INVESTIGATION OF THE FACTORS IN WHICH FIRST-YEAR NON-ELECTIVE AND FOURTH-YEAR AGRICULTURE STUDENTS ENROLL IN HIGH SCHOOL AGRICULTURE CLASSES

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in

Agricultural Education

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Haley Clement

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DEDICATION

I would like to dedicate this study to my father, Mark Clement who has been an agriculture teacher for 35 years.

Throughout his career, he has influenced countless students and has inspired me to become an agriculture teacher.

Thank you.
ACKNOWLEDGMENTS

The writer expresses her sincere appreciation to Dr. Mollie Aschenbrener, her graduate advisor, for guidance, encouragement, and advice given during this study.

Special thanks are given to all agriculture teachers in the Galt Joint Union School district for taking class time to administer the survey.

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The purpose of this study was to investigate self-reported reasons why high school students (a) enroll in agriculture courses for the first time and (b) continue to enroll in agriculture courses during their fourth year of high school agricultural instruction. An additional purpose was to compare the reasons first-year agriculture students enroll in their agriculture class to the reasons fourth-year seniors enrolled in their agriculture class. Demographic differences across the two groups were also compared.

This study used descriptive research methods. The target population involved agriculture education students at two high schools in Galt, California. A questionnaire was developed and administered to 276 students.
The findings of the study are as follows: (a) the students came from mostly rural and suburban living areas, are enrolled in mostly agriculture science courses and come from families with and without production agriculture backgrounds; (b) first-year students enrolled in their current agriculture class because it sounded fun and interesting, it seemed more hand-on, to participate in FFA activities, and because they preferred agriculture teachers; and (c) fourth-year students enrolled in their current agriculture class because it sounded fun and interesting, it seemed more hands-on, to participate in FFA activities, to learn a specific skill or trade, and because they preferred agriculture teachers. Fourth-year students scored higher on nearly all items as compared to first-year students, with 10 items demonstrating statistically significantly differences across the two groups. Understanding enrollment factors allows agriculture programs to enhance recruitment strategies in order to retain more students.
CHAPTER I

INTRODUCTION

Background

America’s ability to stay competitive in the global marketplace has become a growing concern in recent years. In part, this is due to declining numbers of students majoring in science, technology, engineering, and mathematics (STEM) fields (Business High Education Forum, 2010). As the job force changes and the need for new technology grows, a demand for a skilled workforce has sparked a movement in America to inspire students to choose careers in STEM fields (Business High Education Forum, 2010). STEM career fields include a wide variety of disciplines, from mathematics, engineering, computer science, and agriculture science to sociology, biological science, and physiology. The demand for students to graduate college with STEM degrees is due to the need for a skilled workforce in the American economy that can compete with neighboring countries’ developing workforces (Business High Education Forum, 2010). Compared to 31 other countries, the U.S. ranked 25th in mathematics and 17th in science in 2007 (National Math and Science Initiative, 2014). Only 31% of U.S. bachelor’s degrees were given in engineering and science in 2006 compared to 61% and 51% in Japan and China, respectively (National Math and Science Initiative, 2014).

The National Math and Science Initiative (2014) projected that “the U.S. may be short three million high-skilled workers by 2018” and that “Jobs in computer system
design and related services, a field dependent on high-level math and problem-solving skills, are projected to grow 45 percent between 2008 and 2018.” In the areas of research and development, only 29% of research papers published in influential journals were from U.S. scientists, compared to 40% in 1981. For the first time in 2009, over half of U.S. patents were given to non-U.S. companies, due to shortcomings in STEM (Chen & Weko, 2009).

President Obama identified STEM as a priority for education by addressing the need to prepare “students with skills for the new economy [including] problem solving, critical thinking, science, technology, engineering, and math [skills]” (The White House, Office of the Press Secretary, 2014). Obama has specifically called the nation to create at least 100,000 qualified STEM teachers in the next decade. A national plan has been developed by the federal government to build STEM programs. A few initiatives include the STEM innovation network, the STEM teacher pathway program, and the STEM Master Teacher Corps (U.S. Department of Education, 2010).

The STEM crisis has also sparked legislation with the unsuccessful STEM Jobs (H.R. 6429) Act in 2012 (United States House of Representatives Judiciary Committee, 2012). With the number of STEM occupations expected to increase 17% within the next five years, initiatives to increase the number of students entering these fields does not stop with federal programs. It must extend to all education programs and levels (Langdon, Mckittrick, Beede, Khan, & Doms, 2011).

One field within the STEM realm is agriculture, including the agriculture sciences. Currently, over 200 career opportunities exist in agriculture, employing 17% of the total U.S. population (Agriculture Council of America, 2014). Approximately 58,000
job openings for U.S. food and agriculture science graduates are expected in 2014, while the number of graduates in these areas is expected to be only around 57,000 (Agriculture Council of America, 2014). The need to fill these jobs is critical, as the agriculture industry remains a major force in America’s economy, contributing to 4.9% of nominal GDP in 2011 (Agriculture Council of America, 2014).

With California remaining the number one agriculture-producing state in the nation, a need for younger generations to fill agriculture jobs is quickly approaching. As the global population increases—especially in poor, non-Western countries—a need for food is increasing as well. To meet the global demand for food by 2050, agriculture production must increase by 60% by weight to meet the needs of the population, especially in cereal, meat and oil crop production (Cooper & Burton, 2002). For instance, it is estimated that cereal production will need to be increased by 3 billion tons, meat production by 455 million tons, and oil crop production by 282 million tons (Cooper & Burton, 2002). Not only will this greater demand require increased productivity from agriculture farms and ranches, but also a greater demand for professionals and employees with skills in agriculture production.

Currently, less than one percent of America’s population claim they farm as an occupation; however, 17% of the total civilian U.S. population is involved in the production, processing, and selling of the nation’s agriculture products. This makes agriculture the nation’s number one employer, with more than 23 million jobs (Association of Land-Grant Universities, 2009). As the global population grows to the estimated 9 billion in 2050, a need for education and innovative agriculturists is a growing concern. This need will especially hold true as future farmers must devise
methods to produce food on less arable land, degraded soil, and with increasing regulation (Association of Land-Grant Universities, 2009).

Overview of the Agriculture Education Program

The education of agricultural professionals and workers has been an important priority for over a century. Following the creation of the United States Department of Agriculture in 1862, a movement for disseminating agriculture information became a trend across the nation (National FFA Organization, 2013). Formal agriculture education began with the passage of the Morrill Act, legislation that provided land-grant schools. The Hatch Act of 1887 allocated federal money to agriculture research stations and the Smith-Hughes Act of 1917 initiated agriculture education classes at the high school level (National FFA Organization, 2013).

The Future Farmers of America (now called the National FFA Organization) was created in 1928. It has a congressional charter under Title 36 of the United States Code and is an integral part of many agriculture education programs under Publication 105-225 (formally known as Public Law 740) (National FFA Organization, 2013). This integration is a part of the agriculture education model, which stresses agriculture education in the classroom, FFA involvement, and Supervised Agriculture Experience Projects (SAEs or SAEPs). This vision is designed to prepare students with diverse and rich experiences in agriculture. Today’s agriculture education program may be defined as an educational program for middle and high school students about agriculture with emphasis on leadership training and preparing students for careers in agriculture (Cooper & Burton, 2002).
Today, agriculture education is offered in 7th through 12th grades and varies greatly across the country. Many agriculture education programs work closely with the State Department of Education as well as local communities and programs. Many programs specialize in particular subject areas such as agriculture mechanics or biotechnology or focus on community outreach, Supervised Agriculture Experience Projects, FFA leadership, or Career Development Events. Currently, over 800,000 students are enrolled in an agriculture education class in the country, with over 500,000 FFA members (National FFA Organization, 2013).

Agriculture education in California has particularly unique characteristics. With an integral approach to the program—with 100% FFA membership and unique funding opportunities—California has faced many challenges and changes since its charter in 1928. Within the past 30 years, two major funding programs have supported California Agriculture Education. The Carl D. Perkins Vocational Education Act of 1990 and the Agricultural Education Vocational Incentive Grant Program of 1983 have allowed agriculture education programs to develop and diversify (California FAA Education, 2013). California FAA Education (2013) outlines four major goals of these two programs:

Increase the competence of future and current high, middle grades, and ROC/P agricultural education instructors in developing and implementing a new integrated curriculum, student and program certification systems, technical preparation strategies, and effective instructional methodologies. (para. 3)

These two funding sources provide the majority of monetary resources to California programs, providing California schools over $4,000,000 in the 2010-2011 school year.
This funding assists over 70,500 high-school aged students enrolled in 305 agriculture education programs across the state (California FAA Education, 2013).

Students who participate in California agriculture education are mostly Hispanic (47%), male (56%), and in grades 9 to 12 (96%) (California FAA Education, 2013). In 2011, over 1,000 agriculture education classes were offered in California that met California University (e.g., University of California and California State University) admission requirements, known as the A-G requirements. These courses range from traditional classes such as agriculture mechanics, animal science, and forestry and natural resources to more integrated agriscience courses such as veterinary science, landscaping management, and agriculture biology (California FAA Education, 2013).

Statement of Problem

Agriculture education in the United States has long served as the foundation for inspiring students to pursue agriculture careers. Currently, over 11,000 agriculture teachers instruct students in the areas of agriscience, biotechnology, horticulture, animal science, environmental science, and agriculture mechanics (National FFA Organization, 2013). The nation instructs over 800,000 students in formal agriculture education programs from 7th grade through adult school in fifty states and three U.S. territories. Nearly 10% of these students reside in California alone (National Council for Agriculture Education, 2013). To maintain agriculture at its current status and encourage growth for upcoming years, recruitment of eager individuals must be improved. To enhance recruitment, better recruitment strategies must be utilized, specifically at the high school level. Further, to provide student opportunities for strong STEM courses in agriculture
which can benefit their careers, it is important to understand what motivates students to enroll in—and continue to participate in—agriculture courses. Thus, it is essential to research student decision-making processes in order to increase the number of students who enroll—and, importantly, stay enrolled—in agriculture education.

Research Questions

1. What are differences in demographic characteristics between first-year students and fourth-year students?

2. What factors most influence the decision of first-year agriculture students to enroll in non-elective agriculture courses for the first time?

3. What factors most influence the decision of fourth-year agriculture students to enroll in agriculture courses during their fourth year?

4. What differences exist in reported enrollment influences across the two groups?

Purpose of Study

The purpose of this study was to investigate self-reported reasons why high school students (a) enroll in agriculture courses for the first time and (b) continue to enroll in agriculture courses during their fourth year of high school agricultural instruction. An additional purpose of this project was to compare the reasons first-year agriculture students enroll in agriculture classes to the reasons fourth-year seniors enrolled in their agriculture class. To understand the differences between groups, demographic differences across the two groups were also compared. Understanding the reasons in which the participants enroll in agriculture will shed light on how recruitment
strategies should be adjusted for different populations of students within agriculture education programs. With increased enrollment in agriculture education courses, more students will be exposed to STEM knowledge, curriculum, and careers. Increased enrollment in agriculture education programs will prepare qualified students to enhance their STEM knowledge at the postsecondary level and meet the needs of America’s changing economy.

Findings from this study will be used by California agriculture education teachers to investigate the reasons in which students initially enroll and stay enrolled in agriculture education courses. These findings will allow agriculture teachers to explore new ways in which to obtain and retain agriculture students in hopes to inspire and motivate them to pursue degrees and careers within the agriculture industry.

Theoretical Framework

Adolescents often look to others with help in their decision-making. Different people are important for different adolescents (and different arenas of life). Examples include: peers, parents, siblings, teachers, and other influential people (e.g., school counselor, family friend). Strong relationships, whether they are in the family or with peers, can play a substantial role in increasing student achievement (Stewart, 2007). Breakwell and Beardsell (1992) explored parental, peer, and gender effects on students in science attitudes and involvement. Boys had more positive views of science as well as scientific extra-curricular activities. This was attributed to having parents that supported science, parents that engaged in activities jointly with their children and peer friends who
enjoy science. It was found that parental and peer supports are highly influential in predicting participation in science, liking it, and succeeding in this field.

A similar study examined attitudes among family and participation in organized extra-curricular activities. It was found that attitudes of community activities and strong relationships with parents were indicative of involvement of out-of school activities (Morrissey & Werner-Wilson, 2005). Sibling relationships are also thought to influence adolescents and are often marked by nurturance and social support. Yet, as the adolescent child continues to establish more relations outside the family, siblings become less influential in their decision-making. As adolescents mature, they become more distant from their parents and more influenced by relationships outside the family (Steinberg, 2002).

Adolescent interests may also align with those of their peers. In a ten-year longitudinal study, it was found that adolescents’ attitudes toward science are highly positively associated with their friends’ attitudes towards science (Simpson & Oliver, 1990). Peers influence their adolescent friends in many important social decisions, especially those concerning drug and alcohol use (Jenkins, 1996). Individuals at the school can also play a role in student decision-making. Stewart (2007) found that a “sense of school cohesion between students, teachers, and administrators is important for successful student outcomes” (p. 1). Koballa (1988) found that female science teachers were major influences in whether eighth grade girls enrolled in elective physical education courses. A separate study found similar results, examining influences on sixth through twelfth grade girls’ enrollment in science courses (Heaverlo, 2011).
Adolescents choose to participate in various activities for different reasons. They may want something enjoyable, challenging, social, fun, or something that will bring them later benefit. Fullarton (2002) found that student engagement in school activities are attributed to: higher socioeconomic backgrounds, planning to attend college, attending schools with progressive school climates, reporting being pleased with school, and intrinsic motivation. Participation in extracurricular activities from eighth through twelfth grade may also predict academic success and social behaviors in adulthood (Zaff, Moore, Papillo, & Williams, 2003). Croom and Flowers (2001) found that participation in FFA activities could fulfill the student’s sense of belonging. Social factors in the organization were also motivating factors in the participation in FFA activities (Croom & Flowers, 2001).

Phelps, Henry, and Bird (2012) asked high school students why they chose to join or abstain from FFA involvement. The four major themes that emerged regarding why youth chose to participate in FFA were: (1) they received reassurance from others, (2) for personal advantage, (3) as a social activity, and (4) for fun and travel. Most notably, the people that influenced their decision to join the FFA were parents, siblings, peers, and teachers. Rayfield, Compton, Doefert, Fraze, and Akers (2008) also investigated factors that influenced student decisions to participate in FFA. They found that high grade point averages, participation in school clubs, and year in school were strong indications of FFA involvement.
Limitations

The study was conducted on agricultural education students enrolled in high school in Galt, California, a small rural community near Sacramento, California. The survey was completed by the full population of first-year students in a non-elective agriculture course and fourth-year agriculture students at two high schools in Galt, indicating that the results fully represent students from those schools. However, these results may not generalize to students in other communities (e.g., suburban, urban) or high school programs with very alternative enrollment strategies (e.g., required enrollment in FFA programming for all students). This study was also limited to students currently enrolled in agriculture classes, so no information was available on why some students never joined agriculture classes, why some students disenrolled after commencing an agriculture education curriculum, or why they dislike agriculture classes or FFA. Further studies should investigate why students who were once enrolled in agriculture education, chose not to re-enroll the next year. Replications of this study should alter the instrument to additional items. The survey instrument could include items inquiring about how students first heard about agriculture classes, what kept them enrolled throughout the four years, and an item regarding whether or not they enrolled to receive UC/CSU credit in a particular subject. The survey scale could also be changed to a 4-point or 6-point scale with no option of a Neutral/No opinion response. This would force students to choose a side, thus strengthening the results. Lastly, there is also no guarantee that students took the survey seriously, so accuracy of results may be skewed.
Definitions of Terms and Acronyms

4-H

A U.S. youth organization administered by the National Institute of Food and Agriculture and the United States Department of Agriculture (California FFA Association, 2013).

AAAS

The American Association for the Advancement of Science, an international non-profit organization dedicated to advancing science (Next Generation Science Standards, 2013).

A-G Requirement

Courses required for entrance to the University of California and the California State University systems (University of California, 2013).

Agriculture Education Program

A program or department which serves to excel in agriculture education courses, FFA instruction and competition, and oversees supervised agriculture experience programs (California FFA Association, 2013).

Agriculture Education Teacher

One who instructs students about agriculture towards graduation from high school, who teaches students industry skills and prepares them for career and college (California FFA Association, 2013).
CASE

Curriculum for Agriculture Science Education, curricular materials provided for a high level of educational experiences to students (National Council for Agricultural Education, 2013).

CDE

Career Development Event (California FFA Association, 2013).

Common Core

An initiative in the U.S. education system that aligns curricula with each other by reforming standards-based education (Common Core State Standards Initiative, 2012).

FFA

National FFA Organization, a national youth organization embedded within middle and high school agriculture education programs (National FFA Organization, 2013).

FFA Chapter

A school organization that involves FFA members, advisors, officers and works with the State and national organization to implement official FFA functions (California FFA Association, 2013).

NAAE

NGSS

Next Generation Science Standards (2013) are the national science standards designed to provide students with cross-cutting education in science.

Non-elective Agriculture Course

An agriculture course that meets graduation requirements for any non-elective subject. In this study, the first-year participants are enrolled in an Agriculture Science (Agriculture Biology, Agriculture Chemistry) course or Agriculture Government/Economics course.

NRC

The National Research Council, a nonprofit institution that provides advice on issues facing the world (The National Academies, 2009).

NSTA

The National Science Teachers Association, an organization committed to science education (Next Generation Science Standards, 2013).

Recruitment

The action of motivating new students and FFA members into the agriculture education program (California FFA Association, 2013).

SAEP

Supervised Agriculture Experience Program (National FFA Organization, 2013).

STEM

Fields of study in the areas of Science, Technology, Engineering, and Mathematics (U.S. Department of Education, 2010).
CHAPTER II

REVIEW OF LITERATURE

Introduction

Many of the major challenges facing America today are directly related agriculture, including “energy security, national security, human health, and climate change” (The National Academies, 2009, p. 1). Addressing these challenges will require a knowledgeable and skilled workforce in STEM fields, specifically those related to the agriculture sciences (Association of Public Land-Grant Universities, 2009). The National Science Foundation, United States Department of Agriculture, National Academy of Sciences, and other educational institutions have made STEM a major topic of reform. Integration of STEM skills has also become a major focus for universities throughout the country.

After the publication of *Above the Gathering Storm: Energizing and Employing American for a Brighter Economic Future* in 2009, The National Academy of Sciences proposed four recommendations to preserving the U.S. economy with regards to STEM: (1) enhance k-12 math and science education, (2) conduct longitudinal research, (3) recruit top students from the U.S. and abroad, and (4) guarantee that America is the best location for improvement (National Math and Science Initiative, 2014). To maintain its position in the global marketplace—specifically in regards to food production—the NAS urges education reform in America to include STEM curriculum in every aspect of
K-12 education (National Math and Science Initiative, 2014). Thus, to provide K-12 student opportunities for strong STEM courses in agriculture which can benefit the future of the country, it is important to understand what motivates students to enroll in—and continue to participate in—agriculture courses.

STEM and Agriculture Education

As the world population increases and usable land decreases, the nation must produce adequate problem-solvers and scientists to solve global food issues. Preparation of students for such tasks must start at a young age. Inquiry-based instruction and problem-solving activities and lessons are currently strongly emphasized in secondary districts, especially with the implementation of Common Core (Common Core State Standards Initiative, 2012). Increasing STEM concepts across curriculum has become an increasingly important movement in America. Incorporating hands-on activities and real-world skills has always been a goal of agriculture education. Now more than ever, increasing rigor and relevance while equipping students with 21st century skills are becoming more prevalent in agriculture education programs (Common Core State Standards Initiative, 2012). The links between agriculture and science have been investigated across the nation, including an examination of the current STEM concepts addressed in agriculture education, the development of new curricula, and the creation of new goals for educating the next generation regarding scientific, mathematical, and problem-solving concepts.

The National Council for Agriculture developed and managed the “Curriculum for Agriscience Education” (CASE), a comprehensive agriscience
curriculum for secondary agriculture education programs in 2007. The curriculum emphasized a four-pathway system in agriculture education designed to present students with advanced scientific concepts, potential careers in STEM fields, and the necessary skills to pursue future careers or coursework in agriculture. The adoption of CASE curriculum has become more popular across the nation as the need for skilled thinkers in agriculture fields has increased. By 2009, 32 states and 655 teachers implemented CASE into their programs. CASE is one example of how STEM, problem-based learning, and scientific concepts are being woven into agriculture education programs across the country (National Council for Agriculture Education, 2013).

In a related effort, the University of Florida AG-STEM Education Research Laboratory is currently working to uncover ways to improve student learning of STEM concepts in agriculture and life sciences (University of Florida, 2013). Present research focuses on ascertaining specific STEM concepts taught in secondary and postsecondary agriculture classes. The Strengthening Academic Learning and Engagement Special Interest Group through the AG-STEM Education Research Laboratory is presently working on identifying key concepts and practices that should be incorporated into secondary agriscience programs and developing an implementation plan for them in secondary agriscience classes (University of Florida, 2013). The University of Colorado Extension service has also recently focused efforts on teaching Colorado’s youth about agriculture and STEM. The extension agents and specialists from around the state hosted an AgFest tour in the Spring of 2012. The daylong camp taught students about the many STEM-related career opportunities within the agriculture industry such as microbiologists, engineers, entomologists, and hydrologists.
Fitzpatrick (2012) captured the message behind the activities as AgFest by stating:

There was an important message behind the activities at AgFest, even more important than learning where the food we eat, the fiber we wear and some of the energy we burn comes from. That message was this: Between now and 2050, the population of the world will have increased by more than 2 billion people. In the meantime, the acreage available for food production will decrease and the availability of clean water will decrease even more. Farmers will need to produce more food in the next 50 years than they have in the past 10,000 years. That’s a big job for agriculture and it was no accident that the focus on AgFest was on STEM.

The University of Florida and Colorado State University Extension are not alone in endorsing STEM degrees. Texas A&M, Oregon State, Purdue University, and other notable institutions are also promoting STEM majors, offering unique internships, and providing financial assistance to STEM majors.

Research has also focused on the link between STEM concepts and hands-on agricultural learning. Wooten, Rayfield, and Moore (2013) identified STEM concepts that are associated with junior livestock projects in 4-H and FFA. Using a modified Delphi technique, 21 STEM concepts associated with junior livestock projects were identified. The results indicated that math and science concepts were prevalent in livestock projects and that the link between science, technology engineering, core subject education, and livestock projects should be emphasized in curricular and program efforts.

Shoulders and Myers (2013) identified methods that agriculture classes are currently teaching STEM concepts and presented ways to increase STEM concepts in the future. Agriculture education today exposes students to rich, controversial, social, and scientific issues through hands-on learning and inquiry-based laboratory exercises. To enhance learning further, she suggests agriculture classes be rearranged to focus units of study on
socioscientific issue (a topic that has a social and scientific component). Once selected, these units can incorporate agriculture, standards, Next Generation Science Standards, and Common Core literacy standards.

Transition to Common Core Standards

Beginning in 2010, the Council of Chief State School Officers (CCSSO) and the National Governors Association (NGA) developed the Common Core State Standards for grades K-12 and paved the way for their implementation throughout the country (Common Core State Standards Initiative, 2012). The purpose of these new standards is to enable students with the skills and knowledge needed to be successful in college and career. These new standards have been adopted in 46 states and focus on increasing student reading and writing skills. Implementation of these new standards has changed the content, pacing, and teaching styles of most K-12 courses. One major goal of the Common Core Standards is to help all students become college and career ready.

Meeder and Suddreth (2012) stated:

The goal of ensuring that all students graduate from high school ready for college, careers, and life has taken hold in every state across the nation. Yet, all too often, the focus on “college readiness” and “career readiness” remains in two distinct silos, even though there is little question that reading, writing, communications, and mathematical reasoning are all core skills for success in postsecondary education, in the workplace and for citizenship and that all educators should help students develop deepen, and refine those core skills. As such, these literacy and mathematical skills are not, and should not be, the sole domain of the English language arts and mathematics departments but rather should be infused throughout education. (p. 4)

Further, the implementation of math and literacy into Career and Technical Education has allowed CTE programs to incorporate relevant, real-world application into already career-centered courses.
The Next Generation Science Standards (NGSS), a set of standards aligned with Common Core, is a nationwide initiative designed to change the framework of science in grades K-12 (Next Generation Science Standards, 2013). Developed by the National Science Teachers Association, the National Research Council, and other partners, this set of narrowed, in-depth standards was designed to teach science in a more meaningful manner (Next Generation Science Standards, 2012). Although the standards have been established, their implementation will be decided by individual school districts. Few schools will organize the new standards by topic, much like what is seen now (e.g., biology, chemistry, physics). Rather, it has been determined that an integrated approach is the more preferred method (e.g., 9th grade science, 10th grade science). This new integrated method may fundamentally change the way in which agriculture science classes are taught. Although the details of the implementation of NGSS are nascent, there is currently much speculation on how NGSS will be implanted within agriculture education while maintaining a curriculum that is competitive with traditional science courses (Next Generation Science Standards, 2012).

A Shift in Agriculture Education

Within the past decade, it has become more challenging for students to be accepted into college (Abrams, 2013). The increased competition stems mainly from an increasing demand for college admissions by students with a relatively stable supply of spots from colleges. This demand discrepancy has caused high school students to become increasingly selective and strategic when choosing their high school coursework (e.g., selecting an AP course rather than an agriculture option). This trend, coupled with
straining budgets, has affected the ability of high school programs to offer many traditional agriculture courses (Abrams, 2013).

This paradigm shift has also significantly changed the way agriculture education programs are designed. Twenty years ago, agriculture courses such as natural resources and ornamental horticulture were common. Now, pathways are more rigorous and science-based, focused on offering courses like Agriculture Biology and Agriculture Earth Science in order to compete with science departments for the same students (Shelley-Tolbert, Conroy, & Dailey, 2000). French and Balschweid (2009) investigated agriculture teacher attitudes regarding scientific inquiry as an instructional method:

When asked their opinions of their comfort with various content areas and teaching methodologies 95% of teacher educators responded that they felt “very comfortable” or “comfortable” teaching technical agriculture content. Only 68% felt as confident when asked about teaching technical science content. . . . Methods of teaching courses in agricultural education must be taught by those possessing a high level of comfort with not only technical agricultural but technical science as well. In addition, those methods of teaching instructors in agricultural education need to be well versed in the latest accepted methodologies for teaching agriculture and science. (p. 32)

French and Balschweid (2009) further identified the need to increase agriculture teacher qualifications and comfort-level in teaching technical science concepts as the trend to increase science-based agriculture courses continues. The modification in agriculture education course offerings across the nation has also led agriculture programs to obtain CSU and UC approval for many courses. These recent changes have made many agriculture science courses equally as competitive as non-agriculture science courses. In California alone, there are currently over 300 Agriculture Biology, 60 Agriculture Earth Science, and 20 Agriculture Chemistry courses that are CSU/UC approved for A-G requirements (University of California, 2013). The paradigm shift in Agriculture
Education has allowed for new science-based courses to emerge, increased enrollment in secondary agriculture programs, and a trend that encourages students to seek STEM-related careers and degrees.

**Enrollment Factors**

As part of an overarching research endeavor to improve curricular decision-making, researchers have investigated the factors that influence why students enroll in agriculture education courses. Initially, there was much concern because researchers noted a declining enrollment of students in the late 1970s and 1980s (Hoover & Scalon, 1991). For instance, from 1976 to 1989, a 27% decline in enrollment was observed. Knight (1987) investigated the purpose of this decline and determined that secondary agriculture programs did not adjust coursework to meet the demands of the changing industry. Knight also concluded that an increase in the need for more academically rigorous courses to enter college discouraged student enrollment. Further, Knight found that there was a perception that vocational courses were not suitable for college-bound students, thus deterring more academically-oriented students.

These implications are not surprising and are consistent with contemporary trends. In recent years, agriculture education has vastly changed its image from what was once perceived as an organization for white male students from farming backgrounds. It is now a diverse, academically challenging education model that strives to develop students’ leadership and knowledge through diverse agriculture coursework (Welton, 1971). Ullrich and Stapper (1999) found students decided to enroll in agriculture courses because friends, parents, or agriculture teachers encouraged them. They also determined
that school administrators and staff had little to no influence in their decision-making. Rossetti, Elliot, Price, and McClay (1989) determined that students who were not previous FFA members decided to enroll in an agriculture class because they were interested in the subject or they thought it would be an easier class to pass.

A similar study by Reis and Kahler (1997) in Iowa further explored reasons students enroll in agriculture courses. The greatest influences for students in agriculture class were parents, agriculture instructors, friends, and former agriculture education students. Similarly, Kotrlik (1987) also found that parents greatly influenced whether children enrolled in agriculture courses. Additionally, research suggests students enroll in agriculture courses because they enjoy the hands-on nature and active class styles offered in the curriculum. Sutphin and Newsom-Stewart (1995) examined student perception of agriculture courses. They found that students perceived agriculture as more of an activity-centered learning environment with several opportunities for teamwork, work experience, and life skills. Students believed these were valid reasons for taking an agriculture class.

Understanding enrollment factors has widely spanned to investigating cultural, race, and geographic characteristics among students. Esters and Bowen (2004) identified factors influencing students to enroll in an urban agricultural education program. Graduates of the program identified parents and/or guardians as highly influential persons for enrolling in the program as well as recruitment activities, interest in livestock animals, and agriculture career aspirations (Esters & Bowen, 2004).

Esters and Bowen (2004) also concluded that:

Former students’ parents or guardians were the individuals most influencing their decision to enroll in an urban agricultural education program. However, former students’ indicated their mother or female guardian as having more influence than
the father or male guardian. Thus, for the former students in this study, it can be concluded that parents or guardians were the primary individuals influencing their decision to enroll in an urban agricultural education program, although, the mother or female guardian was the most influential individual. (p. 31)

Talbert (1996) determined that minority status, socioeconomic status and gender did not play a significant role in enrollment decisions among minorities. Talbert also determined that pressure groups, influences from home, and school and community influences played a role in their decision-making. Conversely, Talbert and Larke (1995) found that “minority students held more negative perceptions of agriculture than did non-minority students” (p. 1).

Through a qualitative study, Wakefield (2003) identified several reasons minority students enrolled in agriculture education courses. These included but were not limited to: (1) curiosity about the FFA, (2) the class was required, (3) they wanted to learn about agriculture topics, and (4) they enjoyed laboratory learning opportunities. Student decisions were also influenced by the level of involvement of the advisor, opportunities to travel, opportunities to weld, and opportunities for potential careers in computers, welding, medicine, and agriculture science. Wakefield further asked the students about perceptions of minority students toward agriculture. Responses emphasized that the minority students did not wish to be the only student of their race at an agriculture event, did not believe anyone tried to recruit minorities, and believed that there were too many people of a different race in agriculture.

Bell and Fritz (1992) explored female enrollment in agriculture education in Nebraska. They found that when females considered enrollment, they found a lack of career information about available agriculture careers, a lack of existing supportive
networks for participation in agriculture coursework, and difficulty fitting an agriculture
class into their schedule. This was in contrast to the findings of Sutphin and Newsom-
Stewart (1995), which found few gender or ethnicity-related differences in rationale for
selection of agriculturally-related coursework.

Scott and Laverge (2004) studied the perceptions of ninth graders of their
perception of agriculture and their experienced barriers to enrolling in agriculture
coursework. The results suggested that non-minority students had higher mean scores
than did minority students, indicating that the minorities were less likely to enroll in an
agriculture class. It was also found that non-minority students thought more highly of the
agriculture industry and agriculture education than did minority students. However,
results indicated that no particular individual was responsible for encouraging them to
enroll in their agriculture class. Interestingly, it was indicated that most students enrolled
in an agriculture class for reasons other than the original content or purpose of the class.
In a separate study, Luft and Giese (1991) found that an agriculture teacher played a
major role in student interest in registering for an agriculture class. FFA membership and
involvement has also proved to be a major factor for enrollment as studied by Reis and
Khaler (1997).

The above studies suggest several factors may play a role in student
enrollment in agriculture, such as influences by important individuals (e.g., teachers,
parents), personal interests, and opportunities for hands-on learning. However, because
much of the work on this topic is somewhat dated, it would be useful to examine these
influences in a contemporary sample.
Recruitment in Agriculture Education

In order to maintain and increase enrollment, many agriculture education programs plan and implement various recruitment strategies. These may include speaking to feeder schools, informing school counselors and administration about program activities, and distributing promotional materials such as brochures and fliers to parents and students.

Challenges in recruitment and solutions to help increase enrollment in agriculture programs have recently been investigated. Dyer and Breja (2003) explored problems in recruiting students into agriculture education programs through a Delphi study. Dyer and Breja (2003) stated that “scheduling difficulties, lack of guidance counselor support, student involvement in other activities, access to students, increased graduation requirements, image of agriculture, lack of interest in agriculture, and block scheduling” (p. 1) were the major recruitment problems faced by agriculture programs. These problems were further investigated by Myers, Breja, and Dyer (2004) through a study that examined solutions to recruitment issues in high school agriculture programs. Focus groups that once had declining enrollment but have since improved their numbers, were organized. Both issues of why the enrollment had dropped and solutions for why the program improved were discussed. Issues leading to low enrollment were poor teacher quality and commitment, lack of program quality, perception of agriculture, and variety of agriculture activities to the students. The solutions to these issues included hiring quality and dedicated teachers, adapting the curriculum to be more science- and standards-based, providing better classroom instruction and activities, and promoting the agriculture program as a whole.
Baker, Settle, Chiarelli, and Irani (2013) studied specific recruitment strategies in land-grant institutions in the southeastern United States. Focus group results indicated that students preferred recruitment messages delivered in person, campus publications, and online advertisements. Also, full-color promotional materials, pamphlets with statistical information about the agriculture industry, and short videos were favored means of recruitment. The study concluded that recruitment methods should be targeted, diverse, and attention grabbing.

The National FFA Organization has developed several strategies for recruiting and retaining FFA members in agriculture education programs. In *Rev It Up*, the national recruitment and retention guide, the FFA outlines strategies to create a marketing plan for FFA chapters which includes strategies to (1) identify the target audience, (2) draft a message for each identified target, (3) create S.M.A.R.T (Specific, Measureable, Attainable, Realistic, Time-Bound) goals, and (4) create an action plan for recruitment ideas (National FFA Organization, 2005). *Rev It Up* also encourages chapters to establish a target audience and develop recruitment strategies accordingly.

National FFA Organization (2005) states:

Since members, potential members and the public are diverse, your events should reflect that diversity to have the greatest appeal. Younger students in agricultural programs are a natural and easy audience for your message. They are already familiar with many FFA benefits. Other groups may take a little more convincing. For example, non-agriculture students may think that only students who live on a farm can be a part of FFA. Others may have preconceived notions of what people in FFA are like and feel they don’t fit in. Your marketing efforts have to be broad if you’re targeting a group like fellow students. (p. 5)
Once a target audience is established, methods to determine a strategy for each audience member, developing action plans, soliciting outside help, and maintaining a calendar events may be used to increase FFA membership (National FFA Organization, 2005).

Summary of Literature

Universities, educational organizations, and the federal government have addressed the need to increase the number of citizens with STEM degrees to fulfill the demands of the American economy. In order to accomplish this, inspiration and education about STEM must begin at an early age. The University of Florida is currently researching ways in which STEM concepts can be integrated into secondary agriculture education programs. Curriculum like CASE is also quickly being disseminated and used by programs across the state. This integration of STEM concepts into agriculture programs will hopefully inspire students to pursue STEM degrees at the postsecondary level. However, maintaining enrollment continues to be a struggle with increasing college admission requirements, a transition to Common Core standards and the uncertain futures of many agriculture education programs. Thus, understanding why students enroll in agriculture education is pivotal in increasing and maintaining numbers.

Previous research suggests that students enroll in agriculture education for a plethora of reasons. Parents, peers, and agriculture teachers have played a significant role in enrollment as found by Reis and Khaler (1997) and Knight (1987). The appeal of agriculture classes as being hands-on, laboratory-based, and interactive have also been enrollment factors (Sutphin & Newsom-Stewart, 1995; Wakefield, 2003). The thought of an easier class and the use of recruitment strategies have also been found as reasons
students enroll in agriculture education (Esters & Bowen, 2004; Rosetti, Elliot, Price, & McClay, 1989). This study will examine enrollment factors with a contemporary sample as well as compare enrollment factors between first-time agriculture students and fourth-year seniors. The results from this study will help curriculum developers to examine whether the reasons for enrollment change throughout a student’s participation in agriculture education.
CHAPTER III

METHODOLOGY

Design of the Investigation

The current investigation was designed to examine whether a variety of outside, personal, and FFA/SAE influences impacted the choice of first-year students to enroll in a non-elective agriculture course and fourth-year students to enroll in all agriculture courses. To do so, a survey was designed, refined, and administered to both groups of students. The initial surveys administered during the pilot study contained 16 items (first-year survey) and 17 items (fourth-year survey) on five-point Likert scales, and were administered along with an additional six items on participant demographics. Each statement response ranged from 1-5: 1 - strongly disagree, 2 - disagree, 3 - neutral/no opinion, 4 - agree, and 5 - strongly agree. Each statement was selected to reflect potential influences that were found to have an impact on adolescent decision-making in previous literature. For instance, Stewart (2007) found that parents and peers were major influences in adolescent decision-making. This claim is consistent with urban settings, minority students and female populations (Esters & Bowen, 2004). Research also shows that agriculture teachers and former agriculture education students play a major role in influencing adolescents to enroll in agriculture (Reis & Kahler, 1997; Ulrich & Strapper, 1999). Adolescents have also been known to enroll in agriculture classes because they yearn for a hands-on learning experience and want to feel a sense of
belongingness by participating in FFA activities (Croom & Flowers, 2001; Kotrlik, 1987).

The population in this study differs from previous research. Previous studies focused on students from an entire agriculture education program or a specific sub-population (e.g., minority students, programs in urban areas). This study is unique in that it assessed two different sample populations using the same instrument in order to assess differences in influences over the course of high school career. First-year and fourth-year students were compared on the reasons they enrolled in their current agriculture class. This juxtaposition allows for the investigation of whether the reasons influencing student enrollment in agriculture classes change as they progress through the program.

The pilot study instrument contained one 16-item questionnaire for first-year students enrolled in non-elective agriculture courses and one 17-item questionnaire for fourth-year students in any agriculture course. All statements were organized into three subscales to represent three constructs: (1) Outside Influences, (2) Personal Influences, and (3) FFA and SAE Influences. Both surveys were similar in wording with the exception of the 14th statement (I enrolled in this agriculture class because I want to learn a specific skill or trade) which was included in the fourth-year instrument. Upon conclusion of the pilot study, the instrument was streamlined into one 17-item questionnaire. Wording was reorganized to ensure equivalent scales across the groups. The 17-item instrument was categorized into the same three constructs listed above.

The pilot instruments were evaluated by a panel of experts for face validity prior to the pilot study, as suggested by Dillman, Tortora and Bowker (1999). Validity describes the meaning of test scores, specifically dealing with the extent to which test
scores exclusively measure their intended psychological construct(s) and guide consequential decision-making (Wasserman & Bracken, 2003). Internal consistency was estimated by calculating Cronbach’s alpha for both pilot study instruments and the final instrument. This coefficient of reliability measures how closely related a set of items are to each other (Wasserman & Bracken, 2003). This was performed for the instrument as a whole as well as for the three subscales.

Psychometric Results of Pilot Study

Fifty-six students participated in the pilot study. Thirty-eight students took the first year non-elective agriculture student survey and eighteen students took the fourth-year agriculture student survey. Cronbach’s alpha coefficients ($\alpha$)—measures of internal consistency—are presented in Table 1. For the first-year agriculture student survey, the overall alpha coefficient for all three scales was .85. This assessment is a low stakes test, where there are only minor or indirect consequences for examinees requires a median reliability coefficient of 0.60 or greater (Wasserman & Bracken, 2003). The alpha

<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td><strong>Internal Consistency of First-Year and Fourth-Year Pilot Instruments</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>First-Year Pilot Measure ($n = 38$)</th>
<th>Fourth-Year Pilot Measure ($n = 18$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside Influences Subscale</td>
<td>0.86 (7 Items)</td>
<td>0.75 (8 Items)</td>
</tr>
<tr>
<td>Personal Influences Subscale</td>
<td>0.56 (6 Items)</td>
<td>0.41 (6 Items)</td>
</tr>
<tr>
<td>FFA/SAE Influences</td>
<td>0.83 (3 Items)</td>
<td>0.86 (3 Items)</td>
</tr>
<tr>
<td>Total Score</td>
<td>0.85 (16 Items)</td>
<td>0.37 (17 Items)</td>
</tr>
</tbody>
</table>
coefficient for the 6-item Outside Influence, Personal Influences, and FFA and SAE Influences were 0.86, 0.56, and 0.83 respectively. This indicated an acceptable reliability for the assessment.

The overall Cronbach’s alpha for the fourth-year survey was 0.37. The six-item scale for Outside Influences was 0.75. The 8-item scale for Personal Influences was 0.41 and the 3-item scale for FFA and SAE influences was 0.86. Although the overall reliability was below the recommended 0.60 value, this could be due to the low sample size and homogeneous group who participated in the survey. Upon conclusion of the pilot study, the wording for both surveys was streamlined into one comprehensive instrument that could be used on both the first-year and fourth-year students.

Population and Sample

The target population for this study included 276 agriculture education students within the Galt Joint Union High School District in Galt, California. Students from both Liberty Ranch High School and Galt High School participated in the study. Two hundred twenty-five first-year, non-elective agriculture students and 51 fourth year agriculture students participated in the study. This accounted for 100% of the population, thus providing a census. Non-elective first-year participants were identified as students in any grade level who was in their first year of an agriculture course that meets non-elective graduation requirements. This included students enrolled in agriculture science (e.g., agriculture biology, agriculture chemistry) courses as well as students enrolled in agriculture government/economics courses. Fourth-year participants were identified as any senior who had been enrolled in agriculture all four years of high school, regardless
of which classes. Students were excluded from final analyses if they did not complete all 17 items. This led to final samples of 222 (98.6% of original) first-year students and 50 (98.0% of original) fourth-year students. Demographic characteristics of these final groups are discussed in Tables 2 and 3.

Table 2

*Average Age of First-Year and Fourth-Year Students*

<table>
<thead>
<tr>
<th></th>
<th>First Year Students</th>
<th>Fourth Year Students</th>
<th>t</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 219)</td>
<td>(n = 50)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>14.66</td>
<td>17.26</td>
<td>-26.81***</td>
<td>&lt;.001</td>
<td>-2.79</td>
</tr>
<tr>
<td>SD</td>
<td>1.01</td>
<td>.49</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* ***p < .001.

Table 3

*Demographic Frequencies of First-Year and Fourth-Year Students*

<table>
<thead>
<tr>
<th></th>
<th>First-Year Students</th>
<th>Fourth-Year Students</th>
<th>χ²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 222)</td>
<td>(n = 50)</td>
<td>(1)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>117 (53.7)</td>
<td>21 (42.0)</td>
<td>χ²(1) = 2.22, p = .14</td>
</tr>
<tr>
<td>Female</td>
<td>101 (46.3)</td>
<td>29 (58.0)</td>
<td></td>
</tr>
<tr>
<td>Agriculture Production Background</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>68 (31.31)</td>
<td>23 (46.0)</td>
<td>χ²(1) = 3.89, p = .07</td>
</tr>
<tr>
<td>No</td>
<td>149 (68.7)</td>
<td>27 (54.0)</td>
<td></td>
</tr>
<tr>
<td>Living Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>87 (39.7)</td>
<td>27 (54.0)</td>
<td>χ²(2) = 6.76, p = .03</td>
</tr>
<tr>
<td>Suburban</td>
<td>101 (46.1)</td>
<td>13 (26.0)</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>31 (14.2)</td>
<td>10 (20.0)</td>
<td></td>
</tr>
</tbody>
</table>
Demographic data were collected from 269 students. Age information was available for 219 of the 222 first-year students and all 50 of the fourth-year students. If students chose two or more ages, the older age was selected and used. Gender information was available from 218 of the 222 first-year students. Agriculture background data were available from 217 first-years, and data from 219 students were available for living area. Data from all 50 fourth-years were available for gender, agriculture background, and living area. Information from 225 first-year and 51 fourth-year students was collected for the Personal Influences constraint section of the instrument. Data from 223 first-year and 51 fourth-year students were collected for the Outside Influences constraint. Data from 222 first-year and 50 fourth-year students were collected for the FFA and SAE influences constraint.

Treatment

Specific data collected for this survey were obtained through a survey. A questionnaire is a research technique used to gather a large amount of data in a short amount of time. A seventeen-statement Likert instrument was created and uploaded onto an online survey tool, Survey Monkey. Initially, the survey was differentiated for the first-year and fourth-year students (see Appendices A and B). The first-year instrument contained language that was specific for their agriculture science class (e.g., I enrolled in this agriculture class because it seemed more hands-on than regular science courses), rather than being vague enough to accommodate the agriculture government/economics courses. The first-year instrument also did not originally contain item-14 (I enrolled in this agriculture class to learn a specific skill or trade). The fourth-year survey from the
pilot study contained language that was not specific to a type of agriculture course. However, upon conclusion of the pilot study, the surveys were streamlined into one instrument so that results could be compared between the first-year and fourth-year participants. Although identical, the survey was duplicated on Survey Monkey and titled “first-year non-elective agriculture student” and “fourth-year agriculture student.” A link was created for each survey and was posted on the Liberty Ranch High School website. Instructions for how to administer the survey, along with a script of what to say to students, was written and sent to the eleven agriculture education teachers at Liberty Ranch and Galt High Schools (see Appendices C and D). Agriculture teachers administered the survey in their respective agriculture courses. For most of the teachers, a set of agriculture department laptops were shared. Fifteen minutes of class time was allocated to take the survey. Two of the teachers preferred to administer the survey on paper so the instrument was printed, copied, and administered. Later, the results from each of the paper surveys were transferred to Survey Monkey.

Two hundred seventy-six students participated in the study, including 225 in the first-year study and 51 in the fourth-year study. To assess the reliability of the instrument in the full samples, post-hoc Cronbach’s alpha values were examined.

For the first-year agriculture student survey, the overall alpha coefficient for all the overall total score was .90 (see Table 4). The alpha coefficient for the 6-item Outside Influence subscale, 8-item Personal Influences subscale, and 3-item FFA and SAE Influences subscales were .84, .83, and .84 respectively. For the fourth-year agriculture student survey, the overall alpha coefficient was .78. The alpha coefficients for the 6-item Outside Influence subscale, 8-item Personal Influences subscale, and 3-
Table 4

*Internal Consistency of the Final Instrument*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>First-Year (n = 222)</th>
<th>Fourth-Year (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside Influences Subscale</td>
<td>0.84 (6 Items)</td>
<td>0.80 (6 Items)</td>
</tr>
<tr>
<td>Personal Influences Subscale</td>
<td>0.83 (8 Items)</td>
<td>0.44 (8 Items)</td>
</tr>
<tr>
<td>FFA/SAE Influences</td>
<td>0.84 (3 Items)</td>
<td>0.80 (3 Items)</td>
</tr>
<tr>
<td>Total Score</td>
<td>0.90 (17 Items)</td>
<td>0.78 (17 Items)</td>
</tr>
</tbody>
</table>

item FFA and SAE Influences subscale were .80, .44, and .80 respectively. Total alpha coefficients indicate acceptable reliability for the assessment; however the low alpha of .44 for the Outside Influence subscale indicates that the scale consists of more homogeneous item content as compared to the other scales (e.g., students who tend to report one strong personal influence tend to report other personal influences as weak.

**Data Analysis Procedures**

Surveys that were taken on paper were entered into Survey Monkey. The data were then transferred to the Statistical Package for Social Sciences (SPSS) program. Data analysis procedures included examining frequencies and means to describe and compare the populations. Results include analyses of the three scales and individual items.
CHAPTER IV

RESULTS AND DISCUSSION

Presentation of Findings

This chapter examines the data gathered from the questionnaire administered to 272 students in Galt, California (see Tables 5 and 6). The purpose of this study was to answer four questions: (1) What are differences in demographic characteristics between first-year students and fourth-year students? (2) What factors most influence the decision of first-year agriculture students to enroll in non-elective agriculture courses for the first time? (3) What factors most influence the decision of fourth-year agriculture students to enroll in agriculture courses during their fourth year? (4) What differences exist in reported enrollment influences across the two groups? The research questions were answered using a 17-item Likert instrument administered to high school students in Galt, California. The results will attend to each of the research questions guiding this study (see Tables 5 and 6) Findings and conclusions will be presented in the ensuing pages of this chapter.

First-Year Results

The majority of first-year participants were 14 (56.62%) or 15 years old (29.22%) and female (53.88%) (see Table 2). Most students were enrolled in Agriculture Biology (56.16%), Agriculture Environmental Science (24.66%), or Agriculture
### Table 5

**Comparison of First-Year (N = 222) and Fourth-Year (N = 50) Student Questionnaire Item Responses**

<table>
<thead>
<tr>
<th>Item</th>
<th>First Year</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Fourth Year</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>t</th>
<th>p</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Encouraged by parents</td>
<td>3.19</td>
<td>1.10</td>
<td>3.52</td>
<td>1.25</td>
<td>-1.73</td>
<td>.09</td>
<td>-0.29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Encouraged by older siblings</td>
<td>2.91</td>
<td>1.23</td>
<td>3.14</td>
<td>1.26</td>
<td>-1.19</td>
<td>.24</td>
<td>-0.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Encouraged by family friend</td>
<td>3.04</td>
<td>1.20</td>
<td>3.32</td>
<td>1.17</td>
<td>-1.50</td>
<td>.14</td>
<td>-0.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Encouraged by agriculture teacher</td>
<td>2.76</td>
<td>1.20</td>
<td>3.52</td>
<td>1.18</td>
<td>-4.06</td>
<td><strong>&lt;.001</strong></td>
<td>-0.64</td>
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<tr>
<td>5. Encouraged by school counselor</td>
<td>2.77</td>
<td>1.10</td>
<td>2.88</td>
<td>.96</td>
<td>-1.62</td>
<td>.53</td>
<td>-0.10</td>
<td></td>
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<tr>
<td>6. Encouraged by peer</td>
<td>3.32</td>
<td>1.26</td>
<td>3.70</td>
<td>1.07</td>
<td>-1.95</td>
<td>.05</td>
<td>-0.31</td>
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<tr>
<td>7. Prefer agriculture teachers</td>
<td>3.65</td>
<td>1.13</td>
<td>4.38</td>
<td>.75</td>
<td>-5.57</td>
<td><strong>&lt;.001</strong></td>
<td>-0.68</td>
<td></td>
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<tr>
<td>8. It seemed fun</td>
<td>4.07</td>
<td>.99</td>
<td>4.36</td>
<td>.72</td>
<td>-1.94</td>
<td>.05</td>
<td>-0.31</td>
<td></td>
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<tr>
<td>9. It seemed more hands-on</td>
<td>4.17</td>
<td>.96</td>
<td>4.52</td>
<td>.68</td>
<td>-2.47</td>
<td>.01</td>
<td>-0.38</td>
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<tr>
<td>10. It sounded interesting</td>
<td>3.99</td>
<td>1.00</td>
<td>4.54</td>
<td>.65</td>
<td>-3.72</td>
<td><strong>&lt;.001</strong></td>
<td>-0.58</td>
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<tr>
<td>11. My friends are taking it</td>
<td>3.05</td>
<td>1.21</td>
<td>3.60</td>
<td>1.14</td>
<td>-2.97</td>
<td>.003</td>
<td>-0.46</td>
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<td></td>
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<tr>
<td>12. It seemed easier</td>
<td>3.33</td>
<td>1.13</td>
<td>3.20</td>
<td>1.21</td>
<td>.75</td>
<td>.46</td>
<td>0.11</td>
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</tr>
<tr>
<td>13. It seemed more academically challenging</td>
<td>2.95</td>
<td>1.06</td>
<td>3.34</td>
<td>1.10</td>
<td>-2.31</td>
<td><strong>.02</strong></td>
<td>-0.37</td>
<td></td>
<td></td>
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<tr>
<td>14. To learn specific skill or trade</td>
<td>3.26</td>
<td>1.15</td>
<td>3.80</td>
<td>1.18</td>
<td>-3.00</td>
<td>.003</td>
<td>-0.47</td>
<td></td>
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<tr>
<td>15. To show an animal at the fair</td>
<td>2.72</td>
<td>1.38</td>
<td>3.62</td>
<td>1.41</td>
<td>-4.16</td>
<td><strong>&lt;.001</strong></td>
<td>-0.65</td>
<td></td>
<td></td>
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<tr>
<td>16. Interested in FFA activities</td>
<td>3.61</td>
<td>1.23</td>
<td>4.22</td>
<td>.71</td>
<td>-4.72</td>
<td><strong>&lt;.001</strong></td>
<td>-0.53</td>
<td></td>
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<tr>
<td>17. Interested in SAE projects</td>
<td>3.03</td>
<td>1.20</td>
<td>3.78</td>
<td>1.18</td>
<td>-3.99</td>
<td><strong>&lt;.001</strong></td>
<td>-0.63</td>
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</tbody>
</table>

Note: *p < .05, **p < .01, ***p < .001.

225 first-year and 51 fourth-year students responded to items 1-6, 223 first-year and 51 fourth-year students responded to items 7-14, and 222 first-year and 50 fourth-year students responded to items 15-17.

Note: Likert Scale: 1-Strongly Disagree, 2-Disagree, 3-Neutral/No Opinion, 4-Agree, 5-Strongly Agree

Chemistry (10.96%). Most first-year students reported living in suburban (47.03%) or rural (41.10%) living areas. Mean scores for the first-year students range from a low of 2.72 on Item 15 (To show an animal at the fair) to a high score of 4.17 on Item 9 (Seemed more hands-on). Overall, first-year students were interested in FFA activities ($M = 3.61, SD = 1.23$) and enrolled in the agriculture class to learn a specific skill or trade ($M = 3.26, SD = 1.15$). They also enrolled because they thought the class seemed easier than its non-agriculture counterpart ($M = 3.33, SD = 1.13$), and thought it sounded more interesting ($M = 3.99, SD = 1.00$). First-year participants also indicated that the class seemed more hands on ($M = 4.17, SD = 0.96$), fun ($M = 4.07, SD = 0.99$), and that they
Table 6

Comparison of First-Year (N = 222) and Fourth-Year (N = 50) Student Questionnaire Scale Responses

<table>
<thead>
<tr>
<th>Scale</th>
<th>First Year</th>
<th>Fourth Year</th>
<th>t</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>OI (outside influences)</td>
<td>3.00</td>
<td>1.75</td>
<td>3.35</td>
<td>.81</td>
<td>-2.56*</td>
</tr>
<tr>
<td>PI (personal influences)</td>
<td>3.56</td>
<td>.73</td>
<td>3.97</td>
<td>.43</td>
<td>-5.24***</td>
</tr>
<tr>
<td>FS (FFA &amp; SAE influences)</td>
<td>3.12</td>
<td>1.11</td>
<td>3.87</td>
<td>.97</td>
<td>-4.44***</td>
</tr>
</tbody>
</table>

Note. *p < .05. **p < .01. ***p < .001.

Likert Scale: 1-Strongly Disagree, 2-Disagree, 3-Neutral/No Opinion, 4-Agree, 5-Strongly Agree

Means and Standard Deviations were obtained by taking the sum of responses in each construct and dividing by the number of items in each construct.

prefer agriculture teachers over non-agriculture teachers. \( M = 3.65, \ SD = 1.13 \). First-year students indicated that peers \( M = 3.32, \ SD = 1.26 \) and parents \( M = 3.19, \ SD = 1.10 \) encouraged them to enroll in agriculture. Lower mean scores indicated that school counselors \( M = 2.77, \ SD = 1.10 \) and agriculture teachers \( M = 2.76, \ SD = 1.20 \) did not encourage first-year students to enroll in agriculture. Students did not tend to attribute their enrollment to the opportunity to show an animal at the fair \( M = 2.71, \ SD = 1.38 \). First-year students were not highly influenced by parents, siblings, and family friends. The data indicates that—while these people did have some influence in enrollment—other factors were more influential.

Fourth-Year Results

The majority of fourth-year participants were female (58%) and 17 years old (70%). Forty-six of the 51 participants were enrolled in Agriculture Government/Economics courses as well as a Floriculture, Agriculture Leadership, or Agriculture Mechanics class. Most fourth-year students reported living in a rural (54%) or suburban (26%) living area. Mean scores for fourth-year students ranged from a low
score of 2.88 on Item 5 (Encouraged by a school counselor) to a high score of 4.54 on Item 10 (It sounded interesting). Fourth-year students scored a 3 (Neutral/No Opinion) or above on all items except Item 5 (Encouraged by a school counselor). Higher overall mean scores indicate that fourth-year students enrolled in their agriculture class because they were interested in participating in FFA activities ($M = 4.22$, $SD = 0.71$), the class sounded more interesting ($M = 4.54$, $SD = 0.65$), the class seemed more hands-on ($M = 4.52$, $SD = 0.68$), the class seems more fun ($M = 4.36$, $SD = 0.72$), and they preferred agriculture teachers ($M = 4.38$, $SD = 0.75$).

**First and Fourth-Year Comparison**

Means and standard deviations of the 17 items for first-year and fourth-year participants are included in Table 5, as are results of independent samples $t$-tests which examined whether there were statistically and/or practically significant mean score differences across the two groups. Fourth-year students scored significantly higher on nearly all items as compared to first-year students, with 10 items demonstrating statistically significant differences across the two groups. Fourth-year students scored higher on the following items: 4 (Encouraged by an agriculture teacher), 7 (Preferred agriculture teachers), 9 (Seemed more hands-on), 10 (Sounded interesting), 11 (My friends are taking it), 13 (Seemed more academically challenging), 14 (To learn a specific skill or trade), 15 (To show an animal at the fair), 16 (Interested in FFA activities), and 17 (Interested in SAE activities). No large effects were observed, as exemplified by Cohen’s $d$ between the first-year and fourth-year participants. Items 4, 10, 15, 16, and 17 exhibited medium effects whereas Items 1, 3, 6, 8, 9, 11, 13, and 14 exhibited small
effects between the first-year and fourth-year participants. Items 2, 5, and 12 demonstrated negligible effects.

Means and standard deviations as well as independent samples $t$-tests comparing the two groups on the three questionnaire subscales are included in Table 6. Fourth-year students scored statistically significantly higher on all subscales as compared to first-year students. The Outside Influence subscale demonstrated a small effect size while the Personal Influences and FFA and SAE Influences subscales demonstrated medium effects. Fourth-year students scored higher than first-year students on all three subscales.

Discussion of Findings

Research Question One. *What are differences in demographic characteristics when first-year students are compared to fourth-year students?*

Findings indicate small demographic differences between the first and fourth-year participants in regards to gender, agriculture background, and living area. A higher percentage of females are seen in the fourth-year students (58.0%) compared to first-years (46.3%). Male population decreased approximately 10% between first (53.7%) and fourth-year males (42.0%). Increased female enrollment is likely due to increased enrollment among junior and senior girls in floriculture classes. The drop in male enrollment could be due to the decrease in enrollment from general Introduction to Agriculture Mechanics that is taken by freshman and sophomores to Advanced Agriculture Mechanics, a junior and senior level class. A trend is also seen in the parent’s involvement in agriculture and living area. More fourth-year students (46.0%) come from
families where one or more parents are involved in production agriculture compared to first-years (31.31%). The results indicate that students are more likely to stay enrolled in agriculture education courses when their parents are involved in production agriculture. This is perhaps due to the similar agriculture interests and career objectives between parent and child. Living area also played a significant role in enrollment. Chi-squared results indicate that a higher percentage of rural inhabitants were reported by fourth-year students (54.0%) compared to first-year students (39.7%). As with agriculture background, students who live in rural areas may be more connected with and interested in the agriculture industry.

Research Question Two. What factors most influenced the decision of first-year agriculture students to enroll in non-elective agriculture courses for the first time?

Findings indicate that, on average, first-year students have a neutral opinion regarding many factors included in the questionnaire. This is likely due to their inexperience with agriculture education and high school courses in general. The age and class selection of first-year participants suggests that they are in 9th grade. These students would have initially enrolled in their classes in 8th grade. Thus, they would not have knowledge of the opportunities agriculture classes offer (e.g., FFA, SAE activities) nor the influence of agriculture teachers or high school counselors. The highest scores among first-year students were observed on Items 7, 8, 9, 10, and 16; however, Items 7, 10, and 16 had mean scores between 3.00 and 3.99, indicating a neutral/no opinion for most participants. Item 7 scores indicated that first-year students commonly reported enrolling because they preferred agriculture teachers over non-agriculture teachers. With zero experience of agriculture teachers directly, first-year participants would have had to hear
about agriculture teacher performance from other people. Preference for agriculture teachers could be due to their popularity amongst other students, parents, or older siblings. Qualitative data from student responses also concluded that students preferred any agriculture teacher to the non-agriculture teacher who teaches a similar class due to their unpopularity on campus. First-year students also reported higher mean scores on Items 8-10. They thought the class sounded more fun, interesting, and hands-on than its non-agriculture counterpart. This is likely due to the nature of agriculture science curricula, which are designed to be hands-on, lab-based, and contemporary in nature. Students are exposed to real-world problems and situations that are connected to the agriculture industry. Agriculture coursework also emphasizes the “learning by doing” model and values different learning styles (e.g., visual, kinesthetic, auditory, reading/writing) (Hackathorn, Solomon, Bankmeyer, Tennial, & Garczynski, 2011). This philosophy seems to entice students to enroll and stay enrolled in agriculture education.

Average mean scores on Items 1, 2, 3, and 17 suggest neutral/no opinions on parental, sibling, and family friend influence, as well interest in SAE projects. Item 11 (My friends are taking it) had a mean score of 3.05 while Item 6 (Encouraged by a peer) had a mean score of 3.32. These results seem somewhat inconsistent. Further investigation on the matter of peer influence is recommended. Item 15 suggests interest in FFA involvement. First-year students may have heard about the FFA chapter activities and opportunities through word of mouth, 8th grade recruitment days, parents and peers, or local newspaper articles. First-year students declined to be motivated by showing an animal at fair, yet expressed interest in SAE activities. This could be due to the growing diversity of Supervised Agriculture Experience project opportunities the local FFA
programs offer such as community garden work, agriscience projects, and community service.

Overall mean scores indicate that first-year agriculture students did not report strong opinions on many items; however, the results indicate that enrollment was mostly due to the perception of that the class would be enjoyed, the preference for agriculture teachers and the opportunities for FFA involvement. The results suggest that 8th grade students are influenced by the perception of the class, agriculture teacher preference and FFA involvement. These three enrollment factors should be utilized to enhance 8th grade recruitment. When speaking to the 8th graders, students should highlight FFA activities they could get involved in as freshman. This can be done with pictures, manipulatives, rich descriptions, or video footage. Students should give personal stories about FFA activities they have enjoyed and encouraged the students to become involved if they take an agriculture class. Recruiters should also describe what a typical day in an agriculture class is like and highlight the fun, interesting, and hands-on activities they will do if they enroll. Recruiters should also describe the personalities and teaching styles of the agriculture teachers. Perhaps each recruiter can share a favorite memory of their agriculture teacher while restating that the class is fun, academic, and hands-on. A recruitment video that includes footage of agriculture classes, teacher interviews, and FFA activities could prove effective. High school students that are responsible for recruiting should keep these factors in mind when presenting to younger students.

Research Question Three. *What factors are most influential in the decision of fourth-year agriculture students to continue to enroll in agriculture courses during their fourth year?*
Findings indicate that fourth-year students enrolled in their agriculture class for several reasons. These reasons range from encouragement from parents, peers, and agriculture teachers, to the nature of the agriculture class, to the FFA and SAE opportunities. This is likely due to the students’ invested interest in the agriculture education program. The fourth-year students have chosen to continue their enrollment and participation in agriculture education and, thus, would feel strongly about why they have stayed enrolled. Mean scores were above 3 (Neutral/No opinion) on ten of the eleven items. Only Item 5 (Encouraged by a school counselor) had a mean score below 3 ($M = 2.88, SD = 0.96$). This is consistent with qualitative data. When asked about this item, students responded that counselors often discourage agriculture classes, falsely stating that they do not meet the same graduation requirements as non-agriculture courses.

Items 7, 8, 9, 10, and 16 had observed mean scores greater than 4. Results from these items suggest fourth-year satisfaction with the agriculture courses and teachers. Fourth-year participants have already taken previous courses from agriculture teachers, thus making sense of their continued enrollment and preference for agriculture teachers. This claim also holds true for their projections on how the class will be (e.g., interesting, fun, hands-on). Item 4 (Interested in FFA activities), had a mean score of 4.22. Fourth-year students have previous experience with FFA involvement and appear to have enjoyed it. Thus, FFA participation would likely be a source of continued enrollment. Items 1, 6, 11, 14, 15, and 17 had mean scored greater than 3.5. As indicated by items 6 and 11, peers tend to be a source of influence for fourth-year enrollment in an agriculture class. These results are consistent with previous literature as suggest by Steinburg (2002).
Results indicate mean scores higher than 3 (Neutral/no opinion) on Items 2 (Encouraged by older siblings) and 3 (Encouraged by family friend). Although these individuals are influential for fourth-years, they are to a lesser degree when compared to other influences. This could be due to adolescent autonomy and the likelihood that any older siblings have already moved away from the home. Results also indicate that fourth-year students enrolled in their current agriculture class because it seemed more academically challenging than its non-agriculture counterpart ($M = 3.34$, $SD = 1.10$). This is likely due to the nature of most senior-level agriculture classes. These courses are often more project-based and require students to think at higher levels of Bloom’s Taxonomy as compared to the non-agriculture equivalent (Cano, 2006).

Generally, fourth-year students expressed means above 3 (No opinion) for 16 of the 17 items. However, higher mean scores indicate that fourth-year students enrolled in their current agriculture class because they preferred agriculture teachers and thought the class would be more fun, hands-on, interesting, and academically challenging than its non-agriculture counterpart. Fourth-year students also enrolled for continued involvement in FFA activities. To increase enrollment among upperclassmen, in-house recruitment should be enacted. By their junior year, most students probably have a sense of agriculture classes, the instructor who teaches them, and the various FFA and SAE opportunities they can participate in. However, one-on-one student-teacher conversations and in-house recruitment strategies could reiterate the benefits of taking agriculture and give juniors the motivation to enroll. In-house recruitment would involve the agriculture teachers who teach senior agriculture classes speaking with current junior-level agriculture classes. They should emphasize the hands-on nature and academic rigor of
agriculture classes, the personalities and teaching methods of the agriculture teacher, and the various FFA activities they can get involved in as a senior. It may also be helpful to discuss how diverse involvement in school and FFA activities look appealing on resumes and college scholarship applications. Student testimonials may also prove effective.

Seniors who currently are enrolled in agriculture classes can be filmed giving personal feedback about the class and why they chose to continue taking agriculture classes as a senior. This video could be shown in all junior-level agriculture classes. Regardless of the recruitment method chosen, when recruiting junior agriculture students to enroll in agriculture for their senior year, emphasis should be made on the dynamics of the class and teacher, while highlighting FFA opportunities specifically for seniors.

- Research Question Four. *What differences exist in reported enrollment influences across the two groups?*

Independent samples t-tests were conducted to examine whether mean scores of the 17 items significantly differed for first-year and fourth-year participants. Results indicate that fourth-year students scored higher on nearly all items as compared to first-year students, with 10 items demonstrating statistically significant differences across the two groups. In can be concluded that the fourth-year students who remained in FFA throughout high school had overall higher degrees of agreement across all items as compared to first-year enrollees, with the exception of Item 12 (It seemed easier). Items 4 (Encouraged by an agriculture teacher), 7 (Preferred agriculture teachers), 10 (It sounded interesting), 15 (To show an animal at the fair), 16 (Interested in FFA activities), and 17 (Interested in SAE activities) expressed the biggest effect sizes as indicated by Cohen’s d. A comparison of first-year and fourth-year student questionnaire scale responses, as
presented in Table 5, conclude that fourth-year students scored significantly higher on all three subscales. Thus, as compared to first-year students, fourth-year students reported that Outside Influences, Personal Influences, and FFA and SAE Influences had a greater impact on their decision to enroll in an agriculture class.

The findings indicate that fourth-year students have stronger (and generally more positive) opinions regarding the factors that influenced their enrollment in agriculture education when compared to first-year students. Results also suggest that first-year and fourth-year students enroll in agriculture classes for many of the same reasons. Agriculture class and agriculture teacher preference seem to be the biggest factors influencing student enrollment. These results imply that students who are initially interested in agriculture courses tend stay enrolled. They also feel strongly as to why they stayed enrolled. Qualitative data from student’s responses have shown that students feel a sense of belonging in the agriculture department. They have met their best friends in agriculture, have grown close with the agriculture teachers, and feel a sense of home in the agriculture building. These feelings could be shared, both in personal conversation and through video testimonials, with under-classmen to increase retention among students.

Implications

The results from this study suggest that while the factors that influenced first and fourth-year participants to enroll in agriculture courses may be similar; the strength of their influence seems to grow as they continue their involvement in agriculture education. First-year and fourth-year students enroll in agriculture classes for similar
reasons and are more persuaded by the nature of the class and who is teaching it rather than individual people in their lives. This suggests that when recruitment occurs, emphasis should be made on the class, program activities, and agriculture teachers. The results from this study will allow agriculture education programs to tailor their recruitment strategies for first-time enrollees as well as returning students.

Eighth grade recruitment strategies should continue. Emphasis should be made upon the dynamics and structure of agriculture classes as well as the personalities and teaching methods of agriculture teachers. Recruiters could show video footage of a typical agriculture class, FFA activities, and include student footage that gives testimony on why agriculture courses are a great option for freshman. Information about agriculture classes could also be disseminated to the parents of 8th grade students to encourage more parental support and influence. Fourth-year students should be recruited in-house. As juniors, emphasis should be made upon dynamics of the classes offered, difficulty level of curriculum, and teacher personality and teaching methods. Video testimonials of seniors discussing the benefits of four years of agriculture instruction could also be shown to junior-level classes. By their junior year, it is likely that most students enjoy agriculture classes. One-on-one conversations between teachers and junior students as well as in-house recruitment could prove to be adequate recruitment strategies to motivate juniors to enroll in an agriculture class their senior year. School counselors should be given more information about the agriculture education program and be educated on the opportunities for students once enrolled.

The results of this study conclude that high school students are highly motivated by the dynamics and interest-level of the class they enroll in. It appears that the
teacher instructing the class and the opportunities for student involvement weigh heavily in decision-making. Further investigation could assess individual qualities agriculture teachers possess that make them favored over non-agriculture teachers. Results also indicate that students favor classes that seem fun, interesting, and hands-on. A comparison of what teaching strategies agriculture instructors use compared to non-agriculture teachers could also implicate why students perceive agriculture courses as more fun, interesting, and hands-on than non-agriculture courses and should be investigated for further study.

The aforementioned results suggest that agriculture programs should emphasize certain factors when recruiting students. Class dynamics, teacher personality and teaching style, as well as FFA opportunities should all be stressed in 8th grade recruitment strategies as well as in-house recruitment. As suggested by previous literature, full-color promotional materials, one-to-two minute videos, in-person recruitment, and campus publications should also be included in recruitment to capture the attention of students, parents, and school administrators (Baker et al., 2013).
CHAPTER V

STUDY CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In order to maintain its position in the global marketplace, the American economy must enhance its workforce and teaching workforce in the areas of Science, Technology, Engineering, and Mathematics. The federal government, educational organizations, and universities across the nation are demanding a reform in education to increase the number of students interested in STEM fields. One such area within STEM is the agriculture sciences. The need for qualified agriculturists grows, as the world demands more food, technology, and conservation of precious resources. In order to increase the number of qualified AG-STEM graduates, recruitment must begin at the secondary level. Thus, it is important to understand what factors encourage enrollment in agriculture education courses at the high school level. This will allow agriculture programs to discover ways to maintain interest in agriculture so that students may pursue a STEM degree in college.

Several observations were made from this study that may help agriculture educators continue to recruit students for their programs. It was observed that the most influential factors that influenced students to enroll in agriculture education were Outside Influences and FFA and SAE Influences. Both first and fourth-year students enrolled in
their current agriculture class because it seemed fun, interesting, and more hands-on than its non-agriculture counterpart. Students also preferred agriculture teachers instead of non-agriculture teachers. Interest in FFA activities was also a factor in first and fourth-year students. These findings are congruent with Sutphin and Newsom-Stewart (1995) and Wakefield (2003).

It was also observed that fourth-year students felt stronger about why they enrolled in agriculture education courses compared to first-year students in all cases except one. This suggests that preference for agriculture classes grow over time if the student remains in the program. To increase retention among younger students, fourth-year students could voice their opinions on agriculture education and express how it has benefited them throughout their high school career. Observations indicate the greatest influence on the students’ participation in agriculture education were peers followed by parents and agriculture teachers. This finding is similar to Ullrich and Strapper (1999) and Luft and Giese (1991) in their studies to investigate factors that limit or enhance enrollment in agriculture education.

Between both groups, students reported a lack of counselor support. These results are congruent with Dyer and Breja (2003). It is advised that counselors are informed of the factors that influence students to enroll in agriculture education as well as the benefits the program has to offer. Counselors should also be informed about the role they play in influencing student decision making as they consider to enroll in agriculture education classes. Agriculture teachers should work closely with counselors to understand the program as a whole and the opportunities it gives to students.
The results from this study give agriculture programs ideas for recruitment as well as what topics should be emphasized. A wide variety of recruitment strategies, both in person, in print, and through video should be incorporated at the 8th and 11th grade levels. To increase and maintain student enrollment in agriculture education courses at the secondary level, agriculture programs should use the results from this study, along with effective recruitment strategies to inspire and motivate students to enroll in agriculture education courses.

Recommendations

Recommendations for further research include further questionnaire or focus group interviews to gain more insight and clarity about the reasons students chose to enroll in agriculture class. This, along with short answer or free response items on the questionnaire inquiring about who encouraged them to enroll and why they chose to sign up for the class would be beneficial. The study should also be extended to more high schools across the state and nation, especially in different living areas (e.g., urban, cities), and populations (e.g., ethnic minorities, gender). Further investigation should seek students who were once enrolled in agriculture, but did not continue taking agriculture classes to understand what factors caused them to leave the agriculture program. Further, a longitudinal cohort study that follows students throughout their four years of high school would investigate what factors predicted drop-out. This could perhaps provide suggestions on how to target students at greater risk of dropping out of the program and address the likelihood of drop-out by encouraging them to get involved in agriculture and FFA activities they find most interesting. Using a similar instrument, this study could be
expanded to assess a variety of students, schools, and agriculture programs across the country.
REFERENCES
REFERENCES


APPENDIX A
Pilot study Instrument 1: First Year Non-elective Agriculture Student Survey

Directions: Rate your level of influence for enrolling in your current agriculture class by circling the appropriate number

<table>
<thead>
<tr>
<th>Outside Influences</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral/No opinion</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
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<tbody>
<tr>
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<tr>
<td>I enrolled in <em>this</em> agriculture class because it seemed more hands-on than regular science courses</td>
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<tr>
<th>I enrolled in this agriculture class because it seemed more academically challenging than non-agriculture science classes</th>
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**FFA and SAE Influences**

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<th>I enrolled in this agriculture class because I want to show an animal at the fair through FFA</th>
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<tr>
<th>I enrolled in this agriculture class because I am interested in participating in FFA activities</th>
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<table>
<thead>
<tr>
<th>I enrolled in this agriculture class because I am interested in Supervised Agriculture Experience Projects (SAEs)</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
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</table>

**Demographics**

**Gender**

- A. Male
- B. Female

**Age**

- A. 14
- B. 15
- C. 16
- D. 17
- E. 18

**Do you have a production agriculture background? (Do you live on a farm or are one or both of your parents farmers or ranchers?)**

- A. Yes
- B. No

**Where do you live?**

- A. Rural Area
- B. Suburban Area
- C. Urban Area

**Year in Agriculture Education?**

- A. 1
- B. 2
- C. 3
- D. 4
What agriculture classes are you currently enrolled in? (Choose all that apply)

Agriculture Economics/Government (LRHS)
Agriculture Biology (LRHS)
Agriculture Chemistry (LRHS)
Agriculture Anatomy and Physiology (LRHS)
Introduction to Floral Design (LRHS)
Advanced Floral Design (LRHS)
Agriculture Leadership (LRHS)
Agriculture Mechanics I (LRHS)
Agriculture Power Mechanics (LRHS)
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ROP Welding (LRHS)
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Agriculture Small Gas Engines (GHS)
Advanced Agriculture Mechanics (GHS)
Leadership In Agriculture (GHS)
Introduction to Floral Design (GHS)
Advanced Floral Design (GHS)
APPENDIX B
Pilot Study Instrument 2: Fourth-year Agriculture Student Survey

Directions: Rate your level of influence for enrolling in your current agriculture class by circling the appropriate number

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<tr>
<th></th>
<th>Strongly Disagree</th>
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<td><strong>Outside Influences</strong></td>
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I enrolled in this agriculture class because it seemed easier than its non-agriculture counterpart

1 2 3 4 5

I enrolled in this agriculture class because it seemed more academically challenging than its non-agriculture counterpart

1 2 3 4 5

I enrolled in this agriculture class to learn a specific skill or trade (e.g., welding, engine repair, floriculture, etc.)

1 2 3 4 5

**FFA and SAE Influences**

I enrolled in this agriculture class because I want to show an animal at the fair through FFA

1 2 3 4 5

I enrolled in this agriculture class because I am interested in participating in FFA activities

1 2 3 4 5

I enrolled in this agriculture class because I am interested in Supervised Agriculture Experience Projects (SAEs)

1 2 3 4 5

**Demographics**

Gender

A. Male
B. Female

Do you have a production agriculture background? (Do you live on a farm or are one or both of your parents farmers or ranchers?)

A. Yes
B. No

Age

A. 14
B. 15
C. 16
D. 17
E. 18

Where do you live?

A. Rural Area
B. Suburban Area
C. Urban Area

Year in Agriculture Education?

A. 1
B. 2
C. 3
D. 4
What agriculture classes are you currently enrolled in? (Choose all that apply)

Agriculture Economics/Government (LRHS)
Agriculture Biology (LRHS)
Agriculture Chemistry (LRHS)
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Introduction to Floral Design (GHS)
Advanced Floral Design (GHS)
Instrument Used with Full Sample

Directions: Rate your level of influence for enrolling in your current agriculture class by circling the appropriate number

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I enrolled in this agriculture class because it seemed easier than its non-agriculture counterpart (For example you chose Agriculture Biology instead of Biology)

1 2 3 4 5

I enrolled in this agriculture class because it seemed more academically challenging than its non-agriculture counterpart (For example you chose Agriculture Biology instead of Biology)

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I enrolled in this agriculture class to learn a specific skill or trade (e.g., welding, engine repair, floriculture, etc.)

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**FFA and SAE Influences**

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**Demographics**

Gender

A. Male
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Age

A. 14
B. 15
C. 16
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E. 18

Year in Agriculture Education?

A. 1
B. 2
C. 3
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Do you have a production agriculture background? (Do you live on a farm or are one or both of your parents farmers or ranchers?)

A. Yes
B. No

Where do you live?

A. Rural Area
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What agriculture classes are you currently enrolled in? (Choose all that apply)

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Directions for Administering the Survey

Thank you for allowing me to use your class time to have your students complete the survey! The survey should take under ten minutes for each student to complete. The results from this survey will greatly help us understand the factors in which students enroll and stay enrolled in agriculture classes in the Galt Joint Union High School District. Please follow the directions below so the data collection is consistent and accurate.

Procedure

1. There are two surveys (they contain identical questions, but are labeled differently for the two groups of participants). One is for first-year non-elective agriculture students ONLY (agriculture sciences and agriculture economics/government). The second survey is for fourth-year agriculture students, those seniors who have completed four years of agriculture instruction. If a student has transferred during their high school career, but was enrolled in an agriculture class at their previous school, they may complete the survey. Please make sure each student only takes the survey once.

2. The links for each survey are below. You may go about administering the survey in whatever way is convenient for you. I posted it onto my school webpage (see below) and directed students to the website. You may also write the links on the whiteboard or already have the survey pulled up on laptops around the room. What worked for my classes was to have several laptop stations around the room and students took the survey when a station was open (this works well if you have students doing a class project or activity that day).

3. Please read these directions to your students so as to administer the survey consistently in all classes

   You are about the take a survey that will ask you questions about why you enrolled in this agriculture class. You will rate each question on a scale of one to five. 1-You strongly disagree with the statement, 2-you disagree with the statement, 3-you are neutral/have no opinion about the statement, 4-you agree with the statement, and 5-you strongly agree with the statement. Keep in mind that if your answer “Strongly Disagree” that means that the opposite is true for the statement. For example, question one states “My parents encouraged me to enroll in this agriculture class”. If you respond “strongly agree” that means you parents really wanted you to, or directly told you to enroll in this class. “Neutral/No Opinion” means that they did not have an opinion on the matter or did not mention they wanted/not wanted you to take this class and “Strongly Disagree” means they did not want you to take this class at all. Please read each questions carefully. What questions are there?

The website where I posted my surveys (you may use this as a homepage)
http://liberty.ghsd.k12.ca.us/?PageName=TeacherPage&Page=2&StaffID=221936&iSection=Teachers&CorrespondingID=221936

First-Year Non-Elective Agriculture Student Survey
https://www.surveymonkey.com/s/firstyearnon-elective

Fourth-Year Agriculture Students Survey
https://www.surveymonkey.com/s/fourthyear