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Graduates' perspectives regarding the impact of the integration of experiential learning in academic programs

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**Graduates' perspectives regarding the impact of the integration
of experiential learning in academic programs**

by

Bridget Anastasia Driscoll

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE

Major: Agricultural Education

Program of Study Committee:
Michael S. Retallick, Major Professor
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Ames, Iowa

2011

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ABSTRACT

Experiential learning, the process of making meaning from direct experience (Itin, 1999), has been recognized for its educational value in higher education (Smith, 2005). It is often called “learning by doing” because students are involved in a range of skills and activities that require active observation and reflection. Experiential learning can involve laboratory work, field trips, problem-solving, and an assortment of other highly engaging activities included in academic coursework (Roberts, 2006).

Science With Practice (SWP) and Agriculture students Providing integrated solutions for Agronomy and farm business management Questions (AgPAQ) are two examples of experiential-based courses at Iowa State University. SWP is an academic and work experience for undergraduate students who work closely with faculty and staff members on specific projects and/or work assignments. The students set goals at the beginning of the experience; journal and reflect throughout the semester; and, at the end of the experience, (a) submit a final portfolio and final reflection of the experience, and (b) make a professional poster presentation. AgPAQ, previously known as Agron 356/Engl 309, is an upper division learning community where students concurrently enroll in a cluster of four courses (i.e., agronomic, agribusiness, and communication courses). Small teams of students work with real clients and precision agriculture tools to address the client’s needs by preparing a complete crop and soil management plan.

The purpose of this descriptive census survey was to explore the impact of graduates’ participation in one of three of the Iowa State University’s College of Agriculture and Life Sciences integrated, experiential learning programs. A descriptive follow-up survey was conducted on: AgPAQ, Agron 356/Engl 309, and Science With Practice. The objectives to

this study were to: (a) determine the impact the program had on career/graduate school; (b) investigate the level of skill improvement attributed to the program; (c) determine the influence the program had on career development and decidedness; and (d) investigate the extent to which the program enhances career/graduate school preparation.

The accessible population consisted of 123 graduates. Findings were based on data obtained through a web-based survey from 54 (43.90%) respondents. Non-response error was addressed comparing early and late responders. Since no statistically significant differences were found, the findings may be generalizable across the population.

The results of this study, coupled with the literature of higher education, student learning, and experiential learning, indicated that the respondents believe that their experience had a positive impact on the development of their skills and abilities. The results showed a positive influence on their career/graduate school aspirations. The results also indicated that the programs were able to positively enhance career/graduate school preparation by helping the participants transition from undergraduate student to employee/graduate student.

Ultimately, colleges and universities can benefit from the findings of this study because of the demonstrated impact that experiential learning programs have on their participants. The findings of this study revealed that the respondents preferred real-world, hands-on experiences. Thus, agricultural educators, colleges, and universities should consider implementing well-planned experiential learning programs, based on the literature and best practices, into their educational programs and curriculum.

CHAPTER I. INTRODUCTION

Since the advent of the American higher education system in colonial America, education has continued to evolve. In the early days of higher education, course content and delivery were very teacher-centered. By the early twentieth century, scholars and researchers began to discuss the role that personal experience played in learning. The area of study that developed was called experiential learning. At roughly the same time, other researchers and scholars began to study the impact that learning styles and student-centered engagement had on student learning. Iowa State University is one example of an institution of higher education that has grasped these ideas of experiential learning and student-centered learning. Two examples of programs within the College of Agriculture and Life Sciences at Iowa State University that reflect the principles of experiential and student-centered learning are Agriculture students Providing integrated solutions for Agronomy and farm business management Questions (AgPAQ) and Science With Practice.

This chapter introduces in greater detail the evolution of higher education, student learning, and experiential learning. The need for and importance of the study is established. The problem statement is presented. The purpose and objectives are outlined, and the definitions of relevant terms are offered.

Higher Education

Higher education has not always been as structured as it is today. “At the beginning, higher education in America would be governed less by accident than by certain purpose, less by impulse than by design” (Rudolph, 1990, p. 3). The American higher education system began with Harvard, which was established in 1636 in Cambridge, MA (Harvard

University, 2011). At the beginning of higher education, institutions like Harvard were focused mainly on liberal arts education.

There were aspects of life that people longed for in a certain order: shelter, a house of worship, the framework of government, and the advancement of learning (Rudolph, 1990). Higher education was once primarily for the elite, enlightened people who intended to obtain a well-rounded education in liberal studies. There were some middle and lower-class families who were able to send their sons to colleges, but the overwhelming majority of their sons stayed home and farmed (Rudolph, 1990).

Throughout the early years of American higher education, many institutions, people, and events were instrumental in molding today's American educational system. One of the institutions that helped to modify the attitude of American people toward going to further their education at college was the land-grant college. The land-grant college was created out of the Morrill Federal Grant Act of 1862 (Rudolph, 1990). The Act, passed by Congress, had a tremendous impact on the higher education system in the United States. It began to open doors of opportunities for many average American citizens, especially farmers, to participate in a larger variety of education (Christy & Williamson, 1992), including the practical arts.

The Morrill Federal Grant Act of 1862 provided a great prospect for many common Americans, but the act did not divide funds among racial lines. This led to the development of the Morrill Act of 1890, which established colleges of agriculture, mechanical arts, and home economics for people of color (Christy & Williamson, 1992). This second Morrill Act "provided regular annual appropriations for land-grant colleges, the act stipulated that no appropriations would go to states that denied admission to the colleges on the basis of race unless they also set up separate but equal facilities" (Rudolph, 1990, p.254). The Morrill

Acts opened doors for higher education to be able to serve the ordinary person interested in the mechanical and agricultural arts through land-grant colleges (Barrick, 1989).

Evolution of Higher Education

The Morrill Acts have made a difference in higher education, and their purposes are still highly regarded and strong in education today. Now, in American higher education, almost all institutions have goals for their racial and ethnic diversity:

It is widely recognized that meaningful association with Americans of varying backgrounds and cultural histories, as well as contact with international students, adds to the breadth of baccalaureate experience and may serve long-range social goals of diversity and racial accommodation. (Boyer, 1998, pp. 2–3)

These aspirations have become part of the institution's mission and vision.

Mission and vision statements in higher education have been, for numerous years, the way that institutions established and articulated their goals for education. "When a campus is on the verge of committing resources to a new venture, the mission statement can serve as a beacon to help focus on a common goal" (Shapiro & Levine, 1999, p. 46). A mission statement is the vision of what an institution "professes to achieve within its unique environment and with the particular resources it has available have important implications for education programs and for the intended outcomes that faculty develop" (Huba & Freed, 2000, p. 100). Generally, mission statements include areas of citizenship, leadership, internationalization, and diversity, and link them to academic disciplines (Shapiro & Levine, 1999). Each college and university has its own set of goals and mission as to what it wants to provide for its students.

Iowa State University's mission is to, "create, share, and apply knowledge to make Iowa and the world a better place" (Iowa State University, 2009, p. 3). The university has ways to pursue its mission. The means by which Iowa State University pursues its mission include to:

- Create knowledge through world-class scholarship in teaching, research, and creative endeavors.
- Share knowledge through outstanding undergraduate, graduate, professional, and outreach programs.
- Apply knowledge to improve the quality of life for current and future generations.

In carrying out its mission, Iowa State will increase and support diversity in the university community. "Diversity enlivens the exchange of ideas, broadens scholarship, and prepares students for lifelong, productive participation in society" (Iowa State University, 2009, p. 3).

Within the university, every college has its own mission statement and vision as to what the students who enroll in the college will achieve upon completion of their degrees.

The mission of Iowa State University's College of Agriculture and Life Sciences is to:

- Discover and share science-based knowledge for the development of socially beneficial, economically successful and environmentally sound systems for food and other renewable resources.
- Engage communities for enhancing the quality of life, and
- Prepare students to become future leaders in agriculture and society (Iowa State University College of Agriculture and Life Sciences, 2011, para. 1).

The vision statement of Iowa State University's College of Agriculture and Life Sciences states, "The College of Agriculture and Life Sciences will enrich the lives of people in Iowa, the nation and the world through excellence in education, scholarship, service and

leadership in food, agricultural, environmental and social sciences" (Iowa State University College of Agriculture and Life Sciences, 2011, para. 2).

Within each college at a university, each department has its own mission statement and vision. One example of a departmental mission and vision statement is that of Iowa State University's College of Agriculture and Life Sciences Agronomy Department. The department's mission statement says:

The mission of the Iowa State University Agronomy Department is to provide continued excellence in agronomic teaching, research, and outreach. The department achieves this by serving Iowa, the nation, and the world in ways that:

- expand knowledge in crop, soil, and atmospheric sciences.
- identify, develop, and deliver appropriate information and technologies for agronomic practice.
- prepare students for successful careers and continued education in agronomic and related sciences.
- improve crop production and soil management practices, while enhancing environmental quality and sustainability, through interdisciplinary cooperation.
- anticipate and respond to societal needs relative to food and fiber production.
- promote, through education, harmony among the diverse clientele served by agronomy (Iowa State University Agronomy Department, 2011, para. 3).

Iowa State University's Agronomy Department's vision is, "to be the world leader in enhancing productive and sustainable agriculture through the consistent pursuit of excellent basic and applied research, teaching, and outreach activities" (Iowa State University Agronomy Department, 2011, para. 4).

Another example of departmental mission and vision statements is Iowa State University's College of Agriculture and Life Sciences Agricultural Education and Studies Department. The Agricultural Education and Studies Department's mission statement says: "The Department of Agricultural Education & Studies' mission is to provide opportunities to learn, discover and apply the knowledge and skills associated with educational processes in agriculture and the life sciences" (Iowa State University Agricultural Education & Studies

Department, 2011, para. 2). The vision is as follows: “The Department of Agricultural Education and Studies will be a premier leader in the teaching and learning processes of program development, delivery and evaluation systems in agriculture and the life sciences” (Iowa State University Agricultural Education & Studies Department, 2011, para. 4).

Student Learning

One of the focuses of the institutions’ mission statements is student learning. Institutional leaders realize there are many factors that affect student learning. One factor that is said to influence student educational performance is learning styles (Torres & Cano, 1994). Learning styles help students, the learners, to determine how to process and sort information obtained (Cano, Carton, & Raven, 1992). There are many different types of learning styles and ways that students grasp the information that is provided to them. A few of these learning styles are: teacher-centered learning, student-centered learning, service-learning, cooperative-learning, inquiry-based learning, and problem-based learning. Though these are different types of learning, they all fall loosely into the category of experiential learning.

Until somewhat recently, the instructional approach to student learning was focused on teacher-centered strategies (Spring, 2005). The teacher-centered paradigm is when knowledge or information is transmitted from teacher to student, and the students passively receive the information presented (Huba & Freed, 2000). In the teacher-centered model, the teacher's role is to be the primary information giver and the primary evaluator; teaching and assessing are separate entities (Huba & Freed, 2000). The emphasis is on the student getting the right answers through scored tests, and only the students are viewed as the learners (Huba & Freed, 2000).

A transformation to student-centered learning from the entrenched teacher-centered method is needed in order to increase student learning (Huba & Freed, 2000). In the learner-centered paradigm, “Students construct knowledge through gathering and synthesizing information and integrating it with the general skill of inquiry, communication, critical thinking, problem solving, and so on” (Huba & Freed, 2000, p. 5). With this approach, the teacher and the student learn together, evaluate the learning together, and the emphasis is on generating better questions while learning from errors rather than getting the correct answer (Huba & Freed, 2000). An example of student-centered learning that is known throughout many colleges and is expressed highly in education is experiential learning, which is a major focus of this study.

Experiential Learning

Experiential learning is broadly defined as, “the process by which a learner creates meaning from direct experience” (Bohn & Schmidt, 2008, p. 5). When experiential learning is implemented in a classroom setting, students participate in real life activities, reflecting on those activities, and incorporating their new understanding of that activity into their lives (Bohn & Schmidt, 2008).

The idea of experiential education is certainly not new in the field of education (Wulff-Risner & Stewart, 1997). The theory of experiential learning goes back to the work of some very prominent twentieth century scholars (Kolb & Kolb, 2005), a time when agricultural education in the United States was organized in both non-formal and formal settings (Knobloch, 2003). Some of the scholars who helped to model the theory of experiential learning included John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, Carl Rogers, and many others (Kolb & Kolb, 2005).

Experiential Learning in Agriculture

The experiential learning focus of secondary agricultural education can be viewed a multitude of ways. Some skills and abilities cannot be taught by books or by reviewing the works of others. A range of skills and abilities require active observations; many educators like to call this “learning by doing.” Experiential learning can be shown through such activities as laboratory work, field trips, and problem solving.

The experiential learning focus is utilized not only by secondary agricultural education programs, but university departments make the most of experiential learning in their particular curricula (Roberts, 2006). Experiential learning has long been valued in the field of agricultural education and has been recognized as an integral part of the educational process (Cheek, Arrington, Carter, & Randell, 1993).

Experiential Learning in the College of Agriculture and Life Sciences

The College of Agriculture and Life Sciences at Iowa State University strives to follow its mission and vision statement with every student that enrolls in the college. One way that Iowa State University's College of Agriculture and Life Sciences has found to complete its mission is to utilize experiential learning to develop programs that have students focus on real-world skills needed for their futures.

One example of Iowa State University's College of Agriculture and Life Sciences' experiential learning programs is Iowa State University's Agronomy Department's AgPAQ and Agron 356/Engl 309 programs. Agron 356/Engl 309 was the original start of Iowa State University's Agronomy Department's course cluster learning environments. Agron 356/Engl 309 soon turned into the program currently known as AgPAQ, which stands for Agriculture

students Providing integrated solutions for Agronomy and farm business management Questions.

AgPAQ was a learning community for upper-class agriculture students at Iowa State University where students enroll in a “cluster” of courses concurrently. Each learning community team works with real clients and precision agriculture tools to address the client’s needs by preparing a complete crop and soil management plan. Some areas the management plan addresses include concerns relevant to soil loss and residue management, planting dates and rates, profits and costs, and benefits and recommendations for customers. One main goal of AgPAQ is to produce a student learning experience that replicates the realities of the workplace. AgPAQ and Agron 356/Engl 309 easily fit into the Agronomy Department’s goals and objectives.

Another example of Iowa State University's College of Agriculture and Life Sciences' experiential learning programs is Iowa State University's College of Agriculture and Life Science’s Science With Practice program for undergraduate students, which is administered by the Agricultural Education & Studies Department.

SWP students work closely with faculty and staff members on specific projects and/or work assignments. Students partaking in the program earn two credits for fulfilling all the course requirements throughout the semester. The students also earn money for working on their project with their faculty member. At the end of the semester, the students participate in a professional poster presentation to showcase their work. SWP falls into the mission and vision of the Agricultural Education & Studies Department as well as the College of Agriculture and Life Sciences.

The impact that Agron 356/Engl 309, AgPAQ, and SWP have had on graduates who participated in the programs has never been analyzed. It is assumed that the experiential learning portion of these programs has benefited the students in their future careers and endeavors. In order for the College of Agriculture and Life Sciences to continue promoting its experiential learning programs, it is important to determine the impact these programs have made on its graduates.

Need for the Study

Though the AgPAQ and SWP programs are very different, they share commonalities with their focus on experiential learning. This study will help to define those common experiential learning practices and help determine the impacts made on graduates of these programs. The study will also help to determine what specific areas impact graduates' careers/educational advancements and what areas can be improved upon.

To improve the quality of the experiential learning programs at Iowa State University, it is necessary to determine the impact these programs have had on their participants. These programs are important to Iowa State University and the College of Agriculture and Life Sciences because of the funding that is provided for these programs. The costs of these programs would be very high if it was not for external funding. In order to keep these generous contributions coming, it is important to evaluate these programs and determine the extent to which they have a positive influence on the participating students. This study will also benefit other colleges that have similar experiential learning programs, as they can utilize the best practices of the programs which have the greatest impact on their graduates' success. This study will help to determine the impact of a student's participation in AgPAQ, Agron 356/Engl 309, and SWP from the perspective of the alumni of the programs.

Importance of the Study

The importance of this study is that it measures the impact of these programs on students' futures and careers. The study provides the opportunity to identify the areas in which the programs excel and also areas in which the programs could use some improvement. The information gained from this study will benefit not only the College of Agriculture and Life Sciences programs but also experiential and problem-based learning programs in other colleges. The information obtained on the impacts of specific parts of the programs can help other colleges emphasize those aspects in their own programs.

The study will help improve these programs at Iowa State University. Additionally, the study will show the impact of experiential learning and how it can prepare students for their futures. Further studies may show how different impacts of the programs can be made related to program development and career interest.

Problem Statement

Although there has been movement in higher education toward student-centered learning and education has begun to focus on student outcomes, little research has been done to study the impact that experiential-learning based programs have had on those who participated in them.

Purpose and Objectives

The purpose of this descriptive census survey was to explore the impact of graduates' participation in one of three of the Iowa State University's College of Agriculture and Life Sciences integrated, experiential learning programs. A descriptive follow-up survey was conducted with former participants in AgPAQ, Agron 356/Engl 309, and Science With Practice. The objectives of this study were to:

1. Determine the impact the program had on career/graduate school;
2. Investigate the level of skill improvement attributed to the program;
3. Determine the influence the program had on career development and decidedness; and
4. Investigate the extent to which the program enhances career/graduate school preparation.

Definition of Terms

The following terms were defined for use in this study:

AgPAQ – AgPAQ stands for Agriculture students Providing integrated solutions for Agronomy and farm business management Questions. It is a unique learning community for agriculture science students at Iowa State University in which students enroll in a “cluster” of four courses simultaneously.

College of Agriculture and Life Sciences – A division of an established university, devoted to teaching research and extension of agricultural, food, and natural resource issues as well as focusing on undergraduate and graduate education, scholarship, service, and leadership in food, agricultural, environmental, and social sciences (Iowa State University Agricultural Education and Studies Department. (2010).

Experiential Learning – Knowledge, skillfulness, and/or abilities reached through simulation, examination, and/or participation that offer intensity and significance to learning by engaging the mind and/or body through reflection, activity, and application (Roberts, 2006).

Impact – Having a direct effect on a person, place, or thing (Merriam-Webster Online Dictionary, 2011).

Land-Grant College – An institution that has been selected by its state legislature or Congress to receive the benefits of the Morrill Acts of 1862 and 1890. These institutions teach agriculture, military tactics, and the mechanical arts as well as traditional studies, so that members of the working classes could achieve a liberal, sensible education (Cornell University, 2010).

Learning – Knowledge or skill acquired by instruction or study which can be done in numerous ways (Merriam-Webster Online Dictionary, 2011).

Morrill Acts of 1862 and 1890 – Established colleges of agriculture, mechanical arts, and home economics for people of color, and provided regular annual appropriations for land-grant colleges (Rudolph, 1990).

Science With Practice - A College of Agriculture and Life Sciences experiential learning and work program for undergraduate students in agriculture. Students work closely with faculty and staff on specific projects and/or work assignments in university research labs, farms, greenhouses, and other units, earn money, and earn academic credit while fulfilling work responsibilities.

CHAPTER II. LITERATURE REVIEW

This chapter addresses the literature related to the impact that the integration of experiential learning has on graduates. This chapter is divided into four sections: conceptual framework of the study, higher education, student-centered learning, and the impact of student-centered learning. The first section describes the conceptual framework used to mold this study. The second section discusses the role of higher education, agriculture in higher education, and the goals and objectives of undergraduate programs. The third section focuses on student learning and experiential learning in education. The fourth section discusses participation in experiential learning programs and examples of student-centered learning such as SWP and AgPAQ.

Conceptual Framework

The conceptual framework for this research was based on the work of Dr. Patrick D. Terenzini and Dr. Robert D. Reason, both from Pennsylvania State University. Terenzini and Reason (2005) developed a model explaining how the college experience influences student learning and persistence (Figure 1). The model connects the student precollege characteristics and experience, the college experience including organizational context and peer environment, and the outcomes of all of these (Terenzini & Reason, 2005). The model illustrates the influence that (a) precollege characteristics and experiences and (b) college experiences including organizational context and peer environment have on student outcomes such as learning, personal development, social change, and persistence.

The first set of items related to the college experience in Terenzini and Reason's (2005) model are the student precollege characteristics and experiences. This construct included sociodemographic traits, academic preparation and performance, and personal and

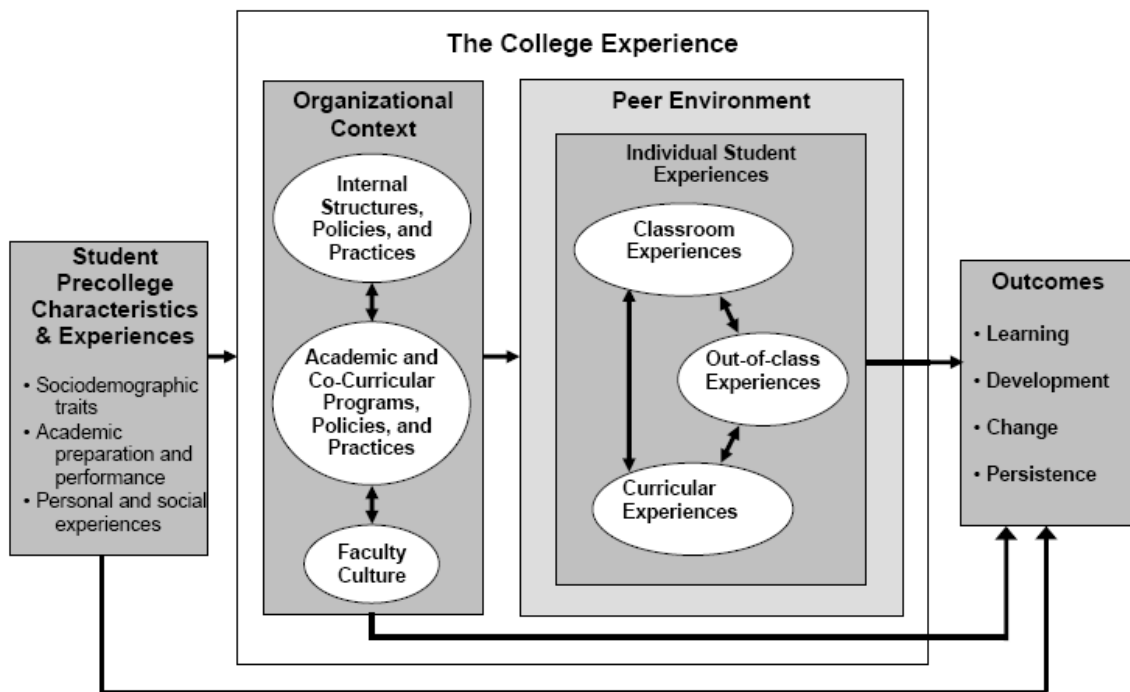


Figure 1. A comprehensive model of influences on student learning and persistence (Terenzini & Reason, 2005)

social experiences (Terenzini & Reason, 2005). These also include academic preparation, social experiences, background, and disposition. Some of the demographic characteristics include ethnicity, race, gender, and age (Anderson, 2007).

The next portion of the model included the organizational context of the institution. The authors mention that three aspects of organizational context have the most influence on students. This construct includes internal structures, policies and practices; academic and co-curricular programs, policies and practices; and faculty culture (Terenzini & Reason, 2005). The first aspect (internal structures, policies and practices of an institution) includes staff support, budgets, working characteristics, etc. (Anderson, 2007). The second aspect (academic and co-curricular programs, policies, and practices' affects on students) includes the anticipated, performed, and established practices of the university (Anderson, 2007).

“Programmatic policies and practices related to students affect student experience as well, for example, learning communities, mentoring programs, and orientation” (Anderson, 2007, p. 30). The third aspect (the faculty culture of an institution) is a great element of the organizational framework of an institution (Terenzini & Reason, 2005). “Faculty culture reflects the philosophy of education of an institution and also the formal and informal availability of faculty to students” (Anderson, 2007, p. 30).

The third portion of Terenzini & Reason's (2005) College Experience model is the peer environment. As Astin (1993) stated, an undergraduate student's peer group is one of the single most commanding sources of influence on personal and academic growth and development. “The peer environment embodies the system of dominant and normative values, beliefs, attitudes, and expectations that characterize a campus’ student body” (Terenzini & Reason, 2005, p. 11). Thus, a student's peer environment is much more than the student’s group of friends. Within this portion of the model, the peer environment includes individual student experiences.

Individual student experiences include curricular experiences, classroom experiences, and out-of-class experiences (Terenzini & Reason, 2005). Curricular experiences are the student’s general education coursework, his/her decision of academic major or field of study, and other academic experiences including, but are not limited to, internships, study abroad, and cooperative education (Terenzini & Reason, 2005). These may also include the amount of writing a student does, the feedback from faculty members, and the instructor’s pedagogical skills (Terenzini & Reason, 2005). Out-of-class experiences refer to what shapes a student's psychosocial, cognitive, attitudinal, and occupational learning outcomes in slight and intricate ways. These may include, but are not limited to, where a student lives

while going to school, hours working on and/or off campus, family support, hours spent studying, and involvement in co-curricular activities (Terenzini & Reason, 2005). The framework suggests that all of these areas are “important to a full understanding of how students change and grow” (Terenzini & Reason, 2005, p. 12).

The fourth and final portion of the college experience framework communicates the individual student outcomes. These outcomes include learning, development, change, and persistence of a student’s education. Researchers of this study utilized Terenzini & Reason’s (2005) college experience model to help mold the objectives of this study. The main aspect of this model that the researchers used was the final pillar of the model, student outcomes. The objectives of this study were to determine the impact of the experiential learning programs. By using this model, researchers were able to develop an instrument that questioned respondents about their individual student experiences in the experiential learning program and the impact that was made on specific aspects of the respondents’ lives because of the program. This study sought to describe the impact that two experiential learning-based academic experiences have on personal skill development and career development outcomes as conceptualized by Terenzini and Reason (2005).

Role of Higher Education

At its beginning, higher education was governed more by a certain purpose than by accident (Rudolph, 1990). Institutions like Harvard, where the higher education system ultimately began, were focused mainly on liberal arts, rather than the mechanical and technical arts. Higher education in America was once for the elite, enlightened people who only wanted to focus on liberal studies. Few middle and lower-class families sent their sons off to college as most of them needed to stay home and farm (Rudolph, 1990).

Congress initiated a new period in the history of higher education with the passage of the Morrill Federal Grant Act of 1862. This legislation began to open up doors of opportunities for average American citizens by allowing them to participate in a larger variety of education (Christy & Williamson, 1992). The purpose of the Morrill Federal Grant Act of 1862 was to equalize higher education by establishing institutions which had an ultimate objective of teaching sections of learning that were related to mechanical and agricultural arts, without taking out the scientific and classical studies and including military tactics. This allowed legislatures of different states to promote liberal and practical education to the industrial classes (Christy & Williamson, 1992).

The Morrill Federal Grant Act of 1862 provided a great prospect for many average Americans, but the act did not divide funds along racial lines. This led to the development of the Second Morrill Act of 1890, which established colleges of agriculture, mechanical arts, and home economics for people of color (Christy & Williamson, 1992). The Morrill Acts opened doors for higher education to serve the common person interested in the mechanical and agricultural arts through land-grant colleges (Barrick, 1989).

The Morrill Acts of 1862 and 1890 were instrumental to the development of agriculture in higher education (Barrick, 1989). According to Barrick (1989), agricultural education, which has been used synonymously with vocational agriculture, is: "the scientific study of the principles and methods of teaching and learning as they pertain to agriculture" (p. 26).

Agricultural education involves the linkage of the application of real world activities to the classroom (Barrick, 1989), but it is much more than the skill training it is perceived to be. In the agricultural education system there are many different approaches to student

learning. Agricultural education professionals have utilized both minds-on and hands-on approaches for lesson design, intent, and delivery (Parr & Edwards, 2004).

Agriculture in higher education is a highly sought out option in land-grant institutions around the country. All institutions have goals and objectives for their undergraduate programs which are shared with the public through the institutions' mission statements. Mission statements reflect institutions' educational values and their intended learning outcomes (Huba & Freed, 2000). Many of these mission statements include general education outcomes focused on aspects of personal development related to responsibility and decision making (Huba & Freed, 2000). "The intended learning outcomes of a program or course should be compatible with the institution's intended outcomes" (Huba & Freed, 2000, p. 107). Thus, each college within an institution and each department within a college must be compatible with the overall institution's learning outcomes. To achieve all of the different learning outcomes of the colleges and departments within an institution, educators must be able to recognize the students' unique learning styles.

Student Learning

Students learn in a variety of ways, each with his/her own unique learning style which helps him/her learn and remember information (Dunn & Dunn, 1978). These learning styles are what is best for each individual student. Many different approaches to teaching and learning are available, and this section focuses on the different learning styles in education and how they are approached.

Learning Styles

A factor that influences a student's educational performance is his/her learning style (Torres & Cano, 1994). "The term *learning styles* refers to individuals' characteristics and

preferred ways of gathering, interpreting, organizing, and thinking about information” (Davis, 1993, p.185). Students prefer to work in various styles such as working independently or in groups, and obtaining information by reading or by active application (Davis, 1993). Different types of learning styles help the learners establish how to process and arrange information gained (Cano et al, 1992). “David Kolb measured differences in learning styles along two basic dimensions—abstract-concrete and active-reflective—and empirically identified four common learning styles: the converger, the diverger, the assimilator, and the accommodator” (Stark & Lattuca, 1997, p.191).

Kolb theorized that individuals with converger learning styles do their best in learning situations where there is only one right answer for a problem (Stark & Lattuca, 1997). On the other hand, divergers can view tangible conditions from numerous viewpoints and organize multiple relationships into a logical and significant whole (Stark & Lattuca, 1997). Divergent learners do best when they are able to generate ideas, work with people, and use their emotions (Stark & Lattuca, 1997). Assimilators excel in inductive analysis and are fascinated with abstract ideas rather than people (Stark & Lattuca, 1997). Assimilator learners are not concerned with the convenient use of theories; they are more interested in strict sciences or mathematics (Stark & Lattuca, 1997). Lastly, the accommodator learners are excellent at carrying out experiments and plans (Stark & Lattuca, 1997). The accommodators are the risk-takers of the learners, and they thrive in situations that call for adaptation to precise, urgent circumstances (Stark & Lattuca, 1997).

Students who take the initiative to self-regulate their learning are the most effective learners (Butler & Winne, 1995). Butler and Winne (1995) define self regulation as a:

style of engaging with tasks in which students exercise a suite of powerful skills: setting goals for upgrading knowledge; deliberating about strategies to select those that balance progress toward goals against unwanted costs; and, as steps are taken and the task evolves, monitoring the accumulating effects of their [the students] engagement. (p. 245)

Students with specific learning styles may be more comfortable academically when studying in areas closely related with their style (Stark & Lattuca, 1997). Conversely, students may achieve from a challenge of working in an area where the learning style varies from their first choice (Stark & Lattuca, 1997). It is important for educators to match their teaching method to a student's learning style in order to increase the student's capacity to take hold of the information and remember the material (McKeachie & Svinicki, 2006).

Learner-centered approach. The student-centered learning, also known as learner-centered, approach tends to engage learning in interactive and socially intriguing inquiries that facilitate lifelong learning (Parr & Edwards, 2004). "We use the term 'learner centered' to refer to environments that pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring to the educational setting" (National Research Council, 2000, p. 133). Student-centered learning atmospheres are intended to offer students opportunities to take a more active role in their learning. This approach has the students taking the responsibilities of analyzing, organizing, and synthesizing information into their own hands (Brush & Saye, 2000). "No longer is the banking approach - the teacher deposits knowledge and the learner receives or withdraws it - to education accepted" (Silverman & Casazza, 2000, p. 255).

Student-centered learning helps promote the development of skills such as problem solving and critical thinking (Brush & Saye, 2000). "Learning is the focus and ultimate goal of the learner-centered paradigm" (Huba & Freed, 2000, p. 8). Educators who embrace

learner-centered teaching believe that “students’ grappling with ideas will lead to more meaningful and enduring learning” (McKeachie & Svinicki, 2006, p. 319).

Group learning. Another learning style that educators use is the group learning approach. There have been a variety of names which “have been given to this form of teaching, and there are some distinction among these: cooperative learning, collaborative learning, collective learning, learning communalities, peer teaching, peer learning, reciprocal learning, team learning, study circles, study groups, and work groups” (Davis, 1993, p. 147). Generally, group learning falls into three categories of group work: formal learning groups, informal learning groups, and study teams (Davis, 1993).

Formal learning groups are group members formed together as a team to complete an identified task. The different types of tasks can vary from writing a report, performing a lab experiment, to preparing a position paper. The students work together until their task is complete and their educator has graded the task (Davis, 1993). Informal learning groups are impermanent groupings of students within a single class meeting. These groups can be initiated by asking students to turn to their neighbor or form a small group to do some problem-solving (Davis, 1993). Finally, study teams are long-term groups. These group members provide each other with encouragement, support, assistance in assignments and course requirements, and a helping hand when a group member misses a class session. The larger the class or lecture, the more valuable a study team can be (Davis, 1993). These three types of groups are using cooperative learning to accomplish a common goal between the groups.

“Collaborative learning is a form of group inquiry in which teacher and students work together actively in the learning processes, with less status distance between teacher and

student than is traditional” (Stark & Lattuca, 1997, p. 254). In collaborative learning, the learning is active. Students present ideas before their peers and take the responsibility upon themselves for their own learning. In this method of learning, teachers put emphasis on higher-order thinking and questioning. Teachers combine lecture and group work, while stressing the improvement of team skills and working in diversified groups (Laufgraben & Shapiro, 2004). This type of learning stresses the developing of interpersonal skills, leadership ability, teamwork, and communication skills (Stark & Lattuca, 1997).

Cooperative learning provides the student with the ability to increase discussion and critical thinking (Long, 1989). According to Long (1989), cooperative learning is a set of instructional strategies in which students are grouped together in teams, and they work collectively towards a universal goal. This unique way of learning limits students to be successful only if their team members are successful (Long, 1989). Cooperative learning can also be viewed as an attempt to get the most out of the power of the peer group to improve student learning (Astin, 1993).

Cooperative learning is a controlled type of learning in which students work in little groups, usually two to four students, to attempt to make the most of each other’s learning (Stark & Lattuca, 1997). Cooperative learning requires students to work together to accomplish shared learning goals. Students achieve their learning goals only if the rest of their group members achieve their learning goals (Johnson, Johnson, & Smith, 1998). According to Johnson et al. (1998), cooperative learning is the center of problem-based learning and is closely related to collaborative learning. Learning cooperatively allows students to work together in informal groups and develop their own learning condition (Johnson et al., 1998). For a learning experience to be considered cooperative, five essentials

must be incorporated: face-to-face interaction, social skills, individual accountability, positive interdependence, and group processing (Stark & Lattuca, 1997).

Summary of Student Learning

Individuals learn in different ways with different learning styles. Individual learning styles are the way learners gather, interpret, organize, and reflect on information (Davis, 1993). Two examples of learning styles that were focused on in this chapter were the learner-centered approach and group learning. The group learning style included collaborative and cooperative learning. It is important for educators to match their instruction method to a student's learning style in order to enhance the student's capacity to take hold of the information and retain the material (McKeachie & Svinicki, 2006).

Experiential Learning

The term experiential learning includes a large variety of strategies that engross students in learning opportunities that go beyond traditional lectures and reading and writing assignments (Shapiro & Levine, 1999). "As far back as John Dewey, we have understood that students learn best and retain most when they are active participants in their own learning" (Shapiro & Levine, 1999, pp. 83–84). Experiential learning is broadly defined as, "the process by which a learner creates meaning from direct experience" (Bohn & Schmidt, 2008, p. 5). When experiential learning is implemented in a classroom setting, it is more specifically considered as students participating in real life activities, reflecting on those activities, and incorporating their new understanding of that activity into their new lives (Bohn & Schmidt, 2008).

Experiential learning has long been valued in the field of agricultural education and has been recognized as an integral part of the educational process (Cheek et al., 1993). Many

articles have been written in areas outside of agricultural education which explain experiential learning and how it can be utilized. Experiential learning is not limited to only secondary agricultural education (Roberts, 2006).

The idea of experiential learning is certainly not new in the field of education (Wulff-Risner & Stewart, 1997). The theory of experiential learning goes back to the work of some very prominent twentieth century scholars (Kolb & Kolb, 2005) at a time when agricultural education in the United States was organized in both non-formal and formal settings (Knobloch, 2003). Some of the scholars who helped to model the theory of experiential learning are John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, Carl Rogers, and many others (Kolb & Kolb, 2005). Each of these scholars helped to develop a holistic model of the experiential learning process (Kolb & Kolb, 2005). These scholars also had their own views and their own definitions of experiential learning, but the theory is built on six propositions that are shared by them all:

1. Learning is best conceived as a process, not in terms of outcomes.
2. All learning is relearning. Learning is best facilitated by a process that draws out the students' beliefs and ideas about a topic so that they can be examined, tested, and integrated with new, more refined ideas.
3. Learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world.
4. Learning is a holistic process of adaptation to the world.
5. Learning results from synergetic transactions between the person and the environment.
6. Learning is the process of creating knowledge. Experiential learning theory (ELT) proposes a constructivist theory of learning whereby social knowledge is created and recreated in the personal knowledge of the learner. (Kolb & Kolb, 2005, p. 194)

Learning experientially, in genuine contexts, has been a foundational model for student learning in agricultural education (Knobloch, 2003). The experiential learning theory suggests that learning occurs as a result of a specific experience of many experiences (Roberts & Harlin, 2007). “Kolb proposed that experiential learning theory is a holistic integrative perspective on learning that combines experience, perception, cognition, and behavior” (Wulff-Risner & Stewart, 1997, p. 43). When referring to the experiential learning theory, Kolb and Kolb (2005) state that, “learning is the major determinant of human development, and how individuals learn shapes the course of their personal development” (Kolb & Kolb, 2005, p.195).

In their article, *Teaching Options and Futures Trading through Experiential Learning*, Parcell and Franken (2009) discussed a commodity trading course which was built upon the principles of experiential learning and has shown successful results. The results of their study demonstrate that by having the students participate in an actual trading pool investment, they became more actively involved in their own learning process. Experiential learning was able to help students take an interest in their own learning and get involved with their course. Another outcome of the integration of experiential learning is the learner being able to identify specific parts of their experience upon which they can reflect (Roberts & Harlin, 2007).

Educators and faculty can provide experiential learning for their students by incorporating the eight principles of good practice for all experiential learning activities recommended by the National Society for Experiential Education (NSEE, 2011). These eight steps are:

1. **Intention:** All parties must be clear from the outset why experience is the chosen approach to the learning that is to take place and to the knowledge that will be demonstrated, applied or result from it. Intention represents the purposefulness that enables experience to become knowledge and, as such, is deeper than the goals, objectives, and activities that define the experience.
2. **Preparedness and Planning:** Participants must ensure that they enter the experience with sufficient foundation to support a successful experience. They must also focus from the earliest stages of the experience/program on the identified intentions, adhering to them as goals, objectives and activities are defined. The resulting plan should include those intentions and be referred to on a regular basis by all parties. At the same time, it should be flexible enough to allow for adaptations as the experience unfolds.
3. **Authenticity:** The experience must have a real world context and/or be useful and meaningful in reference to an applied setting or situation. This means that it should be designed in concert with those who will be affected by or use it, or in response to a real situation.
4. **Reflection:** Reflection is the element that transforms simple experience to a learning experience. For knowledge to be discovered and internalized the learner must test assumptions and hypotheses about the outcomes of decisions and actions taken, then weigh the outcomes against past learning and future implications. This reflective process is integral to all phases of experiential learning, from identifying intention and choosing the experience, to considering preconceptions and observing how they change as the experience unfolds. Reflection is also an essential tool for adjusting the experience and measuring outcomes.
5. **Orientation and Training:** For the full value of the experience to be accessible to both the learner and the learning facilitator(s), and to any involved organizational partners, it is essential that they be prepared with important background information about each other and about the context and environment in which the experience will operate. Once that baseline of knowledge is addressed, ongoing structured development opportunities should also be included to expand the learner's appreciation of the context and skill requirements of her/his work.
6. **Monitoring and Continuous Improvement:** Any learning activity will be dynamic and changing, and the parties involved all bear responsibility for ensuring that the experience, as it is in process, continues to provide the richest learning possible, while affirming the learner. It is important that there be a feedback loop related to learning intentions and quality objectives and that the structure of the experience be sufficiently flexible to permit change in response to what that feedback suggests. While reflection provides input for new hypotheses and knowledge based in documented experience, other strategies for observing progress against

intentions and objectives should also be in place. Monitoring and continuous improvement represent the formative evaluation tools.

7. **Assessment and Evaluation:** Outcomes and processes should be systematically documented with regard to initial intentions and quality outcomes. Assessment is a means to develop and refine the specific learning goals and quality objectives identified during the planning stages of the experience, while evaluation provides comprehensive data about the experiential process as a whole and whether it has met the intentions which suggested it.
8. **Acknowledgment:** Recognition of learning and impact occur throughout the experience by way of the reflective and monitoring processes and through reporting, documentation and sharing of accomplishments. All parties to the experience should be included in the recognition of progress and accomplishment. Culminating documentation and celebration of learning and impact help provide closure and sustainability to the experience. (para. 5)

Research has shown that the metacognitive skills that students employ while partaking in experiential learning activities permit students to assess their highest level of understanding and mastery of the area under discussion (Bohn & Schmidt, 2008). In order to be effective in a large group classroom and not be viewed as impractical and unfeasible, experiential learning activities must be written with a considerable amount of time and effort infused in the activity (Bohn & Schmidt, 2008). By including experiential learning activities in classrooms, students are able to personalize their learning experiences (Bohn & Schmidt, 2008).

Two models of experiential learning which have been developed in higher education are undergraduate research and service-learning (Shapiro & Levine, 1999). These models have helped to transform institutions looking for ways to make their higher education a more participatory learning experience for their undergraduate students (Shapiro & Levine, 1999). Both undergraduate research and service-learning are challenging to students because they connect the student with “problem-posing and problem-solving activities that force them and

their faculty mentors to make connections between what they are learning in their classes and how that knowledge and information can be applied to real-world questions and situations” (Shapiro & Levine, 1999, p. 84).

Inquiry-Based Learning

Inquiry-based learning is unique in the way it obligates the students to do more than only report on a subject (Parr & Edwards, 2004). Inquiry-based learning is used to rekindle curiosity, promote creativity, and increase motivation in students (Retallick & Miller, 2005). This type of learning takes the tendencies of inquiry and uses them to construct knowledge and understanding within a classroom (Retallick & Miller, 2005).

Inquiry-based learning “enables the student to construct an understanding of the natural and socially designed worlds and seek appropriate resolutions to questions and issues rather than looking for a single, correct answer” (Retallick & Miller, 2005, p. 2). According to Retallick & Miller’s research (2005) there are four key principles of inquiry-based learning:

1. The utilization of information processing skills from observation to synthesis should be the focus of learning;
2. The learning process is student-centered;
3. The role of the teacher is one of facilitator and co-learner; and
4. Assessment focuses on both what is valued and the student's conceptual understanding. (p. 2)

Problem-Based Learning

Similar to inquiry-based learning, problem-based learning is, “an instruction (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined

problem” (Savery, 2006, p. 12). Problem-based learning involves experiential learning structured around the justification, examination, and resolution of significant problems (Tuckman & Monetti, 2011). “Problem-based learning is (along with active learning, cooperative/collaborative learning, and technology) one of the most important developments in contemporary higher education” (McKeachie & Svinicki, 2006, p.221).

In problem-based learning, students follow a sequential process which includes the following steps:

1. presentation of the problem situation;
2. identifying the pertinent facts related to the situation;
3. formulating hypotheses as to potential solution;
4. identifying knowledge shortages or learning issues essential for solving the problem;
5. applying the new knowledge to test the hypotheses formulated in the third step; and
6. reflecting on the theoretical knowledge achieved. (Hmelo-Silver, 2004)

Problem-based learning has also been related to experiential learning. It has been said that problem-based learning is a more structured experiential learning experience where students are engaged problem-solvers seeking to identify a problem and a solution, thus becoming self-directed learners (Savery, 2006). “Because of the similarities and the academic achievement that has been realized using these pedagogical approaches in science education, Parr and Edwards suggest that both IBL [Inquiry-Based Learning] and PBL [Problem-Based Learning] are effective means for student learning” (Retallick & Miller, 2005, p. 1).

Service-Learning

Service-learning is defined as an educational experience in which students participate in an organized service activity that meets community needs (O'Neil & Lima, 2003).

Service-learning is linking practical skills with learning (Astin, Vogelgesang, Ikeda, & Yee, 2000). The students reflect on an activity to gain further understanding and an appreciation of the discipline and the community (O'Neil & Lima, 2003). Students benefit from the experience of conducting a service project and relating it to the content of the classroom (Astin et al., 2000).

Agricultural education fits nicely with the service-learning style because of agricultural education's strong ties to serving the community (O'Neil & Lima, 2003). This type of learning is utilized by enhancing the learning environments and providing students with an opportunity to apply classroom knowledge to a community setting (O'Neil & Lima, 2003). Service-learning can help students to choose the appropriate career path and can be used as a capstone in order to test students on all the knowledge they have acquired (O'Neil & Lima, 2003).

Service-learning should include "a balance between service to the community and academic learning and that the hyphen in the phrase symbolizes the central role of reflection in the process of learning through community experience" (Eyler & Giles, 1999, p. 4).

Service-learning is closely related to experiential learning as it has a very similar structure (Eyler, Giles, & Braxton, 1997).

Service-learning can be integrated into courses to give students the hands-on, real-world experience that agricultural educators thrive on providing to their students (O'Neil & Lima, 2003). Service-learning is a form of experiential education whose pedagogy rests

on the values recognized by Dewey and additional experiential learning theorists (Eyler & Giles, 1999). “The concept of service-learning has emerged as a powerful, valuable vehicle for experiential learning in college. Service-learning intentionally connects a socially valuable, public service activity with particular academic course content toward the goal of intellectual growth” (Shapiro & Levine, 1999, p. 87). Service-learning is a more specialized form of learning within experiential learning that came from “students’ increasing insistence that what they learn be relevant, applicable, and closely connected to their values” (McKeachie & Svinicki, 2006, p. 279).

Summary of Experiential Learning

Experiential learning can be addressed in many styles within the classroom. A few examples focused on in this chapter were inquiry-based learning, problem-based learning, and service-learning. Experiential learning is a great way for learning opportunities to take place that go beyond traditional lectures and reading and writing assignments (Shapiro & Levine, 1999). Experiential learning also has students participate in real life activities, reflect on those activities, and incorporate their new understanding of those activities into their lives (Bohn & Schmidt, 2008). Two examples of experiential learning in higher education at Iowa State University in the College of Agriculture and Life Science are SWP and AgPAQ.

Science With Practice

The Science With Practice program is one example of an experiential learning and work program utilized at the undergraduate level in Iowa State University’s College of Agriculture and Life Sciences. SWP was designed specifically to meet the mission and goals listed in the university’s strategic plan (Steiner & Retallick, 2006). Iowa State University’s

College of Agriculture and Life Sciences' SWP program is administered by the Department of Agricultural Education & Studies.

Many programs within educational institutions need continued financial support; the SWP program at Iowa State University is no different. The SWP program aids in increasing student work opportunities and helps faculty and students lower costs through the ISU Agricultural Endowment funding that financially supports the undergraduate wages of SWP participants (Steiner & Retallick, 2006). Participating students work personally with faculty and staff members on detailed projects and/or work assignments. "The purpose of SWP is to provide opportunities for students in agriculture to learn while working with faculty and staff in university research laboratories, farms, greenhouses, and other units through a planned education and work experience program" (Steiner & Retallick, 2006, p. 527).

The SWP program helps students lower college costs by giving them an opportunity to earn two credits for fulfilling all of the course requirements throughout the semester. The students also earn money for working on their project with their faculty mentor. The experience consists of a university research project or program that includes assembling information, communicating with a faculty mentor through oral and written requirements where academic credits are earned (Steiner & Retallick, 2006).

The student's learning outcomes for the SWP program include:

acquiring technical agricultural skill; developing organizational and planning skills related to research and other experiences; developing skills related to data collection, research procedures, written and oral communication, human resources management, teaching and critical analysis of data. Increased understanding of research activities, linkages to higher level course work, and gaining an understanding of the connection between research and practical, real work situations/problems are also learning outcomes of SWP. (Steiner & Retallick, 2006, p. 527)

Students and their faculty mentors work together to develop a learning agreement, which also serves as an application for the program. The agreement outlines the purpose, goals, and expectations of their project. The students are responsible for developing bi-weekly journal entries that reflect on their experiences and activities. At the end of the semester, the students write a final reflection, assemble a portfolio of materials and accomplishments, and participate in a professional poster presentation to showcase their work (Steiner & Retallick, 2006).

Agron 356/Engl 309/AgPAQ

Another example of an experiential learning program in higher education is Iowa State University's College of Agriculture and Life Sciences' Agron 356/Engl 309/AgPAQ. "Agron 356/Engl 309 was the original start of Iowa State University's agronomy department's course cluster learning environments. Agronomy 356 and English 309 were linked and integrated in 1999, 2000, and 2002" (Barnett, Miller, Polito, & Gibson, 2009, p. 5).

The Agronomy 356 course was a site-specific crop and soil management course that focused on the development of solutions to soil and crop management problems through consultation. Students had to identify the client's needs, gather technical information, and use geographic systems as a tool for making management decisions (Iowa State University Agronomy Catalog, 2011). The Agronomy 356 course taught basic principles related to soil drainage, soil erosion and erosion control, tillage, soil fertility, and viability environmental sustainability for a client who was a farmer near Ames, Iowa (Barnett et al., 2009).

The English 309 course at Iowa State University covered the basic theory and practice of writing proposals and reports (Barnett et al., 2009). English 309 gave an

introduction to practice and theory of analyzing and preparing proposals and reports. The reports and proposals were intended for governmental agencies, businesses, and/or corporate and private foundations (Iowa State University Agronomy Catalog, 2011). Both programs put a large emphasis on writing skills. Dr. Barnett (2009) studied the written communication of participants of Agron 356/Engl 309 and AgPAQ using a direct assessment of their writing.

Agron 356/Engl 309 evolved into the program most recently known as AgPAQ. AgPAQ stands for Agriculture students Providing integrated solutions for Agronomy and farm business management Questions. AgPAQ was developed for junior and senior students at Iowa State University in the College of Agriculture and Life Sciences (Barnett et al., 2009). AgPAQ is a combination of an English course, an agricultural economics course, and two agronomy courses that students enroll in concurrently (Barnett et al., 2009). AgPAQ's mission was to provide students the opportunity to successfully solve professional, real-world, work-based, agricultural problems by integrating skills from the linked courses. "A major aspect of the AgPAQ learning community was the consultant relationship students developed with identifying problems and opportunities and recommending improvements for a local farmer" (Barnett et al., 2009, p. 4).

Like many programs within institutions, AgPAQ needed funding. In the beginning of AgPAQ, faculty in the College of Agriculture and Life Science at Iowa State University applied for and received a "USDA Higher Education Challenge Grant, *Integrating an entire semester to make connections for cross-disciplinary collaboration and communication*, (grant number IOW05066) to study the impact of a learning community within the college" (Barnett et al., 2009, p. 1). AgPAQ is a learning community environment for agriculture students at Iowa State University in which students enroll in a "cluster" of courses

concurrently. Each learning community team works with real clients and precision agriculture tools to address the client's needs by preparing a complete crop and soil management plan. A few areas the management plan addresses include concerns relevant to soil loss and residue management, planting dates and rates, profits and costs, benefits and recommendations for customers.

One of the main goals of AgPAQ is to create a student learning experience that reflects the realities of the workplace. The student learning outcomes for AgPAQ include, but are not limited to understanding specific principles and to be able to apply those principles to solve problems in a professional setting, synthesize and integrate knowledge from multiple disciplines, solve and analyze difficult problems in a professional setting, and students will be able to professionally and effectively communicate their solutions to a client (T. A. Polito, personal communication, March 30, 2011).

Summary

Experiential learning programs may have many commonalities. Programs like AgPAQ and SWP are vastly different, but share similar experiential learning principles. These programs utilized the principles set out by the NSEE to make experiential learning programs that will impact the participants. This study helped to define those common experiential learning practices and will help determine what impacts are made on graduates of these programs. The study also helped to determine what specific areas impact graduates careers/educational advancements and what areas can be improved upon.

This chapter addressed the literature related to the impact on students of the integration of experiential learning in education. This chapter highlighted the conceptual framework for this study and explained how this study was modeled from the work of

Terenzini & Reason (2005). Educational developments, such as the Morrill Acts, were mentioned and explained as to how they have helped improve higher education to what it is today. The goals and objectives of undergraduate programs were also explained. A large portion of this chapter summarized student learning styles and how each student learns in a different way. Emphasis was put on experiential learning in higher education and in agricultural education, and examples of experiential learning at the college level (Agron 356/Engl 309, AgPAQ, and SWP) were discussed. This chapter provided background information about the main focal points in this study.

CHAPTER III. METHODS AND PROCEDURES

The purpose of this descriptive census survey was to explore the impact of graduates' participation in one of three of the integrated, experiential learning programs in Iowa State University's College of Agriculture and Life Sciences. A descriptive follow-up survey was conducted with graduates having participated in AgPAQ, Agron 356/Engl 309, or Science With Practice. The objectives of this study were to:

1. Determine the impact the program had on career/graduate school;
2. Investigate the level of skill improvement attributed to the program;
3. Determine the influence the program had on career development and decidedness; and
4. Investigate the extent to which the program enhances career/graduate school preparation.

This chapter outlines the methods and procedures utilized in this study. Included in this chapter is a description of the research design, identification of subjects, instrument development, and procedures used to collect and analyze data.

Survey Research

The purpose and objectives of this study were addressed through survey research. In higher education, it is important to provide assessment of programs in order to determine and improve the impact of a program and to ensure public funds were appropriately beneficial (Miller, Williams, Bekkum, & Steffen, 1998). Graduate or alumni surveys are popular assessment methods to follow-up academic programs (Miller et al., 1998). Miller et al. (1998) suggested the following approach for using a student follow-up survey:

1. Establish objectives for the follow-up;

2. Plan for data collection at regularly scheduled intervals (intervals of five years are recommended) to facilitate trend analysis;
3. Involve current students in the curriculum to be evaluated in planning and interpreting data so they will be ready to participate in future follow-up surveys;
4. Involve faculty and administration in planning activities, including identification of questions to be asked, so they will be effective consumers of the findings;
5. Collect data from both the graduates and their employers, asking some similar questions to allow for comparisons;
6. Keep the variables studied and the response frame as constant as possible;
7. Include specific questions to gather data related to points in time;
8. Use consistent procedures to collect data over time, and
9. Summarize and present findings and trends to decision makers for use in program improvement. (Miller et al., 1998, p. 42)

These recommendations were taken into account while developing the study and establishing the procedures to complete this study.

Survey Mode

This study utilized a descriptive survey research design for the collection and analysis of data. This follow-up survey study utilized electronic e-mail communication over a 10 day period for the data collection. An electronic questionnaire was chosen for this study because the participants were located throughout the United States. According to Dillman (2007), one advantage of using an e-mail survey is the increased speed of the results. Electronic questionnaires have an advantage of being able to collect large amounts of data as well as reaching wide populations. They can also be conducted speedily and are most cost effective (Ary, Jacobs, & Sorensen, 2010).

Survey Development

The questionnaire was a combination of scale, multiple choice, dichotomous, and open-ended questions depending on the research objective. The benefit of using Likert-type scale questions was that, “points can be assigned to the various responses, and thus measures of central tendency, variability, correlation, and the like can be calculated” (Ary et al., 2010, pp. 393–394). Multiple choice/dichotomous, or closed-ended, questions gave the participant specific choices in answering a question. Respondents are better able to quickly respond to close-ended questions (Ary et al., 2010). “A closed format also ensures that all subjects have the same frame of reference in responding and may also make it easier for subjects to respond to questions on sensitive or private topics” (Ary et al., 2010, p. 392).

Open-ended questions permit a free response from the participant rather than restricting the participant to choosing a response (Ary et al., 2010). This helped to let participants have freedom when answering their questions and to be able to answer honestly. Using a combination of these types of questions helped to ensure that the most accurate results were obtained from the participants who filled out the questionnaire. A combination of different types of questions helped to make the survey more user-friendly.

The survey consisted of 14 questions about AgPAQ, Agron 356/Engl 309, and SWP and a demographics section consisting of six multiple choice and open-ended questions. The questions about AgPAQ, Agron 356/Engl 309, and SWP asked about specific aspects of the program, skill and ability improvement and development, career choice and aspirations, and prompted participants’ input on future program procedures, which helped to answer the research questions. The instrument was divided into five sections based upon the different aspects of the programs including a final demographics section.

The instrument used in this study was a researcher-developed instrument. The questionnaire was adapted from the “Summer Undergraduate Research Experiences (SURE)” Survey (Taraban & Blanton, 2008) and previous end-of-the-year evaluations from the AgPAQ and SWP programs. The researchers compiled a list of possible questions from these surveys as well as developed additional questions as appropriate. Once the questions were compiled, the researchers designed and organized the instrument.

Survey Design

The purpose and objectives of this study were addressed through the survey instrument, a questionnaire that was divided into four main sections and a demographics section. The descriptive questionnaire addressed four specific aspects of the program including: (a) program participation and after graduation; (b) skills, abilities, and career impact; (c) career/education influence, overall impact, mentoring and career benefits; and (d) education and recommendation. A demographics section consisting of six multiple choice and open-ended questions was provided at the end of the instrument as the fifth component of the survey.

Program Participation and After Graduation

The first section of the questionnaire asked questions related to program participation and the after graduation status. The first question was a multiple choice question asking in which of the three programs the graduates had once participated. The second question was also a multiple choice question asking about post-graduation. The participants had five different options to choose from: entered the workforce, entered graduate school, returned to family business/farm, entered the military, or other. If the participant chose the other category, they were asked to please specify what they did after graduation.

Skills, Abilities, and Career Impact

The second section of the questionnaire focused on skills and abilities related to workplace and career impact. This section consisted of two Likert-type questions, one multiple choice question, and one open-ended question. The first Likert-type question asked participants to respond to the extent to which they agreed with six statements, each beginning with the following statement, “Because of my AgPAQ, Agron 356/Engl 309, or SWP experience, I am better able to . . .” The ending of the six questions were the following: (a) analyze and solve problems, (b) think independently and formulate my own ideas, (c) communicate more effectively and professionally with clients/mentors, (d) communicate more effectively and professionally with co-workers, (e) integrate and synthesize knowledge from multiple disciplines, and (f) understand discipline specific principles at the beginning of my career (or graduate program) to the point that I was better able to understand and solve the problems I faced. A five point Likert-type scale was used to answer each of these questions; and the scale included: (1) strongly disagree, (2) disagree, (3) neither disagree or agree, (4) agree, (5) strongly agree.

The second question in the second section was a multiple choice question that asked the participants to select the statement that best described the impact the experience had on their career. The participants had three choices: (1) It had no impact on my career/advanced education or my ability to fulfill my responsibilities; (2) It had significant impact early in my career/advanced education but has diminished as I gain more experience; or (3) It has had a significant impact throughout my career, thus far. The third question in this section was an open-ended question asking the participants to explain why they responded as they did to the previous question about the impact the experience had on their career.

The final question in the second section asked the participants to what extent did their skills and abilities improve as a result of their experience in the areas of communication, time management, responsibility, organization, self-confidence, listening skills, research skills, technical skills, and writing skills. Participants were provided an “other” choice to allow them to list another area that was not listed in which they felt they improved the most. A five point Likert-type scale was used as follows: (1) no improvement/very small improvement, (2) small improvement, (3) moderate, (4) large, (5) very large improvement, (6) not applicable/prefer not to answer.

Career/Education Influence, Overall Impact, Mentoring and Career Benefits

The third section asked about career or educational influence because of the program, overall impact, and mentoring and career benefits because of participation. This section consisted of two Likert-type scale questions, two open-ended questions, and one multiple choice question. The first question in this section was a Likert-type scale question asking to what extent did the experience in AgPAQ, Agron 356/Engl 309, or SWP influence the participants view of the workplace or graduate school in the following areas: (1) helped to clarify career/educational goals, (2) better prepared for workplace/graduate school, (3) helped transition to workplace/graduate school, (4) better able to solve problems as a new employee/graduate student, and (5) influenced career/educational advancement. The Likert-type scale used for this question was as follows: (1) none/very little extent, (2) small extent, (3) moderate extent, (4) large extent, (5) very large extent, (6) not applicable/prefer not to answer.

The second question in the third section was an open-ended question asking the participants to share a specific example of how their experience impacted, if at all, their

transition to the workplace/graduate school and how this specific experience impacted their career/educational advancement. The third question was another Likert-type scale question asking if the AgPAQ, Agron 356/Engl 309, or SWP experience made an impact on the participants by (1) assisting in the transition from an undergraduate student to employee/graduate student, (2) influencing career plans for after bachelor's degree, (3) influencing plans for postgraduate education (either right after graduation or in the future), (4) helping become a more active learner, and (5) helping become a more motivated learner. The Likert-type scale used for this question was as follows: (1) strongly disagree, (2) disagree, (3) neither disagree or agree, (4) agree, (5) strongly agree.

The next question asked to what extent the mentoring portion of the experience benefited the participants in their career. The participants had the choice to answer: (a) none/very little extent, (b) small extent, (c) moderate extent, (d) large extent, (e) very large extent, or (f) not applicable/prefer not to answer. The fifth question in this section was an open-ended question asking the participants to share any suggestion they have for improving the mentoring interaction.

Education and Recommendations

Education since graduation and recommendations for the program experiences was the topic for the fourth section of the instrument. This section consisted of two dichotomous questions and one open-ended question. The first question in this section was a dichotomous question asking the participants if, since completing their undergraduate degree, they have taken any graduate level courses. The participants had the choice of answering no or yes, and, if the participant answered yes, they were asked to tell the researchers in what field they had taken graduate level courses.

The second question in this section was another dichotomous question asking the participants if they would recommend the experience to others. The participants had the choice to answer yes or no. If the participants answered no, they were asked to explain why. The third question in the fourth section was an open-ended question asking the participants what advice they would share with students who might consider participating in AgPAQ, Agron 356/Engl 309, or SWP.

Demographics

Demographics were the topic for the final set of questions which consisted of six multiple choice and open-ended questions. This section was intended to provide some information about the respondents. The first multiple choice question in this section asked the participants what their academic major was within the College of Agriculture and Life Sciences. The second multiple choice question asked the participants their year of graduation with answers ranging from 2001 to 2010. The third question in this section was a dichotomous question asking the participants if they entered the workforce, and if their position was related to their field of study. The participants had the choice to answer yes or no to this question.

The fourth question in the last section was an open-ended question asking participants if they entered the workforce, what was the job title of their first position. The fifth question in the last section was an open-ended question asking the participants if they entered the workforce, and the title of their current position. The final question of the last section and the last question of the survey asked participants what the highest level of education they aspire to complete. Participants had the following choices: (a) professional development courses/workshops/seminars required of my position/employer, (b) professional certification

(i.e., CCA, CPAg, etc), (c) master's degree focused on professional development, (d) master's degree focused on science/research, (e) professional degree (i.e., Ph.D., DVM, MD, JD, etc), or (f) other. If the participants chose other for their answer, they were asked to please specify their aspired education.

Survey Validation

Once questions were compiled, the researchers organized the questions into the objectives of the study to protect internal validity. Gay and Airasian (2000) define internal validity as the examined differences on the dependent variable that are a reliable outcome of the independent variable. Threats to internal validity include maturation, testing, history, instrumentation, differential selection of participants, statistical regression, integration effects, and mortality (Onwuegbuzie, 2000). For this study, internal validity was addressed by having multiple people, some who were associated with and knew about the programs in the study and some who did not, view the instrument before it was finalized and sent to the participants. These reviewers looked at how the questions may be interpreted and how well the questions were understood.

External validity, as defined by Johnson and Christensen (2000), is the degree to which the outcomes of a study can be generalized to and across populations, settings, and times. Threats to external validity may include ecological validity, population validity, and external validity of operations (Onwuegbuzie, 2000). For this study, external validity was not a threat as the survey population was the entire population and there was no generalization of the results/findings.

If a question did not fit an objective, it was omitted. The researchers then developed a final written instrument and put it into an electronic form. The instrument was then

reviewed for face and content validity by agricultural education professors, agricultural education students, Iowa State University professors, and Iowa State University students before it was sent out to the participants. According to Goodwin (2010) face validity addresses whether the measure seems to be applicable to those who are taking the survey. It is important in the sense that the participants who are filling out the surveys need to take it seriously. Goodwin (2010) stated that content validity is making sure the survey or questionnaire makes sense to the reader in terms of the construct being addressed. Any comments or feedback obtained from the reviews were incorporated into the instrument.

Population–Sampling Frame

This study was only looking at participants who had graduated from Iowa State University and who had been involved with the programs; those participants were the only ones who were studied. This was to help ensure reliability and accuracy of the results within the study. The target population of this study was individuals who had graduated from Iowa State University and had participated in AgPAQ, Agron 356/Engl 309, or SWP for a least one semester.

The lists of students were compiled by obtaining course lists of previous students from the program coordinators. After the lists were obtained, the researchers went through the process of approval to acquire e-mail addresses from the Iowa State University Foundation, who had up-to-date lists of alumni. This census survey involved the entire population of graduates who had participated in one of the three experiential learning programs.

All subjects who participated in the study were over the age of 18 and informed consent was assumed when the subjects chose to complete the questionnaire. The

participants of this study did not have any risk or discomfort through their participation. Participants provided only information regarding their experience participating in one of the college's experiential learning programs.

Survey Administration

Prior to the development of the instruments and conducting the research for this study, the researcher completed training in human subject research through the Iowa State University Office of Research Compliance. The final draft of the instrument, letters to the participants, and procedures proposed for the study were submitted and approved by the Iowa State University's Institutional Review Board (IRB) (Appendix A).

Once IRB approval was received, informed consent of subjects to participate in this study was sent via e-mail communication with the Uniform Resource Locator (URL) to the instrument included in the e-mail. When the participants entered the URL into the web browser, the home webpage provided information about the study. Participants were to click to continue with the study, thus providing their informed consent. The format of the survey contacts was modeled after Don Dillman's (2007) survey methods.

Confidentiality was addressed as the researchers did not ask for the names of participants. Only an e-mail address was collected as a means to manage follow-up contacts. When a participant completed the survey, their e-mail address was removed from the non-respondents list. E-mail addresses were removed from the database after all contact letters were sent out.

The participants were contacted a total of five times via e-mail over a two week period (Table 1). The first contact was by e-mail notifying the participants of the study, informing them of confidentiality, and asking them to participate in the study. The initial

e-mail also stated that a questionnaire will soon be arriving by e-mail. The second contact was a detailed informational letter via e-mail including a link to the online questionnaire and was sent approximately three days after the initial e-mail. The third contact was a brief reminder e-mail that was sent to the non-respondents approximately one week after the second contact was sent out and included a link to the questionnaire. The fourth was similar to the third contact and acted as a reminder for the survey sent approximately one week after the third e-mail. The fifth and final contact was another reminder e-mail sent to the non-respondents approximately one week after the fourth contact was sent and also included a link to the questionnaire and a notification of being a final contact.

Table 1

Contacts, Details, and Dates of Contact E-mails Sent to Respondents

Contact	Detail	Date
1	Pre-Notice	Tuesday, June 22, 2010
2	Notice	Thursday, June 24, 2010
3	Reminder	Monday, June 28, 2010
4	Final Reminder	Thursday, July 1, 2010
5	Special Contact	Thursday, July 8, 2010
	Closing Date	Thursday, July 15, 2010

In all of the contacts, the participants were informed that the survey would only take 10 minutes of their time and that their responses were valuable to the study.

SurveyMonkey™ was the internet survey tool utilized for this study (SurveyMonkey Corporation, 2009).

SurveyMonkey™ automatically recorded all respondents' e-mail addresses. This feature was used to facilitate the follow-up of non-respondents. Only non-respondents were notified after the first two contacts. Participants' e-mails and responses were not connected at any point. The responses were confidential.

The overall response rate (50.41%) was 62 participants of the 123 contacted. The usable response rate (43.90%) was 54 participants of the 123 contacted. Participants who started the survey but did not complete the entire survey were not used in the usable response rate. To control for non-response error, early and late responders were compared. There were no differences between the early and late respondents.

Statistical Analysis

The questionnaire consisted of scale questions that were used in descriptive analysis procedures. The means for all questions were recorded, and the standard deviations were calculated. The open-ended questions were not analyzed statistically. Mean responses of each of the groups were compared using SPSS. An alpha level of .05 was used, which was decided *a priori*. The statistical information was recorded, calculated, and analyzed using Excel and SPSS.

For the purpose of the data analysis for this study, AgPAQ ($n = 23$) and Agron 356/Engl 309 ($n = 5$) were combined to increase statistical power. Statistical analysis for each question was run to answer the research questions and the study objectives. The researchers determined what statistics to run by determining how the questions fit into the research objective and what information the researchers wanted to learn. Statistical analysis was determined for each question, and then descriptive statistics were conducted.

For each question in the instrument, the number of responses (n), mean, percentage, and standard deviation (SD) were conducted. For the Likert-type scale questions, a t -test for equality of means was conducted. For these questions, equal variances were assumed. Also, t -statistics, means, and percentages were reported separately for AgPAQ and SWP for comparison purposes.

Limitations

The limitations of this study include, but are not limited to, the ability to generalize beyond these specific programs, the measurement of impact because the respondents gave their opinion of the impact, and studying only those who have graduated from Iowa State University. This study was an indirect assessment of the impact of the experiential learning programs at Iowa State University in the College of Agriculture and Life Sciences. The population of this study was limited to the College of Agriculture and Life Sciences graduates who participated in one of the three programs at Iowa State University. Therefore, the results are generalizable only to this population.

The accuracy of the measurement of impact is difficult to statistically achieve. The small number of respondents ($n = 54$) also provides a limitation for this study for statistical power. Since this study has two groups with populations under 30, caution should be made when comparing the two groups. Studying only graduates from Iowa State University limits the numbers available to examine the impact of experiential learning programs. The delimitations of this study include, but are not limited to, graduates of the AgPAQ, Agron 356/Engl 309, and SWP programs.

Assumptions

A major underlying assumption of this study was that the three integrated, experiential learning programs were beneficial to Iowa State University's College of Agriculture and Life Sciences graduates. It was also assumed that all respondents were given equal opportunity to participate. The list of students obtained from the Iowa State University Foundation was assumed to be up-to-date and contained accurate e-mail addresses for all the participants. Not all e-mail addresses, however, were completely up-to-date.

Summary

This chapter outlines the method and procedures demonstrated in this study. The chapter explained the research design, the subjects surveyed, and the instrumentation development. The instrumentation development included specifics about each question in the survey instrument. There was also a section in this chapter about the procedures followed to collect the data in this study.

CHAPTER IV. FINDINGS

The purpose of this descriptive census survey was to explore the impact of graduates' participation in one of three of Iowa State University's College of Agriculture and Life Sciences integrated, experiential learning programs. A descriptive follow-up survey was conducted on Agron 356/Engl 309, AgPAQ, and Science With Practice. The study sought to determine the impact the program had on the graduates' career/graduate school, the level of skill improvement attributed to the program, the influence the program had on career development and decidedness, and the extent to which the program enhanced career/graduate school preparation.

The findings and results of this study are presented in six major sections relating to the study's objectives: (a) demographic characteristics, (b) impact on career/graduate school, (c) level of skill improvement, (d) influence on career/graduate school decidedness, (e) enhancement of career/graduate school preparation, and (f) program impact. For the purpose of the objective of program impact, AgPAQ and SWP were reported separately with *t*-statistics, means, and percentages reported for comparison purposes. For the purpose of this study, and to clearly explain the results, AgPAQ and Agron 356/Engl 309 were combined as one unit known as AgPAQ. There were five Agron 356/Engl 309 alumni respondents and 23 AgPAQ respondents.

Demographic Characteristics

Findings presented in this section were generated from: (a) the first section of the questionnaire with questions related to program participation and after graduation status, and (b) the final set of questions which consisted of six multiple choice and open-ended questions about the participants' demographics. In the first set of questions, participants were asked

which program they had participated in and what they chose to do after graduating from Iowa State University. In the final set of questions, participants were asked to provide information about their academic major, year of graduation, career/graduate school position, first job title/graduate school position, current career/graduate school status, if they have taken any graduate level courses, and the highest level of education they aspired to achieve.

Program Participation

The first question was a multiple choice question asking the participants in which of the three programs they had participated. Respondents were split on the programs they participated in with more participants being part of AgPAQ (including Agron 356/Engl 309) ($n = 28$, 51.9%); the other participants were SWP ($n = 26$, 48.1%). All of the categories were represented. Figure 2 displays the respondents by program participation.

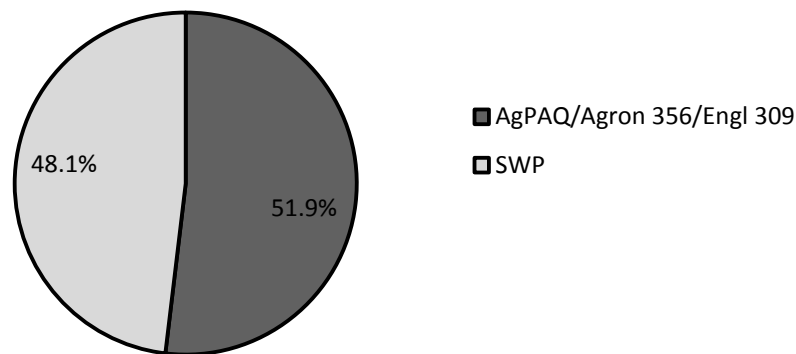


Figure 2. Distribution of Iowa State University College of Agriculture and Life Sciences graduates' response to a questionnaire on integrated, experiential learning programs ($n = 54$)

After Graduation

Participants were asked to report what they did after graduation. This question was a multiple choice question in which participants could answer: entered the workforce, entered

graduate school, returned to family business/farm, entered the military, or other. After graduation, the highest number of respondents entered the workforce (53.2%). Of those respondents that entered the workforce, 64.3% of them were AgPAQ participants and 38.5% were Science With Practice (SWP) participants (Table 2). The next highest response included those who entered graduate school (32.3%). Of those respondents entering graduate school, 10.7% were AgPAQ participants and 57.7% were SWP participants. The remainder of the respondents answered that they returned to the family business/farm (9.7%), and other (4.8%). No respondents had entered the military (0%).

Table 2

Frequencies and Percentages of Iowa State University College of Agriculture and Life Sciences Graduates' after Graduation Decisions (n = 54)

Decision	AgPAQ		SWP		Total	
	<i>n</i>	%	<i>N</i>	%	<i>n</i>	%
Entered the workforce	18	64.3	10	38.5	28	51.9
Entered graduate school	3	10.7	15	57.7	18	33.3
Returned to family business/farm	5	17.9	0	0.0	5	9.3
Entered the military	0	0.0	0	0.0	0	0.0
Other	2	7.1	1	3.8	3	5.5

Some AgPAQ respondents reported that they went back to the family farm (17.9%) while 7.1% chose the option of “other.” Those respondents that were SWP participants answered to the option “other” (3.8%). None of the SWP respondents entered the military or returned to the family business/farm. Participants who chose the option of “other” were

asked to specify their response. Responses included “worked a temporary field job and am waiting to get into graduate school” and “went on for another BA degree.”

Academic Major

Participants were asked to identify their academic major in the College of Agriculture and Life Sciences at Iowa State University. This was a multiple choice question which included all of the majors at Iowa State University in the College of Agriculture and Life Sciences and an option of other. The Agronomy (27.8%), Agricultural Studies (16.7%), Agricultural Business (13.0%), Agricultural and Life Sciences Education (7.4%), and Animal Science (7.4%) majors had the highest number of respondents (Table 3). Animal Ecology made up 5.6% of the respondents, and Agricultural Systems Technology, Biology, Genetics, and Other made up 3.7% of the respondents for each of the majors. The remainder of the respondents were Horticulture, Insect Science/Entomology, Microbiology, and Public Service and Administration in Agriculture with, each making up 1.9% of the respondents.

Participants in AgPAQ majored in Agronomy (50.0%), Agricultural Studies (28.6%), Agricultural Business (17.9%), and Agricultural and Life Sciences Education (3.6%). Participants in SWP had a larger variety of majors including: Animal Science (15.4%), Agricultural and Life Sciences Education (11.5%), Animal Ecology (11.5%), Agricultural Business (7.7%), Agricultural Systems Technology (7.7%), Biology (7.7%), Genetics (7.7%), Other (7.7%), Agricultural Studies (3.8%), Agronomy (3.8%), Horticulture (3.8%), Insect Science/Entomology (3.8%), Microbiology (3.8%), and Public Service and Administration in Agriculture (3.8%).

Table 3

*Frequencies and Percentages of Iowa State University College of Agriculture and Life**Sciences Graduates by Academic Major (n = 54)*

Major	AgPAQ		SWP		Total	
	<i>n</i>	%	<i>N</i>	%	<i>n</i>	%
Agronomy	14	50.0	1	3.8	15	27.8
Agricultural Studies	8	28.6	1	3.8	9	16.7
Agricultural Business	5	17.9	2	7.7	7	13.0
Agricultural and Life Sciences Education	1	3.6	3	11.5	4	7.4
Animal Science	-	-.-	4	7.4	4	7.4
Animal Ecology	-	-.-	3	11.5	3	5.6
Agricultural Systems Technology	-	-.-	2	7.7	2	3.7
Biology	-	-.-	2	7.7	2	3.7
Genetics	-	-.-	2	7.7	2	3.7
Horticulture	-	-.-	1	3.8	1	1.9
Insect Science/Entomology	-	-.-	1	3.8	1	1.9
Microbiology	-	-.-	1	3.8	1	1.9
Public Service and Administration in Agriculture	-	-.-	1	3.8	1	1.9
Agricultural Biochemistry	-	-.-	-	-.-	-	-.-
Biochemistry	-	-.-	-	-.-	-	-.-
Culinary Science	-	-.-	-	-.-	-	-.-
Dairy Science	-	-.-	-	-.-	-	-.-
Dietetics	-	-.-	-	-.-	-	-.-
Diet and Exercise Science	-	-.-	-	-.-	-	-.-
Environmental Science	-	-.-	-	-.-	-	-.-
Food Science	-	-.-	-	-.-	-	-.-
Forestry	-	-.-	-	-.-	-	-.-
Global Resource Systems	-	-.-	-	-.-	-	-.-
Industrial Technology	-	-.-	-	-.-	-	-.-
Nutritional Science	-	-.-	-	-.-	-	-.-
Other	-	-.-	2	7.7	2	3.7

Graduation Year

Participants were asked to identify their year of graduation. This was a multiple choice question in which each of the years 2001 through 2010 were an option for selection. The majority of the participants graduated in 2008 (20.4%), 2007 (16.7%), 2009 (16.7%), and 2005 (14.8%). The rest of the participants graduated in the years of 2010 (13.0%), 2006 (7.4%), 2002 (3.7%), 2003 (3.7%), and 2004 (1.9%) (Table 4). A larger group of AgPAQ participants graduated in 2005 (25.0%) and 2008 (17.9%). The remaining AgPAQ respondents graduated ranging from years 2002 to 2010. The largest group of SWP participants graduated in 2007 (26.9%), 2008 (23.1%), and 2009 (23.1%). The remaining SWP respondents graduated from years 2005 to 2010.

Table 4

Frequencies and Percentages of Iowa State University College of Agriculture and Life Sciences Graduates' Graduation Year (n = 54)

Year	AgPAQ		SWP		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
2001	-	-.	-	-.	-	-.
2002	2	7.1	-	-.	2	3.7
2003	2	7.1	-	-.	2	3.7
2004	1	3.6	-	-.	1	1.9
2005	7	25.0	1	3.8	8	14.8
2006	3	10.7	1	3.8	4	7.4
2007	2	7.1	7	26.9	9	16.7
2008	5	17.9	6	23.1	11	20.4
2009	3	10.7	6	23.1	9	16.7
2010	3	10.7	4	15.4	7	13.0

Job Positions

AgPAQ and SWP graduates were asked if they entered the workforce or secured a position related to their field of study. This was a dichotomous question with the options of answering either yes or no. Of the 54 respondents, 70.4% said their position was related to their field of study, while 5.6% said their position was not related to their field of study (Table 5). Nearly a quarter (24.1%) of those who responded chose to skip the question. Of the AgPAQ participants, 89.3% said their job position was related to their field of study, while 7.1% of respondents' job positions are not related to their field of study. SWP participants reported 50.0% said their job position was related to their field of study, while 3.8% reported their position was not related to their field of study. The larger non-response number for SWP respondents could be attributed to the fact that most of the SWP participants indicated they went on to graduate school.

Table 5

Frequencies and Percentages of Iowa State University College of Agriculture and Life Sciences Graduates' Positions Relating to Participants' Field of Study (n = 54)

Answer	AgPAQ		SWP		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
No	2	7.1	1	3.8	3	5.6
Yes	25	89.3	13	50.0	38	70.4
Missing	1	3.6	12	46.2	13	24.1

If participants entered the workforce, they were asked what was the title of their first position. This was an open-ended question that created many different answers. The answers were broken down into four main categories: Research ($n = 4$), Sales and Marketing ($n = 9$), Agronomy and Crops ($n = 9$), and Other ($n = 15$). The job positions that fell into the

research category included: Temporary Research Assistant, Research Assistant, Quality Scientist 1, and Research Scientist. There were nine job positions that fell into the Sales and Marketing category. Some of these positions included: Account Manager, Graphic Designer and Advertiser, Marketing Representative, and Regional and District Sales Managers. The third category of Agronomy and Crops included positions such as: Agronomist, Sales Agronomist, Crop Specialist, Production Technician, Seed Technician, and Crop Scout. The last category, Other, included a variety of job positions including: Farmer, Heavy-Equipment Operator, Swine Ultrasound Specialist, Agriculture Program Assistant, Assistant Naturalist, and Grain Merchandiser.

Participants were also asked what their current position was, if they entered the workforce. This was an open-ended question that created many different answers. The answers were broken down into four main categories: Research ($n = 5$); Sales, Marketing and Management ($n = 11$); Agronomy and Crops ($n = 9$); and Other ($n = 8$). In the current Research positions, participants indicated job titles of: Research Associate and Soybean Research Associate. In the Sales, Marketing, and Management category, job titles included: Operations Supervisor, Commercial Claims Manager, Agency Manager, Marketing Representative, and Territory Sales Manager. In the third category of Agronomy and Crops, participants designated job titles including: Agronomist, Sales Agronomist, Senior Crop Scout, Seed Quality Supervisor, and Crop Adjuster. In the final category of Other, participants noted job titles of: Academic Advisor and Recruiter in Agricultural Education, Dairy Farmer, Assistant Naturalist, Program Assistant, Agritourism director and Freelance web designer and Journalist, and Farmer.

Higher Education

Participants were asked if, after completing their undergraduate degree, they had taken any graduate level courses. This is a dichotomous question with the options of answering yes or no. If the respondent answered yes to this question, they were asked to identify the field in which they took their graduate level courses. The majority of the respondents responded no (63.0%), they had not taken graduate level courses since graduating, and 37.0% said they had taken graduate level courses (Table 6). Of those respondents who had taken graduate level courses since completing their undergraduate degree, 21.4% were AgPAQ participants, and 53.8% were SWP participants.

Table 6

Frequencies and Percentages of Iowa State University College of Agriculture and Life Sciences Graduates Furthering Their Education with Graduate Courses Since Completing Their Undergraduate Degree (n = 54)

Answer	AgPAQ		SWP		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
No	22	78.6	12	46.2	34	63.0
Yes	6	21.4	14	53.8	20	37.0

The respondents who answered yes to taking graduate level courses since graduation reported the area of study. Some of the areas of study included Education, Agricultural Education and Community Development, Animal Science, Horticulture, Agronomy, Agricultural Engineering, Crop Production and Physiology, Plant Science, Biology, and Genetics.

Lastly, the participants were asked to note the highest level of education they aspired to complete. The highest number of respondents chose they aspire to complete a professional

degree (24.1%), followed by a master's degree focused on science/research (20.4%), master's degree focused on professional development (18.5%), professional development courses/workshops/seminars required of their position/employer (18.5%), and professional certification (14.8%). The remainder of the participants chose the option of other (3.7%) (Table 7). Among AgPAQ participants, the highest level of education aspired was professional development courses/workshops/seminars required by their position/employer (32.1%). Among the SWP participants, the highest level of education aspired was a professional degree (46.2%).

Table 7

Frequencies and Percentages of Iowa State University College of Agriculture and Life Sciences Graduates' Highest Level of Education Aspired (n = 54)

Level of Education	AgPAQ		SWP		Total	
	<i>N</i>	%	<i>n</i>	%	<i>n</i>	%
Professional development courses/workshops/seminars required of my position/employer	9	32.1	1	3.8	10	18.5
Professional certification (i.e., CCA, CPAg, etc.)	7	25.0	1	3.8	8	14.8
Master's degree focused on professional development	5	17.9	5	19.2	10	18.5
Master's degree focused on science/research	4	14.3	7	26.9	11	20.4
Professional degree (i.e. Ph.D., DVM, MD, JD, etc)	1	3.6	12	46.2	13	24.1
Other	2	7.1	0	0.0	2	3.7

Impact on Career/Graduate School

The first objective of this study was to determine the impact the programs had on career/graduate school. Table 8 displays statistics of graduates' responses to the question

regarding the impact the experience made on the respondent's career. This was a multiple choice question in which participants could answer:

- It had no impact on my career/advanced education or my ability to fulfill my responsibilities,
- It had significant impact early in my career/advanced education but has diminished as I gain more experience, or
- It has had a significant impact throughout my career, thus far.

The overall mean for this question was 2.26 ($SD = 0.103$). The AgPAQ respondents had a mean of 2.36 ($SD = 0.731$), and SWP students had a mean of 2.15 ($SD = 0.784$). There was no statistical difference between AgPAQ and SWP respondents. Both groups reported that the program had a significant impact early in their career/advanced education.

Table 8

Distribution of Means, Standard Deviations, T-Statistics, Degrees of Freedom, and Significance for the Impact the Experience had on the Respondent's Career (n = 54)

	AgPAQ		SWP		Total		T-Statistics*		
Impact	<i>SD</i>		<i>SD</i>		<i>SD</i>		<i>t</i>	<i>df</i>	<i>Sig.</i>
	2.36	0.731	2.15	0.784	2.26	0.103	0.986	52	0.329

*Equal variances were assumed.

Note scale: (1) It had no impact on my career/advanced education or my ability to fulfill my responsibilities. (2) It had significant impact early in my career/advanced education but has since diminished as I gain more experience. (3) It has had a significant impact throughout my career, thus far.

The respondents were asked to explain the way they responded to the question about the impact the experience had made on their career/advanced education. The responses to this open-ended question were broken down into three broad categories: (a) no impact on

career/graduate school, (b) significant impact at the start of career, and (c) significant impact on career/graduate school still today.

The first category was graduates explaining how the program did not have an impact on their career or graduate school. Responses that fit into this category mostly explained that because of their individual situations, the program was not beneficial, but it was not the program that was at fault. Examples of responses that fit into the category of “no impact on career/graduate school” are:

“At the time of enrollment in AgPAQ, I thought the program would have a great impact on my future career, but now looking back I can say that it was just a group of classes no different than any other. I am not degrading the program, it just wasn't a program for me.”

“I don't often think of my SWP experience because I was already working for the same department before they moved me to SWP for two semesters. Therefore, I never really viewed my work experience revolving around SWP; I saw SWP just as another part of my work experience. That's not to say that I don't think it's a great program, I just think that in my specific situation it didn't have that much of an impact. Had my participation in SWP been determined before I actually started work, I think it would have left more of an impression.”

“When I was participating in Science With Practice, my goal was to go to graduate school. However, I decided to take time off from school and work. In my current job, I might be able to use some of the knowledge from my project, but it does not relate well to my current job. If my current job was more research based, it might be more relevant. Nevertheless, I still believe that it was a great experience, and I would encourage all students to participate in a project.”

The second category of responses included graduates who reported that the programs had an impact early on in their career or advanced education, but had since diminished because of various reasons. Examples of responses that fit into the category of “significant impact at the start of my career” are:

“I feel that the lessons learned in careers stretch way beyond what could even have been reached in SWP, but it definitely eases the transition into the workforce at the beginning. I have to do weekly reporting for my job, so SWP influences that a lot.

(And overall, my SWP job does not relate to my current career so most of the knowledge doesn't transition).”

“As I gain more experience, I find that I am building my own way of doing things and handling customer relations. The experience I gained in AgPAQ significantly helped me in finding a job and having early confidence to deal with growers in the first year of so of my career.”

“After being out of college for 5 years, many of the tools I use today have been learned from my employer, and in the industry change is a constant. I do believe that it gave me a great foundation to build on for the first three years after graduation, because there is no great way to gain real world experience in college. AgPAQ was as close to this as I could get, and I am very glad Dr. Gibson persuaded me to join the program.”

“My SWP experience led me to future internship and career opportunities, including opportunities abroad. Without the experience, I would not have gained the foundational skills and knowledge that helped me in gaining the future opportunities.”

“As the undergraduate coordinator of the first ever SWP program, I was challenged in new ways and had the opportunity to work alongside two professors and a graduate student. This experience enhanced my professional and communication skills then. Several years have passed now, and other graduate school related experiences have caused me to continue progression. I consider Science With Practice a springboard to my graduate career.”

The last category was graduates explaining how the program did have a significant impact on their career or graduate school still today. Respondents explained the benefits in their careers and graduate school that they have seen that can be attributed to the program. Examples of responses that fit into the category of “significant impact on career/graduate school still today” are:

“In Science With Practice, I learned to design, execute, and analyze experiments independently, which, I believe, put me ahead of other students entering graduate school. Additionally, I got the opportunity to create and present a poster. It is rare to give poster presentations in undergraduate studies so this was very helpful, especially since I now do at least one per year as a graduate student.”

“AgPAQ was a great program that was kind of the capstone to a college education. It tied a lot of different areas of education together and put it into real life scenarios. Farming back at home, it is on a much lesser scale in regards to client-based

communication and help. I still utilize communication skills I learned with the partners on the farm and bring the knowledge I gained on our agronomy and economics side towards making our operation more profitable. I think a lot of people may think it is not useful if you are not going into agronomy/sales/service, but it is something I use every day.”

“Science With Practice gave me experience in a slightly different field than my internship. Because of this added experience, I have and am still able to market myself as a more well-rounded professional with a plethora of skills.”

“To me, a great value of AgPAQ is that it presents student with "real-world" situations and scenarios by requiring them to apply in-class learning, scientific principles, and agronomic knowledge to problem-solve and work with the client. This was the only class that I took at Iowa State that presented me with this opportunity. I completed my MS degree in Crop Production and Physiology, am now working in Agriculture, and in retrospect, this opportunity to address actual situations and issues of the client was a real and perfect preparation for situations I have faced on a day-to-day basis in the two years since I have graduated. Because of my exposure to such opportunity in AgPAQ, and the guidance of the instructors concerning how to apply scientific knowledge to problem-solve (that often there aren't black and white answers) gave me confidence throughout my master's research and saved me much discouragement and frustration I might have experienced had I not taken AgPAQ. Furthermore, the emphasis on communication and group-work is excellent. AgPAQ was the best all-around course I took at ISU, and I believe such classes should be a required part of curriculum in all disciplines as it is a valuable integration of fundamental principles, application, group-work, and communication.”

Next, the participants were asked to respond to a five-point question regarding, specifically how the experience made an impact on them. The five impact categories were: assisting in the transition from an undergraduate student to employee/graduate student, influencing career plans for after bachelor's degree, influencing plans for postgraduate education (either right after graduation or in the future), helping become a more active learner, and helping become a more motivated learner. The respondents were asked to identify the extent to which the experience made an impact on these specific categories using the following scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neither disagree or agree, 4 = Agree, and 5 = Strongly agree. The means and standard deviations were reported in Table 9.

The categories with the highest means were *helping become a more active learner* ($M = 3.81$; $SD = 0.933$), and *helping become a more motivated learner* ($M = 3.80$; $SD = 0.898$). The remainder of the ratings according to their means and standard deviations were: *assisting in the transition from undergraduate student to employee/graduate student* ($M = 3.72$; $SD = 0.878$), *influencing career plans for after bachelor's degree* ($M = 3.41$; $SD = 0.962$), and *influencing plans for postgraduate education* ($M = 3.28$; $SD = 0.979$).

There were no significant statistical differences in the responses of AgPAQ and SWP. Respondents agreed the program assisted them in the transition from undergraduate student to employee/graduate student and helped them become more active and motivated learners. The responses were neutral that the program influenced their career plans for after their bachelor's degree and for postgraduate education.

Level of Skill Improvement

The next objective was to investigate the level of skill improvement attributed to the program. The participants were asked, based upon what they know now, to what extent they improved their skills and abilities as a result of their experience. The participants rated each of the 10 categories using a Likert-type scale (Table 10). The categories were communication, time management, responsibility, organization, self-confidence, listening skills, research skills, technical skills, writing skills, and other. When the respondents rated the option of other, they had the option to specify their skills. The Likert-type scale used was the following: (1) No improvement/very small improvement, (2) Small improvement, (3) Moderate improvement, (4) Large improvement, (5) Very large improvement, and (6) Not applicable/prefer not to answer.

Table 9

Distribution of Means, Standard Deviations, T-Statistics, Degrees of Freedom, and Significance for the Impact the Experience Had on Five Different Categories (n = 54)

Impact	AgPAQ		SWP		Total		T-Statistics*		
		<i>SD</i>		<i>SD</i>		<i>SD</i>	<i>T</i>	<i>df</i>	<i>Sig.</i>
Helping me become a more active learner	3.79	1.031	3.85	0.834	3.81	0.933	-0.236	52	0.815
Helping me become a more motivated learner	3.79	0.995	3.81	0.801	3.80	0.898	-0.089	52	0.929
Assisting me in the transition from an undergraduate student to employee/graduate student	3.79	0.917	3.65	0.846	3.72	0.878	0.548	52	0.586
Influencing my career plans for after my bachelor's degree	3.43	1.069	3.38	0.852	3.41	0.962	0.166	52	0.869
Influencing my plan for postgraduate education (either right after graduation or in the future)	3.29	1.049	3.27	0.919	3.28	0.979	0.061	52	0.951

*Equal variances assumed.

Note scale: (1) Strongly disagree, (2) Disagree, (3) Neither disagree or agree, (4) Agree, (5) Strongly agree

Table 10

Distribution of Means, Standard Deviations, t-Statistics, Degrees of Freedom, and Significance for the Improvement of Skills and Abilities as a Result of the Experience (N = 54)

Skills and Abilities	AgPAQ		SWP		Total		T-Statistics*		
	Mean	SD	Mean	SD	Mean	SD	t	df	Sig.
Research Skills	3.70	1.171	3.42	1.323	3.57	1.264	0.806	51	0.424
Communication	3.57	1.069	3.23	1.210	3.41	1.141	1.098	52	0.277
Self-Confidence	3.48	1.312	3.08	1.412	3.28	1.364	1.081	51	0.285
Technical Skills	3.46	1.105	3.08	1.468	3.28	1.295	1.101	52	0.276
Organization	3.50	1.202	2.92	1.017	3.22	1.144	1.897	52	0.063
Writing Skills	3.50	1.232	2.85	1.156	3.19	1.230	2.007	52	0.050**
Responsibility	3.18	1.219	2.96	1.183	3.07	1.195	0.663	52	0.510
Listening Skills	3.32	1.278	2.69	1.011	3.02	1.189	1.996	52	0.051
Time Management	3.11	1.197	2.84	1.179	2.98	1.185	0.817	51	0.418
Other	4.67	0.577	3.00	1.789	3.56	1.667	1.528	7	0.170

*Equal variances assumed.

Note scale: (1) No improvement/very small improvement, (2) Small improvement, (3) Moderate improvement, (4) Large improvement, (5) Very large improvement

**Statistical significance at $p < .05$

The category with the highest overall combined (SWP and AgPAQ) mean was *research skills* with a mean of 3.57 ($SD = 1.264$). The category that had the next highest mean was *other* ($M = 3.56$; $SD = 1.667$). The next three closest means and standard deviations were *communication skills* ($M = 3.41$; $SD = 1.141$), *self-confidence* ($M = 3.28$; $SD = 1.364$), and *technical skills* ($M = 3.28$; $SD = 1.295$).

The other category ratings according to their means were *organization* ($M = 3.22$; $SD = 1.144$), *writing skills* ($M = 3.19$; $SD = 1.230$), *responsibility* ($M = 3.07$; $SD = 1.195$), *listening skills* ($M = 3.02$; $SD = 1.189$), and *time management* ($M = 2.98$; $SD = 1.185$). The respondents that specified the category of *other* mentioned skills such as detail, taking constructive criticism, cultural awareness, ability to work in new settings, and group-work.

Respondents rated all categories except research skills and other as showing moderate improvement. Writing skills was the only category that showed statistical significance. In this category, AgPAQ respondents reported greater improvement than SWP respondents.

Influence on Career/Graduate School Decidedness

The third objective in this study was to determine the influence the programs had on career and graduate school decidedness. Participants were asked to what extent their experience in AgPAQ, Agron 356/Engl 309, or SWP influenced their view of the workplace or graduate school in the following areas: helped to clarify career/education goals, better prepared for workplace/graduate school, helped transition to workplace/graduate school, better able to solve problems that were faced as a new employee/graduate student, and influenced career/educational advancement. The respondents were asked to rate each of the five categories using the following Likert-type scale: (1) None/very little extent, (2) Small

extent, (3) Moderate extent, (4) Large extent, (5) Very large extent, and (6) Not applicable/prefer not to answer (Table 11).

The category with the highest overall combined (SWP and AgPAQ) mean was *better prepared for workplace/graduate school* ($M = 3.23$; $SD = 1.171$). The next highest category was *better able to solve problems faced as a new employee/graduate student* ($M = 3.17$; $SD = 1.194$), followed by *helped transition to workplace graduate school* ($M = 2.91$; $SD = 1.350$), *influenced career/educational advancement* ($M = 2.79$; $SD = 1.405$), and *helped to clarify career/educational goals* ($M = 2.68$; $SD = 1.341$).

The respondents indicated a moderate extent for four of the five categories. The fifth category, *helped to transition to workplace/graduate school*, was the only category which showed statistical significance. The AgPAQ respondents rated this category higher than SWP respondents.

In the next question, respondents were asked to share a specific example of how their experience impacted, if at all, their transition to the workplace/graduate school and how the specific experience impacted their career/educational advancement. This was an open-ended question, thus a variety of examples of experiences were shared. Some of the common themes were transition to workplace/graduate school, problem-solving abilities, improvement of skills, pursuing careers/educational decisions, teamwork, and career/graduate school expectations. A few examples of the experiences respondents described are as follows:

“More than anything, AgPAQ taught me to have patience working with people with different skill sets. As I had a weak group in one class, my grade in that class fell below my expectations. It was an early lesson that everyone has a different level they will be successful at.”

“I am currently in charge of an agritourism department which involves a lot of advertising, data tracking, and researching consumer needs and wants. These are

the three main skills I attained from Science With Practice at the Iowa Pork Industry Center and Communication Services that have helped me the most. Furthermore, I probably wouldn't have attempted this position if I hadn't had a little experience in it already and knew that I enjoyed the work and could successfully handle the responsibility.”

“I do not have a specific example but would rather state that AgPAQ made my overall transition smooth—with AgPAQ I had already experienced workplace-type situations. The fact that I had a smooth transition most certainly contributed to my success in graduate school and now the workplace.”

“Learning the best way to report to manager on a weekly basis - I e-mailed a weekly report on Friday to all sales reps and managers of what is happening in my territory, problems I'm experiencing, positive forward movement, and questions I need help with. This relates to all the journaling we did with SWP. Learning how to keep track of communication and to-do items - general scheduling/office organization - being proactive with questions was important with my SWP because the professor wasn't always around to answer them on a daily basis. I'm out in the field in my job and without a manager right at hand, so thinking ahead becomes very important, especially before I go see an important client.”

“The team environment was the most important. In my career I work with many groups to develop new products or solve problems. First my group has to identify the need and/or needs. Next, I have to make sure the group I am working with is on the same page with what the problem is or what we need to develop. As ideas come out, I have to listen to everyone's take in the situation. Finally I have to make sure that the team I am working with is on the same page on how we are going to solve the problem.”

Enhancement of Career/Graduate School Preparation

The fourth objective of this study was to investigate the extent to which the program enhances career/graduate school preparation. Participants were asked if they were better able to do the following because of their experience: analyze and solve problems, think independently and formulate their own ideas, communicate more effectively and professionally with clients/mentors, communicate more effectively and more professionally with co-workers, integrate and synthesize knowledge from multiple disciplines, understand discipline specific principles at the beginning of their career (or graduate program) to the

point that they were better able to understand and solve the problems they were facing.

Respondents were to rate each of these six categories using the following Likert-type scale:

(1) Strongly disagree, (2) Disagree, (3) Neither disagree or agree, (4) Agree, and (5) Strongly agree.

The means and standard deviations were reported in Table 12. The category with the highest overall combined (SWP and AgPAQ) mean was *better able to communicate more effectively and professionally with clients/mentors* ($M = 4.19$; $SD = 0.709$). The category with the next highest mean was *better able to communicate more effectively and professionally with co-workers* ($M = 4.04$; $SD = 0.751$). *Better able to integrate and synthesize knowledge from multiple disciplines* ($M = 3.98$; $SD = 0.835$) was the next highest category, followed by *better able to think independently and formulate own ideas* ($M = 3.96$; $SD = 0.868$) and *better able to understand discipline specific principles at the beginning of their career* ($M = 3.91$; $SD = 0.791$). There was no statistical significance reported. The respondents all agreed that they were better able to do these skills because of their experience.

Table 11

Distribution of Means, Standard Deviations, t-statistics, Degrees of Freedom, and Significance for Influence the Experience Has Made on the Workplace/Graduate School (n = 54)

Influence	AgPAQ		SWP		Total		T-Statistics*		
		<i>SD</i>		<i>SD</i>		<i>SD</i>	<i>T</i>	<i>df</i>	<i>Sig.</i>
Better prepared me for workplace/graduate school	3.39	1.100	3.04	1.241	3.23	1.171	1.097	51	0.278
Better able to solve problems that I faced as a new employee/graduate student	3.43	1.136	2.88	1.211	3.17	1.194	1.703	52	0.095
Helped me transition to workplace/graduate school	3.32	1.249	2.46	1.334	2.91	1.350	2.447	52	0.018**
Influenced my career/educational advancement	2.86	1.458	2.72	1.370	2.79	1.405	0.352	51	0.727
Helped me to clarify career/education goals	2.85	1.292	2.50	1.393	2.68	1.341	0.954	51	0.345

*Equal variances assumed.

Note scale: (1) None/very little extent, (2) Small extent, (3) Moderate extent, (4) Large extent, (5) Very large extent.

**Statistical significance at $p < .05$.

Table 12

Distribution of Means, Standard Deviations, t-Statistics, Degrees of Freedom, and Significance for the Skills Enhances as a Result of the Experience (n = 54)

Better able to...	AgPAQ		SWP		Total		T-Statistics*		
		<i>SD</i>		<i>SD</i>		<i>SD</i>	<i>t</i>	<i>df</i>	<i>Sig.</i>
Communicate more effectively and professionally with clients/mentors	4.26	0.764	4.12	0.653	4.19	0.709	0.736	51	0.465
Communicate more effectively and professionally with co-workers	4.04	0.744	4.04	0.774	4.04	0.751	-0.013	52	0.989
Integrate and synthesize knowledge from multiple disciplines	4.07	0.900	3.88	0.766	3.98	0.835	0.819	52	0.417
Think independently and formulate my own ideas	4.00	0.903	3.92	0.845	3.96	0.868	0.323	52	0.748
Understand discipline specific principles at the beginning of my career (or graduate program) to the point that I was better able to understand and solve the problems I faced then	3.96	0.808	3.85	0.784	3.91	0.791	0.534	51	0.596
Analyze and solve problems	3.96	0.693	3.81	0.694	3.89	0.691	0.829	52	0.411

*Equal variances assumed.

Note scale: (1) Strongly disagree, (2) Disagree, (3) Neither disagree or agree, (4) Agree, (5) Strongly agree

Program Impact

One purpose of this study was to determine the impact of the programs. The participants were asked four questions that fit into this purpose. The first question asked to what extent the mentoring portion of the experience benefited the participants in their career. The second question asked the respondents to share any suggestions they had for improving the mentoring interaction of the programs. The third question in this section asked the respondents if they would recommend the experience to others, and the final question asked the respondents what advice they would share with others who might consider participating in one of the programs.

The first question in this section, to what extent did the mentoring portion of the experience benefit their career, was a Likert-type scale question. The scale for this question was as follows: (1) None/very little extent, (2) Small extent, (3) Moderate extent, (4) Large extent, (5) Very large extent, and (6) Not applicable/prefer not to answer. The means, standard deviations, and *t*-statistics were reported (Table 13). The overall mean for this question was 3.39 (*SD* = 1.433). The mean of the AgPAQ participants was 3.54 (*SD* = 1.598), and the mean of the SWP participants was 3.23 (*SD* = 1.243). There was no statistical difference reported for this section. All of the respondents indicated moderate extent to the benefit of the mentoring portion of the program.

For the next question in this section, participants were asked to share any suggestions they had for improving the mentoring interaction. This was an open-ended question, which led to the respondents leaving an assortment of responses. The suggestions were sorted into two categories, slight improvements and no improvements. Some examples of the

respondent's suggestions for the mentoring program that fit into the category of *slight improvements* are:

Table 13

Distribution of Means, Standard Deviations, t-Statistics, Degrees of Freedom, and

Significance for Benefit of the Mentoring Portion of the Program (n = 54)

Benefit	AgPAQ		SWP		Total		T-Statistics*		
		<i>SD</i>		<i>SD</i>		<i>SD</i>	<i>t</i>	<i>Df</i>	<i>Sig.</i>
	3.54	1.598	3.23	1.243	3.39	1.433	0.778	52	0.440

*Equal variances assumed.

Note scale: (1) None/very little extent, (2) Small extent, (3) Moderate extent, (4) Large extent, (5) Very large extent

“I always wished that we would have had the chance to learn about selling skills while in the course. I know that many employers will send you to training once you are hired but having a base line knowledge of selling skills/styles would have been great. I also wish that we could have done more troubleshooting/diagnosing in field issues that may come up with a customer or father while walking a field. People often times look to a new ISU grad for advice or problem solving. We were given the tools to learn it on our own, which is great because we must continue to learn on the job every day, but I would have like to of picked up a few tips from some seasoned veterans while in college before hitting the industry.”

“Mentoring is extremely important to me, but honestly, as I look back I can't recall who my mentor was in this situation. Was it supposed to be my boss? Was it supposed to be the SWP administrators themselves? As I said in my earlier response, I feel that I continued with my job as usual except that I had to write mini-progress reports every couple of weeks and give a presentation at the end. Obviously, my mentoring interaction could have been improved with more one-on-one discussion time about my role and performance.”

“Maybe have us each do an individual project, and have you guys provide input and feedback.”

Some examples of the respondents' suggestions for the mentoring program that fit into the category of *no improvements* are:

“I have no suggestions for improving the mentoring interaction. In both my SWP my mentors were extremely helpful. If anything I think the mentorship is the most important part. I felt more at ease asking questions, versus not having a mentor and being nervous and being too nervous to ask for help when I needed it.”

“No suggestions for improvement because the way in which AgPAQ was team-taught was excellent. I would not change that aspect of it by any means. The professors were available and completely helpful.”

“No suggestions. I had an excellent mentor who was very engaged and had a very open door policy, which allowed me to meet with her at any point and discuss everything that we were working on. It was a very collaborative experience which allowed me to develop my skills and abilities (especially in writing and communicating effectively!).”

The next question in the impact portion of the questionnaire asked the respondents if they would recommend the experience to others (Table 14). The respondents had the option to answer with either yes or no. If they answered no, they were asked to explain. Nearly all of the respondents said, yes (92.6%, $n = 50$), they would recommend the experience to others, and only 5.6% ($n = 3$) said no, they would not. One respondent (1.9%) did not respond. Of the AgPAQ participants, 85.7% ($n = 24$) said yes, and 10.7% ($n = 5$) said no. Of the SWP respondents, 100% of the respondents selected yes. There were only three individuals who chose to explain why they chose no. Their responses were:

“Maybe, but it will take more time than taking regular classes.”

“Probably not.”

“Only if they don’t like working in groups would I discourage participation in this class.”

Table 14

*Frequencies and Percentages of Past Program Participants'**Recommendations to Others (n = 54)*

Answer	AgPAQ		SWP		Total	
	<i>n</i>	%	<i>N</i>	%	<i>n</i>	%
No	3	10.7	0	0.0	3	5.5
Yes	24	85.7	26	100.0	50	92.6
Missing	1	3.6	0	0.0	1	1.9

The final question asked participants what advice they would share with others who might consider participating in AgPAQ, Agron 356/Engl 309, or SWP. The respondents provided a plethora of advice to future students. Their responses were categorized into three broad categories: *active commitment*, *real-world/hands-on*, and *other*. Examples of responses that fit into the category *active commitment* are as follows:

“It takes a vast amount of time and commitment to learning, however, the experience gained in the end is worth it!”

“You only get out what you put in. While the reflective pieces may not seem relevant at the time, it is a great way for you to look back to see what you learned from the experience.”

“Don’t hesitate too much when offered the chance to take this course. It was by far the best experience/class I took while at ISU. It is as close to the real world as you can get while sitting in a classroom. You will be ahead of the curve and other job applicants if you put all your effort into this program. We must all find a way to differentiate ourselves in the industry to further our career, and this is one way to do that even before you receive your diploma.”

“Try a little harder and pay more attention. There are a lot of things that we covered in Agron 356 that are useful in the workplace. I run into situations a lot where I remember talking about something, but since I wasn’t paying close attention, I can’t remember the details.”

Examples of responses that fit into the category *real-world/hands-on* are as follow:

“SWP – For those who are motivated by the idea of “learning by doing,” SWP is for you. Outside of classroom experiences are what I cherish the most about my ISU career. This is also a great opportunity for undergraduate students interested in agricultural research. They can find out if graduate school is an option, get a taste of research, and develop a scientific way of thinking.”

“This class will be a great challenge but a great pay-off. It will offer you something that other classes do not: real-world experience and situations. To have that before you graduate is a unique and powerful opportunity. By taking AgPAQ you will be laying the foundation for a successful start to your career or graduate program.”

“Go for it! It is an awesome experience that really helps you put your life into a situation that is realistic and helps you understand what goes on in the workplace.”

“SWP offers students an extraordinary opportunity to gain real, hands-on experience in a research setting that could lead to personal and professional insights relevant to career and educational goals. I’d highly recommend the experience for self-starters, motivated learners, and students considering careers in the professional or applied sciences.”

Examples of responses that fit into the category *other* are as follows:

“Learn all you can from your mentor/boss. They have a lot of knowledge and experiences to gain from.”

“Take as many SWPs as possible, even if it doesn’t fit exactly in your field of interest. You need a huge amount of experience proving your abilities and skills to compete with the rest of the world. You need more than college courses and internships to be competitive in the world.”

“It can be a good experience, but I did find it more time consuming than similar other classes. If you are looking to increase your teamwork skills, it can help you there if you don’t have much experience. It is also good at teaching one how everything ties together in the workplace.”

“The program provides a structure that facilitates learning by application. The class content can be applied much like in real-life situations.”

CHAPTER V. SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

This chapter discusses the major findings broken down into six sections including a demographics section. These sections are demographics, impact on career/graduate school, skill improvement, influence on career/graduate school decidedness, enhancement of career/graduate school preparation, and program impact. Following the major findings, this chapter discusses conclusions made from the results of this study. Implications and the educational significance of this study are also highlighted in this chapter. Lastly, recommendations and suggestions for further research are discussed.

Summary

The purpose of this study was to explore the impact of graduates' participation in one of two of Iowa State University's College of Agriculture and Life Sciences integrated, experiential learning programs. A descriptive follow-up survey was conducted focused on: AgPAQ and Science With Practice. The objectives of this study were to:

1. Determine the impact the program had on career/graduate school,
2. Investigate the level of skill improvement attributed to the program,
3. Determine the influence the program had on career development and decidedness, and
4. Investigate the extent to which the program enhances career/graduate school preparation.

This study utilized a descriptive census survey research design. The accessible population consisted of 123 graduates who once participated in one of the two programs and graduated from Iowa State University's College of Agriculture and Life Sciences. A web-based survey design using SurveyMonkey™ (2009) was used to collect data for this

study. The survey instrument consisted of five major sections related to the study's objectives.

The survey instrument was sent to 123 graduates, and a total of 62 graduates responded. A total of 54 useable questionnaires were returned for a response rate of 43.9%. Non-respondents were compared to early and late responders to determine if there were differences between early and late respondents. Raw data collected using SurveyMonkey™ (2009) were entered into an Excel spreadsheet and imported into SPSS. Descriptive statistics such as means, standard deviations, frequencies, and percentages were used to analyze the data. Inferential statistics such as *t*-tests were used to determine differences among selected groups.

Summary of Major Findings

The following section of this chapter outlines the major findings of the study. This section is divided into demographics, impact on career/graduate school, level of skill improvement, influence on career/graduate school decidedness, enhancement of career/graduate school preparation, and the programs' impact.

Demographics

The demographics revealed that slightly over half of the respondents participated in AgPAQ (including Agron 356/Engl 309), and the other half were SWP participants. After graduation, most respondents entered the workforce. Of those who entered the workforce, the majority were AgPAQ participants (64.3%). On the other hand, the SWP participants were more likely to enter graduate school (57.7%). Very few respondents returned to the family business/farm (9.3%), and no participants entered the military.

The participants in this study represented 14 of the 25 academic majors in the College of Agriculture and Life Sciences at Iowa State University. AgPAQ participants represented four majors, while SWP participants represented 14 different majors. This can be attributed to the focus and objectives of each program. The courses within the AgPAQ program are intense courses which students majoring in Agronomy and Agricultural Business might take and have pre-requisites that may have already been completed. SWP is a less intensive course open to the entire College of Agriculture and Life Sciences that does not have a specific focus on material that will be covered (i.e., Animal Science issues, Soil Science, Economic issues, etc.).

The highest number of participants was Agronomy majors, followed by Agricultural Studies majors. Of the AgPAQ respondents, half were Agronomy majors. Conversely, very few of the SWP graduates were Agronomy majors. The major with the most participants for SWP was Animal Science, followed closely by Animal Ecology and Agricultural and Life Sciences Education. The graduation year with the most respondents was 2008. AgPAQ had the most respondents graduate in 2005, while SWP had the highest number of respondents graduate in 2007. The graduation years ranged from 2000 to 2010.

The majority of the respondents started their careers with a job related to their field of study. AgPAQ had nearly all respondents enter their field of study while SWP only had half of their respondents. The SWP respondents had a higher number of non-respondents for this question due to the fact that many of them entered graduate school rather than the workforce. The respondents gave the researchers the title of their first job position. The largest portion of the answers fell into the categories of research, sales and marketing, agronomy and crops, and other. Participants also gave the title of their current professional position. These

responses fell into four broad categories of research, sales, marketing and management, agronomy and crops, and other.

Since completing their undergraduate degree, the majority of respondents had not taken any higher education courses. Almost one quarter of AgPAQ graduates had taken graduate level courses, whereas over half of the SWP graduates had taken graduate level courses. Higher education is aspired by graduates who participated in one of these programs. A large portion of AgPAQ graduates noted professional development courses/workshops/seminars required by their position/employer represented the highest level of education to which they aspired. Conversely, nearly half of the SWP respondents noted that the highest level of education they aspired to receive was a professional degree (i.e. Ph.D., DVM, MD, JD, etc).

Impact on Career/Graduate School

Nearly all of the respondents stated that the experience had some impact on their career/graduate school. When the respondents reasoned why their experience did not have a significant impact on the career, they stated the experience had no impact on their career because of their individual situation and not because of the program. The respondents showed that both of the programs had an impact by developing skills and abilities and helping them get into their desired career/graduate school.

The respondents agreed the program had an impact by assisting in the transition from undergraduate student to employee/graduate student. Respondents also agreed the program has shown to have some influence on career plans for graduates after earning their Bachelor's degree. Most respondents had no opinion of programs having an impact on their plans for

postgraduate education. There were no significant statistical differences between AgPAQ respondents SWP respondents.

Skill Improvement

Participants were asked to rate the level of improvement of 10 different skill categories. Respondents indicated an improvement in the category of research skills. The participants also stated that there had been moderate improvement in the categories of communication skills, self confidence, technical skills, organization, writing skills, responsibility, and listening skills. There was a significant statistical difference in the AgPAQ and SWP students in the category on writing skills. The AgPAQ respondents rated writing skills significantly higher than SWP respondents.

Influence on Career/Graduate School Decidedness

The area with the largest influence on respondents' career/graduate school decidedness was the area of being better able to solve problems that the participants faced as a new employee/graduate student. The respondents believed this category had a moderate impact. The respondents also reported that they were moderately better prepared for the workplace/graduate school and that the experience helped in the transition to the workplace/graduate school.

There was a significant statistical difference between AgPAQ and SWP respondents in the area of helping transition to the workplace/graduate school. AgPAQ respondents rated this category significantly higher than SWP respondents. The participants' responses to the open-ended question asking specifically how the experience impacted their career/graduate school indicate impacts in helping the transition to the workplace/graduate school,

improvement in problem-solving abilities, improvement of skills, pursuing careers/educational advancement, teamwork, and career/graduate school expectations.

Enhancement of Career/Graduate School Preparation

Participants responded to six statements related to the enhancement of career/graduate school preparation. Nearly all of the respondents agreed that because of the experience, they were able to: (a) analyze and solve problems, (b) think independently and formulate their own ideas, (c) communicate more effectively and professionally with clients/mentors, (d) communicate more effectively and professionally with co-workers, (e) integrate and synthesize knowledge from multiple disciplines, and (f) understand discipline specific principles at the beginning of their career (or graduate program) to the point that they were better able to understand and solve the problems they faced then. Overall, there was no significant statistical difference between the AgPAQ and the SWP respondents.

Program Impact

When the participants were asked to respond about the mentoring portion of the experience, the respondents noted that the mentoring portion moderately benefited their experience. There was no significant statistical difference between the AgPAQ and SWP respondents regarding mentoring. The participants were also asked to give suggestions for improving the mentoring portion of the experience. The respondents gave a variety of responses that generally said that only slight improvements would make the mentoring portion better. Most respondents stated that the mentoring portion did not need any improvements at all.

The respondents were asked if they would recommend the experience to others. Nearly all of the AgPAQ participants said they would recommend the experience to others,

while all of the SWP respondents would recommend the experience to others. The respondents also gave advice to future participants of the program, and most of the respondents agreed that the experience requires active commitment and provides students with real-world, hands-on experiences.

Conclusions

The following conclusions were drawn based on the findings as they related to perceptions of graduates from Iowa State University's College of Agriculture and Life Sciences integrated, experiential learning programs (AgPAQ and SWP), and the review of student learning styles and experiential learning literature:

1. The study provided evidence that the AgPAQ, and SWP programs have a positive impact on the participants' career and/or graduate school. This conclusion is based on respondents' reports that the programs had a significant impact on their career by helping them transition into the workplace/graduate school and by providing them with real-world, hands-on experiences.
2. The respondents reported a higher level of professional skill improvement because of participation in these programs. This conclusion is based on the information that nearly all of the respondents reported a moderate or large improvement of their skills and abilities as a result of the experience.
3. The programs had a positive influence on the graduates' career development and decidedness by helping to clarify their career and educational goals.
4. A concerted effort to integrate writing does have a significant impact on skill development. English 309 was one of the two courses in AgPAQ. AgPAQ respondents reported a statistically greater impact on writing skills.

5. The career decidedness reflected outcomes and purposes of each experiential learning program. This conclusion is based on the findings in which AgPAQ and SWP respondents showed an inverse relationship for the level of education they aspired to achieve. AgPAQ respondents reported they would continue to take professional development courses/workshops/seminars required by their profession. SWP respondents, however, aspired to receive a professional degree (i.e., Ph.D., DVM, MD, JD, etc.). These responses correlate to each of the individual program's career and educational goals and objectives.
6. Experiential learning programs like AgPAQ and SWP programs were able to enhance the participants' career/graduate school preparation because participants reported that the programs helped the transition from undergraduate student to employee/graduate student.
7. Based on experiential learning literature and the respondents' statements regarding experiential learning programs, respondents appear to recommend experiential learning programs. Respondents indicated this by the statements they shared and the overwhelming recommendation of the programs to others.
8. There is value in experiential learning-based principles in programs in Iowa State University's College of Agriculture and Life Sciences. The responses given by the respondents pointed out that the design of these programs have been focused on content that enables students to learn real-world, hands-on skills and abilities.

Implications and Educational Significance

Implications of this study can be drawn from relating experiential learning to higher education. For example, experiential learning opportunities take place at Iowa State

University in the College of Agriculture and Life Sciences through academic programming like the AgPAQ and SWP programs. Students have an opportunity to enhance student learning by using real-world life skills that will transfer into their future careers and educational achievements. Students who participate in one of these experiential learning courses are able to feel more comfortable and self-confident once they enter the workplace/graduate school.

Coordinators of AgPAQ and SWP can benefit from the findings of this study by knowing which skills and abilities have an impact on their participants, and which skills and abilities could use some additional focus to increase in the enhancement of those skills and abilities. The coordinators can also align the purpose and outcomes of the curriculum around the type of students they have entering their programs. The AgPAQ program could align its curriculum with students who have their goals set on entering the workforce directly after their undergraduate degree, whereas SWP could align its curriculum with students who have their goals set on pursuing higher educational degrees, such as a Masters or Ph.D. after their undergraduate degree, keeping in mind that it's the process and principles associated with experiential learning that make the programs effective.

Additionally, educators at the higher education level should consider continuing their educational foci on experiential learning. Educators can use the findings and the literature reviewed in this study to better understand the benefits in using experiential learning in their programs and curriculum. Educators and faculty can provide experiential learning for their students by following the eight principles of good practice for all experiential learning activities recommended by the National Society for Experiential Education (NSEE, 2011). The eight steps suggested by the NSEE to follow are: (a) intention, (b) preparedness and

planning, (c) authenticity, (d) reflection, (e) orientation and training, (f) monitoring and continuous improvement, (g) assessment and evolution, and (h) acknowledgment (NSEE, 2011).

There is a lot of potential for student achievement when educators use the principles of experiential learning. AgPAQ and SWP are examples of two programs that have tried to incorporate these principles into their programs. The findings of this study would suggest that utilization of these principles in practice show a positive impact.

Recommendations

The following recommendations were made based on the findings of this study:

1. Iowa State University College of Agriculture and Life Sciences should continue the AgPAQ and SWP programs based on the positive impact expressed by respondents of this study.
2. Faculty teaching college-level courses should try to implement more experiential learning activities into their daily course work to increase students' ability to learn hands-on skills that they may be able to use in their future careers/academic advancements.
3. Since many of the respondents indicated that they would recommend this experience to others, other institutions besides Iowa State University should consider implementing programs similar to Iowa State University's AgPAQ and SWP programs. Not only do these programs meet student learning outcomes, but respondents value the experience because it connects academics to the real-world.

Further Research

The following recommendations for further research are offered based on the findings of this study:

1. Students enrolled in AgPAQ and SWP at Iowa State University should be given a pre-survey asking their perceptions of the program and what they hope to gain from their experience. After completing the course, the students should complete a post-survey inquiring if they felt their perceptions were correct and if they gained the experience that they expected.
2. A similar survey should be conducted in all of the colleges at Iowa State University, as well as other colleges and universities. This could help to validate the findings of this study and might possibly determine universal experiential learning program guidelines. Furthermore, this would bring about the identification of different issues and needs related to undergraduate experiences regarding the development of skills and abilities that need to be addressed.
3. In a future study, researchers should explore whether or not a difference would occur in participants of AgPAQ and SWP because students are traditional or non-traditional students. This could determine if the programs had different impacts on different age groups.
4. A deeper inquiry of these programs should be conducted to further understand the impact of the programs. Qualitative research methods should be considered.
5. It is recommended that if further research is done with the AgPAQ and SWP population, there should be contacts made in a variety of ways such as phone, internet, and mail to improve response rate and yield richer data.

6. This study should be repeated in 5 to 10 years with the same graduates, as well as those who will be graduating in the next 5 to 10 years, to see if, as the programs evolve and change, the students' perceptions of the programs evolve and change.

PART B: MEDICAL HEALTH INFORMATION OR RECORDS

- 10) Yes No Does your project require the use of a health care provider's records concerning past, present, or future physical, dental, or mental health information about a subject? The Health Insurance Portability and Accountability Act established the conditions under which protected health information may be used or disclosed for research purposes. If your project will involve the use of any past or present clinical information about someone, or if you will add clinical information to someone's treatment record (electronic or paper) during the study, you must complete and submit the Application for Use of Protected Health Information.

PART C: ANTICIPATED ENROLLMENT

Estimated number of participants to be enrolled in the study Total: 208 Males: 141 Females: 67	
Check if any enrolled participants are:	Check below if this project involves either:
<input type="checkbox"/> Minors (Under 18)	<input checked="" type="checkbox"/> Adults, non-students
Age Range of Minors:	<input type="checkbox"/> Minor ISU students
<input type="checkbox"/> Pregnant Women/Fetuses	<input type="checkbox"/> ISU students 18 and older
<input type="checkbox"/> Cognitively Impaired	<input type="checkbox"/> Other (explain)
<input type="checkbox"/> Prisoners	
List estimated percent of the anticipated enrollment that will be minorities if known:	
American Indian:	Alaskan Native:
Asian or Pacific Islander:	Black or African American:
Latino or Hispanic:	

PART D: PARTICIPANT SELECTION

Please use additional space as necessary to adequately answer each question.

11. Explain the procedures and rationale for selecting participants, including the inclusion and exclusion criteria (e.g., where will names come from, what persons will be included or excluded and why, etc.).

Participants will consist of Iowa State University's College of Agriculture and Life Sciences graduates who have participated in one of the three semester long experiential learning programs, specifically AgPAQ, Agron 356/Engl 309 and Science With Practice. AgPAQ and Agron 356/Engl 309 are upper-level, course based learning community programs administered through CALS. Science With Practice is a college-wide experiential learning program that combines academic and work experience components. The list of participants is provided by the researchers (Retallick and Polito) as they serve as the faculty of record for the programs. The contact information (email addresses) will be obtained from the Iowa State University Foundation.

12. Describe the procedures for contacting participants (e.g., letter, email, flyer, advertisements, phone call, etc.). Attach copies of any letters, scripts, flyers, or advertisements that will be used. Recruitment materials should include a statement of the voluntary and confidential nature of the research.

This study is a survey research project and will utilize a web-based questionnaire. Only participant's email will be obtained from the ISU Foundation. Participants will only be contacted by email using the Tailor Designed Method (Dillman, 2007).

PART E: RESEARCH PLAN

Include sufficient detail for IRB review of this project independent of the grant, protocol, or other documents.

13. The information needed here is similar to that in the "methods" or "procedures" sections of a research proposal—it should describe the flow of events that will occur during your interactions with subjects. Please describe in detail your plans for collecting data from participants, including all procedures, tasks, or interventions participants will be asked to complete during the research (e.g., random assignment, any conditions or treatment groups into which participants will be divided, mail survey or interview procedures, sensors to be worn, amount of blood drawn, etc.). This information is intended to inform the committee of the procedures used in the study and their potential risk. Please do not respond with "see attached" or "not applicable."

The list of participant's names will be provided by the program coordinators. Only those who have graduated will be asked to participate. Their email addresses will be obtained from the ISU Foundation.

Dillman's (2007) Tailor-designed survey research methods will be utilized. Participants will be contacted by email five times as recommended by Dillman.

The contacts are as follows (over a 14 day period):

The first will be a pre notice email, informing the participants of the study and informing them of confidentiality. It will also state that a questionnaire will soon be arriving in their email.

The second contact will be a detailed notification letter via email including a link to the online questionnaire and will be sent approximately 3 days after the pre-notice.

The third contact will be a brief reminder email that will be sent to non-respondents approximately 7 days after the second contact is sent and will include a link to the questionnaire.

The fourth contact will a final reminder the will be sent via email out approximately 10 days after the pre-notice letter. This will be sent out to non-respondents and will have a link to the questionnaire.

A fifth contact will be utilized as a special contact, depending on the rate of response, to the non-respondents. This will be sent out approximately 14 days after the pre-notice.

The participants and the researchers will never have any face to face interactions.

14. For studies involving pathology/diagnostic specimens, indicate whether specimens will be collected prospectively and/or already exist "on the shelf" at the time of submission of this review form. If prospective, describe specimen procurement procedures; indicate whether any additional medical information about the subject is being gathered, and whether specimens are linked at any time by code number to the participant's identity. If this question is not applicable, please type N/A in the response cell.

n/a

15. For studies involving deception or where information is intentionally withheld from participants, such as the full purpose of the study, please explain how persons will be deceived or what information will be withheld. Additionally, a waiver of the applicable elements of consent will be needed. Please complete the "Waiver of Elements of Consent" form (available at the IRB website). If this question is not applicable, please type N/A in the response cell.

n/a

PART F: CONSENT PROCESS

A copy of any translated informed consent documents and an English version should be submitted with the application. Provide the name of the individual who translated the consent documents, their qualifications for translating documents, and in particular informed consent documents, below.

If the consent process does not include documented consent, a waiver of documentation of consent must be requested. If any information about the study is intentionally withheld or misleading (i.e., deception is used), a waiver of the elements of consent must be requested. Forms for requesting waivers are available at the IRB website.

16. Describe the consent process for adult participants (those who are age 18 and older).

Participants will receive an informational letter by e-mail. This letter will include all of the elements of consent. Participation is voluntary and consent will be assumed if the subject responds to the questionnaire.

17. If your study involves minor children, please explain how parental consent will be obtained prior to enrollment of the minor(s).

n/a

18. Please explain how assent will be obtained from minors (younger than 18 years of age), prior to their enrollment. Also, please explain if the assent process will be documented (e.g., a *simplified version of the consent form, combined with the parental informed consent document*). According to the federal regulations assent "...means a child's

affirmative agreement to participate in research. Mere failure to object should not, absent affirmative agreement, be construed as assent.”

n/a

PART G: DATA ANALYSIS

19. Describe how the data will be analyzed (*e.g. statistical methodology, statistical evaluation, statistical measures used to evaluate results*).

The questionnaire will consist of scale questions that will be used in descriptive analysis procedures. The means, medians, and modes for each question will be recorded and the standard deviations will be calculated. The open-ended questions will not be analyzed statistically. To meet the objective, “Compare impact of the two programs,” mean responses of the groups will be compared. An alpha level of .05 will be used, which was decided “a priori.” The statistical information will be recorded, calculated and analyzed using Excel and SPSS.

PART H: RISKS

The concept of risk goes beyond physical risk and includes risks to participants' dignity and self-respect as well as psychological, emotional, legal, social or financial risk.

20. Yes No Is the **probability** of the harm or discomfort anticipated in the proposed research greater than that encountered ordinarily in daily life or during the performance of routine physical or psychological examinations or tests?
21. Yes No Is the **magnitude** of the harm or discomfort greater than that encountered ordinarily in daily life, or during the performance of routine physical or psychological examinations or tests?
22. Describe any risks or discomforts to the participants and how they will be minimized and precautions taken. Do **not** respond with N/A. If you believe that there will not be risk or discomfort to participants, you must explain why.

Participants will not have any risk or discomfort through participation in this study. Participants will only be providing information regarding their experience participating in one of the college's experiential learning programs.

23. If this study involves vulnerable populations, including minors, pregnant women, prisoners, the cognitively impaired, or those educationally or economically disadvantaged, what additional protections will be provided to minimize risks?

n/a

PART I: COMPENSATION

24. Yes No Will participants receive compensation for their participation? If yes, please explain.

Do not make the payment an inducement, only a compensation for expenses and inconvenience. If a person is to receive money or another token of appreciation for their participation, explain when it will be given and any conditions of full or partial payment. (E.g., volunteers will receive \$5.00 for each of the five visits in the study or a total of \$25.00 if he/she completes the study. If a participant withdraws from participation, they will receive \$5.00 for

each of the visits completed.) It is considered undue influence to make completion of the study the basis for compensation.

n/a

PART J: CONFIDENTIALITY

25. Describe below the methods that will be used to ensure the confidentiality of data obtained. (For example, who has access to the data, where the data will be stored, security measures for web-based surveys and computer storage, how long data or specimens will be retained, anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased, etc.)

SurveyMonkey.com will automatically record respondent's email addresses. This feature will be used to facilitate the follow-up of non-respondents. Only non-respondents will be notified after the first two contacts. Participant's emails and responses will not be connected at any point. The responses will be confidential.

PART K: REGISTRY PROJECTS

26. To be considered a registry: (1) the individuals must have a common condition or demonstrate common responses to questions; (2) the individuals in the registry might be contacted in the future; and (3) the names/data of the individuals in the registry might be used by investigators other than the one maintaining the registry.

Yes No Does this project establish a registry?

If "yes," please provide the registry name below.

n/a

Checklist for Attachments

Listed below are the types of documents that should be submitted for IRB review. Please check and attach the documents that are applicable for your study:

- A copy of the informed consent document **OR** Letter of introduction containing the elements of consent
- A copy of the assent form if minors will be enrolled
- Letter of approval from cooperating organizations or institutions allowing you to conduct research at their facility
- Data-gathering instruments (including surveys)
- Recruitment fliers, phone scripts, or any other documents or materials participants will see or hear

The original signed copy of the application form and one set of accompanying materials should be submitted for review. **Federal regulations require that one copy of the grant application or proposal be submitted for comparison with the application for approval.**

FOR IRB USE ONLY:

Action by the Institutional Review Board (IRB):

- Project approved. Date: _____
- Project is exempt. Date: 6/8/10
- Project not approved. Date: _____
- IRB approval is not required. Date: _____
 - Project is not research according to the federal definition.
 - Project does not include human subjects as defined by the federal regulations.

Kerry A Agnitsch
IRB Approval Signature

June 8, 2010
Date

AGPAC, AGRON 356/ENGL 309, SWP

[Exit this survey](#)

The purpose of this study is to explore the impact of your participation in one of the college's integrated, experiential learning programs. You are being asked to participate because you have completed one of the following programs: AgPAQ, Agron 356/Engl 309, or Science With Practice.

1. In which program did you participate?

AgPAQ

Agron 356/Engl 309

Science With Practice

2. What did you do after graduation?

Entered the workforce

Entered graduate school

Returned to family business/farm

Entered the military

Other (please specify)

Next

AGPAC, AGRON 356/ENGL 309, SWP

[Exit this survey](#)

Please complete this questionnaire based on your experience in the specific program (AgPAQ, Agron 356/Engl 309, or SWP).

3. Because of my AgPAQ, Agron 356/Engl 309, or SWP experience, I am better able to...

Strongly disagree	Disagree	Neither disagree or agree	Agree	Strongly agree
----------------------	----------	---------------------------------	-------	-------------------

- Analyze and solve problems
- Think independently and formulate my own ideas
- Communicate more effectively and professionally with clients/mentors
- Communicate more effectively and professionally with co-workers
- Integrate and synthesize knowledge from multiple disciplines
- Understand discipline specific principles at the beginning of my career (or graduate program) to the point that I was better able to understand and solve the problems I faced then

4. Select the statement that best describes the impact the experience has had on your career.

- It had no impact on my career/advanced education or my ability to fulfill my responsibilities.
- It had significant impact early in my career/advanced education but has diminished as I gain more experience.
- It has had a significant impact throughout my career, thus far.

5. Please explain why you responded as you did to the previous question.

6. Based upon what you know now, to what extent did your skills and abilities improve as a result of your experience:

No Small Moderate Large Very large Not

	Improvement / very small Improvement	Improvement	Improvement	Improvement	Improvement	Improvement	applicable / prefer not to answer
Communication							
Time management							
Responsibility							
Organization							
Self-confidence							
Listening skills							
Research skills							
Technical skills							
Writing skills							
Other							
Other (please specify)							
<input type="text"/>							

[Prev](#) [Next](#)

AGPAC, AGRON 356/ENGL 309, SWP

[Exit this survey](#)

7. To what extent did your experience in AgPAQ, Agron 356/Engl 309, or SWP influence your view of the workplace or graduate school in the following areas?

	None / very little extent	Small extent	Moderate extent	Large extent	Very large extent	Not applicable / prefer not to answer
Helped me clarify career/educational goals						
Better prepared me for workplace/graduate school						
Helped me transition to workplace/graduate school						
Better able to solve problems that I faced as a new employee/graduate student						
Influenced my career/educational advancement						

8. Please share a specific example of how your experience impacted, if at all, your transition to the workplace/graduate school and how this specific experience impacted your career/education advancement.

9. The AgPAQ, Agron 356/Engl 309, or SWP experience made an impact on me by...

	Strongly disagree	Disagree	Neither disagree or agree	Agree	Strongly agree
Assisting me in the transition from an undergraduate student to employee/graduate student					
Influencing my career plans for after my bachelor's degree					

	Strongly disagree	Disagree	Neither disagree or agree	Agree	Strongly agree
Influencing my plan for postgraduate education (either right after graduation or in the future)					
Helping me become a more active learner					
Helping me become a more motivated learner					

10. To what extent did the mentoring portion of your experience benefit you in your career?

None / very little extent

Small extent

Moderate extent

Large extent

Very large extent

Not applicable / prefer not to answer

11. Please share any suggestions you have for improving the mentoring interaction.

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AGPAC, AGRON 356/ENGL 309, SWP

[Exit this survey](#)

12. Since completing your undergraduate degree, have you taken any graduate level courses?

No

Yes (what field)

13. Would you recommend this experience to others?

Yes

No (please explain)

14. What advice would you share with others who might consider participating in the AgPAQ, Agron 356/Engl 309, or SWP?

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AGPAC, AGRON 356/ENGL 309, SWP

[Exit this survey](#)

Demographics

15. Academic Major

Select your major

16. Year of graduation

Select your year of graduation

17. If you entered the workforce, is your position related to your field of study?

Yes

No

18. If you entered the workforce, what was the job title of your first position?

19. If you entered the work force, what is your current position?

20. What is the highest level of education do you aspire to complete? (check one)

Professional development courses/workshops/seminars required of my position/employer

Professional certification (i.e. CCA, CPAg, etc)

Master's degree focused on professional development

Master's degree focused on science/research

Professional degree (i.e. Ph.D., DVM, MD, JD, etc)

Other (please specify)

[Prev](#)

[Done](#)

Contact 1 – Pre-notification

April 22, 2010

Dear ISU CALS Graduate,

In a few days you will be receiving a web-based questionnaire regarding your participation in AgPAQ, Agron 356/Engl 309, or Science With Practice. Drs. Tom Polito and Michael S. Retallick are studying the impacts of these three college-level programs on your transition to either the workplace or graduate school. You are being contacted as an alum of Iowa State University's College of Agriculture and Life Sciences because records indicate that you participated in one of these programs. Your input is valuable.

In the coming days we will be sending you a link to a web-based questionnaire regarding the impact your participation had on your transition from undergraduate student to employee/graduate student. Please consider participating in this study as your input is valuable to the future of these programs and the student who will participate. Your responses to the questionnaire are confidential and will only be reported in summary form.

Please watch for an e-mail in the coming days. If you have any questions or comments, please contact Bridget (e-mail: bdrisco@iastate.edu or phone: (319) 430-8023) or Dr. Retallick (e-mail: msr@iastate.edu or phone: (515) 294-4810).

Thank you in advance.

Bridget Driscoll
Graduate Research Assistant

Dr. Michael Retallick
Assistant Professor

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Contact 2 – First Notification

April 22, 2010

Dear ISU CALS Graduate,

A few days ago you were sent an e-mail message informing you of an upcoming study. We are exploring the impact of your participation in one of three of the Iowa State University's College of Agriculture and Life Science programs: AgPAQ, Agron 356/Engl 309, or Science With Practice.

Please take 10 minutes of your time to answer the questionnaire which is available at <http://www.surveymonkey.com/s/G32SF7Z> . Feedback related to your experience is needed.

Your participation in this study is voluntary and you are welcome to withdraw from this study at any time. You may skip any questions that you do not feel comfortable answering. All responses are confidential and will only be reported in summary form.

If you have questions or comments, please contact Bridget (e-mail: bdrisco@iastate.edu or phone: (319) 430-8023) or Dr. Retallick (e-mail: msr@iastate.edu or phone: (515) 294-4810).

Your participation in this study is greatly appreciated.

Sincerely,

Bridget Driscoll
Graduate Research Assistant

Dr. Michael Retallick
Assistant Professor

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Contact 3

April 22, 2010

Dear ISU CALS Graduate,

Several days ago you were invited to participate in a questionnaire regarding your participation in AgPAQ, Agron 356/Engl 309, or Science With Practice. We are conducting a study exploring the impact of your participation. If you have already completed and submitted the questionnaire, please accept our sincere thank you. Otherwise, please complete the questionnaire and submit it.

The questionnaire can be complete at <http://www.surveymonkey.com/s/G32SF7Z> . Please take 10 minutes to complete the questionnaire.

Your participation in this study is voluntary and you are welcome to withdraw from this study at any time. You may skip any questions that you do not feel comfortable answering. All responses are confidential and will only be reported in summary form.

If you have questions or comments, please contact Bridget (e-mail: bdrisco@iastate.edu or phone: (319) 430-8023) or Dr. Retallick (e-mail: msr@iastate.edu or phone: (515) 294-4810).

Your participation in this study is greatly appreciated.

Sincerely,

Bridget Driscoll
Graduate Research Assistant

Dr. Michael Retallick
Assistant Professor

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Contact 4

April 22, 2010

Dear ISU CALS Graduate,

Last week, you were invited to participate in a study exploring the impact of your participation in one of three of the Iowa State University's College of Agriculture and Life Sciences program: AgPAQ, Agron 356/Engl 309, or Science With Practice. Our records indicate that you have not yet completed the questionnaire. If you have, please accept our sincere thank you. Otherwise, please complete and submit the questionnaire. Your participation is very crucial to this study.

The questionnaire can be complete at <http://www.surveymonkey.com/s/G32SF7Z> . Please take 10 minutes to complete the questionnaire.

Your participation in this study is voluntary and you are welcome to withdraw from this study at any time. You may skip any questions that you do not feel comfortable answering. All responses are confidential and will only be reported in summary form.

If you have questions or comments, please contact Bridget (e-mail: bdrisco@iastate.edu or phone: (319) 430-8023) or Dr. Retallick (e-mail: msr@iastate.edu or phone: (515) 294-4810).

Your participation in this study is greatly appreciated.

Sincerely,

Bridget Driscoll
Graduate Research Assistant

Dr. Michael Retallick
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If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Contact 5

April 22, 2010

Dear ISU CALS Graduate,

This is our final attempt to contact you. We have sent several e-mail messages inviting you to participate in a study exploring the impact of you participation in one of three of the Iowa State University's College of Agriculture and Life Sciences programs: AgPAQ, Agron 356/Engl 309, or Science With Practice. Our records indicate that you have not yet completed the questionnaire. If you have, please accept our sincere thank you. Otherwise, please complete and submit the questionnaire. Your participation is very crucial to this study.

The questionnaire can be complete at <http://www.surveymonkey.com/s/G32SF7Z> . Please take 10 minutes to complete the questionnaire.

Your participation in this study is voluntary and you are welcome to withdraw from this study at any time. You may skip any questions that you do not feel comfortable answering. All responses are confidential and will only be reported in summary form.

If you have questions or comments, please contact Bridget (e-mail: bdrisco@iastate.edu or phone: (319) 430-8023) or Dr. Retallick (e-mail: msr@iastate.edu or phone: (515) 294-4810).

Your participation in this study is greatly appreciated.

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I am also appreciative of my committee members, Drs. Robert Martin and Steven Mickelson, for the continuous feedback they provided me throughout this process. The thoughts, suggestions, and ideas given to me by these individuals vastly added value to this research study.

I sincerely want to thank my family, friends, fellow graduate students and other loved ones for believing in me and supporting me in my educational decisions. I will forever be indebted to all of you for your nonstop motivation and inspiration throughout this study. The love, patience, and support of this group during good times and in difficult times made all the difference.