroom and laboratory experience. In this component, students are given foundational education in agriculture. The second ring is comprised of leadership development. In this arena, students are provided the opportunity to develop leadership skills through student organizations such as Future Farmers of America (FFA). The third ring is comprised of SAE projects and allows students the opportunity to apply knowledge in an applied environment (National Association of Agriculture Educators, n.d). The three ring model of agriculture education is not typical. Agriculture teachers may view school farms as not only a classroom, but facilities for students to gain knowledge and experience when working on their SAE projects.

School farms can act as an agriculture student's laboratory. These facilities allow students to gain knowledge by providing hands on experiences, as well as applying knowledge gained from the classroom, into practical use. Students with access to school farms may have the opportunity to apply knowledge gained from one ring of the model into practical use, and practice different skills in other rings of the model (Rothenberger & Stewart, 1995). The school farm acts as a classroom or laboratory, allowing students to gain knowledge in a variety of subjects (Shoulders & Myers, 2012). These facilities can be a living classroom in which students gain knowledge in an informal learning environment (Ramsey & Edwards, 2004) otherwise difficult to receive in the traditional classroom setting. A school farm may allow students to practice for career development events and expand leadership skills. Leadership skills that might be obtained from having access to facilities such as a school farm include written and oral communication, responsibility, determination, critical thinking, and a strong work ethic (Ramsey & Edwards, 2004). The school farm can also be utilized to enhance SAE projects and may

provide students a place to house or expand their projects. Overall, a school farm allows for student growth and assists with student learning.

Overview of Calaveras High School

Calaveras High School is a small high school of about 1000 students 45 miles east of Stockton in the foothills of the Sierra Nevada's. The Calaveras High School agriculture department consists of one and a half agriculture teachers. Calaveras High School has a school farm that is approximately one and a half acres in size. The school farm currently consists of a non-functional greenhouse, nine raised beds, a large open barn with a pen attached, a pig barn with three stalls and a small rabbit barn. This farm services the entire school district and around 200 students enrolled in agriculture education courses at Calaveras High School.

Problem

The school farm at Calaveras High School is in desperate need of repair. The greenhouse was built over 15 years ago by an agriculture teacher and students. However, it has not been maintained since its construction. The siding is torn, not attached or missing. The entire greenhouse is slanted slightly for no apparent reason. The greenhouse does not have running water, it has a broken irrigation system, and the heaters and coolers do not work (See appendix F). Due to the lack of control over the temperature in the greenhouse, plant germination is sporadic and dependent upon the weather. It has been used to grow starter plants, but the raised beds currently on the property are not protected from the deer and plants are often consumed before they can root.

The large barn was built more recently, but is not being used to its full capacity. Animals are not currently housed in the barn. At this moment, it is being used for storage and other odds and ends. The pig barn is used during the spring to house student projects, but has not been well-maintained. The rabbit barn is used by students involved in the rabbit cooperative, but again, has not been well-maintained. The cages were not installed properly, the siding is falling off and the door does not remain closed.

Significance

This project is important to support students at Calaveras High School as well as the students of Calaveras Unified School District. Students do not always have the option to house their SAE projects at home, thus a functional school farm would provide a place to house and raise their projects. It would also allow for increased scope of projects. Students could have breeding projects, plant sales, plant propagation, and allow for more diversified projects. In addition to a facility to house SAE projects, it would expand the classroom and curriculum that could be taught by both instructors. Students would have increased opportunities for hands on curriculum if the greenhouse supported plant life.

Limitations

The challenge of this project is a financial barrier. There appears to be tremendous community and district support, but money does not exist to support this project. The unstable environment in education provides additional challenges to securing the financial resources need to build new facilities.

Calaveras High School agriculture department created a vision for its school farm, students, and community. This vision is aimed at student achievement and success. Students with access to a fully functional school farm would have additional learning opportunities. Several long-term goals were created based upon improvement to the school farm. These goals include: increase diversity of student projects, including breeding and horticulture, education of elementary school student by secondary school students, and increased community involvement (i.e. plant sales).

The first objective of this project will be to determine if there is student, parent, and community support for revitalizing the school farm. A budget is needed to assist administrators, parents, and community members in determining their support for the school farm (See appendix E). The second objective of the project will determine potential impact of a school farm. This impact could include SAE opportunities, agriculture curriculum changes and FFA opportunities.

Definition of Terms

- FFA: Future Farmers of America, a youth leadership organization based in agriculture education.
- Supervised Agriculture Education Project (SAEP): Student designed projects based in agriculture, example fair animals.
- School Farm: School facilities modeled after farms, may include a greenhouse and barns.
- Propagation: Production of new plant life, from seeds, cutting or other methods of plant reproduction.

- Greenhouse: A building specialty designed to support the production of plant life.
- Horticulture: The study of plant life.

CHAPTER II

REVIEW OF LITERATURE

Importance of Agriculture Education

Foundation of Agriculture Education

Agriculture education is rooted in educational theory dated to the early 1800's when secondary schools and post-secondary schools began offering agriculture courses. The mid 1800's began the era of land grant colleges, culminating in the passage of the Morrill Land Grant Act of 1862 (Ag in the Classroom, n.d.). This act of congress designated 30,000 acres of federal land in each state to be sold to fund public universities. These universities focused on education in agriculture and mechanical arts (Library of Congress, 2010). The University of California, Davis is an example of one of these land grant universities. Throughout the remainder of the 1800's, more land grant universities were established as well as experiment stations (Camp & Crunkilton, 1985).

The early 1900's brought change to agriculture education in the secondary school environment. This change began with the passage of the Smith-Hughes Act, which occurred in 1917. The passage of the act funded vocational education programs, including agriculture education. Included in the act was a structure for operating vocational education programs (Patterson, n.d.). The Smith-Hughes act provided two important aspects to current agriculture education. The first is funding to agriculture programs. The second is the ability to have school farms (Camp & Crunkilton, 1985).

As vocational education grew, so did inter-curricular organizations, including the Future Farmers of America. The FFA organization began in 1928 and was comprised of male students enrolled in vocational education courses (National FFA, n.d.). The New Farmers of America (NFA) became a national organization in 1935 to serve African-American students in the segregated south. In 1965, the two organizations merged, allowing male students of any race to participate in the FFA organization (National FFA, n.d.).

Women were allowed membership into the Future Farmers of America in 1969 (National FFA, n.d.). The passage of Public Law 740 in 1950, granted the FFA the ability to be an inter-curricular organization. An inter-curricular organization is one in which students learn about and participate in the organization as part of the curriculum. Public law 740 allowed for these curricular changes in agriculture education (Camp & Crunkilton, 1985). These curricular changes eventually evolved into the three ring model of agriculture education, classroom, FFA, and SAE, that is used today.

Supervised Agriculture Experience Projects

Supervised occupational experience programs (SOE) originally began as a method to offer practical, hands on experiences in the agriculture industry including home and industry experience (Boone, Doerfert & Elliott, 1987). The agriculture industry has a need for skilled, education employees. These skills can be gained through participation in FFA and SAE projects (Ramsey & Edwards, 2012). Skills employers desire include: safety awareness, inventory, bio-security, plant identification, weed identification, plant types, soil preparation, and people skills (Ramsey & Edwards, 2012).

Agriculture programs provide an opportunity for students to gain these skills. SAE projects are a prime example of one of these opportunities for students (Ramsey & Edwards, 2012). Students participating in SAE projects build skills such as communication, dedication, and hard work.

SAE originally began with the concept of "home projects." These "home projects" began with Rufus Stimson. Rufus Stimson was hired as the director at the Smith's Agriculture School, the first of its kind, in Massachusetts (Boone et al., 1987). He observed that students came to school concerned about issues occurring on their farm at home. Mr. Stimson wanted students to focus on these problems, but to also have a strong foundation in agriculture education. He created the "home project" in which current SAE projects are modeled (Boone et al., 1987). These projects were officially established in the Vocational Education Act and became law in 1963 (Boone et al., 1987).

Since its inception, the SAE component of agriculture education has undergone slight revisions, but the basic concept remains the same (Boone et al., 1987). Students are still required to have a SAE project, but it may now provide hands on experience in the industry as well as more diversified projects such as horticulture, animal breeding, and agriculture mechanics. As agriculture education changed, so have SAE projects (Boone et al., 1987).

SAE projects could be considered a type of informal learning. Student participation in SAE projects allows the utilization of knowledge gained in the classroom and the ability to apply it in a real life situation (Cheek, Arrington, Carter & Randell, 1994). Students who participate in SAE projects have higher achievement in the

classroom (Cheek et al., 1994). SAE projects provide valuable informal learning opportunities not only in agriculture, but science as well (Ramsey & Edwards, 2004). Informal learning activities encourage higher order thinking and reasoning skills (Ramsey & Edwards, 2004).

Informal and Formal Learning

Formal and informal learning should collectively allow students to gain knowledge and experience for a number of learning environments (Roberts, 2006). Etling (1993) suggested education occurs on a continuum from formal to informal educational environments (as cited in Roberts, 2006). Formal environments are structured in which the educator has control over the learning; classrooms are the classic example (Roberts, 2006). Informal environments are unplanned and not guided by an educator. They can be defined as incidental and real life experiences (Roberts, 2006). The three ring model of agriculture education provides both formal and informal learning environments.

Educational Theory

The purposed of agriculture education is to provide students a foundation in science and agriculture with a hands on, experimental learning experience. Over time, there have been changes in educational theory; however, experimental theory closely connects with agriculture education. Experimental education theory began with the works of John Dewey (Roberts, 2006). Dewey theorized that people engage in “reflective thought,” the process of how students learn from their observations and experiences (Roberts, 2006).

Dewey had five steps of the learning process. These steps are: 1) a felt difficulty 2) its location and difficulty 3) suggestion of possible solution 4) development of reasoning of the bearing, and 5) further observation and experiment, leading to acceptance or rejection (Roberts, 2006). The process or "steps" for both the scientific method and Dewey's learning process have been compared. Dewey stated that there is no coincidence since both begin with a hypothesis and finish in an experiment (Roberts, 2006).

There have been numerous researchers and theorists who have added their own ideas to experimental learning. Joplin (1981) stated that all learning is experimental (as cited in Roberts, 2006). Joplin believed learning was cyclical in nature, leading to continuous and lifelong learning (as cited in Roberts, 2006). Joplin theorized that the experiential learning cycle can happen in a few seconds or a few years through his mini maxi theory (as cited in Roberts, 2006). Mini moments are a "flash of insight" that can happen in a few seconds (Roberts, 2006). Maxi moments can be school-wide curriculum which can last years (Roberts, 2006).

Rogers (1961) offered a model of experimental learning that includes inquiry-based learning, simulation and programmed instruction (as cited in Roberts, 2006). Dale (1946) offered a theory called the "cone of experience" (as cited in Roberts, 2006). The "cone of experience" has its base in concrete experience or doing. The middle of the cone is observing and the top of the cone is abstract or symbolizing (Roberts, 2006).

Similarly, Kolb (1984) offered an experimental learning theory and model (McLoed, 2010; Roberts, 2006). Kolb theorized that learning happened on a continuum. Learning begins with concrete experience, then moves to reflective observation, then to

abstract conceptualization, and finally to active experimentation (McLoed, 2012). According to Kolb, students first grasp or understand the information and then they are able to transform the information (as cited in Roberts, 2006).

Kolb's Learning Cycle

Kolb's theory is cyclical and students may enter the learning cycle at any point. For the sake of simplicity, the top of the circle will be the starting point for describing each component of Kolb's learning cycle. The top of Kolb's learning cycle is concrete experience (See Figure 2). A concrete experience is one in which a student can taste, see, smell, touch or otherwise interact with the lesson (Roberts, 2006). An example in agriculture education may be learning that external anatomy of a lamb or the plant life cycle. Moving around the model to the right, the second aspect is reflective observation (See Figure 2). Students are given the opportunity to contemplate or reflect on what they have learned and begin to internalize the information (Roberts, 2006). An example of reflective observation in agriculture education may be to watch a teacher demonstrate how to transplant from a six pack to a four inch pot.

The third aspect is abstract conceptualization (See Figure 2). During this stage, students begin to comprehend the information by forming rules, hypotheses, or generalizations (Roberts, 2006). An example of abstract conceptualization in agriculture education may be for students to create a hypothesis for a laboratory experience, such as the amount of sunlight needed for seed germination. The fourth aspect involves active experimentation (See Figure 2). In this stage, students test the idea they formed during abstract conceptualization (Roberts, 2006). An example of this aspect in agriculture

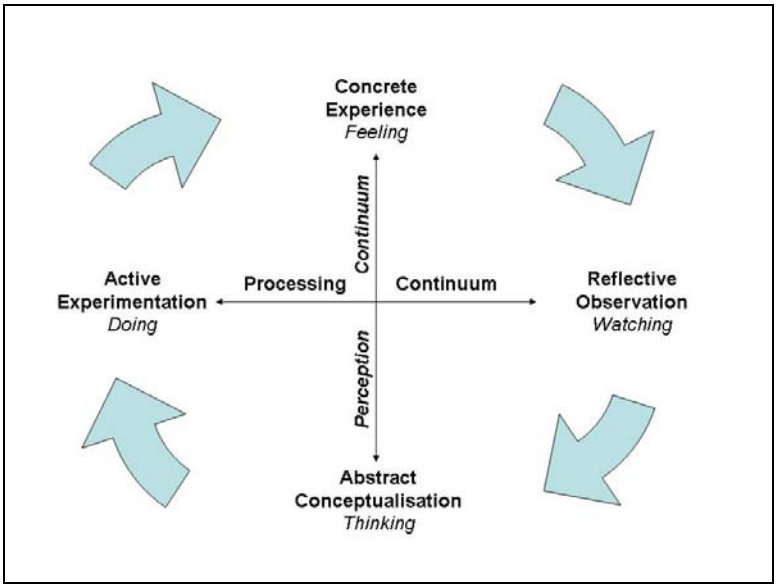

Figure 2. Kolb's Learning cycle.

Source: Clark, D. (2011, July 13). Kolb's learning styles and experiential learning model. Retrieved from http://www.nwlink.com/~donclark/hrd/styles/kolb.html Reprinted with permission.

education may include students conducting an experiment to determine the amount of fertilizer needed for corn plants. Students can enter or exit the cycle at any stage.

Teachers play an important role as facilitator in Kolb's theory and guiding students through the stages. It is the role of the educator to spark student interest and assist students in connecting concrete knowledge and the "big idea" (Baker, Robinson, & Kolb, 2013). Teachers should be able to step back, observe student performance and guide them into success (Baker, Robinson, & Kolb, 2013). All learning is an experience of one kind or another. It is the job of the teacher to make the experience a meaningful one for students (Baker, Robinson, & Kolb, 2013).

Experiential learning has been a foundation of agriculture education since its inception. While it has been traditionally accepted that the SAE component of agriculture education provides students with an experiential learning experience, Kolb asserted that all learning is experiential (Baker et. al., 2013). Since all learning is experiential, all components of agriculture education should provide equal opportunity for experiential learning (Baker et al., 2013). Access to school farms and greenhouses may better allow teachers to teach all aspects to experiential learning.

Greenhouses as a Learning Tool

In order to obtain or maintain school farm facilities, including greenhouses, school administrators must be aware of the positive impact made on students, both inside and outside the classroom, with access to school farms. Arizona teachers with access to a greenhouse use the facility in their program to meet a variety of needs (Franklin, 2008). Teachers are most likely to use greenhouse for classroom instruction, student SAE projects and fundraising (Franklin, 2008). Teachers often use school farms as an agriculture laboratory (Williams & McCarthy, 1985). School farms provide a place to showcase agriculture department and agriculture student achievements to the community (Williams & McCarthy, 1985). These showcases could include plant sales, project competitions, and agriculture awareness events. For a majority of agriculture teachers, school greenhouses will serve as a laboratory for classroom instruction (Williams & McCarthy, 1985).

School farms and greenhouses act as laboratories in which students can gain hands on experiences (Shoulders & Myers, 2013). Agriculture education lends itself

easily to Kolb's learning theory (Shoulders & Myers, 2013). Teachers have the ability to provide students with concrete knowledge and allow for experiential experiences in agricultural laboratories. An example could be student learning about the lifecycle of plants. They experience concrete knowledge in the classroom and experiential learning when plants are grown in the greenhouse.

Agriculture teachers may struggle with active experimentation and student reflection using Kolb theory (Shoulders & Myers, 2013). However, teachers do engage students more often in the first three cycles (concrete experience, reflective observation and abstract conceptualization) of Kolb's theory (Shoulders & Myers, 2013). When teachers utilize school farm facilities after they have provided students with a concrete experience, (classroom instruction) student comprehension increases (Shoulders & Myers, 2013).

Concrete knowledge or classroom instruction can be considered the base for student learning. Teachers spend about half of classroom time on concrete knowledge and only 11 % of time using active experimentation (Shoulders & Myers, 2013). Concrete knowledge is gained through traditional classroom lectures and worksheets (Shoulders & Myers, 2013). Lack of facilities for active experimentation may affect teaching time. Access to school farms allows access for students to experiment and learn through hands on experiences. Teachers with access to school farm facilities use a majority of their facilities more than once a week (Shoulders & Myers, 2012). Agriculture teacher access to school farm facilities ranges based on program location. Seventy-five percent of Arizona teachers report having a greenhouse with an average size of 1,300 square feet (Franklin, 2008).

Students who have access to, and are able to participate in labs may feel a sense of adventure. Students become their own teachers, providing the opportunity to explore ideas and reach conclusions (Shoulders & Myers, 2012). Teachers with access to school farms report a positive correlation in student learning (Shoulders & Myers, 2012). Thus, school farms positively impact student learning.

One type of laboratory experiences can be seen in the area of greenhouse production. Teacher education on the proper use of greenhouse facilities is vital in assisting students in acquisition of horticulture knowledge (Franklin, 2011). Student learning can be enhanced with a greenhouse, but this can be affected by teacher preparation (Franklin, 2011). Skills deemed important include safety knowledge, plant identification and greenhouse management (Franklin, 2011). Teachers possessing these skills may be able to better assist students in a greenhouse laboratory setting because teachers feel better prepared for this type of teaching environment (Franklin, 2011).

Greenhouses provide students with a facility to have laboratory experience as well as industry experience. Students with access to school farm facilities, such as a greenhouse, perform higher on knowledge tests than students with no access to such facilities (Rothenberger & Stewart, 1995). This demonstrates that acquiring concrete knowledge is not enough for students to comprehend material. Greenhouses allow for experiential learning in agriculture education (Rothenberger & Stewart, 1995). Students who have access to greenhouses are able to build concrete knowledge, increase skills, and gain experience in real world situations.

CHAPTER III

METODOLOGY

Needs Assessment

Instrument

The instruments created for this project included three needs assessments that utilized a Likert scale and open response questions. A needs assessment was selected for use because it was the best tool to determine parent and community support. Needs assessments are used to determine the needs of a specific group of people ("comprehensive needs assessment," 2001). This needs assessment was created and used to determine the gap between the current state of the school farm and the desired state of the school farm as seen by students, parents and community members.

A Likert scale can be defined as a scale in which participants chose an option that best aligns with their perceptions (Losby & Wetmore, 2012). Participants are presented with a range of options from strongly agree to strongly disagree (Losby & Wetmore, 2012). Likert scales are used when attempting to determine participants' attitude or feelings on a specific topic (Losby & Wetmore, 2012). A Likert scale was selected because it is familiar to students, parents and community members, as Likert scales are commonly used in surveys.

The needs assessments created include the following: Needs Assessment A: Perceptions of Current and Future School Farm Usage; Needs Assessment B:

Perceptions of the School Farm and SAE Projects; and Needs Assessment C: Community Perceptions of School Farm and SAE Projects. Each of these assessments were reviewed by a panel of experts to provide content and validity. Each assessment was also evaluated for face and content validity. It was determined that each needs assessment was a valid measurement tool.

Three needs assessments were created for this project. The first was Needs Assessment A; Perceptions of Current and Future School Farm Usage. This assessment assessed the perceptions of current and future school farm usage. The same survey was given to student, parent, and community member participants. Needs Assessment A: Perceptions of Current and Future School Farm Usage, focused on the school farm and needed improvements. The objective of Needs Assessment A: Perceptions of Current and Future School Farm Usage was to determine if there was student, parent and community support for building a new greenhouse.

The second sets of needs assessments (Needs Assessment B: Perceptions of the School Farm and SAE Projects and Needs Assessment C; Community Perceptions of School Farm and SAE Projects,) focused on SAE projects and school farm improvement. Needs Assessment B: Perceptions of the School Farm and SAE Projects was given only to students while Needs Assessment C: Community Perceptions of School Farm and SAE Projects, was given to parents and community members. The objectives of Needs Assessments B and C was to determine potential impact of potential future SAE projects. These Needs Assessments focused on obtaining a new greenhouse and potential SAE projects.

Needs Assessment A

Perceptions of Current and Future School Farm Usage, first asked students, parents, and community members a few demographic questions for the purpose of classification. The demographic questions allowed differentiation between student and parent/community member participants. A Likert scale was utilized that ranged from strongly agree (1) to strongly disagree (5). Fifteen Likert type questions and two open response questions were utilized to measure the perception of potential school farm. The open response questions were placed at the end of the survey to allow participates an opportunity to expand their answers (See appendix A).

Needs Assessment B

Perceptions of the School Farm and SAE Projects, asked students to identify their year in school and current SAE project, if applicable, for demographic purposes. A Likert scale was utilized that ranged from strongly disagree (1) to strongly agree (5). Eight Likert-type question and two open response questions were used to assess student perceptions of potential horticulture SAE projects (See appendix B).

Needs Assessment C

Community Perceptions of School Farm and SAE Projects, was given to community members and parents. Participants were asked to identify if they were a parent or staff/community member. A Likert scale was utilized that ranged from strongly disagree (1) to strongly agree (5). Five questions using the Likert scale and two open response questions were used to assess parent perceptions of potential SAE projects utilizing the school farm (See appendix C).

The purpose of the Needs Assessment A: Perceptions of Current and Future School Farm Usage was to gain a better understanding of student and community support. Agriculture teachers were utilized to administer and oversee the deployment of the needs survey. Students from two sections of Agriculture Science one, one section of Agriculture Science two, one section of Agriculture Biology, and four sections of Agriculture Computers as well as FFA officers were purposely selected to complete the assessment. Needs Assessment A: Perceptions of Current and Future School Farm Usage was given to 16 community members (*n*=16), in addition to students (*n*=121) comprised of 39 freshman, 36 sophomores, 29 juniors and 17 seniors. Sixteen parents and community members were surveyed at an FFA Boosters meeting.

The purpose of needs Assessment B: Perceptions of the School Farm and SAE Projects and Needs Assessment C: Community perceptions of School Farm and SAE Projects, was to determine the perceptions of SAE support and utilization of the school farm.

Needs Assessment B: Perceptions of the School Farm and SAE projects was administered to students (*n*=121), comprised of 38 freshman, 41 sophomores, 27 juniors, and 15 seniors. Students from two sections of Agriculture Science one, one section of Agriculture Science two, one section of Agriculture Biology, and four sections of Agriculture Computers as well as FFA officers were purposely selected to complete the assessment. Needs Assessment C: Community Perceptions of School Farm and SAE Projects were administered to 13 parents (*n*=13) at an FFA boosters meeting.

CHAPTER IV

RESULTS AND DISCUSSION

Results of Needs Assessments

Results from Needs Assessment A

Objective one sought to determine if there was support for revitalizing the school farm by students, parents and community members. Upon review of needs assessment A, it can be concluded that students, parent and community members believe that the school farm needs improvement (see Tables 1 and 2).

Students did not disagree or strongly disagree with any of the questions in the needs assessment. Students were relatively neutral when asked if the greenhouse is usable in its current state (see Table 1).

Students were asked two open response questions. The first question, "*What improvements would you like to see made at the school farm?"* resulted in a variety of student responses, ranging from building a new greenhouse to new breeding animals. Of the 121 students surveyed, 62 responded that they would like to see improvements made to the school greenhouse, 31 students responded with new barn, and the reminder of responses being numerous.

The second open response question, "*What facilities improvement would you like to see?"* saw student responses ranging from building a new greenhouse to new barns. A majority of students (*n*= 79) suggested the greenhouse was the facility that

Table 1

Student Perceptions of Current and Future School Farm Usage, (n=121)

Statement	Mean	SD
1. Agriculture classes use the school farm.	2.00	1.06
2. The school farm needs improvement.	1.78	1.11
3. The greenhouse is useable in its current state.	3.39	1.29
4. Students are willing to work to improve the farm.	2.51	1.20
5. Food grown at the farm could be used in food service.	2.50	1.23
6. The community would like to see a fully functional farm.	2.15	1.14
7. The community is willing to assist in farm improvements.	2.80	1.05
8. Students will benefit from farm improvements.	2.00	1.07
9. Farm facilities are fully functional.	2.99	1.05
10. All farm facilities could use an upgrade or improvement.	1.89	1.08
11. There are opportunities for student use of current Farm facilities.	2.35	0.98
12. There is district support for improving school farm facilities.	2.77	1.03
13. All CUSD students would benefit from farm improvements.	2.51	1.06
14. All CHS students would benefit from Farm improvements.	2.34	1.03
15. The community would benefit from farm improvements.	2.50	1.09

Note: Scale 1 = Strongly Agree; 2 = Moderately agree; 3= Neutral; 4= Moderately disagree; 5= Strongly disagree

most needed to be improved. Improvements to the swine barn were indicated by 19 students, while improvements to the rabbit barn were suggested by 12 students.

Parents and community members did not strongly disagree or disagree with any of the statements in the needs assessment. This group also appeared undecided when asked

Table 2

Community Perceptions of Current and Future School Farm Usage (n=16)

Statement	Mean	SD
1. Agriculture classes use the school farm.	1.75	1.00
2. The school farm needs improvement.	1.13	0.34
3. The greenhouse is useable in its current state.	3.75	1.34
4. Students are willing to work to improve the farm.	2.13	0.74
5. Food grown at the farm could be used in food service.	1.63	1.08
6. The community would like to see a fully functional farm.	1.44	0.51
7. The community is willing to assist in farm improvements.	1.63	0.81
8. Students will benefit from farm improvements.	1.19	0.40
9. Farm facilities are fully functional.	3.71	0.61
10. All farm facilities could use an upgrade or improvement.	1.79	1.25
11. There are opportunities for student use of current Farm facilities.	2.43	1.22
12. There is district support for improving school farm facilities.	3.71	1.33
13. All CUSD students would benefit from farm improvements.	2.14	0.86
14. All CHS students would benefit from Farm improvements.	1.93	0.73
15. The community would benefit from farm improvements.	**1.79**	**0.80**

Note: Scale 1 = Strongly Agree; 2= Moderately agree; 3= Neutral;
4= Moderately disagree; 5= Strongly disagree

if the greenhouse was usable in its current state (see Table 2). Participants were neutral when asked if the school farm is fully functional (see Table 2). When participants were asked if district support existed for potential changes to the school farm, responses were

neutral (see Table 2). Parents and community members may be more aware of how the school district operates than students.

Parents and community members were asked two open response questions. The first question, "*What improvements would you like to see made at the school farm?"* Every participant suggested the school farm needed improvements to the greenhouse and raised beds. Reasons stated by participants for these improvements included ability to hold plant sales, community involvement, and increase SAE projects.

The second open response question, "*What facilities improvement would you like to see?"* Responses varied between the greenhouse and barns. Eleven parents suggested the greenhouse was the facility most in need of improvement, while five parents suggested the swine and rabbits barns were in most need of improvement.

Results of Needs Assessment B

The second objective sought to determine the impact of improvements to the school farm in terms of curriculum changes, FFA functions and SAE projects. Students were neutral when asked about potential horticulture projects using current or improved school farm facilities (see Table 3).

Additionally, students were asked two open response questions. The first was *What horticulture projects would you like to see on the school farm?* Responses ranged from trees to flowers. There was no consensus among students on this topic. Each student had a different idea of what plants, crops or trees they would like to see at the school farm. A majority of students did state that they would like to see some type of edible plants or flowers based on their answers (i.e. carrots, tomatoes, bell peppers and a wide variety of flowers).

Table 3

Perceptions of the School Farm and SAE Projects (n=121)

Statement	Mean	SD
1. Could you use the current school farm to house your SAE Project?	2.92	1.35
2. Would you do a horticulture SAE project?	2.88	1.28
3. Would you assist others with a horticulture project?	3.17	1.13
4. Are horticulture projects possible with the current greenhouse?	2.94	1.27
5. Would you like to see a new greenhouse?	4.03	1.18
6. Would you assist I obtaining a new greenhouse?	3.66	1.33
7. Would you have SAE projects at school with new facilities?	3.28	1.21
8. Would a new greenhouse be helpful with your SAE?	3.01	1.42

Note: 1=Strongly disagree; 2= Moderately disagree; 3= Neutral; 4=Moderately agree; 5=Strongly agree

The second question posed was *If you had a horticulture SAE project, what would it be? How big would it be?* Fifty-six students responded that they would not have a horticulture SAE project. Twenty-five students responded that they would like to grow plants, such as tomatoes, in the greenhouse. Most of these were seen as small projects (one to five plants). Remaining students were unsure if they would have a horticulture SAE project.

Results from Needs Assessment C

Parents and community members felt strongly that they would support the building of a new greenhouse (see Table 4). Participants responded positively when asked if they would like to see students using the school farm to house SAE projects.

Table 4

Community perceptions of School Farm and SAE Projects (n=13)

Statement	Mean	SD
1. Would you support building a new Greenhouse?	4.69	0.63
2. Would you support student SAE projects using CURRENT school farm facilities?	4.23	1.24
3. Would you assist in building new farm facilities?	4.31	1.03
4. Would you like to see students using the school farm for SAE projects?	4.92	0.28
5. Would having a functional school farm assist with students SAE projects?	4.85	0.38

Note: 1=Strongly disagree; 2= Moderately disagree; 3= Neutral; 4=Moderately agree; 5=Strongly agree

Parents and community members were posed with two open response questions. The first question posed was *What SAE projects would you like to see students having at the school farm?* There were a variety of answers, but the most common response from parents and community members, was a desire to see plant sales. Parents and community members expressed interest in students organizing and running plant sales for the community. The other responses varied from tree to row crops.

The second question posed, *What horticulture projects would you like to see?* In response to this question, parents and community members strongly perceived the need for plants such as tomatoes, bell peppers, onions and other edible crops as well as flowers. Every respondent stated they wanted to see plants that could be sold at plant sales to community members.

The overall results from these needs assessment indicated students, parents and community members agreed that the current school farm facilities are not functional and new facilities are needed. Students, parents and community member are willing to assist in obtaining new facilities. They disagreed about the potential for student participation in horticulture SAE projects.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Overview

The study determined support for improvements to the school farm, specifically the greenhouse, does exist. Students currently do utilize the greenhouse for classroom projects, but have expressed concern over lack of plant germination and growth. The most exciting response indicated students were willing to assist the implementation of improvement to the school farm. This willingness demonstrates students have a vested interest in their program and desire improvements to the school farm.

Students believe improvements would benefit them in several ways. First, they indicate it would increase opportunities for hands on labs that are not currently available to them. The second is that SAE opportunities would increase. Students would be able to house horticulture projects at school. Ideas from students include plant sales, floriculture uses, and supplying fresh food for food service on campus. Parents and community members also support making improvements to the school farm. They agree that students would benefit both inside and outside the classroom.

Due to scope of improving the school farm, the process will require prioritization based upon student need. The greenhouse is clearly the first building that

needs to be addressed, as indicated by students, parents, and community members (appendix G). There are five components to obtaining a new greenhouse including budget, funding, tear down of existing structure, building a new greenhouse, and maintaining the new greenhouse.

The first component of obtaining a new greenhouse is creating a budget. A proposal was requested and received from International Greenhouse Company (IGC). If purchased through IGC, the cost of a new greenhouse would be $13,325 (See appendix D). This includes the frame, covering, doors, cooling system, heating system and control system. However, additional items needed include an irrigation system ($1,300) shade cloth ($320) and portable steel benches ($2,750). A new greenhouse, accessories, engineering cost and sales tax total $15,124.38. This cost assumes parents, students, and community members are willing to remove the existing greenhouse and construct a new greenhouse. However, if the International Greenhouse Company completes the demolition and new construction, an additional $24,800 would be required. The cost savings would allow financial resources to be allocated to supplies such as soil, pots, fertilizer, etc. Additionally, the commitment of parents, students and community members would create significant “buy-in” and encourage involvement in the agricultural program.

The second component of obtaining a new greenhouse is funding. Although there is support from students, parents, and community members, financial barriers do exist. Funding through grant writing would be required to purchase the greenhouse as well as purchase supplies required to effectively operate the greenhouse. There are currently no sources of school district funding to support this project. All funding must be

obtained through grants. Several community members have expressed an interest in assisting in securing grant funding. The greatest barrier to grant funding includes the time required to generate a competitive grant proposal and the need for district support. The school district is not willing to provide a tax identification number or EIN number unless the business department has reviewed the grant and any tax regulations associated with the grant. This process can delay grant writing as some grants require the EIN number before applicants are able to submit the grant.

The third and fourth components of obtaining a new greenhouse are directly related. The third component of obtaining a greenhouse is removal of the existing building. The fourth component of obtaining a new greenhouse is building a new greenhouse. Removing the old greenhouse and installing a new facility can occur through community and student volunteers or the professionals at IGN to complete this process. Substantial cost savings would occur if community volunteers and students remove the current greenhouse. However, there are legal restrictions regarding student participation in this type of experience.

The final component is maintenance of the new greenhouse. This is arguably the most important component and where students play a vital role. If students value the new greenhouse, they will maintain the facility and use it properly. Students will need to take a vested interest in the new facilities. Creating new and exciting SAE projects will assist students in creating an attachment to the new facilities.

Following the installation of a new greenhouse, additional improvements could be implemented at the school farm as indicated in needs assessment A, B and C. For example, raised beds could be used in tandem with the greenhouse (appendix E).

Plants started in the greenhouse could be transplanted into the raised beds. However, the raised beds would require deer proof fencing. This could be completed with the help of community members and the agriculture mechanics class.

Another improvement could be the incorporation of a small orchard of fruit and nut trees. This addition would provide additional educational environments, including grafting. However, it would also teach students about harvesting and provide opportunities to work with local farmers.

Animal facilities could also benefit from additional financial resources. Specifically, the swine barn could use an update including an improved watering system, feeders and fans to maintain temperature control. Additional improvements could focus on the existing large barn. More specifically, the barn needs permanent storage and improved fencing for poultry and other livestock including sheep and goats. The pen attached to the barn needs several improvements including being reseeded, selectively harvesting trees and a higher fence to prevent stray dogs.

Suggestions for Improvement

If this project was to be undertaken again, there is one main area in which improvements could be made. This area is the needs assessment. An electronic survey may have been more receptive to participants. This would also allow more people to participate in the survey and remove any cases of missing data. It would also allow participants to complete the survey at their leisure and without pressure. Accessing the needs assessment electronically would allow more in depth responses to open response

questions. The instrument could be constructed in a more concise, sequential manner to aid clarity.

Suggestions for Further Research

Future research could be to determine what grant funding is available for these types of school farm improvements. After improvements to the school farm have been completed, additional research could be completed to determine if goals were achieved. Future research could be used to determine curriculum changes necessary to utilize the new farm facilities.

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APPENDIX A

NEEDS ASSESSMENT A

Calaveras High School Agriculture Department Survey

Thank you for taking a few minutes to complete our survey. The purpose of this survey is help determine what improvements could be done with the school farm.

Are you a student? ____ Yes ___No

If Yes, what grade? ____9th ____10th ____11th ____12th

Are you a parent or community member? ____Yes ____No

Please use the following scale to answer the questions

1	2	3	4	5
Strongly Disagree	Moderately Disagree	Neutral	Moderately Agree	Strongly Agree

	Strongly Disagree	Moderately Disagree	Neutral	Moderately Agree	Strongly Agree
Agriculture classes use the school farm.	1	2	3	4	5
The school farm needs improvement.	1	2	3	4	5
The greenhouse is useable in its current state.	1	2	3	4	5
Students are willing to work to improve the farm.	1	2	3	4	5
Food grown at the farm could be used in food service.	1	2	3	4	5
The community would like to see a fully functional farm.	1	2	3	4	5
The community is willing to assist in farm improvements.	1	2	3	4	5

Students will benefit from farm improvements.	1	2	3	4	5
Farm facilities are fully functional.	1	2	3	4	5
All farm facilities could use an upgrade or improvement.	1	2	3	4	5
There are opportunities for student use of current farm facilities.	1	2	3	4	5
There is district support for improving school farm facilities.	1	2	3	4	5
All CUSD students would benefit from farm improvements.	1	2	3	4	5
All CHS students would benefit from Farm improvements.	1	2	3	4	5
The community would benefit from farm improvements.	1	2	3	4	5

The remaining questions are open response. Please feel free to include anything else you want teachers to be aware of.

1. What improvement would you like to see made at the CHS school farm?

2. What facilities improvement would you like to see?

APPENDIX B

NEEDS ASSESSMENT B

Calaveras High School Agriculture Department Survey

Thank you for taking a few minutes to complete our survey. The purpose of this survey is determine what Supervised Agriculture Experience projects could utilize the school farm.

What grade are you? ____9th ____10th ____11th ____12th

Do you currently have a SAE Project? _____Yes _____ No

Please use the following scale to answer the questions

1 2 3 4 5

Strongly Disagree Moderately Disagree Neutral Moderately Agree Strongly Agree

	Strongly Disagree	Moderately Disagree	Neutral	Moderately Agree	Strongly Agree
Could you use the current school farm to house your SAE project?	1	2	3	4	5
Would you do a horticulture SAE project?	1	2	3	4	5
Would you assist others with a horticulture project?	1	2	3	4	5
Are horticulture projects possible with the current greenhouse?	1	2	3	4	5
Would you like to see a new greenhouse?	1	2	3	4	5
Would you assist is obtaining a new greenhouse?	1	2	3	4	5
Would do have SAE projects at school with new facilities?	1	2	3	4	5
Would a new greenhouse be helpful with your SAE?	1	2	3	4	5

Open Response Questions- Please feel free to expand

1. What horticulture projects would you like to see on the school farm?

2. If you had a horticulture SAE project, what would it be? How big would it be?

APPENDIX C

NEEDS ASSESSMENT C

Calaveras High School Agriculture Department Survey

Thank you for taking a few minutes to complete our survey. The purpose of this survey is determine what Supervised Agriculture Experience projects could utilize the school farm.

Are you a parent? ___Yes ___No

Are you a staff or community member? ___Yes ___No

Please use the following scale to answer the questions

1	2	3	4	5
Strongly Disagree	Moderately Disagree	Neutral	Moderately Agree	Strongly Agree

		Strongly Disagree	Moderately Disagree	Neutral	Moderately Agree	Strongly Agree
1.	Would you support building a new greenhouse	1	2	3	4	5
2.	Would you support student SAE projects using CURRENT school farm facilities?	1	2	3	4	5
3.	Would you assist in building new farm facilities?	1	2	3	4	5
4.	Would you like to see students using the school farm for SAE projects?	1	2	3	4	5
5.	Would having a functional school farm assist with student SAE projects?	1	2	3	4	5

Open Response- Please feel free to expand

1. What SAE projects would you like to see students having at the school farm?

2. What horticulture projects would you like to see?

APPENDIX D

INTERNATIONAL GREENHOUSE PROPOSAL

International Greenhouse Company
The People Who Know Greenhouses
3701 Seaport Blvd
West Sacramento, CA 95691
www.greenhousemegastore.com
www.igcusa.com
www.4greenhouses.com

greenhousemegastore
Phone: 1-916-372-7933
Fax: 1-916-372-7949
E-Mail: ben.george@igcusa.com

PROPOSAL # 155778

TO: Calaveras High School
PHONE: FAX:

ATT: Abigail Ferrell

PROJECT: GREENHOUSE QUOTATION

DATE: 8/20/2013

International Greenhouse Company is pleased to propose the following: **PRICE**

1. **STRUCTURE – (1) 18' x 36' Jr. Series Teaching Greenhouse** **$11,600**

   A. **Frame** – All galvanized steel, pre-punched and bolt together design including:

   - Roll-Form columns with base plates on 6' centers.
   - Up-right supports plus horizontal girts supplied at each end wall.
   - Horizontal girts supplied at both side walls.
   - *SUPERIOR STRENGTH* rollformed (hat profile) truss assembly on 6' centers.
   - *SUPERIOR STRENGTH flush mounted* rollformed (hat section) purlins.
   - Aluminum corner trim.
   - Brackets and fasteners as required to assemble frame.
   - * Installation instruction and prints.

   B. **Engineering**

   - Greenhouse standard design is for 12lb live load/ 85 mph wind rating. This load rating is not guaranteed to comply with local loading requirements.
   - For an **additional $800** IGC can provide **engineered drawings** and load calculations package, signed and sealed by an engineer licensed in the state of California.

2. **COVERING** **Included**

   A. **Roof, Sidewalls, and Endwalls**– Set for rigid covering:

   - IGC to provide 6mm Twin-wall (clear) polycarbonate UV treated outside and inside treated with condensate control.
   - IGC to provide all aluminum extrusions, fasteners, and closure strips.
   - *Installation instructions and prints.

3. DOORS **Included**

A. **Swing Door** – IGC to provide (1) 3' x 6'8" Plyco insulated utility door complete with locksets, frame, and jambs.

4. COOLING **Included**

A. **Evaporative Cooling** – IGC to provide (1) EV-HM Phoenix Manufacturing 6,500cfm external mounted evaporative cooler.

B. **Aluminum Commercial Inlet Shutters** – IGC to provide (3) J&D MFG 36" Motorized inlet shutters complete with:
- Shutter motor system

C. **Horizontal Airflow Fans** – IGC to provide (2) 12" HAF fans complete with:
- Heavy-Duty Mounting assembly.
- Solid aluminum blades.

5. HEAT **Included**

IGC to provide (1) Modine HER100, 35,000btu, Electric Heater for Greenhouse. 240v, 1phase.

- Heavy duty in line mounted heater hanger assembly.

6. ENVIRONMENTAL CONTROL SYSTEMS **$1,725**

IGC to provide (1) Micro-Grow Growmate Series Automated Greenhouse Controllers to

RECOMMENDED ACCESSORIES:

7. Shade Cloth **$320**

IGC to provide (1) 27' x 37' Black 50% Shade Cloth designed to mount externally to greenhouse frame. Complete with fabricated edges, inset brass grommets, and rope cleats for mounting to greenhouse frame.

8. Portable Steel Benches **$2,750**

IGC to provide (4) 3' x 12', (2) 3' x 8', and (2) 5' x 12' Portable Steel Benches

9. Custom Irrigation System **$1,300**

IGC to provide custom drip and overhead mist irrigation system for proposal greenhouse structure. System includes netafim mist emitters, benchtop drip emitters, Sterling 4 station irrigation controllers, filter, pressure regulator, and 16mm polyethylene lines.

Net Price Structure and Equipment:	$ 13,325
Engineering:	$800
Net Price Shipping:	FREE
Sales Tax:	$999.38
Total Package:	**$15,124.38**
(Plus desired Options)	

nstallation Quotation on Next Page

APPENDIX E

BUDGET FOR NEW GREENHOUSE AND SUPPLIES

Item Needed	Amount of Items Needed	Price per Item	Total Amount
Greenhouse	1	$11,600	$11,600
Environment Control System	1	$1,725	$1,725
Shade Cloth	1	$320	$320
Steel Benches	4	$687.5	$2,750
Irrigation System	1	$1,300	$1,300
1020 Trays	60	$12/ 10 pack	$72
Insert-4 cells	2 packs	$12 per pack	$118
3 inch square pots	450	$450 per case	$38
4 inch pots	450	$450 per case	$66.50
Plant Labels 6 inch long	1000	$1000 per pack	$29.50
Biodegradable pots	360	$49 per case of 180	$98
17 cm round pot short	300	$60 for 294 per case	$60
Total Amount Needed			$18,177

APPENDIX F

PHOTOS OF EXISTING SCHOOL FARM


NISSAN

APPENDIX G

TIMELINE FOR OBTAINING NEW GREENHOUSE

Summer 2014

Begin researching and writing grants for new Greenhouse. Grants to be written include the following: FFA Food for all and Lowes Building Communities. Begin outreach programs to local community groups and nursery's for donations.

Fall 2014

Search for a contractor to tear down old Greenhouse. Set up a date sometime in October or November for demolition.

January 2015

Finalize funding sources for new Greenhouse. Order Greenhouse and begin construction.

April 2015

Have new Greenhouse constructed.

APPENDIX H

THE COUNCIL
A national partnership for excellence in agriculture and education.

National Council for Agricultural Education
P.O. Box 68960
6060 FFA Drive
Indianapolis, IN 46268-0960

Telephone: (317) 802-4248
Facsimile: (317) 802-5248

To:

Abigail Ferrell
PO Box 1194
San Andreas, CA 95249

Dear Abigail,

This letter grants you permission to use The National Council for Agricultural Education's graphic of the three-circle model of agricultural education in your master's project at California State University, Chico.

Please include the following permission statement with the graphic: Three-circle model of agricultural education used with permission of The National Council for Agricultural Education.

Sincerely,

Michael S. Honeycutt
Managing Director
National Council for Agricultural Education

APPENDIX I

Donald Clark

Abigail Ferrell
PO Box 1194
San Andreas, CA 95249

Dear Abigail,

I grant you permission to use the image modeling Kolbs Theory of Experimental Learning for your Master's project through California State University, Chico. I also grant permission for the image to be used online via the Chico Digital Repository.

Sincerely,

Donald Clark

APPENDIX J

California State University, Chico
Chico, California 95929-0875
Office of Graduate Studies
530-898-6880
Fax: 530-898-3342
www.csuchico.edu/graduatestudies

March 5, 2014

Abigail Ferrell
P.O Box 1194
San Andreas, CA 95249

Dear Abigail Ferrell,

As the Chair of the Campus Institutional Review Board, I have determined that your research proposal entitled "DETERMINING THE SCHOOL AND COMMUNITY NEEDS FOR A NEW CAMPUS GREENHOUSE"is exempt from full committee review. This clearance allows you to proceed with your study.

I do ask that you notify our office should there be any further modifications to, or complications arising from or within, the study. In addition, should this project continue longer than the authorized date, you will need to apply for an extension from our office. When your data collection is complete, you will need to turn in the attached Post Data Collection Report for final approval. Students should be aware that failure to comply with any HSRC requirements will delay graduation. If you should have any questions regarding this clearance, please do not hesitate to contact me.

Sincerely,

John Mahoney, Ph.D., Chair
Human Subjects in Research Committee

Attachment: Post Data Collection Report

cc: Mollie Aschenbrener (310)